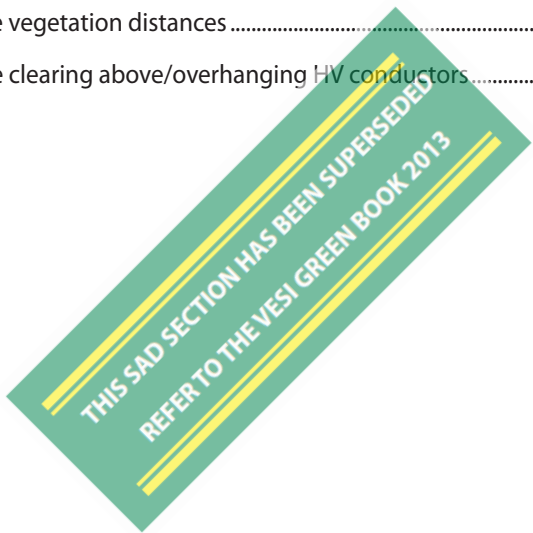


SAFE APPROACH DISTANCES

SECTION 8

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1. GENERAL

Electrical apparatus must never be assumed to be dead, de-energised or isolated and unnecessary approach to electrical apparatus or unnecessary contact with parts regarded as alive shall be avoided. Clearances shall be maintained until the proven status of electrical apparatus and application of organisational procedures allows otherwise; e.g. Access Permit. Necessary approach shall be restricted to the period required to perform the work.

In emergency situations where there is a risk of electric shock to persons from electrical conductors or apparatus, (e.g. fallen conductors), prompt action shall be taken to ensure ordinary people are kept clear of the hazard; 6 metres for HV or 2 metres for LV conductors.

Only approved and tested equipment shall be permitted to be brought within the exclusion zone or in direct contact with live high voltage conductors. Equipment is any instrument or device designed for use in the vicinity of, or direct contact with live high voltage conductors.

Only an appropriately authorised person/s may place the insulated portion of an electrically tested EWP in contact with exposed live low voltage conductors.

To maintain Safe Approach Distances from overhead conductors, appropriate allowance shall be made for sag and sway under a variety of conditions.

Safe Approach Distances vary according to the individual and their training. Persons are classified under the following headings:

- a. **Authorised Person** means a person with technical knowledge or sufficient experience who has been approved, or has the delegated authority to act on behalf of the organisation, to perform the duty concerned.
- b. **Instructed Person** means a person adequately advised or supervised by an authorised person to enable them to avoid the dangers which electricity may create.
- c. **Ordinary Person** means a person without sufficient training or experience to enable them to avoid the dangers which electrical apparatus may create.

NOTE: For the purpose of this section, Ordinary Person means the same as in the definitions of the 2006 Green Book, i.e. a person under the control of a Network Operator or HV Customer.

2. LIMITS OF APPROACH AND SAFE APPROACH DISTANCE PRINCIPLES

Historically 'Limits of Approach' principles have applied as personal and plant clearances in Victoria. This was defined as:

"The minimum distance beyond the reach of any part of the person's body or any conducting or unapproved object touching any part of the person's body".

'Safe Approach Distances' are based on an "exclusion zone" principle. Exclusion Zone Principles can be defined as:

"The minimum distance that shall be maintained by a person, vehicle or mobile plant (including its load, controlling ropes and any other accessories) when approaching electrical apparatus other than for work in accordance with an Access Authority".

Safe Approach Distance wording has been adopted by the VESI to align with National Electricity Network Safety Code - Guidelines for Safe approach Distances to Electrical.

Refer Figure 1 below and Figure 2 over page.

