

# Transmission Line Easement and Clearance Requirements

## Design Standard

### DOCUMENT HIERARCHY

This document resides within the Planning component of Western Power's Asset Management System (AMS).

### DOCUMENT DATE

This document was last updated 26/05/2026.

### IMPLEMENTATION DATE

This document came into service 02/03/2017.

### DOCUMENT CONTROL

Record of endorsement, approval, stakeholders, and notification list is provided in VOLT-1381921126-6587 appendix

### RESPONSIBILITIES

Western Power's Engineering and Design Function is responsible for this document

### CONTACT

Western Power welcomes your comments, questions, and feedback on this document, which can be emailed to [standards.excellence@westernpower.com.au](mailto:standards.excellence@westernpower.com.au)

### DISCLAIMER

This document is published by Western Power for information purposes only. The user must make and rely on their own inquiries as to the quality, currency, accuracy, completeness, and fitness for purpose of any information contained in this document. Western Power does not give any warranty or make any representation concerning the information provided in this document. By using the information in this document, the user acknowledges that they are solely responsible for obtaining independent professional advice prior to commencing any project, activities, or other works. Western Power is not liable in any way for any loss, damage, liability, cost or claim of any kind whatsoever (including responsibility by reason of its negligence) arising from or in connection with the use of or reliance on the information contained in this document. Western Power reserves its rights to modify, supplement or cancel this document or any part thereof at any time and without notice to users.

### COPYRIGHT

© Copyright 2026 Electricity Networks Corporation trading as Western Power. All rights reserved. No part of this work may be reproduced or copied in any form or by any means without the written permission of Western Power or unless permitted under the Copyright Act 1968 (Cth). Product or company names are trademarks or registered trademarks of their respective holders

© Western Power  
ABN 18540492861



# Contents

<b>Revision Details .....</b>	<b>3</b>
<b>1. Introduction .....</b>	<b>4</b>
1.1 Purpose and scope .....	4
1.2 Acronyms .....	4
1.3 Definitions .....	4
1.4 References .....	4
<b>2. Safety in Design .....</b>	<b>5</b>
<b>3. Transmission Line Easement .....</b>	<b>5</b>
3.1 Support Structure Deflection .....	6
3.1.1 Timber, Steel and Concrete Pole Deflection .....	6
3.1.2 Soil Condition .....	7
3.1.3 Steel Tower Deflection .....	7
3.1.4 Stayed Support Structure .....	8
3.2 Blowout .....	9
3.3 Safety Clearance .....	9
3.4 Typical Transmission Line Easement Width .....	9
<b>4. Clearances from Non-electrical Structures .....</b>	<b>9</b>
<b>5. Work Health and Safety Regulations .....</b>	<b>9</b>
<b>6. Transmission Underground Power Cable Easement .....</b>	<b>10</b>
<b>7. Vegetation Clearing .....</b>	<b>10</b>
7.1 Vegetation Clearance Zone .....	10
7.2 Vegetation Clearing Requirements .....	11
7.3 Sensitive and protective environmental areas .....	11
7.4 Clearing permits / approvals .....	12
7.5 Deviations .....	12
<b>Appendices .....</b>	<b>13</b>

## Revision Details

Version	Date	Summary of change
0	02/03/2017	Initial release
1	14/05/2021	New template and updated standard
2	30/10/2023	Change to AMS format
3	04/05/2026	New section on vegetation clearance requirements
4	26/05/2026	Added stay easement requirements

## 1. Introduction

Transmission line easements are established to manage activities that could breach safety standards and to ensure the protection of, and safe access to, the electricity network.

Registering an easement on a property serves as an early warning to landowners and developers, prompting engagement with Western Power to ensure that public safety and network assets are not compromised.

Beyond land use and development controls, vegetation near power lines can also affect network safety and reliability. While trees, shrubs, and other vegetation provide environmental and lifestyle benefits, vegetation that interferes with power lines presents a proven risk to public safety, the environment, and power supply reliability. For this reason, vegetation clearing is required.

### 1.1 Purpose and scope

This Standard specifies the factors affecting easement widths and requirements on vegetation clearing.

### 1.2 Acronyms

Acronym	Definition
Pa	Pascal (unit)
kV	Kilovolt (unit)
MOT	Maximum Operating Temperature (°C)

### 1.3 Definitions

Term	Definition
Easement	A type of interest that has been registered over a parcel of land. It provides the holder of the easement the right to use the land for a particular purpose even though they do not own the land. It provides a 'right of way', allowing Western Power workers to access, maintain and refurbish electrical infrastructure on private property.
Electrical clearance	A safe distance from electrical equipment/infrastructure.
Support Structure	General term for different structure types that support the conductors of the overhead electrical line.
Safety clearance zone	Used in the absence of a registered easement to describe the area adjacent to a power line within which AS/NZS 7000 clearance restrictions must be observed.

### 1.4 References

References which support implementation of this document

**Table 1.1 References**

Reference No.	Title
AS/NZS 1170.2:2011	Structural Design Actions – Wind Actions
AS 3818.1-2009	Timber – Heavy structural products – Visually graded. Part 1: General Requirements

AS/NZS 7000:2016	Overhead Line Design
	Work Health and Safety (General) Regulations 2022
	Energy Operator (Powers) Act 1979
	Environmental Protection Act 186

## 2. Safety in Design

The transmission line easement and clearance requirements must consider all safety aspects that can arise from the construction, operation, maintenance and decommissioning of the transmission line and other activities within the line corridor.

The Transmission Line Easement and Clearance Requirement Hazard Management Register (HMR)<sup>1</sup> captures and document what risks have been controlled by this standard, and what residual risks may remain that should be considered at the project design stages and construction.

