

Vegetation Clearance Management

Document No. MMI 0013

Amendment No. 14.1

18/05/26

Revision History

This amendment replaces previous versions of this standard, the minor change made is below:

- Removal of the 'per annum' requirement in respect to Minimum Regrowth Allowances

All changes to the scope / purpose of this document from the previous amendment are highlighted in this document with grey colouring.

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For any enquiries relating to the content of this document please contact the Workplace Experience Team.

Document Control

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1. Purpose

To detail the management of vegetation in proximity to network assets and prioritise defects which are found within these clearances.

2. Scope

This instruction covers the vegetation management requirements (including the vegetation clearances and defect priorities) near the company network assets, including up to the point of supply for High Voltage Customer lines.

Where Private Overhead Lines are inspected as part of the OLI/GLI or PSBI processes, the same vegetation clearances and priorities must be applied.

This instruction does not cover:

- The vegetation clearance requirement around streetlight lanterns in areas where the electricity is supplied by underground mains, as this responsibility lies with the local council.
- The rights and vegetation management obligations of lines on private property. This is covered in Mains Maintenance Instruction MMI 0021 – Guide to rights and obligations for electricity mains located on private property.

3. References

External Regulations

Electricity Supply Act 1995 (NSW)

Electricity Supply (Safety and Network Management) Regulation 2014

ENA National Electricity Network Safety Code (Doc 01-2008)

Environmental Planning and Assessment Act 1979

Industry Safety Steering Committee (ISSC) 3 – Guide for the management of Vegetation in the vicinity of electricity assets (2016)

National Parks and Wildlife Act 1974

Native Vegetation Regulation 2013

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy No 14 – Coastal Wetlands

State Environmental Planning Policy No 26 – Littoral Rainforests

Threatened species Conservation Act 1995

Wilderness Act, 1987

Work Health and Safety Act 2011

Work Health and Safety Regulation 2011

External Standards

Standard No.	Year	Title
AS 4373	2007	Pruning of Amenity Trees

Company Policies and Procedures

Company Policy (Network) 9.9.1 – Network Asset Maintenance

Company Procedure (Network) GAM 0114 – Granting Dispensation from Engineering Documents

Endeavour Energy Authorisations Manual

Vegetation Control Manual Version 3

Endeavour Energy's Electrical Safety Rules

PSBI Schedule 10 - LiDAR and Vegetation Defect Specifications Version 1

Company Standards

EMS 0004	Managing Near Electrical Infrastructure and Pest, Weed and Disease Mitigation
EMS 0008	Maintenance and construction of access tracks
EMS 0012	Notification of access to National Parks and Water NSW Special and Controlled Areas
MMI 0001	Pole and line inspection and treatment procedures
MMI 0021	Guide to rights and obligations for electricity mains located on private property

4. Definitions & Abbreviations

Abbreviation	Meaning
ABC	Aerial bundled conductor
ACSR	Aluminium conductor steel reinforced
CCT	Covered conductor thick
ESR	Electrical Safety Rules
GIS	The company's Graphical Information System
PSBI	Pre-summer bushfire inspection
RFS	Rural Fire Service
TOBAN	Total Fire Ban
VMS	Vegetation Management System

Term	Definition
Authorised	A person with technical knowledge or sufficient experience who has been approved and authorised in writing by the company to perform the function requiring authorisation as described in Endeavour Energy's Authorisation Manual.
Bushfire Consequence Rating	An algorithm-determined measure of the relative consequence between areas of the network in respect to supporting a bushfire. The consequence rating is classified as High, Medium, Low or Very Low.
Bushfire Prone Land	Bushfire prone land is defined by NSW RFS, which is detailed in Company policy 9.1.1 – Bushfire Risk Management. This area is recorded on the company's graphical information system (GIS).
Bushfire Danger Period	The statutory Bushfire Danger Period is defined by the Rural Fire Service which is nominally between 1st of October to 31st March each year, but may vary from year to year and in specific locations due to local conditions.
Clear to the Sky	The practice of removing all vegetation above the network asset, to the width of the Minimum Vegetation Clearance for that asset.
Clearing Requirement	The clearing requirement is the sum of the Minimum Vegetation Clearance and the Regrowth Allowance. It is the expected outcome immediately after the Vegetation Control Maintenance Cycle has been carried out.
Covered Conductor	A conductor that is covered with specified insulation material of adequate thickness for the voltage at which the conductor is operated. This generally refers to HVABC, LVABC and CCT.
Easement	The encumbrance on the title of land (which may be limited in width and height above or below the land) conferring a right to the company to construct, operate, maintain, repair, renew, replace or upgrade electrical infrastructure.
Fall-in Vegetation Hazard / Hazard Tree	Visually defective vegetation (which is vegetation that is dead, dying and appears structurally unsound as identified from the perspective of the Network Asset as far as it is reasonably practicable to do so), that may be outside the minimum Clearing Requirement distances from network assets and may require pruning, cutting, or removal to obviate the risk of it falling, dropping, and contacting the assets.

Vegetation Clearance Management

Groundline Vegetation Management	Management of vegetation adjacent to, below, or near network assets, in order to maintain safety clearances and access as well as improve the vegetation management in the vicinity of the asset.
Grow-in Vegetation Hazard / Vegetation Defect	Vegetation within the stated Minimum Vegetation Clearances for all network assets.
Vegetation Control Maintenance Cycle / Cutting Cycle	The baseline expected frequency of cutting along any span or feeder. This underpins the Regrowth Allowance. The need for cutting back vegetation shall be defined by Endeavour Energy.
Minimum Vegetation Clearance	The minimum clearance area surrounding the asset which, as far as reasonably practicable, is kept free of all vegetation in accordance with this standard.
Network Asset	The company's above ground electrical assets as detailed in this standard which can be interfered with or affected by vegetation to the extent of creating a hazard.
Private Overhead Line	All aerial mains and their supports that extend beyond the point of supply, including all aerial consumer mains and all aerial sub-circuits.
Regrowth Allowance	The additional vegetation clearance requirement above the Minimum Vegetation Clearance to prevent regrowth incursions into the Minimum Vegetation Clearance.
Significant / Heritage Tree	Any tree classified as: • Significant by the National Trust of Australia (NSW); • Recognised by a government authority; or • Listed by a local government authority on a Significant Tree Register (STR). Significant trees may be individually heritage listed, or form part of a larger place listed as a heritage item, area or heritage conservation area (for instance street trees within a conservation area). Significance is generally in relation to one or more of historic, aesthetic, scientific (for example, botanical, ecological or horticultural value) or social value. Heritage significance in NSW is defined in reference to the NSW State Heritage Register criteria within the Office of Environment and Heritage. Further details; refer to Environmental Management Standard EMS 0004 – Managing Vegetation Near Electrical Infrastructure and Pest, Weed and Disease Mitigation.
Trimming Map	A mapping system, which divides Endeavour Energy's franchise area into land areas, used to allow for the efficient trimming of the vegetation adjacent to its network. These maps are defined by Endeavour Energy and can vary in size.

5. General Requirements

The company is responsible for maintaining a safe, reliable and secure network and as part of this; vegetation clearing near network assets is carried out to reduce the risks of fire, service interruptions, and possible safety and environmental impacts.

The principles and philosophy of vegetation management detailed in this standard are based upon the industry document ISSC 3 – Guide for the management of Vegetation in the vicinity of electricity assets (2016).

Vegetation trimming practices are to be conducted in accordance with the Vegetation Control Manual and Environmental Management Standard EMS 0004 – Managing Vegetation Near Electrical Infrastructure and Pest, Weed and Disease Mitigation as well as AS 4373 Pruning of Amenity Trees.

