

**A handbook  
for workplaces**

# Using earthmoving equipment near overhead electrical assets

Edition No. 1  
December 2009



On 18 June 2017, the Occupational Health and Safety Regulations 2017 (OHS Regulations 2017) replaced the Occupational Health and Safety Regulations 2007 (OHS Regulations 2007), which expired on this date. **This publication has not yet been updated to reflect the changes introduced by the OHS Regulations 2017 and should not be relied upon as a substitute for legal advice.**

Information on the key changes introduced by the OHS 2017 Regulations can be found in the guidance titled *Occupational Health and Safety Regulations 2017: Summary of changes* - available at [https://www.worksafe.vic.gov.au/\\_data/assets/pdf\\_file/0011/207659/ISBN-OHS-regulations-summary-of-changes-2017-04.pdf](https://www.worksafe.vic.gov.au/_data/assets/pdf_file/0011/207659/ISBN-OHS-regulations-summary-of-changes-2017-04.pdf). However, this guidance document contains material of a general nature only and is not to be used as a substitute for obtaining legal advice.

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The information presented in this publication is intended for general use only. It should not be viewed as a definitive guide to the law, and should be read in conjunction with the *Occupational Health and Safety Act 2004* and the *Occupational Health and Safety Regulations 2007*.

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# Introduction

Construction contractors are often required to undertake work involving powered mobile earthmoving equipment under or adjacent to powerlines or other electrical assets. Work near energised electrical installations (including overhead electrical assets) is defined as high risk construction work under the Occupational Health and Safety Regulations 2007 as it poses a significant risk to people's safety.

Contractors working near electrical assets have obligations under both the *Electrical Safety Act 1998* and the *Occupational Health and Safety Act 2004* (OHS Act). This handbook provides practical advice on how to create a safe working environment specifically when using earthmoving equipment near overhead electrical lines and assets. Employers who implement these guidelines are deemed to have met their obligations regarding the risks of working near overhead electrical assets.

# Scope

The guidelines in this handbook apply to any work involving the use of earthmoving equipment near low and high voltage assets (up to and including 66 kV) where the assets are on power poles.

The handbook provides guidance on:

- managing the risks associated with **working near overhead electrical cables** including high and low voltage distribution conductors, farm type single wire earth return (SWER) lines, service cables to premises and telecommunications cables
- **working near other overhead assets that conduct electricity** such as electrical transformers that are usually mounted lower than the conducting cables and, therefore, pose an additional risk.

This guide applies to any crown, public or private land or roadway.

It **does not** provide guidance on:

- work conducted near transmission towers
- work near underground assets
- work near ground-mounted electrical equipment such as kiosk substations
- work within 3 metres of DC traction conductors (tram wires) – for work near these assets contractors should contact the asset owners for advice and any permits
- work involving the use of earthmoving equipment with the ability to raise and lower loads by the use of a hoist rope and winch such as mobile cranes
- earthmoving equipment in transit between jobs on a public road under either its own power or on a transporter vehicle
- work being undertaken by an emergency service organisation during a declared or emergency incident
- development of a safety management plan to address other risks associated with the work.

## Earthmoving equipment covered in this handbook

Typical examples of earthmoving equipment used on civil construction projects include:

Type of earthmoving equipment	Activities
Backhoe	Excavating trenches and other earthworks.
Hydraulic excavator	Lifting and laying stormwater pipes, precast pits, and other underground utility mains and services. Loading trucks from excavation works.
Front-end loader, larger payloader, materials handling or load shifting equipment	Loading trucks from excavation works. Lifting and laying stormwater pipes, precast pits, underground utility mains and services.
Standard tip trucks or truck and trailer	Delivering material to the site, moving material on site or removing excess material from site.
Directional drills or trenchers	Underground boring and excavation of trenches.
Graders tractors or scrapers	Excavation or grading earthworks.

# No Go Zones

The No Go Zone for power poles extends anywhere above and three metres from any overhead electrical asset (see Diagram 1 over page).

When operating any earthmoving equipment, employers must provide a safe system of work to manage the significant risks of operating near overhead electrical assets (see 'Managing No Go Zone safety' on page 9 for further advice).