## 3. Transmission Line Easement

An easement width is calculated as a distance measured both side from the centre line of the overhead power line. It is always parallel sided and should be at least equal to:

$$2 \times (\text{support structure deflection} + \text{blowout} + \text{safety clearance}) + \text{distance between outer conductors}$$

Where:

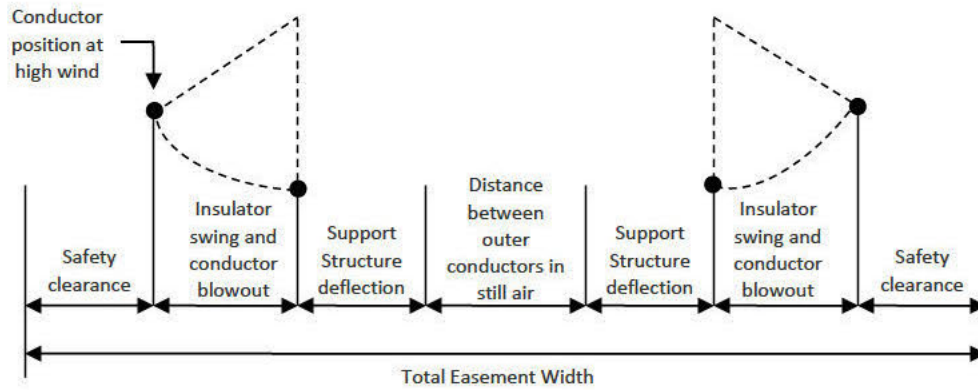
**Support Structure deflection:** greatest horizontal distance at tip of structure to the undeformed position of the tip of the structure which shall include lateral movement for short duration at serviceable wind and sustained deflection such as creep and foundation rotation.

**Blowout:** greatest horizontal distance the conductor of the longest span in the section moves under wind conditions. Insulator swing needs to be included when there are insulator strings used on suspension structures.

**Safety Clearance:** minimum clearance from electrical conductors to any non-electrical infrastructure such as structures and buildings as stipulated in AS/NZS 7000.

**Distance between outer conductors:** greatest horizontal separation between outer conductors on the support structure in still air.

<sup>1</sup> ID-005-06a2d58f61cc2226235dde6d6f1836f5



**Figure 3.1: Components of Easement Width**

### 3.1 Support Structure Deflection

Support structure deflection is taken as the lateral movement of the support structure under serviceable wind pressure of 500 Pa<sup>2</sup>.

It is measured from the tip of the structure to the undeformed position of the tip of the structure.

#### 3.1.1 Timber, Steel and Concrete Pole Deflection

The total deflection of a pole is a combination of both:

- Elastic - wind loading on structure
- Non-elastic deflection - foundation rotation (Appendix A.2) and creep/warping/shrinkage of timber poles.

**Table 3.1: Timber Pole (Overall Height up to 21.5m) Deflection**

Timber Pole <sup>3</sup>	Soil Condition <sup>4</sup>		
	Soft/Loose	Firm/Medium	Stiff/Dense
Total deflection <sup>5</sup>	1.8 m	1.4 m	1.2 m

<sup>2</sup> The serviceable wind pressure of 500 Pa only applies to areas in region A (all terrain categories) and region B (terrain categories 1 and 2 only) as defined in AS/NZS 1170.2. For other regions and terrain categories, the serviceable wind pressure shall be derived from a 50 year return period and an averaging time of 5 minutes.

<sup>3</sup> Pole degradation factor of 0.9 has been applied based on the pole diameter at the ground line. The pole shall be strength group S3 (according to AS 3818.1) or better as per T5000 standard requirement.

<sup>4</sup> Soil properties as defined in Table L1 and L2 of AS/NZS 7000 for cohesive and non-cohesive soils.

<sup>5</sup> Total deflection is based on the maximum allowable non-elastic deflection of 0.55 m. Timber poles with non-elastic deflection greater than 0.55 shall be considered as operating beyond its serviceability limit state and shall be rectified. For steel/concrete poles, the serviceability limit is 2 % of its effective pole length.

Table 3.2: Steel/Concrete Pole Deflection

Steel/Concrete Pole	Soil Condition <sup>4</sup>		
	Soft/Loose	Firm/Medium	Stiff/Dense
Fixity Point	½	⅓	200 mm <sup>6</sup>
Non-elastic deflection (Degree of foundation rotation)	1 °	0.5 °	0.5 °
Elastic deflection (wind)	3 % of pole effective length (Appendix A.3)		
<b>Total deflection</b>	<b>Non-elastic plus elastic deflection</b>		

### 3.1.2 Soil Condition

The firm/medium soil condition is a good representation of the typical soil encountered in Western Australia.

When determining the pole deflection, the criteria in Table 3.3 shall apply.

Table 3.3: Criteria for Determining Pole Deflection

Calculation Type	Soil Condition
Easement	Firm/Medium
Clearance	Actual Soil Condition

For clearance calculation, actual soil condition shall be considered. Where soil condition is identified to be soft/loose and the easement/clearance calculation is still within the allowable limit, then no further works is required. However, if it fails, then calculation based on improved soil condition shall be conducted with remedial works to improve the soil (should it satisfy the electrical clearance requirement) to occur prior to construction of the structure proposed to be located within the easement.

### 3.1.3 Steel Tower Deflection

For steel towers, the total maximum horizontal deflection shall be in accordance with Table 3.4.

Table 3.4: Steel Tower Deflection

Steel Tower Height	Total Deflection
Less than 35 m	0.5 m
Between 35 - 70 m	1.0 m

<sup>6</sup> For steel/concrete poles in good soil, the point of foundation rotation shall be taken as 200 mm below ground level. This shall also apply to all caisson foundation, irrespective of soil condition.