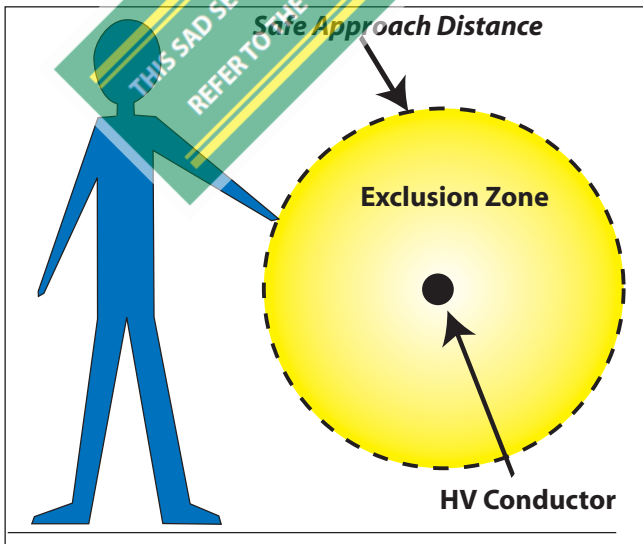


Figure 1. Safe Approach Distance Application

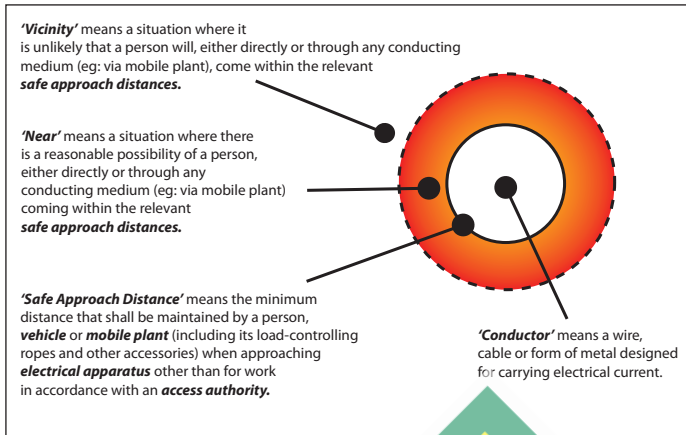


Figure 2. Illustration of differences between Safe Approach Distance, Near and Vicinity

Safe Approach Distance - Special

'Safe Approach Distance – Special' applies only to Authorised persons. The Safe Approach Distance has been determined using risk analysis methods.

Safe Approach Distance – Special must be used in conjunction with the following control measures:

- The Authorised Person has been specifically trained and approved to perform the work at the Safe Approach Distance - Special.
- On site risk assessments have been conducted.
- Safety observers shall be used to monitor the work activities.
- Control of inadvertent body movement by the use of insulating barriers, insulated plant and appliances and controlled body movements.
- The exposure time of the Authorised Persons working at the Safe Approach Distance - Special is minimised.
- External influences on plant and equipment, e.g. traffic, stabiliser footings are removed or controlled.
- Addressing adverse impact of weather and environmental conditions (e.g. rain, lightning, wind, light, sag or sway of conductors).

- The Safe Approach Distances - Special shall be maintained from any part of the persons body or any conducting or unapproved object touching any part of the persons body by using controlled movement.
- By considering the documented control measures the application of Safe Approach Distance - Special allows closer than "normal" approach, whilst taking into account overhead proximity, controlled upper limb movement horizontally from the worker's body and any tool being used.

If these controls cannot be applied, Access Authorities shall be issued or live work techniques shall be applied.

The Safe Approach Distance - Special principle is demonstrated in Figure 3.