When determining the control measures to be implemented (including whether the use of a spotter is required), the employer must consider how close to the electrical assets any part of the earthmoving equipment may come through its range of movements. The maximum range of the equipment's possible movements is known as the 'design envelope' (see 'Definitions' on page 16). The design envelope of all earthmoving equipment should be determined and recorded in the safe work method statement (SWMS) before starting work near overhead electrical assets. (A sample SWMS is available from [worksafe.vic.gov.au](http://worksafe.vic.gov.au))

Appropriate clearance distances must be identified and maintained. The person developing the SWMS must be able to accurately identify the level of voltage on the particular overhead electrical system including any traction system. The height of the conductor at the pole and lowest point (generally mid span) must be identified by non-contact means before starting any work.

The type of control measures to be used will, in part, be determined by the relationship between the equipment's design envelope and the No Go Zone area. This interaction is set out in:

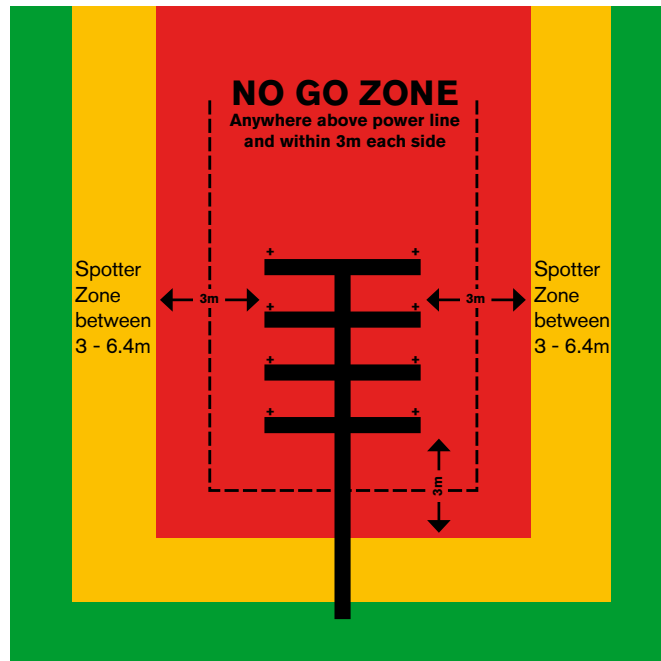
**Diagram 1: No Go Zone clearances:** shows the basic No Go Zone for electrical assets on power poles up to and including 66 kV.

**Table A: Limits of approach:** specifies the minimum clearances for earthmoving equipment – where earthmoving equipment can reach inside these limits a written Permit to Work must be obtained and additional safety precautions implemented.

**Table B: Safe work requirements:** states the precautions that must be implemented before starting work – these will vary depending on the design envelope of the earthmoving equipment and the voltage of the overhead electrical asset.

# No Go Zones

**Diagram 1: No Go Zone clearances**



- Open area outside 6.4m of powerlines
- Spotter Zone
- No Go Zone

The dotted line in Diagram 1 is a general representation of the minimum clearances from electrical assets. You must refer to Table A for the actual minimum clearance depending on the type of asset. If there is any doubt about the type of overhead asset, contact the asset owner (see page 17 for details).

**Table A: Limits of approach**

Types of overhead assets	Minimum clearance from asset
High voltage electricity conductors up to and including 66 kV	2000 mm
Un-insulated low voltage electricity conductors	1000 mm
Insulated low voltage electricity conductors, greater than 50 V but less than 1000 V	500 mm
Communications cabling – broadband and telephony	300 mm