Appropriate environmental considerations must be undertaken where the requirements of this standard define a level of clearing which will significantly increase from past practices. All relevant environmental legislation must be taken into consideration.

6. Vegetation Encroachment & Cutting Cycles

Where vegetation has encroached on the clearances detailed in this standard, these breaches must be recorded as a defect and prioritised in accordance with Section 14.

The clearances specified in Clause 9.3 must consider the Minimum Vegetation Clearance for the applicable construction type.

6.1. Vegetation Growth Rate

The vegetation contractor must cut back vegetation beyond the minimum clearances, to a point from the conductor equal to the greater of:

1. The established cutting lines (where evident); or,
2. The Minimum Vegetation Clearances plus the minimum Regrowth Allowance (as defined below), and in circumstances where fast growing species are found or environmental conditions may permit increased growth rates, an 'Additional Regrowth Factor'.

The minimum Regrowth Allowances are to be used as follows:

- High Voltage (HV): 1.5 metres; or,
- Low Voltage (LV): 1.0 metres.

Example: For a HV conductor on a 24-months cycle, the minimum Regrowth Allowance shall be 1.5 metres.

6.2. Vegetation Management Cycles (Cutting Cycle)

KEY

-  Min Vegetation clearance
(as per clause 5.6.2)
-  Regrowth Allowance
(as determined by authorised personnel)
-  Potential cutting lines

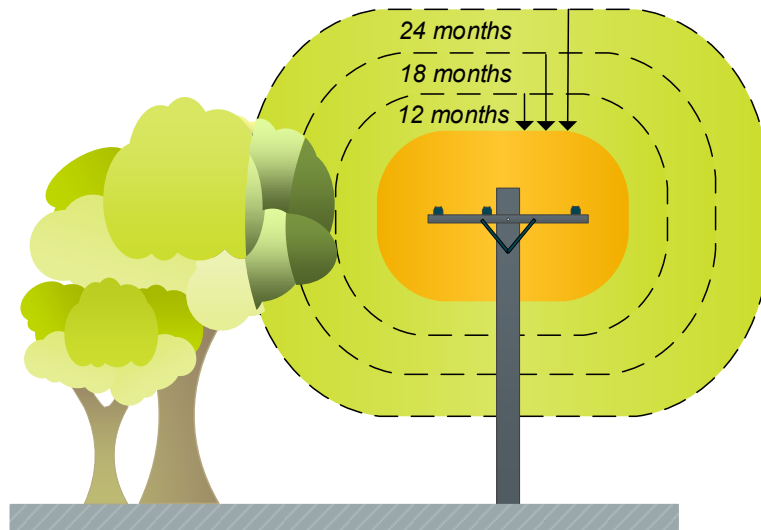


Figure 1: Example of various cutting cycles

6.3. Vegetation Trimming Schedule

The routine trimming schedule shall be ordered, where practicable, in such a way that spans with higher bushfire consequence ratings shall be programmed to be cut closer to the start of the bushfire danger period.

7. Authorised Workers

The clearing of vegetation near network assets must be carried out only by persons authorised in accordance with Endeavour Energy's Authorisation Manual.

8. Lands with Special Requirements

8.1. Environmentally Sensitive Areas

Environmentally sensitive areas are defined and prescribed in Environmental Management Standard EMS 0004 – Managing Vegetation Near Electrical Infrastructure and Pest, Weed and Disease Mitigation.

8.2. Private Lines/Land

Within the company's network, there exist overhead lines which the company does not own. The obligations of both the company and the owners / customers of these assets are detailed in 'MMI 0021 – Guide to rights and obligations for electricity mains located on private property'.

9. Vegetation Clearances from Network Assets

If vegetation is within minimum safety clearances for an authorised person as defined in the ESR, the entire tree must be considered live. Only approved techniques employing insulated tools, approved live line techniques or under Access Authority conditions, must be employed to remove the vegetation.

For guidance on safe approach distances and requirements for vegetation control in close proximity to overhead mains, refer to the ESR.

If a construction, voltage level or span length is not covered in Tables 1-3 of Clause 9.3, or spans greater than 600 metres in 'Annexure 2 - Clearances for Spans Over 600m', the construction, voltage level, span length, Functional Location ID of the span must be submitted to the Asset Risk and Performance Manager to determine the required Minimum Vegetation Clearances.

Vegetation must be trimmed to the conductor's constructed voltage, rather than the voltage in which it may be operated at (including de-energised lines). For example, a conductor which is constructed to the 33kV standard but is energised at 11kV (or is de-energised), the 33kV Minimum Vegetation Clearances must apply.

For covered mains (LVABC, HVABC, and CCT), large limbs or tree trunks that are not climbable are permitted within the Minimum Vegetation Clearances, provided there is no evidence of direct physical contact between the mains and the trunk or limb. The trunk or limb must be removed if there is any evidence of sheath damage, cable contact or the opportunity to climb the tree.

The distances listed in Tables 1-3 of Clause 9.3, are to be measured from the conductor in its static position (no wind situation).

Where vegetation which has been historically cut to distances greater than those specified within Table 1-3 of Clause 9.3, and maintaining these distances poses no additional cost to the company, these clearances may be continued to be maintained at this greater distance. This includes situations which involve maintaining a straight line instead of the 1/6th, 2/3rd profile.

9.1. Third-Party Infrastructure

The company does not have any vegetation management requirements in proximity to third party infrastructure installed on the company assets and no additional clearing is required for such assets.

9.2. Overhead Line Easements

Where vegetation has previously been maintained for an overhead line easement / corridor (beyond the minimum clearances), this must continue to be maintained. This additional clearing of the easement / corridor is to be done as part of the routine cutting processes and is not considered a defect unless vegetation has come within the Minimum Vegetation Clearances.

9.3. Overhead Line Clearances

The following tables outlines the different criteria for Minimum Vegetation Clearances. For Tables 2 and 3, the 1/6th clearances are measured from the crossarm, up until the 1/6th of the span length. Refer to Annexure 1 for further details.

Table 1: Minimum Vegetation Clearances (m) above and below the conductor

Designated bushfire prone areas: Add 0.5 metres to the clearances for bare conductors.								
Voltage	Conductor Type	Span Length – X (m)						
		X ≤ 50	50 < X ≤ 100	100 < X ≤ 200	200 < X ≤ 300	300 < X ≤ 400	400 < X ≤ 500	500 < X ≤ 600
Up to and including 1 kV	Bare conductors	1.0	1.0	2.5	4.0	N/A	N/A	N/A
	Covered and EE comm. cables*	0.5		1.0		N/A	N/A	N/A
Greater than 1kV, up to and including 22kV	Bare conductors (not including steel)	1.5	2.5	3.5	5.0			
	HVABC	0.5		1.0		N/A	N/A	N/A
	CCT	1.0				N/A	N/A	N/A
	Steel conductors (including SWER)	1.5	1.5	2.5	4.0			
Greater than 22kV, up to and including 66kV	Steel conductors	1.5	1.5	2.5	4.0			
	Bare conductors (not including steel)	2.0	3.0	4.0	6.0			
132kV	Bare conductors	3.0	4.0	5.0	6.5			

* refer to clause 14.2 for reduced defect criteria for a range of conductors. The values in this table are still to be used as the minimum safety clearances.