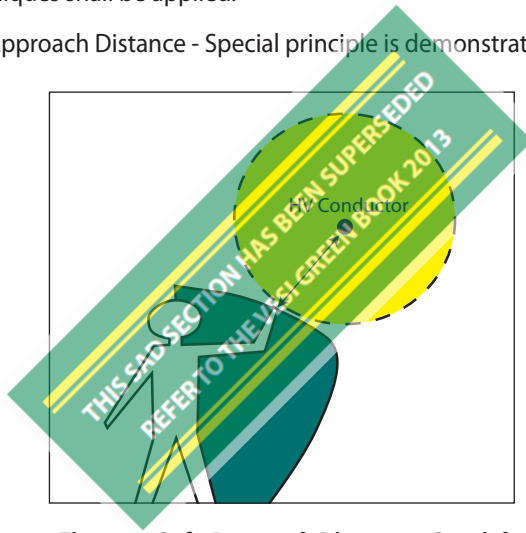


Figure 3. Safe Approach Distance – Special

As described in the 2006 Green Book, Safe Approach Distances are now the minimum clearance requirements for electrical work in Victoria. Refer to Table 1 for clearances.

Table 1 – Safe Approach Distance for Ordinary Persons, Instructed Persons or Authorised Persons

Ordinary Persons		Safe Approach Distance for Instructed Persons & Authorised Persons	Safe Approach Distance – Special for Authorised Persons Only, Refer Clause 6.2.3.	Authorised Live HV Electrical Workers
All Safe Approach Distances Apply to Bare Conductors Unless Otherwise Indicated		Safe Approach Distance (Notes 1 and 2) Millimetres	Safe Approach Distance (Notes 1 and 2) Millimetres	Safe Approach Distance (Notes 1 and 2) Millimetres
Nominal Phase to Phase AC Voltage kV	Safe Approach Distance Refer Notes 1 to 3 Millimetres			
LV including communications catenary connected to LV neutrals insulated LV	1500			
Earthed metallic screened HV Insulated Conductor	100			
Unscreened Insulated HV Conductor up to and including 66	2000			
HV up to and including 22		2000	700	
33	2000	700		
50	2000	750		
66	2000	900		
110	3000	1000		
132	3000	1200		
220	4000	1700		
275	5000	2300		
330	6000	2700		
400	6000	3300		
500	6000	3600		
Nominal Pole to earth DC Voltage (kV) 1.5 or less	1500	Instructed Persons – no contact Authorised Persons – Insulated contact only		
+/- 25	2000	700		
+/- 85	3000	1000		
+/- 150	3000	1200		
+/- 270	4500	1800		
+/- 350	5000	2500		
+/- 400	6000	2900		

NOTES

1. Deliberately avoid movements that could result in distances being infringed.
2. The distances specified are based on work from a stable surface. Appropriate allowance shall be made for conductor sag and sway.
3. These figures are the minimum Safe Approach Distance that shall be used by Ordinary Persons. For approach closer than these distances an Ordinary Person would need to become an Instructed Person.
4. When conducting G&B work up to and including 33KV, use the Safe Approach Distance of 700mm for 50 & 66KV conductors adjacent to the work area.
5. Insulated Live Line Stick (Hot Stick) work methods require the personal clearance to remain at 380 / 680 mm at all times.

COMMENT: Ordinary persons outside of the VESI refer to Electricity Safety (Network Asset) Regulations or "No Go Zone" Guidelines, as appropriate for "Safe Approach Distance".

THIS ACTION HAS BEEN SUPERSED
REF TO THE VESI GREEN BOOK

3. NO GO ZONE

In 1998 and 1999 a number of fatalities, serious injuries and near misses of members of the public occurred involving contact with overhead electrical distribution or transmission assets. As a result of industry, unions and regulatory authorities working together, new “rules” were introduced in relation to working near overhead powerlines. These rules were launched in October 1999 and given the title “No Go Zone” (NGZ).