# No Go Zones

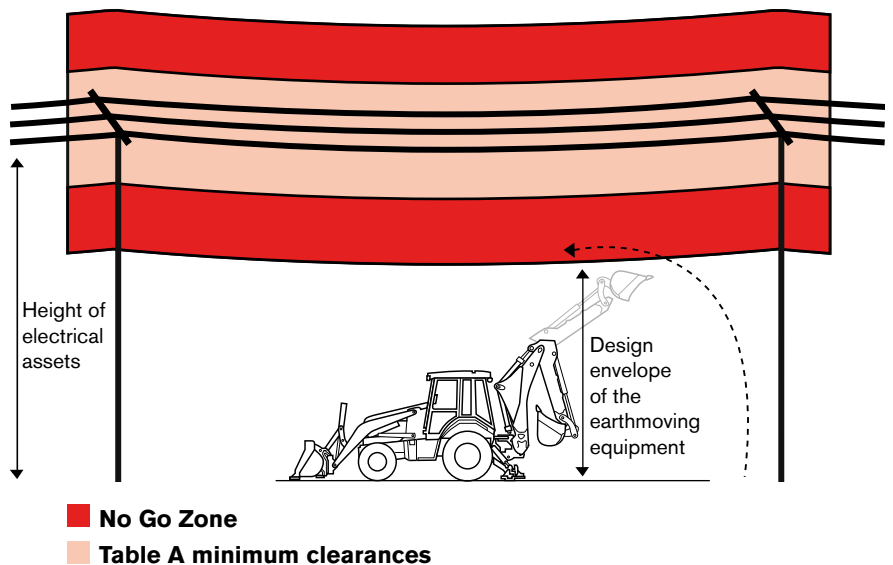
**Table B: Safe work requirements**

**Limit of approach of equipment design envelope**

<b>OUTSIDE NO GO ZONE</b>	<b>NO GO ZONE</b>	
Safe systems of work (spotter may not be required)	<b>Outside Table A Clearances *</b>	<b>Inside Table A Clearances *</b>
	Safe systems of work (including use of spotter)	Written permit and safe systems of work (including use of spotter)

\* See Diagram 2: Design envelope and limits of approach (below) for Table A clearances.

**Diagram 2: Design envelope and limits approach**



## When a spotter is not required

Where the works to be undertaken are more than 6.4m from the electrical assets, but the design envelope of the earthmoving equipment may still reach into the 3m No Go Zone, the use of a spotter may be omitted where all of the following apply:

1. the works are designed and set up so that no part of the earthmoving equipment or its load is required to come within 6.4m of the electrical assets
2. the control measures to ensure the above requirements are documented in a SWMS
3. a person is authorised and assigned the responsibility of ensuring compliance with the SWMS.



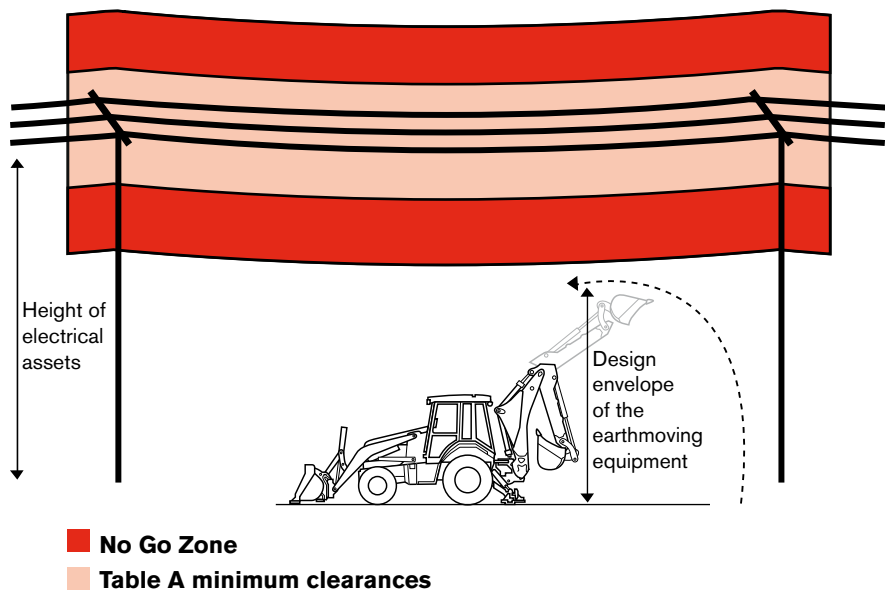
# No Go Zones

## Minimum safety controls

### Scenario 1: Design envelope outside the No Go Zone

Where the design envelope of the earthmoving equipment will not reach into the No Go Zone but is within the spotter zone, work may start in accordance with a site-specific SWMS. In this situation it is not mandatory to use a spotter solely for observing the proximity of the equipment to the overhead electrical assets.

