TREE MANAGEMENT PLAN

Safety and Environmental Services

April 2014

Endeavour Energy

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1.0 INTRODUCTION

In 2004, Endeavour Energy became the first energy company to endorse the Energy Supply Association of Australia Code of Sustainable Practice. In translating the Code into practice, we recognise the need to achieve a balance between our obligations as a service provider and the values of the community and surrounding environment.

This balance is a key element in our approach to managing vegetation near our network assets. This plan defines how Endeavour Energy manages vegetation and the issues that are considered in our approach.

1.1 COMPANY PROFILE

Endeavour Energy is a state-owned corporation that is responsible for the safe and reliable supply of electricity to 2.1 million people in households and businesses across Sydney's Greater West, Blue Mountains, Southern Highlands and the Illawarra (Figure 1). The Endeavour Energy network is made up of over 170 major substations, 315,000 power poles and 28,000 smaller substations bound together by 33,000 kilometres of underground and overground cables.

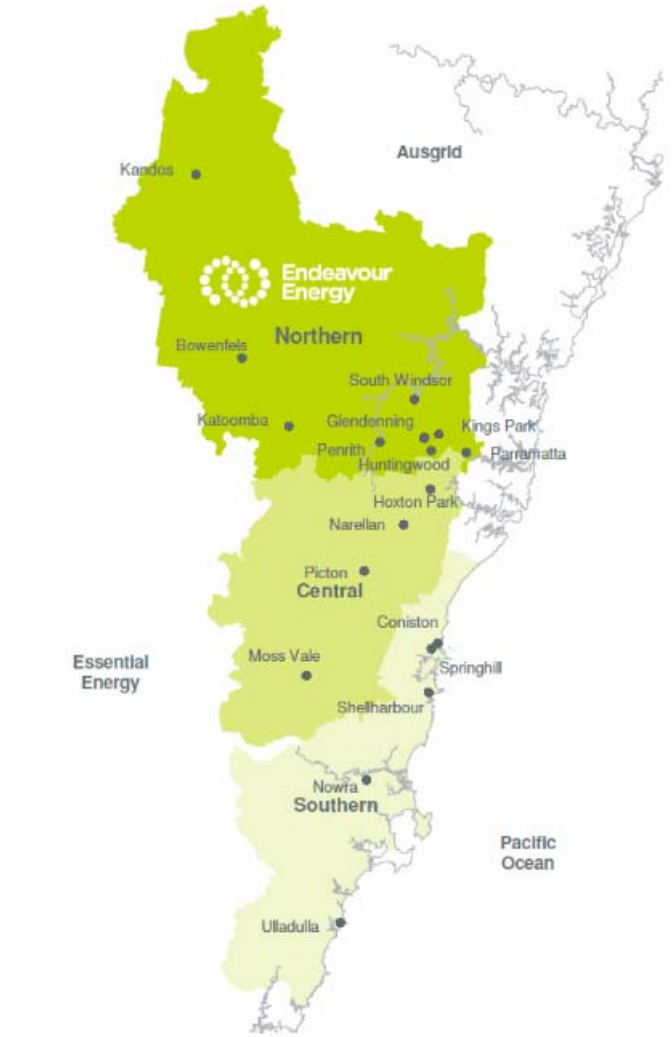

Figure 1 Endeavour Energy network area

We are incorporated under the *Energy Services Corporation Act 1995* and conduct our business within the terms of the *Electricity Supply Act 1995* on behalf of our shareholder, the NSW Government.

1.2 OVERVIEW OF THIS PLAN

This Tree Management Plan defines our approach to managing vegetation near our network assets and associated infrastructure.

This plan provides an overview of our responsibilities, tree pruning techniques, defines our policy on tree removal, and provides guidance on planting near network assets.

1.3 FEEDBACK AND REVIEW

Feedback on this plan can be provided at any time and will be considered during periodic reviews. Written submissions should be addressed to:

Environmental Business Partner Team Leader
Endeavour Energy
PO Box 811, Seven Hills NSW 1730

Telephone: 131 081

2.0 FACTORS INFLUENCING VEGETATION MANAGEMENT

Endeavour Energy has a statutory obligation to maintain our electrical assets in a safe and reliable manner. Balancing this obligation with our commitment to sustainability remains an ongoing challenge that we are working to achieve. Our approach to managing vegetation reflects the Industry Safety Steering Committee Guidelines[1] and works toward meeting community expectations and respecting the environmental values of the streetscape and rural environment.