Table 2: Minimum blowout vegetation clearances (m) for spans $\leq 300\text{m}$

<i>Designated bushfire prone areas: Add 0.5 metres to the clearances for bare conductors.</i>									
Voltage	Conductor Type	Span Length – X (m)							
		X $\leq$ 50		50 < X $\leq$ 100		100 < X $\leq$ 200		200 < X $\leq$ 300	
		First and Last 1/6 th	Middle 2/3rds	First and Last 1/6 th	Middle 2/3rds	First and Last 1/6 th	Middle 2/3rds	First and Last 1/6 th	Middle 2/3rds
Up to and including 1 kV	Bare conductors	1.0		1.0		1.5	2.5	3.5	4.0
	Covered and EE comm. cables*	0.5		0.5		0.5	1.0	1.0	
Greater than 1kV, up to and including 22kV	Bare conductors (not including steel)	1.5		1.5	2.5	2.0	3.5	4.0	5.0
	HVABC	0.5		0.5		0.5	1.0	1.0	
	CCT	1.0		1.0		1.0	1.0	1.0	
	Steel conductors (including SWER)	1.5		1.5		1.5	2.5	2.0	4.0
Greater than 22kV, up to and including 66kV	Steel conductors	1.5		1.5		1.5	2.5	2.0	4.0
	Bare conductors (not including steel)	2.0		2.0	3.0	3.0	4.0	4.5	6.0
132kV	Bare conductors	3.0		3.0	4.0	3.5	5.0	5.5	6.5

Note: 1/6th clearances - Measured from the crossarm to 1/6th of the span length. Refer to Annexure 1 for further explanation

* refer to clause 14.2 for reduced defect criteria for a range of conductors. The values in this table are still to be used as the minimum safety clearances.

Table 3: Minimum blowout vegetation clearances (m) for spans >300m to 600m

<i>Designated bushfire prone areas: Add 0.5 metres to the clearances for bare conductors.</i>							
Voltage	Conductor Type	Span Length – X (m)					
		300 < X ≤ 400		400 < X ≤ 500		500 < X ≤ 600	
		First and Last 1/6 th	Middle 2/3rds	First and Last 1/6 th	Middle 2/3rds	First and Last 1/6 th	Middle 2/3rds
Up to and including 1 kV	Bare conductors	N/A					
	Covered and EE comm. cables	N/A					
Greater than 1kV, up to and including 22kV	Bare conductors (not including steel)	4.0	7.0	5.5	9.5	8.0	12.5
	HVABC	N/A					
	CCT	N/A					
	Steel conductors (including SWER)	3.5	6.0	5.0	8.5	7.0	11.0
Greater than 22kV, up to and including 66kV	Steel conductors	3.5	6.0	5.0	8.5	7.0	11.0
	Bare conductors (not including steel)	4.5	7.5	6.0	10.0	8.5	13.0
132kV	Bare conductors	5.0	8.5	7.0	11.0	9.5	14.0

Note: 1/6th clearances - Measured from the crossarm to 1/6th of the span length. Refer to Annexure 1 for further explanation.

Clearances for spans greater than 600m can be found in Annexure 2.

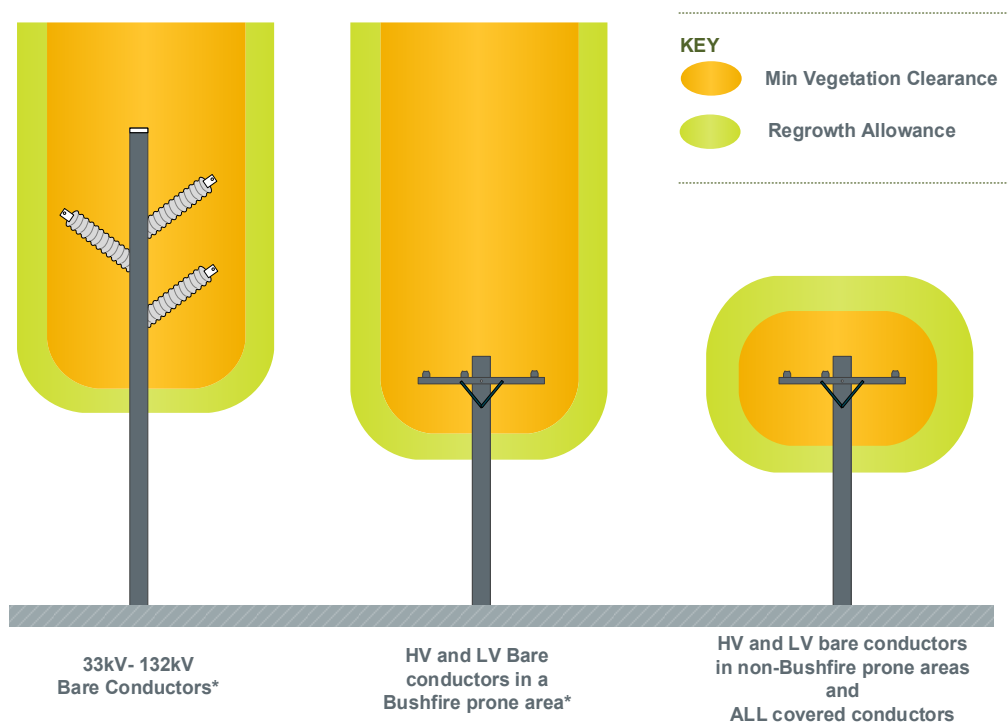
9.4. Clearance Above Overhead Lines

'Clear to the Sky' vegetation clearances involve the practice of the removal of all vegetation above the network assets, to the width of the Minimum Vegetation Clearance plus the Regrowth Allowance, as indicated in Figure 2. The undertaking of 'Clear to the Sky' hazard remediation must always consider the environmental conditions and community amenity of performing the vegetation clearing.

For 33kV through to 132kV lines, the clearance above bare conductors must have 'Clear to the Sky' for all new feeders and existing feeders where this criteria is already implemented, unless it is prevented by local environmental conditions.

For bare distribution lines in bushfire prone areas, 'Clear to the Sky' vegetation clearances must be maintained on all new lines and where it currently exists, unless it is impracticable to do so.

For ALL covered conductors and distribution lines in non-bushfire prone areas, an envelope around the conductor, equal to the clearances in Table 1 must be achieved.



* - Only applies for new constructions and where Clear to the Sky currently exists

Figure 2: Clearance above conductors

9.5. Pole Clearances

Minimum required clearances from poles (timber, steel or concrete etc) are defined in Figure 3.

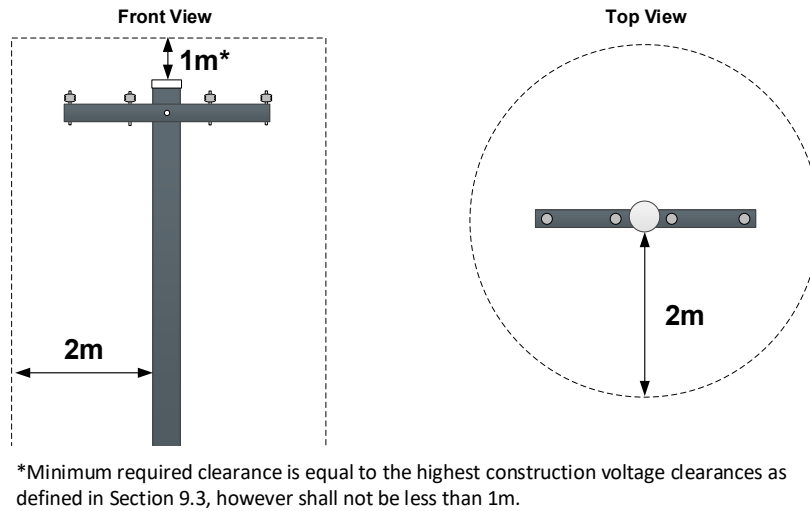


Figure 3: Clearances required around pole

9.6. Towers

A minimum clearance of three (3) metres must be achieved in all directions around the tower structure, or a twelve (12) metre radius from the centre of the tower, whichever is greater. Additionally, the proximity of vegetation to the conductors, specifically the 1/6th clearances, as specified in Table 2 and 3, must be achieved as per clause 11 “Groundline Vegetation Management”.