**Diagram 3: Outside the No Go Zone**



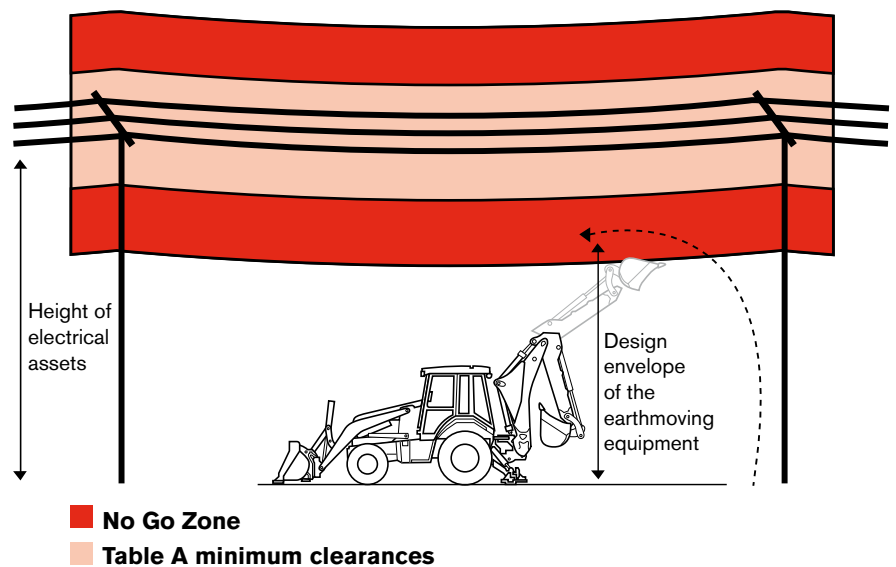
# No Go Zones

## Scenario 2: Design envelope inside the No Go Zone

Where the design envelope of the equipment will reach into the No Go Zone but not encroach on the limits of approach (as stated in Table A) work may proceed as outlined in the section 'Managing No Go Zone safety' providing:

- a SWMS has been developed and implemented
- the SWMS includes:
  - documented heights and voltages of overhead electrical assets
  - documented heights of the earthmoving equipment being used
  - a designated spotter

**Diagram 4: Inside the No Go Zone**

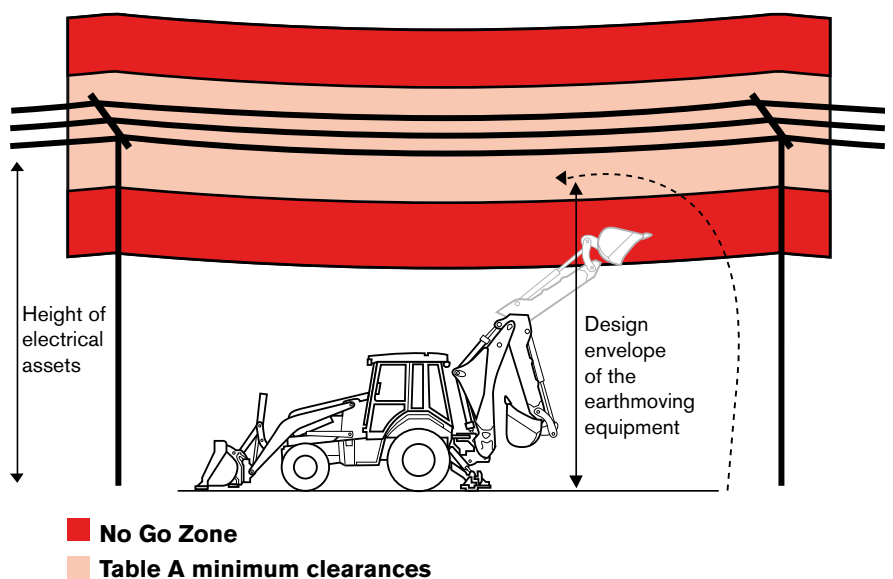


# No Go Zones

## Scenario 3: Design envelope encroaching on limits of approach

Where the design envelope of the earthmoving equipment will reach into No Go Zone and encroach on the limits of approach (stated in Table A) a higher order control should be implemented where possible (eg have power disconnected). Work should also proceed as outlined in the section 'Managing No Go Zone safety'.

**Diagram 5: Encroaching on the limits of approach (Table A)**



### Permit required

In this situation, **no work may begin** unless the asset owner has granted written permission (Permit to Work) which stipulates the conditions before work can be undertaken.

To obtain a Permit to Work, the contractor will need to contact the relevant asset owner.