Many factors influence the development of our vegetation management standards. Appropriate consideration of such factors, as defined below, is conducted prior to identifying the preferred vegetation management option.

2.1 SAFETY

Due to the inherent risks of live electricity, safety must always be the first priority when considering the clearance between trees and overhead powerlines. To keep the community safe, a safety clearance around powerlines needs to be established and maintained. If branches are within the required safety clearance, they are pruned back to the nearest growth point or branch collar to protect the health of the tree and prevent poorly attached regrowth that would create future safety hazards.

The minimum accepted distance between vegetation and overhead lines, designed to accommodate both safety clearances and regrowth, has been defined by the Industry Safety Steering Committee Guidelines. Our standards have incorporated the requirements of the guidelines as defined in Table 1. The minimum trimming clearance is strongly influenced by the voltage of the overhead cables with higher voltages requiring increased clearances. Other considerations include the type of overhead cable and the distance between poles or towers (span length).

1 Industry Safety Steering Committee (ISSC 3) Guidelines for Managing Vegetation Near Powerlines, December 2005.

Table 1 Minimum trimming clearances (metres)

Voltage of Overhead Line	Type of Overhead Line	Spans up to 50 metres	Spans 50 to 100 metres	Spans 100 to 200 metres	Spans 200 to 300 metres
Up to and including 1,000 volts	Bare low voltage and bare street light wires	2.0	2.0	3.5	5.0
	Low voltage ABC	0.5	0.5	1.0	N/A
	XLPE and PVC covered street light wires and service lines	0.5	0.5	N/A	N/A
1,000 volts up to and including 22,000 volts	Bare overhead lines	3.0	3.5	4.5	6.0
	High voltage ABC	0.5	0.5	1.0	N/A
	CCT in urban areas	0.5	0.5	1.0	N/A
	CCT in non urban areas	1.0	2.0	2.5	N/A
33,000 volts up to and including 66,000 volts	Bare overhead lines	3.0	4.0	5.0	7.0
132,000 volts	Bare overhead lines	4.0	5.0	6.0	7.5

Notes:
ABC – Aerial Bundled Cable; XLPE – Crosslinked Polyethylene; PVC – polyvinyl chloride; CCT – Covered Conductor Thick

2.2 NETWORK RELIABILITY

Enhancing the reliability of our network and meeting customer expectations by keeping the lights on remains a priority. A significant proportion of electricity blackouts during storms are caused by trees that have damaged power lines. Further, foliage and dislodged branches can cause wires to fall down, resulting in a safety hazard.

2.3 BUSHFIRE PREVENTION

Bushfires are one of the potential hazards affecting large areas of the Endeavour Energy network. In areas prone to bushfire, maintaining safe clearances to prevent the ignition of bushfires from electricity lines remains a priority. Recognising the hazard of bushfires, Endeavour Energy aims to ensure that vegetation is kept at a safe distance from electrical infrastructure in declared bushfire prone areas. In accordance with the Industry Safety Steering Committee Guidelines, the clearance distances provided in Table 1, except low voltage insulated service lines, are increased by 0.5 metres in bushfire prone areas. In non-urban bushfire prone areas, this requirement may be increased, subject to the environmental assessment process, to include the trimming of all vegetation above conductors.

Although Endeavour Energy does not routinely manage fuel loads in the vicinity of electrical assets, this may be considered for strategic assets located in declared bushfire prone areas.

2.4 STREETSCAPE AMENITY

The contribution of trees to the visual amenity of the streetscape is recognised and considered in our approach to vegetation management. A number of options are available for managing vegetation in proximity to electrical assets, particularly in urban areas. Where the maintenance of safety clearance distances is considered to have a significant impact on visual amenity, the feasibility of alternatives will be evaluated.

2.5 ACCESS TO NETWORK ASSETS

Vegetation can hinder access to network assets. Maintaining access to network assets is vital to ensuring a reliable electricity supply. Endeavour Energy actively maintains access tracks to enable vehicles and crews to inspect and maintain the electricity network.