### 3.1.4 Stayed Support Structure

For any stayed support structure, the total maximum horizontal deflection shall be half the value of the un-stayed support structure. This is only applicable to stays under tension in the opposite direction (up to  $15^\circ$ ) and attached to at least half the structure's height above ground.

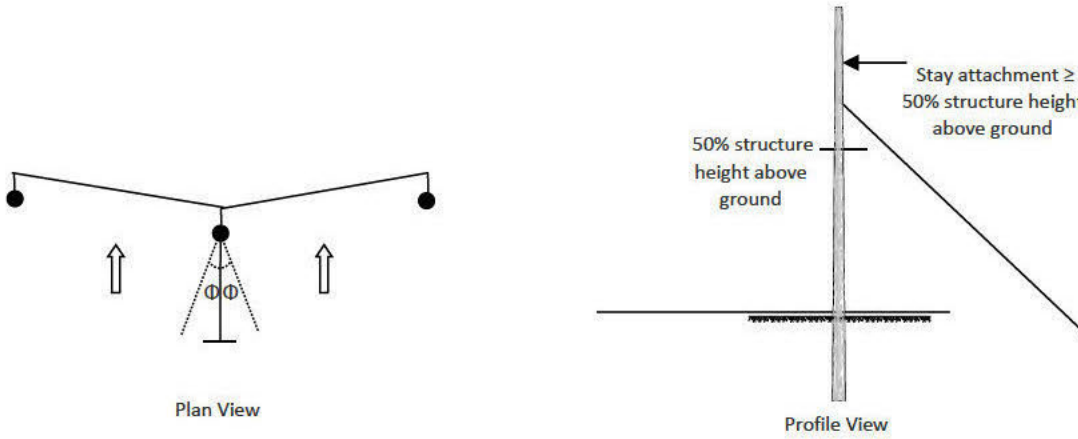


Figure 3.2: Effective Stay Configuration ( $\Phi \leq 15^\circ$ )

The stay easement shall be included if this sits outside the line easement. The stay easement width is measured 1m perpendicular from the stay centreline and extends 2m past the point where it enters the ground.

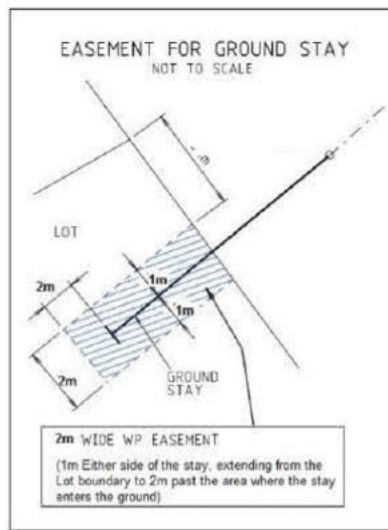


Figure 3.3: Ground stay or stay pole easement (outside of line easement)

### 3.2 Blowout

Blowout calculations for conductor (and insulator where required) shall be based on the following:

- 1) Conductor temperature 40 °C
- 2) Sag (including elongation due to wind)
- 3) Serviceable wind pressure of 500 Pa<sup>7</sup>

The method to determine the conductor blowout and insulator swing shall be in accordance with Appendix Q of AS/NZS 7000 or by using numerical analysis.

### 3.3 Safety Clearance

The safety clearance is taken as the horizontal electrical clearance required for the nominal voltage of the circuit according to AS/NZS 7000, Table 3.7.

Table 3.5: Horizontal Safety Clearances

33 kV < U ≤ 132 kV	3.0 m
132 kV < U ≤ 275 kV	4.5 m
275 kV < U ≤ 330 kV	5.0 m

### 3.4 Typical Transmission Line Easement Width

Registered easement shall be based on the calculated easement width.

For information on a range of typical easement width, refer to Western Power's website (reproduced in Appendix A.1 for ease of reference).

## 4. Clearances from Non-electrical Structures

The minimum electrical clearances from non-electrical structures set by AS/NZS 7000 (Figure 3.10 and table 3.7) is calculated from the point of the worst conductor swing or the maximum conductor sag, whichever governs. It shall be measured to the actual non-electrical structure's location within the span/s.

In addition to the minimum safe distances, consideration to allow for the encroachment shall also consider issues arising from induced voltages, electromagnetic fields and access for maintenance and construction.

## 5. Work Health and Safety Regulations

The minimum clearance requirements set by AS/NZS 7000 is the minimum electrical clearances to non-electrical structures. It does not apply to people, plant or materials used or working near the vicinity of overhead power lines. For this, section 166a of the Western Australian Work Health and Safety (General) Regulations 2022 stipulates a 6.0 m danger zone from the live overhead power line of a voltage exceeding 33 000 volts which must be kept clear.

<sup>7</sup> The serviceable wind pressure of 500 Pa only applies to areas in region A (all terrain categories) and region B (terrain categories 1 and 2 only) as defined in AS/NZS 1170.2. For other regions and terrain categories, the serviceable wind pressure shall be derived from a 50 year return period and an averaging time of 5 minutes.

## 6. Transmission Underground Power Cable Easement

Easements for transmission underground power cable shall be a minimum width of 3 m from the outermost cables of the circuit or circuits.

## 7. Vegetation Clearing

The vegetation clearing requirements set out in this Standard apply to the construction of new transmission line projects (132 kV and above), as well as to modifications of existing in-service brownfield transmission lines.

Volumetric asset replacement work is excluded.