Contact Energy Safe Victoria on **(03) 9203 9700** for direction if uncertain of which company to contact.

Any permit issued will include other requirements and conditions of work that must be adhered to at the worksite.

# Managing No Go Zone safety

To meet OHS obligations to provide a safe workplace for all employees (including subcontractors), contractors must develop and implement a specific SWMS for works near electrical assets. The SWMS is part of the employer's overall safety management system. The development of an SWMS requires the contractor, in consultation with workers, to undertake a risk assessment process for identifying and controlling risks to health and safety that may arise during the works.

## Risk assessment

Risk assessments should be documented and the rating may be included on the SWMS. When conducting the risk assessment the following criteria should be considered:

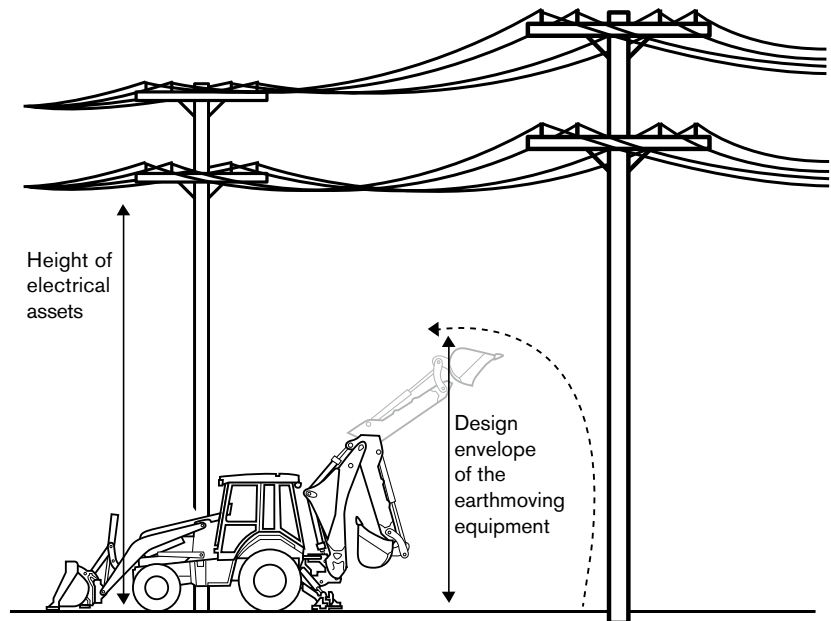
- scope of work to be undertaken
- location and type of utility services affecting the worksite (note: where the conductor voltages, insulation characteristics, height or sag details of conductors are unknown, the contractor should seek the information from the asset owner. This will generally be arranged via a site inspection.)
- the minimum distance between the wires and the ground, giving consideration to the sag of the wires and to any localised areas of soil mounding or ground structures. The shortest of those distances should be your guide for determining a safe work system
- the degree of sway in the sagging wire/s
- presence of earthing wires from transformers or Single Wire Earth Return (SWER) systems
- presence of other electrical assets
- the number of employees involved in the works
- the complexity of the tasks to be undertaken
- types of earthmoving equipment to be used on the worksite and their design envelope
- proximity to roads and other infrastructure
- proximity to any areas accessible to the public
- aspects of the work requiring specialised training
- personal protective equipment suitable for the task
- ensuring that the process or procedure is appropriate for the nature, scale and environment in which it is to be applied.

# Managing No Go Zone safety

## Generic risk assessment

Where the work involves a specific, repetitive task and the risk factors are considered to be similar, a generic risk assessment may be prepared. The contractor should always ensure the generic risk assessment considers the specific site characteristics and proposed work activities.

**Diagram 6**



## Controlling risks (Safe Work Method Statement – SWMS)

A competent person must develop a safe system of work for working near overhead electrical assets. This process should involve consultation with the workers' health and safety representatives (HSRs) and directly with the workers required to carry out the work. Advice or input may also be required from clients, the asset owner or others experienced in this type of work. The final work system must be documented in an SWMS.

Any identified risk to the safety of the workers or anyone else must be eliminated. Where the elimination of risk is not reasonably practicable, it must be reduced as much as possible. An effective way to do this is to use the 'Hierarchy of control' (see next page). Controls at the top of the hierarchy are more effective in dealing with the risk and must be implemented where reasonably practicable. Specific circumstances may require a combination of controls to be implemented.