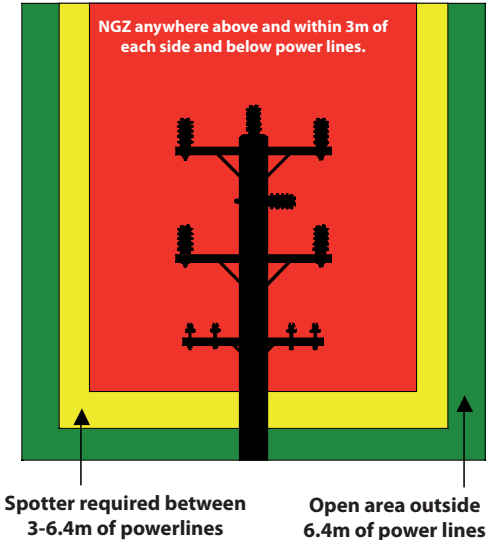
This section is provided so field workers can provide directions to non-VESI persons approaching or working in the vicinity of electricity company assets.

The NGZ rules apply only to non-VESI persons undertaking work near overhead powerlines. They provide greater clearances than those outlined in the Network Assets Regulations and are interpreted in a simplified manner.

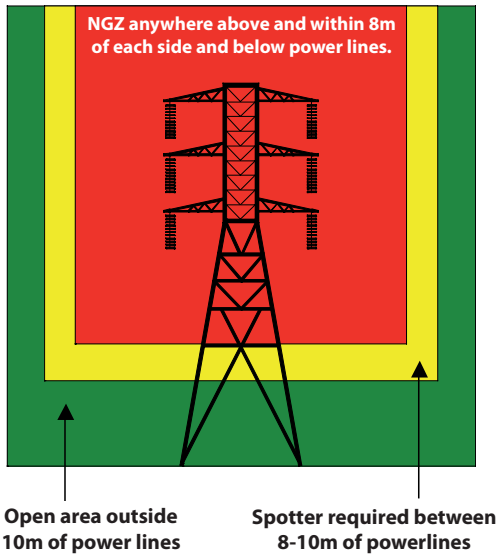
The NGZ rules define the differing requirements for 3 zones.

RED ZONE	No Go Zone. Written permission from the Network Operator required to undertake works. (Refer to VESI NGZ Guidelines).
YELLOW ZONE	Trained and registered spotter, (Safety Observer) required.
GREEN ZONE	Open area. Normal safe work practices and precautions apply.

No Go Zone for Distribution & Sub-Transmission lines



No Go Zone for Transmission



SEC8:

Not to Scale

4. VEGETATION CLEARING – SAFE APPROACH DISTANCES AND SAFE VEGETATION DISTANCES FOR INSTRUCTED OR AUTHORISED PERSONS

The Safe Approach Distances for Instructed or Authorised Persons are detailed in the 2006 Green Book (the Code Of Practice on Electrical Safety for the Distribution Businesses in the Victorian Electricity Supply Industry) (Section 6). Clause 6.2.5 describes Safe Approach Distance: Vegetation Clearing – General.

Safe Vegetation Distance described in this document means the minimum separation in air that should be maintained between vegetation and live electrical apparatus when performing vegetation management work.

Any safe system of work employed to undertake vegetation clearing near overhead powerlines shall result in the achievement of both the Safe Approach Distances and Safe Vegetation Distances. The preferred method of controlling risk is by the inclusion of a second level of precaution into the safe system of work. (eg. insulated workplatforms and insulated tools.)

The clearing of vegetation adjacent to overhead powerlines by Instructed or Authorised Persons using climbing or ground based methods must comply with any additional specific network operator control procedures. These procedures shall ensure that any climbing and ground based clearing methods provide at least the appropriate Safe Approach Distances for persons (and tools) as well as the minimum Safe Vegetation Distances at all times. Climbing and ground based clearing methods may require additional clearances and controls to ensure a safe system of work is maintained.

Special considerations for vegetation work near powerlines¹

The Safe Approach Distance for persons and mobile plant are specified for ideal environmental, weather and working conditions. Allowances must be made for the effects of ambient temperature, conductor temperature, network fault current (surge), wind and other environmental influences on overhead powerline sag and sway while vegetation management work is in progress. In practice, extra safety clearance should be considered when working adjacent to powerlines towards the centre of the span to ensure that appropriate Safe Approach Distances are maintained at all times.