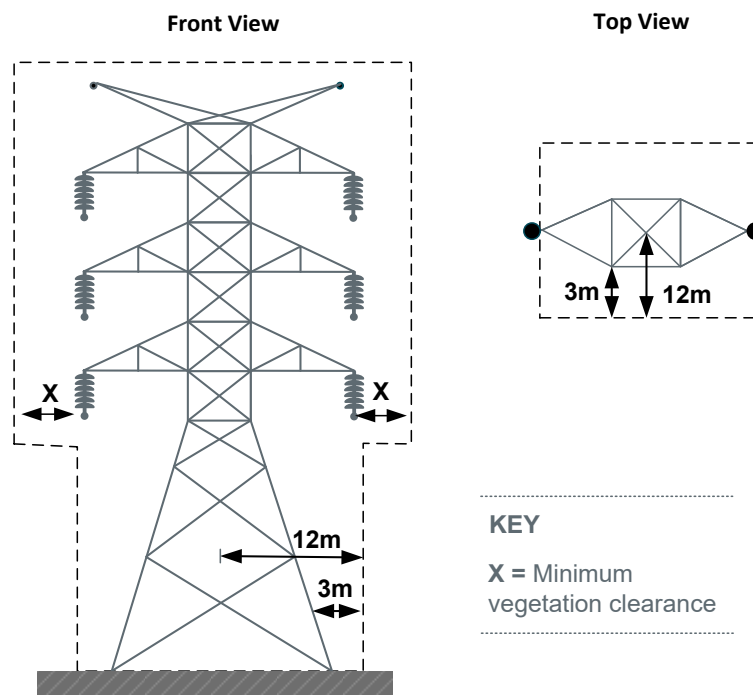


Figure 4: Clearances required around towers

9.7. Streetlight Clearances

Streetlight lanterns must achieve a minimum clearance of two (2) metres in all directions, except above the lantern, where a minimum clearance of one (1) metre is required.

Maintaining clearances around streetlight lanterns in areas where electricity is supplied by underground mains is the responsibility of the local council. However, where the supply is by overhead mains, this is the responsibility of the company.

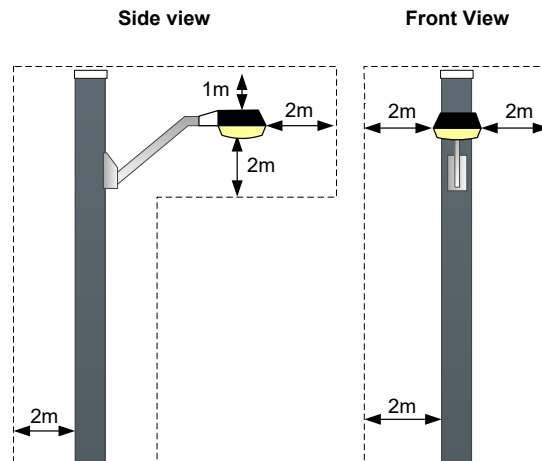


Figure 5: Clearances around street light lanterns

9.8. Ground Mounted Distribution Substations

For the purposes of this clause, 'ground mounted distribution substations' refers to any pad-mounted substations, kiosk-type substations, switching stations, and/or any other ground mounted substations with primary voltages less than 33kV and are otherwise not considered zone substations.

Ground mounted distribution substations within an easement must have the easement cleared of all vegetation (excluding short grass) to a height of at least two (2) metres above the highest point on the substation.

For ground mounted distribution substations without a formal easement, such as those installed on the road verge, vegetation must be cleared at least one (1) metre from the substation in all directions, extending to a height of at least two (2) metres above the highest point on the substation.

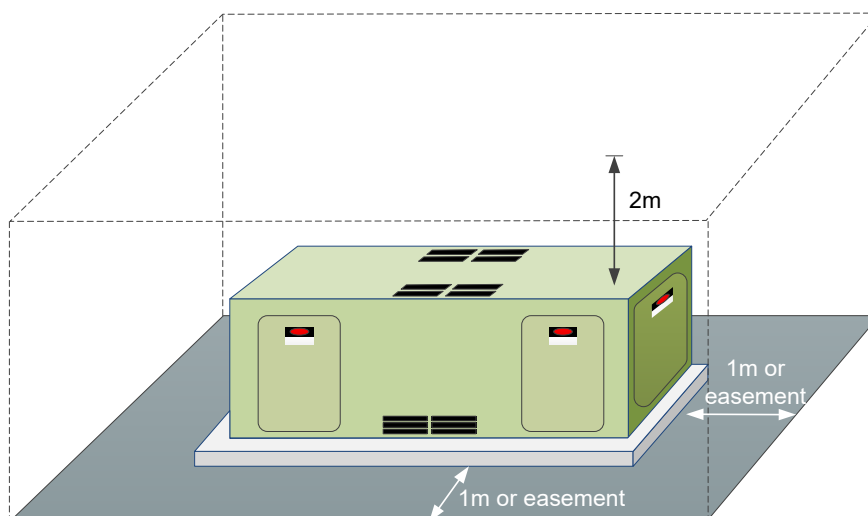


Figure 6: Clearances around ground substations

9.9. Zone / Transmission Substations & Switchyards

The following table summarises the vegetation clearing requirements for zone substations, transmission substations and switch yards:

Table 4: Vegetation requirements for substations

Requirement	Bushfire Prone Area	Non-Bushfire Prone Area
Minimum Vegetation Clearance surrounding external fence	Ten (10) metres	Three (3) metres
Substations with live exposed outdoor electrical equipment (e.g. air insulated busbars)	'Clear to the Sky' and cleared of fall-in vegetation hazards from the fence boundary to a distance of ten (10) metres	'Clear to the Sky' and cleared of fall-in vegetation hazards from the fence boundary to a distance of three (3) metres

Surrounding the boundary fence, up until the Minimum Vegetation Clearance distance, only mown grass is permitted unless a site-based risk assessment for encroaching vegetation has been completed and accepted by Asset Risk and Performance Manager.

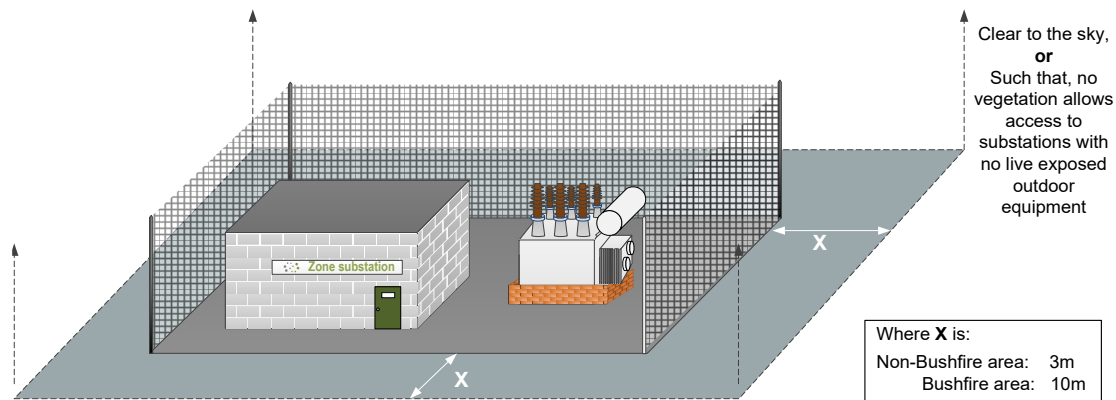


Figure 7: Clearances required around and above a zone or transmission substation.