# Managing No Go Zone safety

## Hierarchy of control

### Elimination of the risk

Methods to eliminate the risk of earthmoving equipment coming near overhead electrical assets include:

- at the planning and design stages, design the works so the equipment will not need to be used near overhead electrical assets
- vary or realign the proposed offset away from the overhead electrical assets to allow pipes or other assets to be laid safely. This will require client and or statutory approvals as appropriate
- where possible, consider design changes that will eliminate encroaching on a No Go Zone (eg select PVC pipes that can be moved manually rather than heavier pipes that require mechanical lifting)
- arrange for relocation of overhead cables
- use earthmoving equipment with a smaller design envelope.

### Engineering controls

Engineering controls to minimise the risk of equipment encroaching on the No Go Zone of overhead electrical assets include:

- modifying earthmoving equipment design to permanently reduce its design envelope (eg fitting and use of electronic or hydraulic height control devices)
- temporarily shutting down or isolating overhead cables
- erecting temporary physical height barriers to limit higher loads from passing under an overhead cable
- erecting temporary physical longitudinal fencing or height markers which indicate the extent of movement allowed by the equipment.

### Administrative controls

Administrative controls involve developing work procedures and systems that rely on adequate training, skill and supervision to ensure that they are implemented. These controls are the least preferred control option. Higher order controls must be implemented where reasonably practicable. Examples of administrative controls include:

- a work procedure that requires the operator of the equipment to keep the bucket and hydraulic arm below a designated height or within a restricted swing range. The use of this type of control would require the use of a spotter to adequately control the risk
- signage and marking of designated restricted movement areas for trucks and other equipment delivering or working on site
- use of a spotter to ensure the operation of the equipment does not encroach No Go Zone clearances.

### Single Wire Earth Return (SWER) electrical systems

No excavation work shall be undertaken within a 10 metre radius of a pole with a SWER transformer mounted on it. For further information regarding work near SWER systems contact your local electricity company.

# Using a spotter

Where a spotter is to be used, the contractor must ensure they are properly inducted into all site safety procedures including the relevant SWMS.

The spotter must remain at the task for the entire time the earthmoving equipment is required to operate in accordance with the SWMS. The spotter may only observe for one item of operating earthmoving equipment at any time. The spotter must also carefully position themselves so that they can monitor the distance between the equipment and the lines, and must provide early and effective warning to the earthmoving equipment operator of any potential encroachment on the No Go Zone.

Spotters for overhead electrical lines shall have completed an endorsed spotter training course by a registered training provider and be competent in the following areas:

- knowledge of the design envelopes for the equipment being used
- knowledge of the operation and uses of equipment
- knowledge of the hazards posed by overhead electrical assets.

# Training

Under the OHS Act, employers of people working near overhead electrical assets are responsible for the training of their employees to ensure compliance with these guidelines.

Employers should verify and document that each employee has received the required training.

The training should be developed in consultation with employees, the client and/or principal contractor (as appropriate), and include the following:

- specific electrical awareness
- appropriate emergency and first aid instruction
- associated hazard identification and risk assessment
- SWMS
- operation of earthmoving equipment
- communications systems
- emergency management systems.



# Emergency procedures

An employer must provide for an emergency or incident involving overhead electrical assets, including communications cables, and address the following:

- what to do should the earthmoving equipment come into contact with overhead cables
- how to exit the earthmoving equipment if necessary
- how to manage the incident site
- who and how to contact.

Relevant training in the emergency procedures must be provided to employees, as outlined in the 'Emergency flowchart' opposite.

# Emergency flowchart

## Emergency flowchart

Should contact be made with an overhead power line, you the driver/operator should stay in the vehicle at all times **unless there is a risk of fire or other urgent reason.**

**If you have to leave the machine,** you should follow the steps below to avoid electrocution:

1. **Jump clear without touching the ground and vehicle simultaneously.**  
Try to land with both feet together, you should then shuffle or jump or with both feet together until you are at least 10 metres clear.
2. **Do not run**
3. **If you fall to the ground,** roll clear. Do not try to get up by pushing off with your hands because the electricity may pass through the arms and legs in contact with the ground causing you to possibly receive an electrical shock.