### 7.1 Vegetation Clearance Zone

The vegetation clearance zone (D) at construction for future operations and maintenance is the physical space around power lines (envelope), which is to be kept clear of vegetation. It should be at least equal to:

**D = minimum approach distance for authorised vegetation management workers<sup>8</sup> + vegetation regrowth zone for future maintenance**

Vegetation regrowth must be 3m for both metro and rural areas.

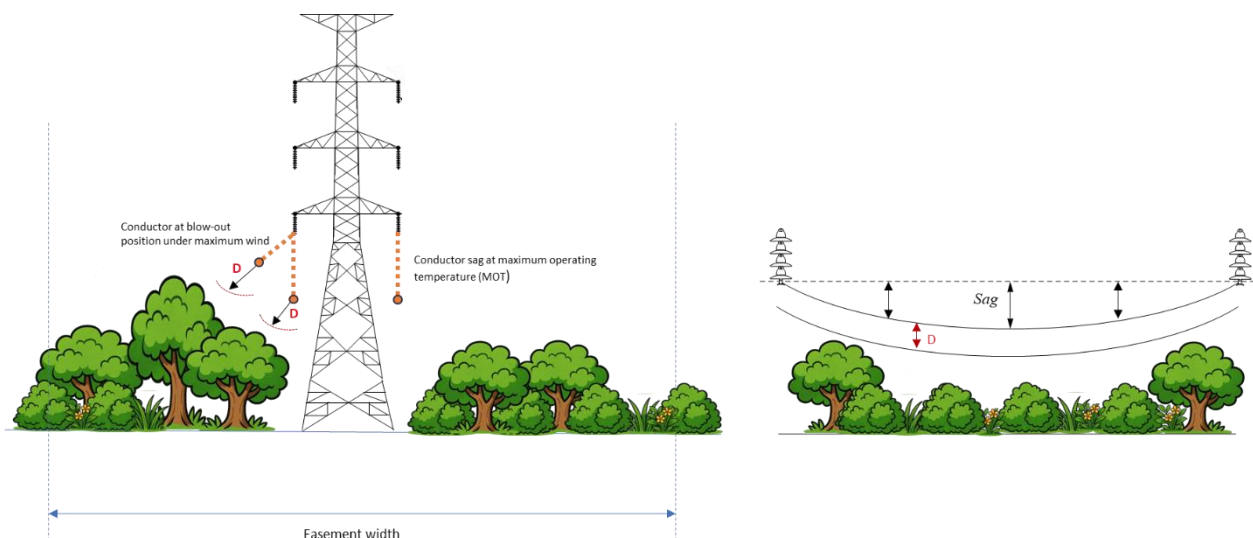


Figure 4: Vegetation clearance zone

<sup>8</sup> Electrical System Safety Rules table 9, column B – vegetation clearance for overhead line workers and HV live line workers undertaking vegetation management

## 7.2 Vegetation Clearing Requirements

Vegetation clearing requirements applicable to the construction of transmission lines shall be in accordance with Table 7.1 and Appendices A.4 to A.7.

**Table 7.1: Vegetation Clearing Requirements**

	Greenfield/New transmission Lines	Modification to existing/brownfield transmission lines
Vegetation between outermost conductors	Vegetation between outermost conductors that has potential to grow into vegetation clearance zone (D) to be <b>cleared to ground</b> .	Vegetation between outermost conductors that has potential to grow into vegetation clearance zone (D) to be <b>cleared to ground or trimmed</b> to outside the vegetation clearance zone (D)
Vegetation from outermost conductors to edge of easement	Vegetation must not encroach into vegetation clearance zone (D). Vegetation to be trimmed/cut back where required.	
Hazardous falling trees (both inside and outside the easement)	Trees within falling distance to the power line (considering maximum conductor sag position at maximum operating temperature - MOT) shall be <b>cleared to ground</b> .	Trees within falling distance to the power line (considering maximum conductor sag position at maximum operating temperature - MOT), shall be <b>cleared to ground or trimmed</b> to below the height of lowest conductor position at MOT
Structure work platform	Vegetation to be permanently removed for tower and pole work platform	
Access tracks	Vegetation to be permanently removed for access tracks. These to be built as close as practically possible alongside the line and connecting the poles/towers for safe access to the structures	
Overhanging vegetation	Vegetation overhanging the overhead line is not permitted	

## 7.3 Sensitive and protective environmental areas

Where vegetation exists within environmentally sensitive areas and with the potential to grow into the vegetation clearance zone (D), it shall be trimmed or cut back. Vegetation must be cut / trimmed to outside the required vegetation clearance zone for construction (D).

Environmental sensitive areas include:

- Areas containing threatened flora or fauna species protected under environmental legislation.
- The site falls within a protected area, such as a conservation reserve, national park, or heritage-listed land.
- Landowner or Traditional Owner agreements are pending or unresolved.
- Cultural heritage assessments have identified sites of significance.
- Soil instability or erosion risks that make clearing unsafe or environmentally damaging.

#### **7.4 Clearing permits / approvals**

Western Power must comply with the obligations outlined in the Environmental Protection Act and operates within the requirements of the Energy Operator (Powers) Act.

The Energy Operator (Powers) Act does not, in all cases, give Western Power the ability to maintain an easement (i.e. clear vegetation) that has not been cleared previously.