9.10. Access Tracks

Vegetation clearance management of access tracks must have:

- Minimum width of four (4) metres across; and,
- Minimum height of four (4) metres above.

No additional vegetation clearing beyond the edges of the existing access track is permitted.

Management of vegetation in and around access tracks shall also comply with EMS 0008 - Maintenance and construction of access tracks.

9.11. Water Crossings

All vegetation clearing works near waterways are considered environmentally sensitive and must be carried out in accordance with this standard. The affected Catchment Management Authority must be notified of the proposed works as per Environmental Management Standard EMS 0012 – Notification of access to National Parks and Water NSW Special and Controlled Areas.

Water crossings are classified as vulnerable land, and under Clause 59 - Native Vegetation Regulation 2013, the maximum vegetation clearing around a water crossing sign cannot exceed fifteen (15) metres from the asset.

9.11.1. Water Crossing Signs

All vegetation must be cleared between the two (2) 45° angle projected lines extending outwards from the crossing sign face towards the water, ensuring that the entire sign face is visible to watercrafts:

- From any point within a 45° angle from either side of the front surface of the sign;
- From a distance of one hundred (100) metres from the crossing sign face; and,
- From water level to the height of five (5) metres above the water surface.

Any vegetation that is encroaching on or may grow to obscure the view of the sign prior to the next cutting cycle must be cleared. If the removal of vegetation poses a risk of erosion that could jeopardise the stability of the sign, the Vegetation Operations Manager must be notified for further investigation.

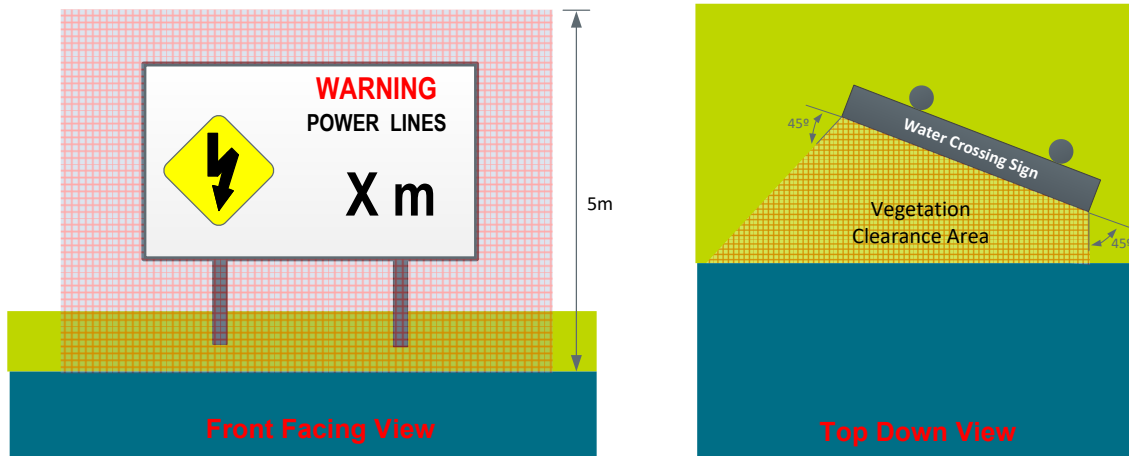


Figure 8: Example of the vegetation clearing requirements for a water crossing sign

9.12. Fall-in Vegetation Hazard/Hazard Tree Defects

Vegetation surrounding network infrastructure must be visually inspected for trees or part thereof, that is visually defective, or appears dead dying and structurally unsound, and that has the potential to interact with the electrical network. The inspection must be conducted during any on-site scoping or cutting procedures. The area to be inspected is not limited to the Minimum Vegetation Clearances and must cover all vegetation readily visible from the perspective of the network assets as far as reasonably practicable to do so.

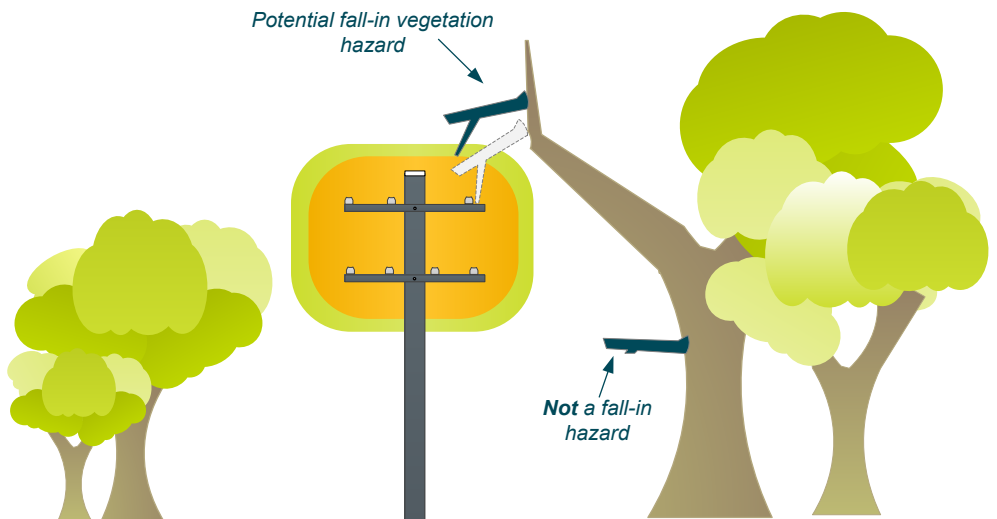


Figure 9: Vegetation which may impact the conductor must be removed

In assessing the fall-in vegetation hazard/hazard trees, consideration must be given to the height and distance from the line of the vegetation, and the likelihood of impact to the Network Asset.

9.13. Network Batteries

Any Network Batteries installed within our network are subject to easements and clearance zones in alignment with MDI 0044. Any such easement or clearance zone shall be cleared of all vegetation (excluding short grass) to the extent of the easement or clearance zone (whichever is greater) and to a height of at least two (2) metres above the highest point on the asset.

10. Significant/Heritage Trees or Sensitive Issue Trees

Where a significant/heritage/sensitive tree is identified and reduced clearances are required, a dispensation request, as per Company Procedure (Network) GAM 0014 – Granting Dispensation from Engineering Documents, must be submitted. For the classification of a significant/heritage tree, refer to Clause 10.

Records must be kept for all significant and heritage trees, and their locations identified on tree trimming maps. The reduced clearances must be re-assessed as and when cyclical vegetation management occurs for the area.

The management of a significant/heritage/sensitive tree is contained within Annexure A of Environmental Management Standard EMS 0004 – Managing Vegetation Near Electrical Infrastructure and Pest, Weed and Disease Mitigation.

11. Groundline Vegetation Management

Management of vegetation under network assets at groundline level is carried out in order to establish and maintain both safety clearances and maintenance access.

Vegetation that has the ability to grow greater than three (3) metres in height must be removed from the easement / asset corridor.