**Warn other people** to keep well clear of the site until the power company advises that the power is turned off.

**Do not** approach any victim in the vicinity (10m) until the power is turned off.

**Call for emergency assistance on 000 at the earliest opportunity and advise of the situation and wait for help**

**Wait for confirmation by the power company that the power has been turned off**

**Offer first aid without placing yourself in any danger (refer to WorkSafe's *First aid in the workplace Compliance Code*)**

# Definitions

**Asset owner:** The asset owner of overhead assets is the electrical distribution company. If you don't know who this is, contact Energy Safe Victoria on **(03) 9203 9700**.

**Competent person (for developing a safe system of work system):** Is a person who has the knowledge and skills to identify the types of overhead conductors and other assets safely, accurately measure the heights involved and apply the guidance outlined in this document. They should also have an understanding of the operating movements of the earthmoving equipment involved.

**Design envelope:** The space encapsulating all possible movements of the earthmoving equipment and any load attached under maximum reach. The design envelope can be adjusted for any earthmoving equipment by the installation and operation of fail-safe physical guards or controls that cannot be modified or overturned by the operator.

**Limits of approach:** These are the minimum clearances (as set out in Table A) which determine the requirements for additional control measures. Operators of earthmoving equipment whose design envelope may reach inside these limits must obtain a Permit to Work from the asset owner.

**Low Voltage (LV):** A nominated voltage exceeding 50 volts but not exceeding 1000 volts.

**No Go Zone:** This is the area within 3.0m to either side or beneath the overhead electrical asset on a pole. The No Go Zone also includes any space above the asset. (Note: generally electrical assets on poles are less than or equal to 66 kV.)

**Spotter:** A competent and trained person who observes and warns against unsafe approach to overhead and underground assets. A spotter for overhead assets shall have successfully completed an endorsed training course.

**Spotter zone:** This is the area within 6.4m on either side or beneath an overhead electrical asset on a pole. The spotter zone also extends vertically above the asset. (Note: generally electrical assets on poles are less than or equal to 66 kV.)

**SWER:** Single Wire Earth Return

**SWMS:** Safe Work Method Statement

## Further information

### Related WorkSafe publications

- *Framework for undertaking work near overhead and underground assets, 2006*
- *No Go Zones for overhead electrical power lines: Special provisions for plant and equipment, 2004*

### Legislation and regulations

- *Occupational Health and Safety Act 2004*
- *Electrical Safety Act 1988*
- Occupational Health and Safety Regulations 2007
- Electricity Safety (Network Assets) Regulations 1999

All Victorian Government legislation is available from Information Victoria by calling **1300 366 356** or online at **bookshop.vic.gov.au**

Further guidance on managing safety and No Go Zones is available via the following websites:

WorkSafe Victoria: **worksafe.vic.gov.au**

Energy Safe Victoria: **esv.vic.gov.au**

## Contacts

### Electricity:

CitiPower .....	1300 301 101
Metro Trains .....	03 9619 2977
Energy Safe Victoria .....	03 9203 9700
Jemena Electrical Networks .....	131 626
Powercor Australia .....	132 206
SP AusNet .....	1300 360 795 (Option 1, Option 5)
United Energy .....	132 099
Yarra Trams .....	03 9610 3394
Alinta .....	131 626

### Communications:

Optus - Overhead Assets .....	1800 500 305
Telstra .....	132 203 (Option 3)

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## WorkSafe Victoria

### Advisory Service

222 Exhibition Street  
Melbourne 3000

Phone .....03 9641 1444

Toll-free ..... 1800 136 089

Email ..... [info@worksafe.vic.gov.au](mailto:info@worksafe.vic.gov.au)

### Head Office

222 Exhibition Street  
Melbourne 3000

Phone .....03 9641 1555

Toll-free ..... 1800 136 089

Website ..... [worksafe.vic.gov.au](http://worksafe.vic.gov.au)

### Local Offices

Ballarat .....03 5338 4444

Bendigo .....03 5443 8866

Dandenong .....03 8792 9000

Geelong .....03 5226 1200

Melbourne

(628 Bourke Street).....03 9941 0558

Mildura .....03 5021 4001

Mulgrave .....03 9565 9444

Preston .....03 9485 4555

Shepparton .....03 5831 8260

Traralgon .....03 5174 8900

Wangaratta .....03 5721 8588

Warrnambool .....03 5564 3200