¹ 2006 Green Book – Table 1 Safe Approach Distance for Ordinary Persons, Instructed Persons or Authorised Persons

2006 Green Book – Table 2 Safe Approach Distances for Vehicles (Excepting Mobile Plant when in the Working Mode)

2006 Green Book – Table 3 Safe Approach Distance for Mobile Plant when in the Working Mode

2006 Green Book – Table 4 Safe Approach Distances to Conductors for insulated Mobile Plant when operated by persons instructed or authorised to work on or near exposed conductors.

Factors regarding conductor movement to consider include:

- Positioning of plant and persons and the method of cutting of limbs.
- Sway – Conductors can move unexpectedly due to causes such as wind, fault currents or impacts. Under fault conditions movement may be sudden and extreme, in excess of the full sag at everyday temperatures.
- Sag –While tree limbs don't normally move upwards conductors may move downwards due to possible causes including, conductor temperature rise, wind, fault currents and impacts.
- The type of construction (for example suspension insulators allow more conductor movement than post insulators).

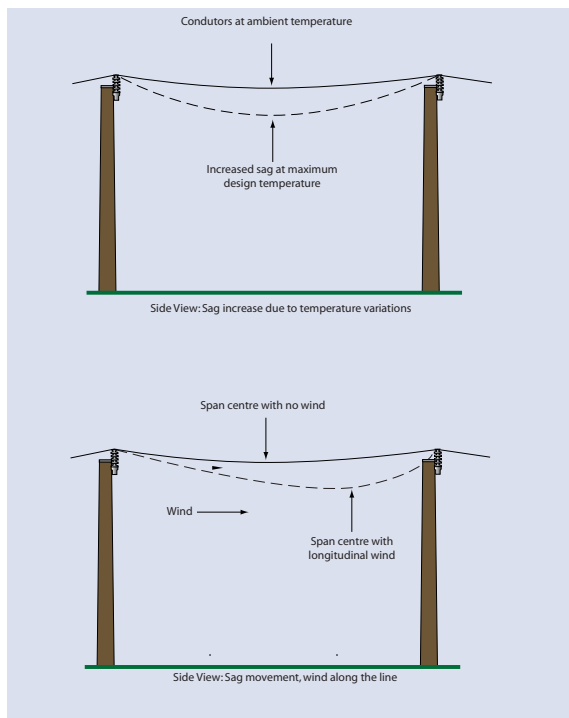


Figure 1 – Conductor Sag and Sway (Side Elevation)

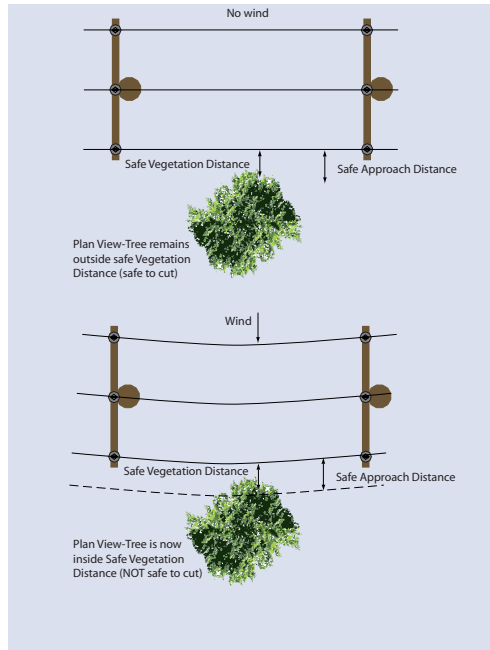


Figure 2 – Conductor Sag and Sway (Plan View)