Vegetation that impedes access to network assets must be removed from the easement / asset corridor.

11.1. Slashed Areas

Where vegetation has previously been slashed/trittered or mechanically removed to the established (mature) tree line, this practice must be maintained.

11.2. Non-Slashed Areas

Any vegetation that will reach a height greater than three (3) metres and is within the Minimum Vegetation Clearance must be removed.

11.3. Gullies / Creek Lines

Vegetation must be retained within gullies and/or creek lines with no root disturbance to reduce the incidence of erosion whilst maintaining the minimum clearances from the conductor as detailed in Tables 1-3 of Clause 9.3. Care should be taken that no debris is to be left in the water ways.

Trees that cannot be climbed or accessed by a vehicle may be removed. Vegetation material may be retained in consultation with the landowner.

12. Planted Vegetation

In situations where newly planted vegetation around assets will present a future hazard, whereby the vegetation can possibly grow into the Minimum Vegetation Clearance, the person/organisation responsible for the planting must be requested to remove or relocate the vegetation. If the person/organisation does not remove the offending vegetation by the requested time period, the company may remove the vegetation.

For further details regarding planting trees near the electrical network, refer to Section 5 of the Tree Management Plan.

13. Clearing for Construction / Augmentation

All vegetation clearing around new or augmented network asset constructions must consider fall-in vegetation hazards/hazard trees, and be carried out to the requirements of this standard.

14. Vegetation Defect Management

Where vegetation has encroached on the clearances detailed in this standard, these must be considered a defect and recorded within the company's VMS database.

14.1. Vegetation Defect Classification

Vegetation encroachments are to be categorised as follows:

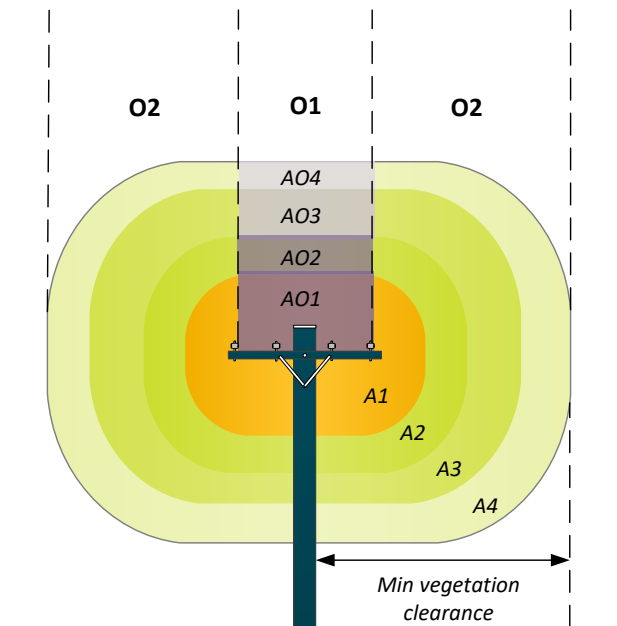


Figure 10: Vegetation defects

Table 5: Vegetation zone

Code	Description
A1	Encroaching within the Minimum Vegetation Clearance by 75% or more
A2	Encroaching within the Minimum Vegetation Clearance between 50% and 75%
A3	Encroaching within the Minimum Vegetation Clearance between 25% and 50%
A4	Encroaching within the Minimum Vegetation Clearance up to 25%
O1	Vegetation outside the Minimum Vegetation Clearances directly above bare conductors
O2	Vegetation outside the Minimum Vegetation Clearances directly above bare Minimum Vegetation Clearances
AOX	Encroaching within the Minimum Vegetation Clearances and directly above bare conductors

These classifications only apply to overhead line defects. Exclusions and special considerations apply to vegetation defects on LV Covered Services (refer to Clause 14.2). For vegetation defects for other Network Assets, these must be categorised as per the priorities in Clause 14.3.

Any vegetation defect identified as touching the high voltage network (11 kV and above) must be reported to the Endeavour Energy call centre immediately.

14.2. LV Covered Services Vegetation Defects

For the purposes of this clause, 'LV Covered Services' refers to all LV services that are covered, as well as any covered road crossings dedicated to servicing the service(s), that is immediately preceding the service span (as indicated in green in Figure 111).

Vegetation at LV covered services, up to the customer's property boundary, should not be removed or trimmed unless a vegetation defect exists where the service is no longer sitting in the designed or nominal sag position, cannot be inspected due to vegetation, or presents a safety hazard. LV covered and insulated services vegetation defects are not classified as bushfire defects and must only be managed in accordance with the defect actions specified in Table 6.

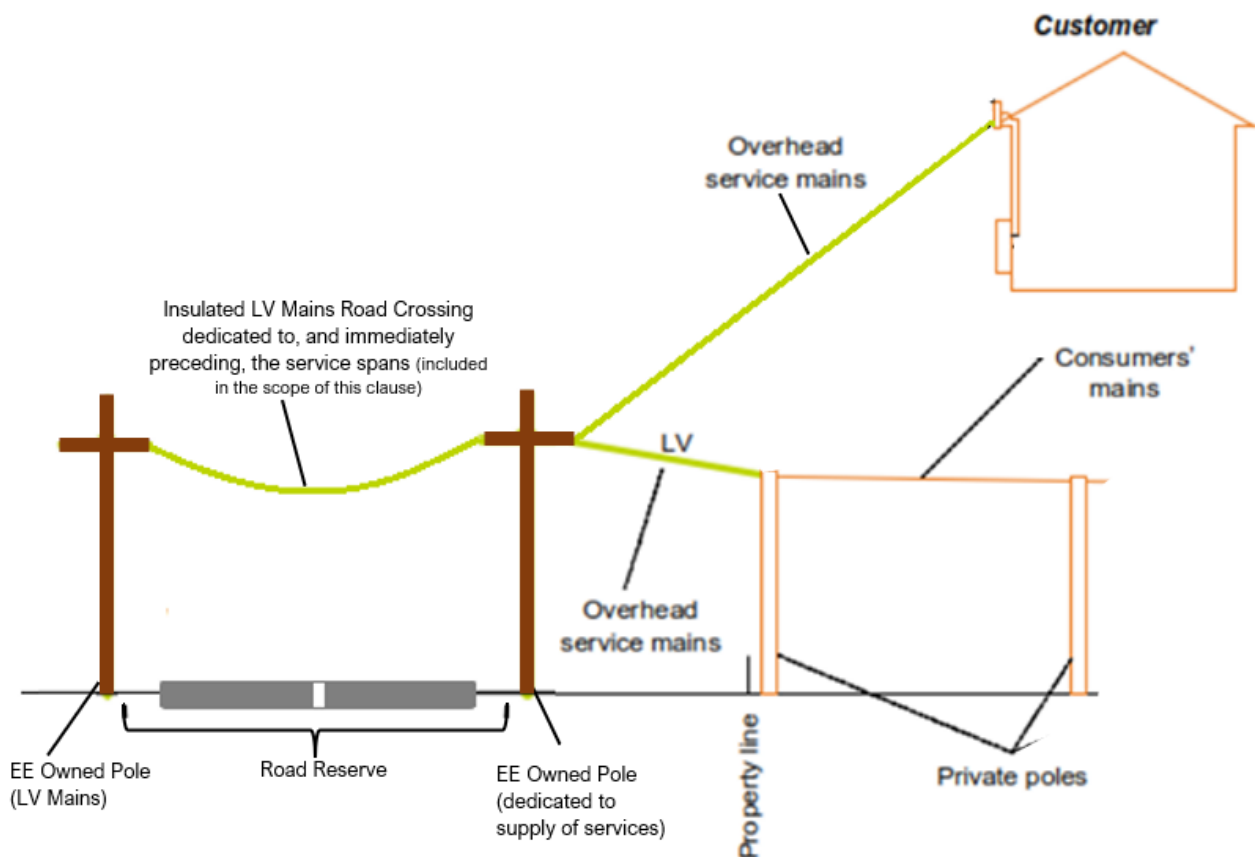


Figure 11: Insulated LV services & associated conductors

The definition of a “Vegetation Defect” for LV covered services is as follows:

Table 6: LV covered services defects

LV Covered Services			
Vegetation Category	Defect Criteria	Defect Action	
B2	Vegetation clearance <0.1m	Track & Monitor (SAP Priority 9)	
B1	Conductor displaced from nominal sag position by vegetation growth, cannot be inspected due to vegetation, or presents a safety hazard	Private Land	Defect and send letter to customer for rectification ¹
		Public Land	Defect, resolve as part of next routine vegetation cutting cycle
Note 1: Raise the defect in Endeavour Energy's Asset Management System, notify the customer of the existence of the defect and the implications of not fixing the defect and then close the defect. These defects are not deemed a serious enough risk to safety that they would generally be progressed to the point of disconnection.			

For clarity, this clause only defines ‘vegetation defect’ for LV covered services. It does not impact cycle times, cutting lines, Regrowth Allowance, or cutback clearances. i.e. no changes are made to the cutting lines for trimming purposes. Cutting lines are to be defined based on vegetation clearances from Table 1-3, plus consideration of regrowth as per Section 6.

When B1 vegetation defects on such services are raised, it shall be made clear if it is due to “service physically moved by vegetation”, “being unable to inspect”, and/or “a potential public safety risk”.

As this clause permits vegetation contact with low voltage services, an additional check for public safety risk shall also be conducted. If in the opinion of the inspector, the vegetation in contact with the service is of a nature that it could be climbed and/or contact with a bare or damaged service could be made by a person, a B1 defect shall be raised on the service to have it cleared.

14.3. Vegetation Defect Prioritisation

In general, vegetation management is carried out through the vegetation contract(s) process, where vegetation that is encroaching on network assets is scoped and cut on an ongoing basis.

It is common for the RFS to bring forward the start of the statutory bushfire season from 1st October each year. As such, reasonable effort shall be made to rectify vegetation defects on BFPL by 31st August each year, however such defects shall not be classed as overdue until the dates dictated in Table 7 & Table 8.

Vegetation defects identified through the PSBI, routine work (excluding the routine vegetation management/PSBI program) or during the OLI/GLI process must be prioritised and rectified within the timeframes specified in Table 7 & Table 8.

Table 7: Vegetation defect priority

Assets	Method of Identifying Vegetation Defects	Defect Priority
Overhead lines	PSBI Process	In accordance with bushfire prone land maps and within Bushfire Vegetation Defects outlined in Table 7.
	Out of cycle / OLI/GLI Process	Defects identified as part of the OLI/GLI process or defects found out of the routine vegetation trimming cycle are to be prioritised in accordance with Annexure 3 – Maximum Defect Rectification Periods.
	Immediately after cutting	To be considered and addressed under the contractual performance framework in the first instance.
Poles	All defects	6 Months
Towers		
Padmount / Switching station		
Zone / Transmission substation		
Streetlight lantern		1 Month
Water crossing sign		1 Year

Table 8: Bushfire vegetation defects

Defect Type	Category	Sub Category	Due Date
Vegetation defects near bare conductors	A1 & A2 Defects	All	Defect due date or Bushfire Danger Period* (whichever comes first)
	A3 & A4 Defects	Assuming a regrowth rate, will become A1 & A2 defects by Bushfire Danger Period*	
		Assuming a regrowth rate, will become A1 or A2 defects by 1 st March	The date on which the defect is predicted to be an A1 or A2, or 31 st of December (whichever comes first)
Vegetation near covered conductors	A1 – A2 Defects	All	Defect due date or Bushfire Danger Period* (whichever comes first)
	A3 – A4 Defects		Managed according to vegetation contract

*Bushfire Danger Period is set as 1st of October unless declared earlier by RFS

For clarity:

- Any A1 or A2 defects identified within the bushfire danger period will be treated as overdue; and,
- Neither B1 or B2 defects (refer Section 14.2) should be classified as bushfire defects.

The rectification of defects must be prioritised and factor in the following components:

- Voltage level;
- Position of encroachment (adjacent to or beneath the mains);
- Strength of vegetation (can it be climbed or cause conductors to clash);
- Growth rate;
- Time of year found (whether during or outside of the bushfire period); and
- Risk associated with the area (consequence rating).

Each of these variables will have influence over the risk posed by the vegetation encroachment.

14.4. Defect Reporting Requirements

Where a vegetation defect is found (including during scoping of the routine vegetation program), the defect must be recorded in accordance with Annexure 4, which includes the following fields:

- Date of the span was inspected;
- Bay in which the defect exists (asset number of poles either side);
- Most significant encroachment within the span (e.g: A1, A2, A3 or A4);
- Number of trees (per span) with a defect²; and,
- Source of the defect (e.g. PSBI, scoping).

Note 2: This is expected to be a subjective reporting measure to provide an indication of volume.

15. Authorities & Responsibilities

General Manager Future Grid & Asset Management has the authority and responsibility for approving this instruction, if there is a deviation from Australian Standards or a proposed material change in risk.

Head of Asset Management & Digital has the authority and responsibility for:

- approving this standard, when it complies with Australian Standards and has no material change in risk;
- making recommendations to the General Manager Future Grid & Asset Management in respect to this standard; and,
- approving or rejecting dispensation requests that do not adhere to this standard.

Asset Risk & Performance Manager has the authority and responsibility for:

- keeping the content of this instruction up to date;
- reviewing and either endorsing or rejecting dispensation requests that do not adhere to this standard; and,
- analysing spans/constructions submitted, which are not covered in this standard.

Vegetation Operations Manager has the authority and responsibility for:

- checking the Vegetation Management Contractor has performed tree trimming to this standard;
- validating fall-in vegetation hazard defects;
- evaluating new/augmented lines for correct vegetation management;
- managing the submission of dispensation enquiries;
- maintaining the vegetation management system; and,
- monitoring reporting performance and quality of vegetation contractors.

Vegetation Management Contractor has the authority and responsibility for:

- maintaining clearances between vegetation and the company's Network Assets, in accordance with this standard;
- establishing vegetation management contracts with the company;
- checking contract employees are provided with the relevant training;
- checking tree trimming maps for significant trees; and,
- confirming that all work is carried out according to the Endeavour Energy Safety Rules and Authorisations Manual.
- Accurately reporting of vegetation defects as required by clause 14.4.

Annexure 1 – 1/6th Tree Trimming Concept

To reduce the impact of the company's vegetation management process, the company has taken the approach of implementing a "1/6th trimming concept". This concept segments the span length into three parts: the initial 1/6th of the span, the subsequent 2/3rds in the centre section of the span, and the final 1/6th of the span. Each segment type (1/6th or 2/3rds) has a required vegetation clearance from the conductor. These clearances are used to consider the parabolic nature of the conductor blowout as indicated by Figure 12 below.