3.0 VEGETATION MANGEMENT OPTIONS

Following consideration of the factors addressed in Section 2, a number of options are considered by Endeavour Energy for managing vegetation in proximity to electrical assets. These options are discussed in detail below.

3.1 PRUNING

In respect to electrical assets, tree pruning may be defined as the selective removal of branches to enable safety clearance distances to be maintained.

Pruning techniques, as defined in Endeavour Energy's standards, reflect the *Australian Standard AS 4373 Pruning of Amenity Trees*.

Prior to selecting an appropriate pruning technique, the tree growth habit is assessed together with the impact of previous pruning works. Typically, the selected pruning method is influenced by the extent of previous pruning practices and tree species. When pruning is undertaken in young trees, pruning techniques will result in a modified growth habit, thereby avoiding overhead powerlines.
In the past, many trees situated under overhead powerlines have been pruned by removing branches to the desired clearance rather than pruning to the growth point. This practice can result in the growth of large quantities of weakly attached branches, affecting both tree health and public safety. This practice is no longer employed.

It should be noted that each branch is pruned to achieve the minimum safety clearance together with an allowance for regrowth. Once this has been achieved, branches are pruned to the nearest collar or growth point to protect the tree from infection or detrimental growth patterns.

Trees are generally pruned on a cycle of one to three years, depending on the rate of regrowth, bushfire risk and local conditions and characteristics. Pruning trees can also occur on a more frequent basis allowing for reduced trimming to accommodate regrowth. Such a cycle is typically only applied for heritage or locally significant listed trees where standard clearances are likely to impact on the aesthetic values of the tree.

3.2 GROUNDLINE CLEARING, SLASHING OR TRITTERING

This method has been historically used on a number of rural lines and road verges to prevent vegetation from growing into safety clearances. It should be noted that for groundline clearing, slashing and trittering works in areas not recently subject to this management option, an environmental assessment process defined in the *Environmental Planning and Assessment Act 1979* is followed. Stakeholder engagement occurs during this process in order to achieve balanced outcomes.

3.3 TREE REMOVAL

The removal of trees growing in proximity to power lines will only be considered where alternative methods, as defined in this section of the plan, are not feasible. In these cases, tree removal works are subject to the environmental assessment process (with the exception of emergency works and hazardous trees) and shall only be undertaken following stakeholder consultation. The following cases may result in the removal of a tree:

- The tree is considered to be a serious risk to the safety of employees, the public or property; and/or
- The health of the tree or its location is such that it presents an immediate risk to network assets; and/or
- Pruning techniques are likely to result in substantial damage to the tree.

3.4 TECHNICAL OPTIONS

In managing our assets sustainably, there is recognition that safety clearance distances between trees and overhead cables may be achieved through a number of measures of which tree pruning is just one. Where tree pruning activities will have a detrimental impact on tree health or is considered inappropriate for a particular location, technical alternatives may be considered.

For existing assets, the primary technical option used to reduce tree trimming is the installation of aerial bundled cable (ABC). The replacement of bare low voltage conductors with this insulated cable allows safety clearance distances to be reduced from 1.0 metre to 0.5 metre. Although the cable is significantly thicker than open wires, many tree species will grow around the cable and provide an effective screen. As such, ABC is typically installed in areas where dense stands of trees will screen the cable.

Where existing low voltage overhead cables must be replaced or augmented, our policy is to replace the cable with ABC. High voltage cables in areas with large established trees are replaced with ABC or Covered Conductor Thick (CCT). Both types of insulted cable provide better reliability outcomes for customers as they are less susceptible to interruptions from wind-blown branches when compared to bare conductors. In addition, as described above, tree trimming safety clearances are reduced where insulated cables are used.

4.0 OUR ENVIRONMENT AND COMMUNITY

Irrespective of the vegetation management option used, Endeavour Energy has a number of responsibilities to our environment and the wider community. This section details the key issues that are reflected in our approach.

4.1 ENVIRONMENTAL DUE DILIGENCE

Endeavour Energy's commitment to environmental performance is communicated through our Environment Policy and implemented through an Environmental Management System. Developed in accordance with the international standard ISO14001, the Environmental Management System consists of formal, documented processes for identifying and responding to environmental risks.