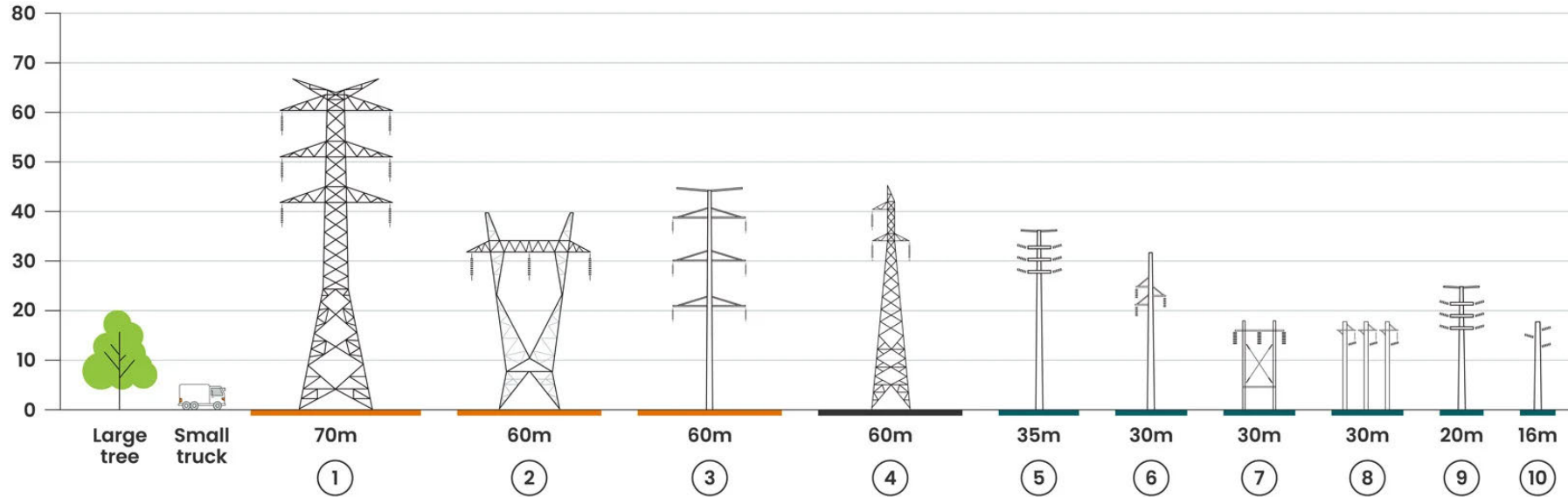
Therefore, Western Power requires a clearing permit over the entire easement area to allow it to perform ongoing maintenance (i.e. vegetation management) and to operate the line.

#### **7.5 Deviations**

Deviations from this guidance require written approval from Western Power's Asset Performance Function. Any proposed deviations are to be supported by a documented risk assessment and signed off by relevant parties.

## Appendices

### A.1 Typical Overhead Transmission Line Easement Width<sup>9</sup>



**1.**  
330kV Double Circuit  
Steel Lattice Tower

**2.**  
330kV Single Circuit Steel  
Lattice Tower (Low Profile)

**3.**  
330kV Double Circuit  
Steel Pole

**4.**  
220kV Single Circuit  
Steel Lattice Tower

**5.**  
132kV Double Circuit Steel  
Pole (Rural)

**6.**  
132kV Single Circuit  
Steel Pole (Rural)

**7.**  
132kV Single Circuit Wood  
Pole (Rural)

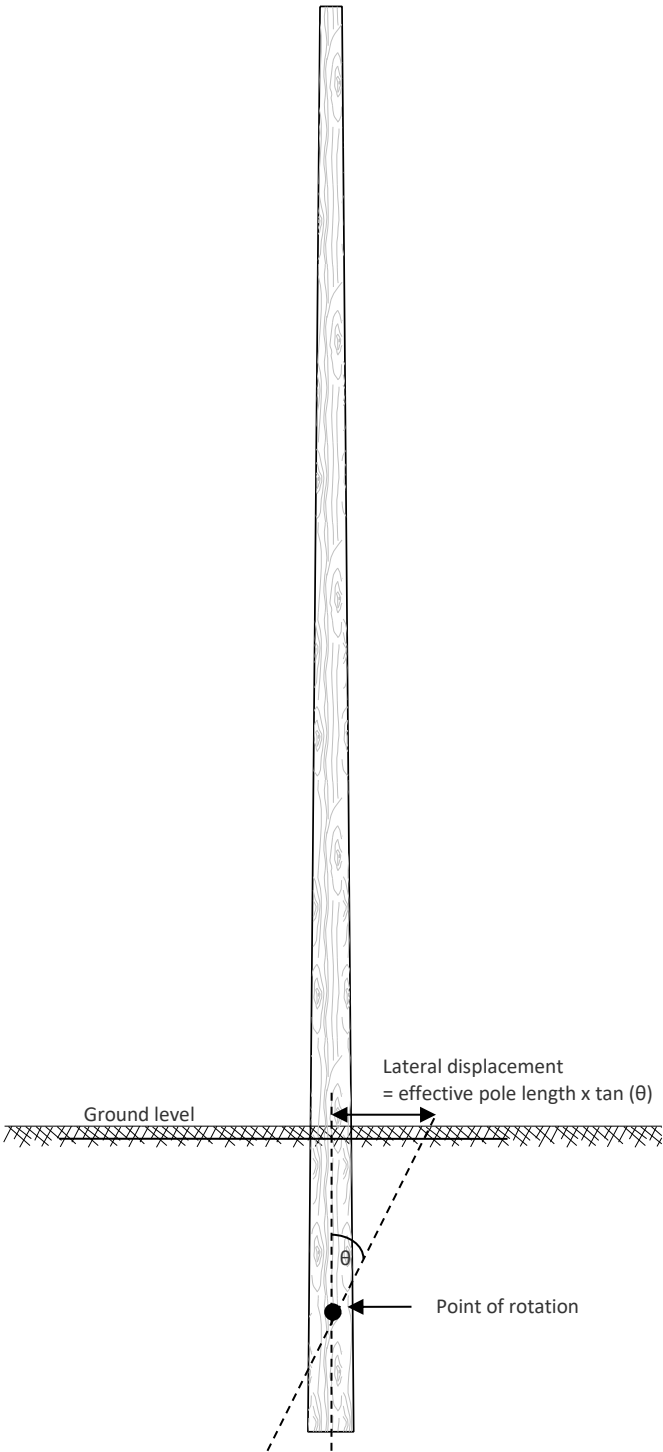
**8.**  
132kV Single Circuit  
Wood Pole (Rural)