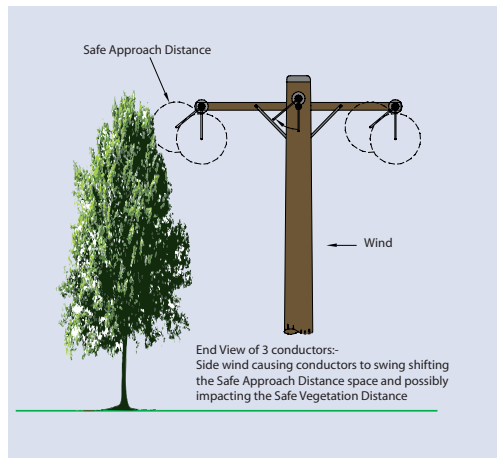


Figure 3 – Conductor Sag and Sway (Section Elevation)

Safe vegetation distances

Instructed or Authorised Persons, whilst at all times maintaining appropriate Safe Approach Distances and provided an appropriate risk assessment has been completed and deemed safe, can clear vegetation which is no closer than the distances in Table 1 – Safe Vegetation Distances.

Issues to be considered as part of a Risk Assessment prior to commencing work shall include:

- The suppression of Auto-reclose
- Positioning the 'mobile plant' and persons such that Safe Approach Distances can be maintained in all circumstances.
- The use of 'Safety Observers' and barriers and signs.
- Consideration of weather and environmental conditions;
 - rain
 - wind
 - light
 - sag or sway of conductors
- Consideration of changes in current flow in conductors
 - fault surge
 - network switching
- Movement of the tree when cut
- The use of 'insulated barriers', protective covers and 'insulated' equipment
- De-energising the electrical apparatus
- Isolating and earthing the electrical apparatus
- Using insulated tools and equipment
- A safe means and method of controlling the movement of limbs being cut

Tree limbs shall be considered as conductive (electrically unapproved) objects when in the vicinity of HV conductors.

The vegetation distances more than the minimum requirements in Table 1 – Safe Vegetation Distances (detailed below) have been assessed as providing sufficient flashover protection for Instructed or Authorised Persons working at appropriate Safe Approach Distances provided there is a safe system of work employed to undertake the task.

The Safe Vegetation Distances in Table 1 – Safe Vegetation Distances for vegetation below conductors is less than the Safe Vegetation Distance for vegetation beside conductors because a cut limb will not normally move upward. Means of controlling the movement of limbs being cut shall be made via an appropriate risk assessment undertaken prior to commencing the task and action taken as appropriate.

Table 1 – Safe Vegetation Distances

VOLTAGE	SAFE VEGETATION DISTANCE
Up to 1000V	Trees can be touching
Above 1000V and up to and including 22kV	(A) Below – 300mm (B) Beside – 700mm (C) Above/Overhanging – Not Permitted
Above 22kV and up to and including 66kV	(A) Below – 400mm (B) Beside – 900mm (C) Above /Overhanging – Not Permitted

Tree clearing permitted if vegetation is located outside Zone (C) for Instructed or Authorised persons provided Safe Approach Distances are maintained.

Vegetation located within, and or tree clearing in this zone, can only be undertaken by Authorised HV Live Line Persons or under access permit conditions.

Instructed or Authorised Persons may clear limbs above/overhanging low voltage conductors with the conductors 'alive' provided movement of limbs being cut can be controlled.

Tree clearing above/overhanging HV conductors

Only Authorised HV Live Line persons are permitted to clear tree limbs above/overhanging live HV conductors using appropriate Live Line procedures. Only Authorised HV Live Line persons are permitted to clear vegetation from an EWP positioned over the top of live HV conductors.

Information regarding Live Line Tree Cutting and Limb Removal in and around High Voltage Conductors is contained in Appendix B of the Energy Safe Victoria 'Minimum Rules for Carrying Out High Voltage Live Line Work in Victoria'.

Tree clearing can only be undertaken by Instructed or Authorised Persons above/overhanging HV conductors under appropriate access authority arrangements (ie – de-energised conditions).