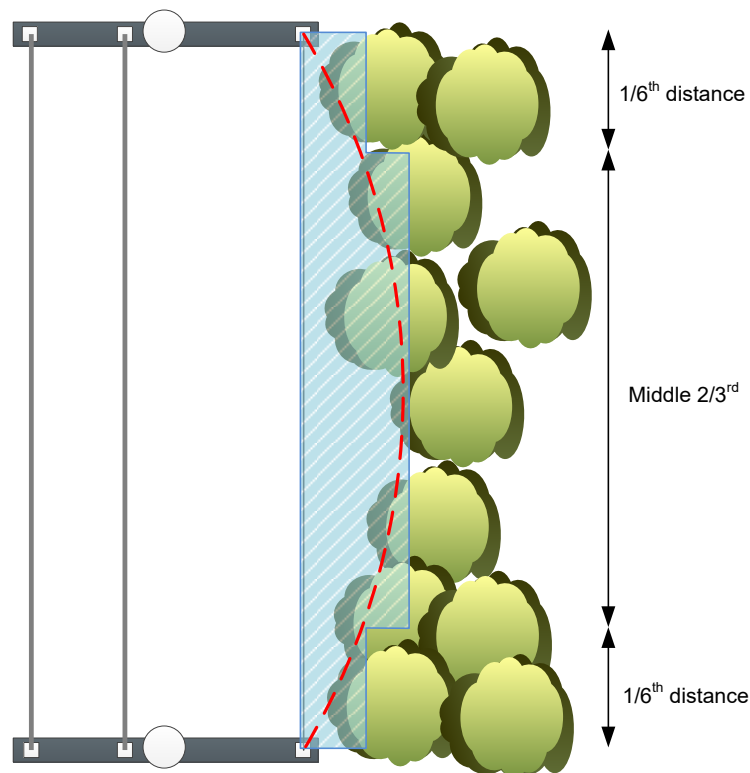


Figure 12: 1/6th Trimming concept

Annexure 2 – Clearances for Spans Over 600m

Vegetation clearances for spans within the company's network, which are over six hundred (600) metres in length, are covered individually within the document "Clearances for spans over 600m".

Where the clearances indicated for a given span are either not cost effective and/or impractical to achieve (due to access and/or environmental constraints), details of the span and constraint(s) are to be sent to the Asset Risk and Performance Manager for further review.

Annexure 3 – Maximum Defect Rectification Periods

Where vegetation defects are identified as part of routine work (e.g. during a pole replacement – that is, outside of the routine vegetation management and PSBI programs) or during the OLI/GLI process, the defects must be prioritised and rectified within the periods defined in Table 9, or as per Section 14.2.

Table 9: Maximum rectification time (months) for overhead grow-in vegetation hazard/vegetation defects

Conductor Type	Voltage Level	Encroachment Classification	Map Consequence Category				
			High	Medium	Low	Very Low	Non-Bushfire Prone
Covered	LV ⁴ / HV / Comms	A4 or AO4	6	6	6	6	6
		A3 or AO3	6	6	6	6	6
		A2 or AO2	3	6	6	6	6
		A1 or AO1	3	6	6	6	6
Bare ¹	LV	A4 or AO4	3	6	6	6	6
		A3 or AO3	1	3	6	6	6
		A2 or AO2	1	1	3	3	3
		A1 or AO1	1	1	1	3	3
	HV / Transmission	A4 or AO4	3	6	6	6	6
		A3 or AO3	1	3	6	6	6
		A2 or AO2	1	1	3	3	3
		A1 or AO1 (not touching)	1 / Emergency (refer to Note 1)			3	3
		A1 or AO1 (touching)	Emergency				

Notes:

1. A1 defects associated with bare HV within a High, Medium or Low consequence map are considered as emergency work if identified during the Bushfire Danger Period.
2. Defects of a climbing nature for all bare mains are to be rectified on a priority basis and as soon as reasonably practical, unless a risk assessment determines the climbing likelihood to be unlikely or rare.
3. Private customer defects must be rectified in accordance with Division 2A of the Electricity Supply Act 1995, which grants special powers for bushfire prevention within bushfire prone land. If customers fail to respond to direction under this Division, Endeavour Energy will undertake this work in accordance with this annexure.
4. This table does not apply to defects associated with LV covered and insulated services, which are covered in Section 14.2.

Annexure 4 – Inspection Requirements and Specifications

Vegetation Inspection Requirements

Inspections and audits will be undertaken at Endeavour Energy's discretion.

Where LiDAR is used, a LiDAR sensor capable of capturing sufficient points to identify terrain classification (e.g. structures, vegetation and types of ground required for each scenario), earth wires and all conductors, is required as a minimum.

Minimum requirements and specifications for LiDAR based inspections are contained in PSBI Schedule 10 – LiDAR and Vegetation Defect Specifications Version 1.

Other specifications may be used subject to approval by the Asset Risk & Performance Manager.

The LiDAR specifications summarised below are provided for guidance and represent a high-level overview only.

Requirement	Specification
Co-ordinate and level datum	Horizontal datum and horizontal datum must as per Endeavour's Datum, Geoid model and AHD requirements e.g. Horizontal: GDA94 and Vertical: AHD71.
LiDAR point density	Sufficient to allow modelling of the terrain to the required accuracy outlined in Section 19.2.1 Must allow the ability to identify all of the conductors in each span of the line that is inspected. Every span of the inspected line must have sufficient points on the conductors to enable accurate modelling of the span.

LiDAR Accuracy and Check Points

Requirement	Specification
Global accuracy of LiDAR data	Minimum 30 points per square metre where the area covers Endeavour assets. A points per square meter reduction may be acceptable for areas not overlapping with Endeavour assets upon agreement with Endeavour Energy. Expectation this shall still be approximately 20 points per square meter minimum. Horizontal accuracy: +/- 0.2 m @ 95% Confidence Interval or better Vertical accuracy: +/- 0.15 m @ 95% Confidence Interval or better
Relative accuracy between successive inspection points	Point to point distance of +/- 0.075m @ 95% Confidence Interval or better Where a target of +/- 0.05 metres @ 95% Confidence Interval or better where multiple independent returns can be leveraged to reconstruct a refined position.

Note: the +/- 0.075m has been undertaken to enable the full illumination approach, to maximise vegetation/point return.

LiDAR Inspection Deliverables

Type Deliverable	Scope	Format
1. Survey Report	- Survey control list survey marks - Time and date of each flight - Achieved accuracy of measurements - Density and point distribution - Post processing actions for inaccurate/misaligned results	Specified by contractual agreement
	- Source of primary ellipsoidal height control. - Details of ellipsoid to orthometric corrections applied. - All survey check point comparisons undertaken to prove the global accuracy requirements. - All survey check points used including site ID and coordinates. - All relative accuracy checks undertaken to prove relative accuracy.	

Vegetation Clearance Defects

Vegetation clearance defects must be modelled in accordance with the Minimum Vegetation Clearance requirements specified in Table 5, and in compliance with the specifications outlined with Schedule 10 – LiDAR and Vegetation Defect Specifications Version 1.

Vegetation-Inspection Reporting Requirements

Requirement	Format
Vegetation clearance defects shall follow items including but not limited to:	
- Veg ID - Plant number - Comments - Inspection date - Defect type - Priority - Bushfire risk - Bushfire defect flag - Image link - ENZEN platform defect link - Map number - Depot ID - Voltage category - Veg span ID - Bay ID - Feeder number - Conductor type - Construction voltage - Distance from wire to condition	XLSX

- Maximum span clearance
- Span length
- X & Y coordinate

Span defect report to show a plan view and profile view of each defected span. A cross-section of the span showing where each defect exists is also to be shown in this report.

PDF