**9.**  
132kV Double Circuit  
Steel Pole (Metro)

**10.**  
132kV Single Circuit  
Wood/Steel Pole (Metro)

<sup>9</sup> Western Power website - [https://www.westernpower.com.au/safety/safety-at-home/our-infrastructure-around-homes/transmission-line-easement-landowner-obligations/?\\_sq= easement](https://www.westernpower.com.au/safety/safety-at-home/our-infrastructure-around-homes/transmission-line-easement-landowner-obligations/?_sq= easement)

A.2 Foundation Rotation



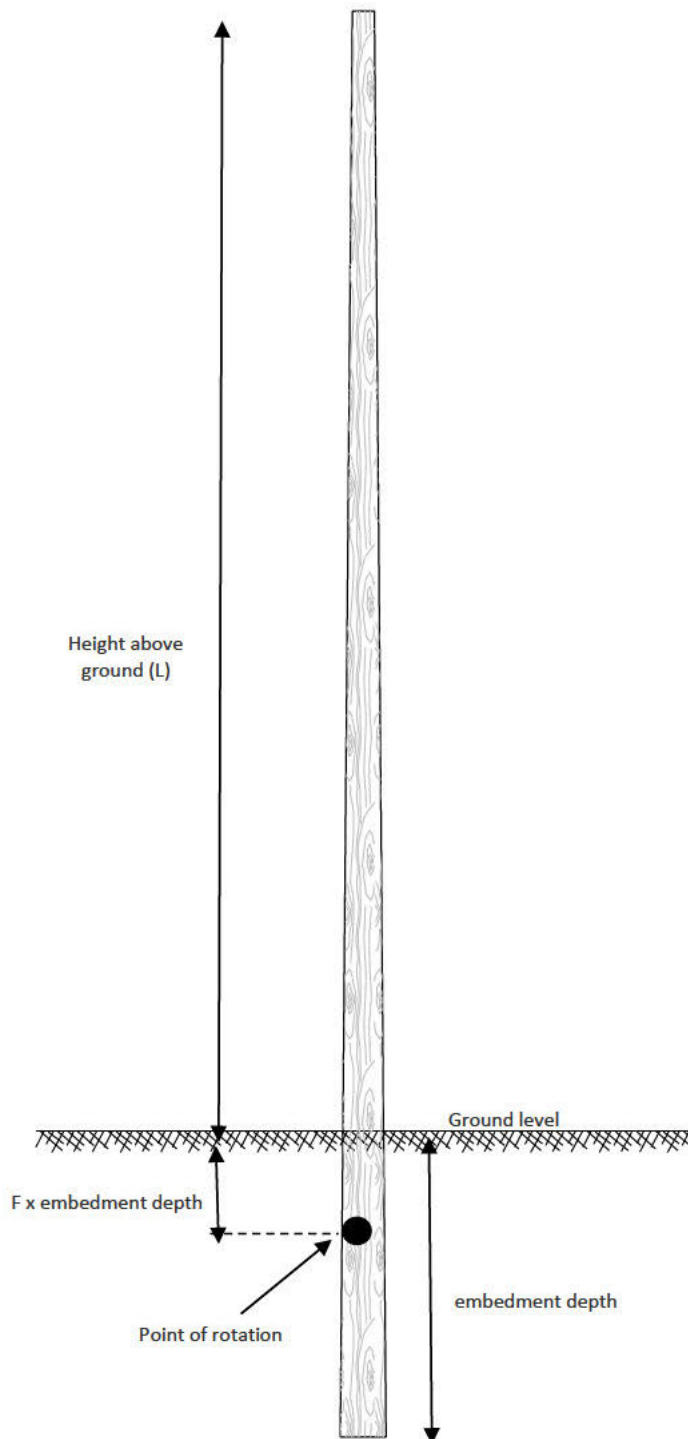
### A.3 Pole Effective Length

A pole's effective length is determined by:

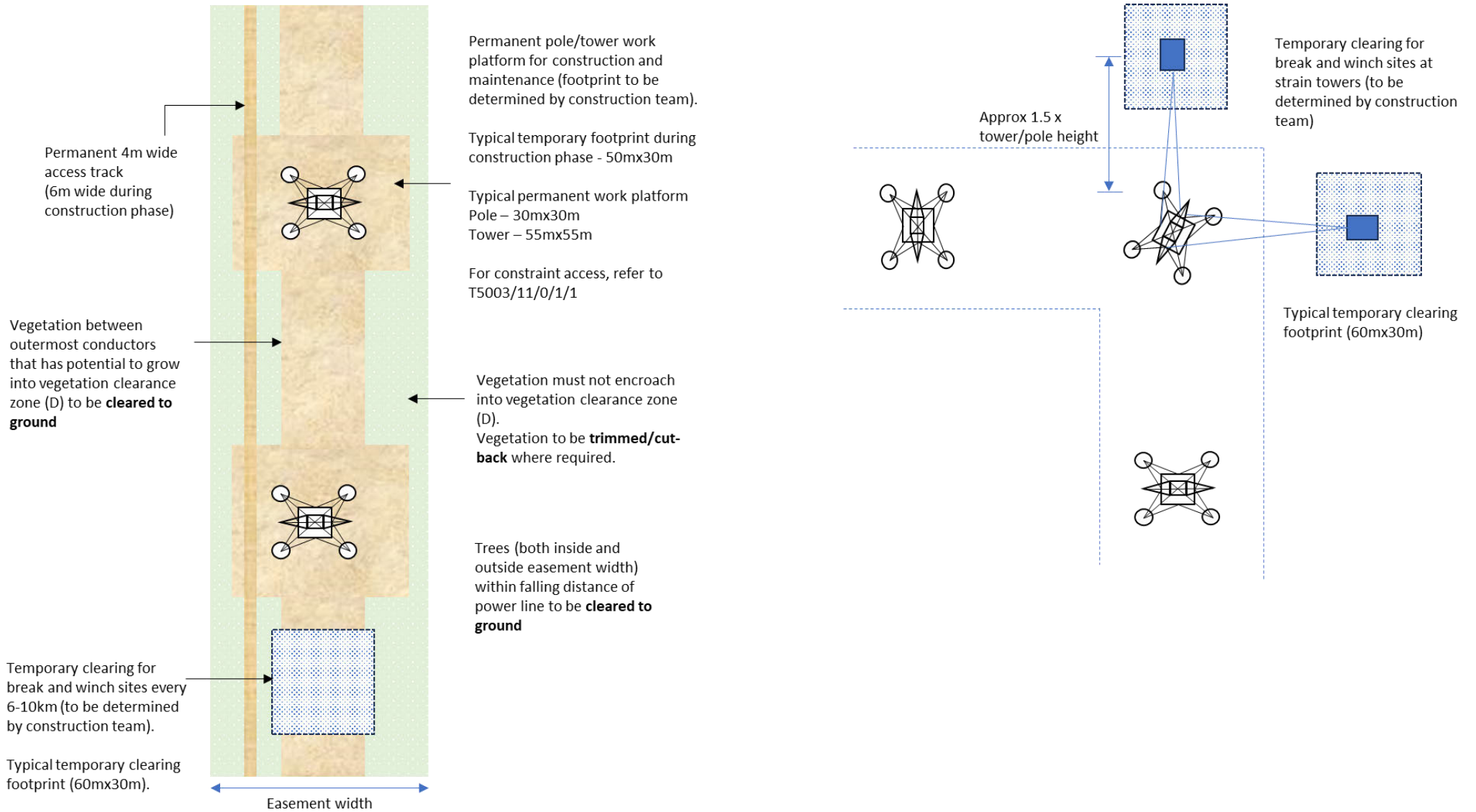
$$PoleEffectiveLength(m) = L + F \times embedmentdepth$$

where  $L$  is the pole height above ground

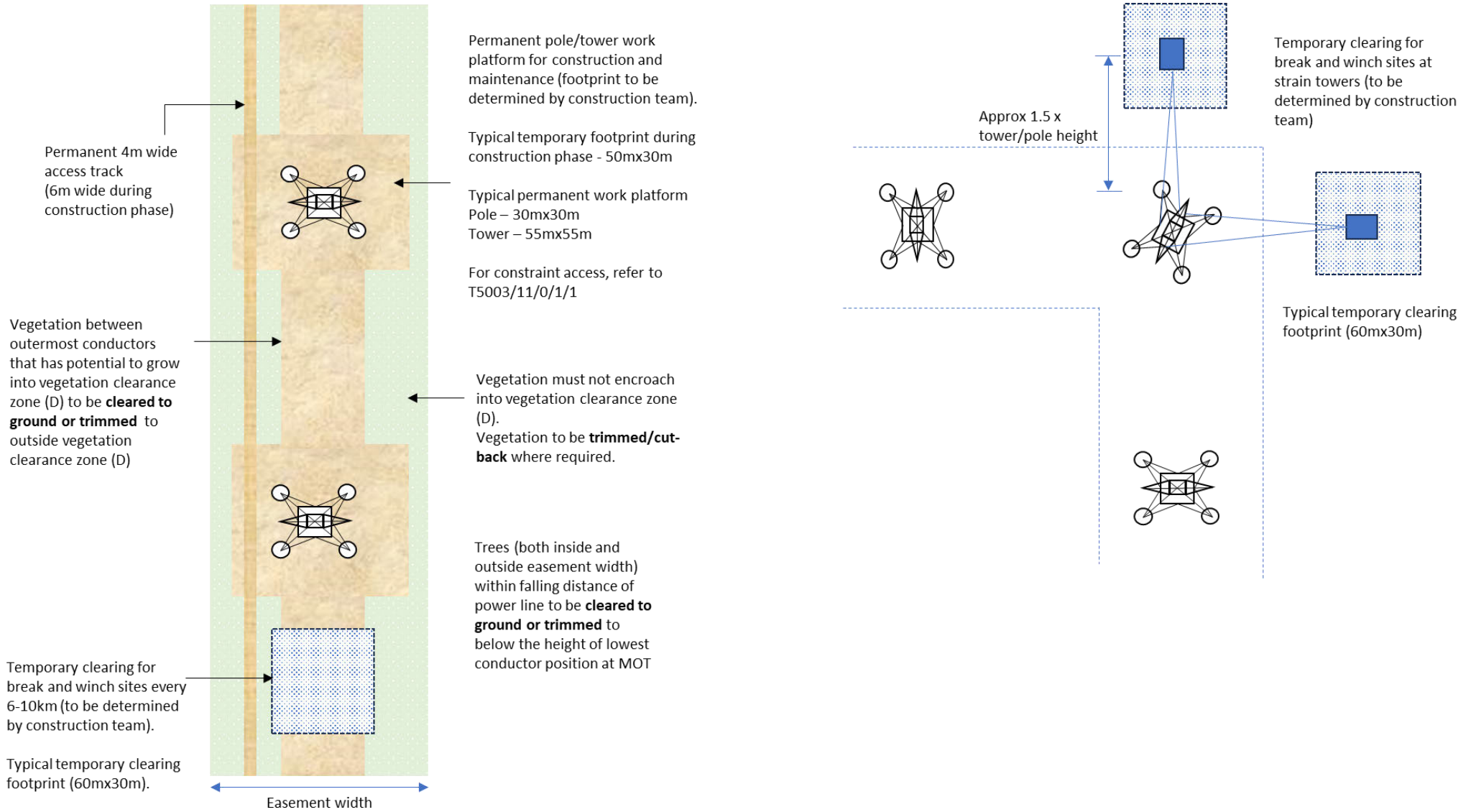
$F$  is the % embedment depth to the point of rotation (fixity point).