In respect to vegetation management, the environmental risks have been considered and reflected in relevant standards and procedures. Employees and contractors conducting tree pruning works undertake training to ensure ongoing compliance with the requirements of our procedures.

This section provides a summary of the key environmental issues associated with vegetation management together with our approach to managing these issues.

Heritage Sites

Tree pruning or tree removal works have the potential to impact on natural and cultural heritage features including aboriginal sites, non-aboriginal historic structures and relics, memorial gardens, parks, and protected or heritage listed trees.

The environmental assessment process, as defined through the *Environmental Planning and Assessment Act 1979*, forms the basis for identifying and evaluating environment risks prior to tree removal or excavation works. In the event that aboriginal or non-aboriginal objects or places are identified, works will immediately cease. The event will be reported to the Office of Environment and Heritage or the Heritage Council for appropriate action.

Potential impacts to significant, memorial or heritage trees are evaluated prior to undertaking pruning works. In some cases, alternative pruning cycles or technical options may be considered where practicable. Endeavour Energy collaborates with local councils to facilitate the identification and management of significant trees.

Threatened Species

Vegetation classified as threatened or endangered under relevant legislation may grow within easements or near powerlines. In some cases, previous clearing undertaken within powerline corridors has created ideal growing conditions for threatened or endangered floral species. Additionally, certain vegetation may comprise habitat for threatened or endangered fauna.

Where such species or communities are known to exist, vegetation management activities will be modified to minimise potential damage on threatened species. This may include alternative pruning cycles, the provision of specialist assistance or variations in the vegetation management options.

Erosion and Sediment Control

Where trees must be removed or replaced in accordance with the requirements of this plan, works will be undertaken to minimise erosion and sedimentation. Primary measures will focus on preventing erosion through the retention of root structures and minimising disturbance to low growing species and ground covers. Where soil is exposed and there is the potential for erosion, appropriate controls will be established and maintained including brush-matting with locally available seed bearing vegetation.

Waste Management

Green waste generated as part of tree pruning works in urban areas is recycled. Within rural areas, it may be appropriate to allow debris to naturally decompose where safety is not compromised and the property owner has approved the practice. Where debris contains noxious weeds, off-site recycling is undertaken to prevent the spread of weeds.

Pesticides
As part of Endeavour Energy's maintenance programs, various pesticides are applied to protect assets and maintain public safety. Pesticides used for vegetation control are restricted to cut stump and spot spray methods following the specimen label and Material Safety Data Sheet.

The application of pesticides in public open spaces is governed by our Pesticide Use Notification Plan. This plan was developed in accordance with the requirements of the *Pesticides Regulation 2009* and defines how we will inform the community of the use of pesticides in public open spaces. Copies of the Plan are available from the Endeavour Energy website at www.endeavourenergy.com.au.

Our pest management program reflects best practice to minimise adverse impacts to the surrounding community and environment. All personnel who are engaged in using pesticides receive appropriate competency-based training.

4.2 OUR COMMUNITY

The inherent safety risks associated with vegetation near powerlines are such that Endeavour Energy must ensure that appropriate clearance distances are maintained. Recognising this risk, we are committed to developing appropriate public education initiatives to encourage the selection of appropriate species of trees for planting under or near powerlines.

Where Endeavour Energy undertakes pruning works, employees or contractors shall possess appropriate qualifications and authorisations. Given the hazards associated with pruning vegetation in proximity to powerlines, qualifications are clearly defined and monitored.

Prior to undertaking pruning works, we will notify landowners and occupiers of the type of works to be undertaken and the proposed timing. It should be noted that pruning works are subject to weather conditions and may be delayed to ensure the safety of employees and contractors.

Vegetation growing near private lines or service lines is the responsibility of the respective landowner or occupier. In these cases, Endeavour Energy will monitor vegetation growth and advise property owners or occupiers when safety clearances have been compromised. Alternatively, where safety clearances have not been maintained by the property owner or occupier, the *Electricity Supply Act 1995* enables Endeavour Energy to undertake the pruning works at the cost of the property owner.

Pruning vegetation in proximity to power lines or network assets is extremely hazardous and should never be undertaken by an unqualified landowner or occupier. Vegetation growing within three metres of the electricity network must be pruned by qualified and authorised vegetation management contractors. Care must be taken to ensure both tree trimming equipment and vegetation remains outside the three metre safety clearance distance.

Alternatively, if tree trimming is not a desirable option, landowners may opt to engage the services of an accredited service provider to relocate the point of attachment of the service line away from vegetation. The name of an accredited service provider (ASP) who works in your area may be obtained by contacting the Department of Trade and Investment.

Further information on trimming safely is available on our website www.endeavourenergy.com.au

5.0 PLANTING GUIDELINES

Large trees planted underneath powerlines pose significant challenges for Endeavour Energy, particularly when the trees are not amendable to pruning. Whilst pruning avoids the need to remove trees, Endeavour Energy's residual challenge from continued maintenance of large planted trees is to balance the social, environmental and economic costs with our stakeholders. As such, consideration must be given to the suitability of trees before planting in close proximity to powerlines. Trees should be planted at the same distance from the powerline as their potential height. In rural and bushfire prone areas, the ground immediately beneath powerlines should be free of any combustible materials.

5.1 WHAT TO CONSIDER BEFORE PLANTING NEAR POWER LINES

- Consider how tall, wide and deep a plant will grow and how it will impact on overhead or underground services such as power lines, service pillars or other electricity infrastructure. Ensure the mature plant will not damage buildings, fences or foundations, or interfere with motorists' vision.

- Throughout its life, vegetation should never overhang, touch or be able to fall on electrical infrastructure including substations, power lines, or service lines to private property.

- Whilst it is not advisable to plant trees directly under overhead powerlines, if you do, remember that the safety clearance distances detailed in Table 1 must be maintained between the lowest wire and the top of the mature plant. Only trees that have a growth potential less than 3 metres in height will reduce the impact of pruning in future years. Taller species such as eucalyptus, palms or camphor laurels, should therefore, never be planted in close proximity to power lines.

- Aim to plant trees at a greater distance from power lines than their potential height. As an example, a tree with a mature height of 10 metres should be planted 10 metres from the nearest powerline.

- Gain council approval prior to planting any trees, shrubs or plants on the nature strip.

5.2 WHAT TO PLANT

Due to the varied climatic and growing conditions that are experienced across Endeavour Energy's network area, it is very difficult to recommend species that would be suitable for planting near powerlines in all situations. Species should be selected on the basis of their low mature height, aesthetic qualities, drought tolerance, frost resistance, amenability to pruning and general suitability to the growing conditions experienced across Endeavour Energy's network area. It is strongly recommend that you contact your local nursery and/or council for advice on species that might be appropriate in your area.

6.0 DEFINITIONS

Aerial Bundled Cable (ABC)
Two or more cores twisted together into a single bundled cable assembly. ABC may be low voltage or high voltage.

Bushfire prone areas
Areas of land defined by bushfire prone by local councils in accordance with the requirements of the Rural Fires Act 1997.

Covered Conductor Thick (CCT)
A conductor around which is applied a specified thickness of insulating material. The nominal covering thickness is dependent on the working voltage.

Fault and Emergency Works
Refers to the following:

Works that are required to restore/ensure the supply of electricity due to component failure (actual or anticipated) or adverse environmental influence; or

Works where Endeavour Energy has reasonable cause to believe that particular vegetation could destroy, damage or interfere with its electricity works, or could cause its electricity works to become a potential cause of bush fire or a potential risk to public safety, and that urgent corrective action is required to manage the vegetation in accordance with the standards referred to in this agreement.

High voltage
Any voltage above 1,000 volts

Kilovolts (kV)
1 kilovolt = 1,000 volts

Low voltage
Any voltage below 1,000 volts

Network assets
All elements of Endeavour Energy's electrical infrastructure associated with the transmission, distribution and supply of electricity. This includes, but is not limited to, powerlines, pilot cables, streetlights, poles, stay wires, substations and transformers.

Overhead
In relation to a powerline, refers to a powerline that is above ground level.

Powerline
Any electrical cable, structure or equipment used for or in connection with the supply of electricity.

Vegetation
Refers to all plant life, including, but not limited to, trees, palms, vines, shrubs and grasses which could destroy, damage, or interfere with the network assets and maintenance access, or could make the network assets become a potential cause of bushfire or a potential risk to public safety.