## A.4 Greenfield Projects – Vegetation Clearing Plan View



## A.5 Brownfield Projects – Vegetation Clearing Plan View



## A.6 Vegetation Clearing General Arrangement – 132kV Steel Pole

NOTE:

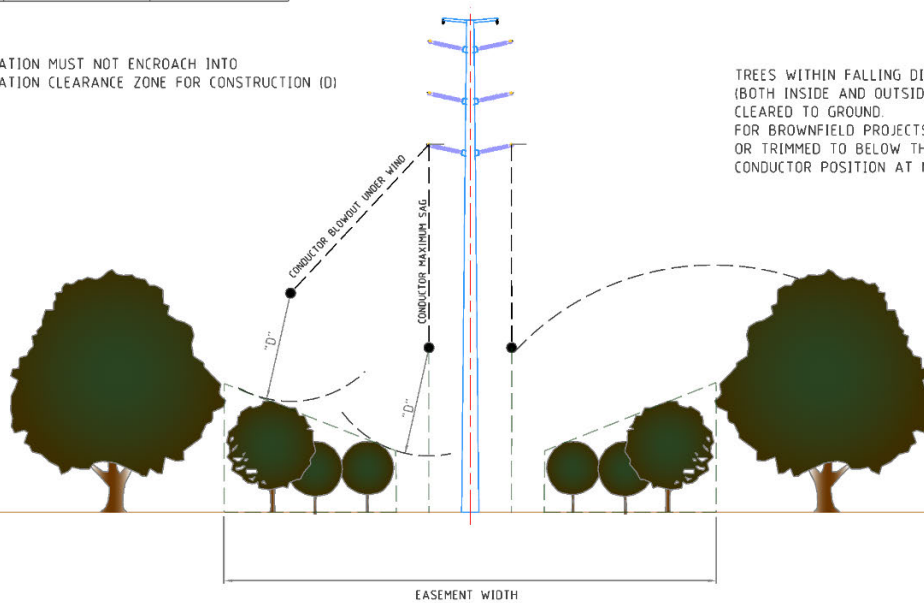
- 1- VEGETATION CLEARANCE ZONE FOR CONSTRUCTION (D) = VEGETATION CLEARANCES FOR OVERHEAD LINE WORKERS + VEGETATION REGROWTH ZONE FOR FUTURE MAINTENANCE.
- 2- REFER TO OF ELECTRICAL SYSTEM SAFETY RULES (ESSR) FOR VEGETATION CLEARANCES FOR OVERHEAD LINE WORKERS.
- 3 - THE GENERAL ARRANGEMENT SHOWN APPLIES TO A 132kV STEEL POLE, HOWEVER, IT CAN BE EXTRAPOLATED TO OTHER VOLTAGES USING THE VALUES IN TABLE 1.

TABLE 1

VOLTAGE	CLEARANCE	REGROWTH	TOTAL (D)
132kV	1400mm	3000mm	4400mm
220kV	3000mm	3000mm	6000mm
330kV	4000mm	3000mm	7000mm

VEGETATION MUST NOT ENCROACH INTO VEGETATION CLEARANCE ZONE FOR CONSTRUCTION (D)

TREES WITHIN FALLING DISTANCE TO THE POWER LINE (BOTH INSIDE AND OUTSIDE THE EASEMENT) SHALL BE CLEARED TO GROUND. FOR BROWNFIELD PROJECTS, THEY SHALL BE CLEARED TO GROUND OR TRIMMED TO BELOW THE HEIGHT OF THE LOWEST CONDUCTOR POSITION AT MOT.



## A.7 Vegetation Clearing General Arrangement – 330kV Steel Tower

**NOTE:**

- 1- VEGETATION CLEARANCE ZONE FOR CONSTRUCTION (D) = VEGETATION CLEARANCES FOR OVERHEAD LINE WORKERS + VEGETATION REGROWTH ZONE FOR FUTURE MAINTENANCE.
- 2- REFER TO OF ELECTRICAL SYSTEM SAFETY RULES (ESSR) FOR VEGETATION CLEARANCES FOR OVERHEAD LINE WORKERS.
- 3- THE GENERAL ARRANGEMENT SHOWN APPLIES TO A 330kV STEEL TOWER, HOWEVER, IT CAN BE EXTRAPOLATED TO OTHER VOLTAGES USING THE VALUES IN TABLE 1.

TABLE 1

VOLTAGE	CLEARANCE	REGROWTH	TOTAL (D)
132kV	1400mm	3000mm	4400mm
220kV	3000mm	3000mm	6000mm
330kV	4000mm	3000mm	7000mm

