William Hodgkinson

Subject: FW: NSW Planning, Industry & Environment SSD-10446 Request for Input on SEARs Luddenham Resource Recovery Facility

Attachments: SW Work near overhead power lines.pdf; EE Drawing 86232 OH lines minimum clearances.pdf; EE Fact Sheet Building Conctruction.pdf; EE FPJ 6007 Technical Review Request Aug 2019.pdf; EE Guide for Padmount Substations.pdf; EE MDI0044 Easements and Property Tenure.pdf; EE Safety on the job.pdf; EE Safety Plumbing.pdf; ENA EMF What We Know.pdf

From: Cornelis Duba <Cornelis.Duba@endeavourenergy.com.au>
Sent: Wednesday, 8 April 2020 9:51 AM
To: DPE CSE Information Planning Mailbox <information@planning.nsw.gov.au>
Cc: William Hodgkinson <William.Hodgkinson@planning.nsw.gov.au>
Subject: NSW Planning, Industry & Environment SSD-10446 Request for Input on SEARs Luddenham Resource Recovery Facility

The Secretary
NSW Planning, Industry & Environment

ATTENTION: Will Hodgkinson, Acting Principal Planner Industry Assessments

Dear Sir or Madam

I refer to the Department's below email of 1 April 2020 regarding the Request for Secretary's Environmental Assessment Requirements (SEARs) for State Significant Development SSD 10447 at 275 Adams Road, Luddenham (Lot 3 DP 623799) for the Luddenham Resource Recovery Facility being the construction of a Resource Recovery Facility (RRF) accepting up to 600,000 tonnes per annum (tpa) of construction and demolition waste and commercial and industrial waste. Submissions need to be made to the Department by 14 April 2020.

As shown in the below site plans from Endeavour Energy's G/Net master facility model (and extracts from Google Maps Street View) there are:

- No easements over the site benefitting Endeavour Energy (active easements are indicated by red hatching).
- Low voltage and 11,000 volt / 11 kilovolt (kV) high voltage overhead power lines to the road verge / roadway.
- An extended low voltage overhead service conductor coming from a pole on the road verge to the south west of the battle-axe access, crossing the adjoining Lot 1 DP 623799 to a series of customer owned / private pole (indicated by the green circle) on the site providing the customer connection point for the existing building / premises on the site.

Please note the location, extent and type of any electricity infrastructure, boundaries etc. shown on the plan is indicative only. Generally (depending on the scale and/or features selected), low voltage (normally not exceeding 1,000 volts) is indicated by blue lines and high voltage (normally exceeding 1,000 volts but for Endeavour Energy's network not exceeding 132,000 volts / 132 kV) by red lines (these lines can appear as solid or dashed and where there are multiple lines / cables only the higher voltage may be shown). This plan only shows the Endeavour Energy network and does not show electricity infrastructure belonging to other authorities or customers owned electrical equipment beyond the customer connection point / point of supply to the property. This plan is not a 'Dial Before You Dig' plan under the provisions of Part 5E 'Protection of underground electricity power lines' of the *Electricity Supply Act 1995* (NSW).

Endeavour Energy would expect that the Planning Secretary would require the applicant to address in utilities as a key issue in the future Environmental Impact Statement and will:

- identify and address the existing capacity to service the development proposed and any augmentation requirements for utilities in consultation with relevant agencies; and
- identify and potential impacts of the proposed construction and operation on the existing utility infrastructure and service provider assets, and demonstrate how these will be protected, or impacts mitigated.

For the first point please refer to the below point 'Network Capacity / Connection'.

In regard to the second point, the extended low voltage overhead service conductor traversing the adjoining property and the site, although not held under easement it is a protected assets and deemed to be lawful for all purposes under Section 53 'Protection of certain electricity works' of the *Electricity Supply Act 1995* (NSW). Essentially this means the owner or occupier of the land cannot take any action in relation to the presence in, on or over the land of electricity works ie. the electricity infrastructure cannot be removed to rectify the encroachment.

These protected assets are managed as if an easement is in place meaning that near / underneath the overhead low voltage service conductors:

- No buildings or structures should be installed.
- The surface level should not be altered.

In accordance with Endeavour Energy's Mains Design Instruction MDI 0044 'Easements and Property Tenure Rights', as shown in the following extracts of Table 1 – 'Minimum easement widths', the low voltage overhead power lines require a 9 metre minimum easement width ie. 4.5 metres to both sides of the centre line of the poles / conductors.

Table 1 - Minimum easement widths

	Voltage	Asset Type	Construction	Minimum Easement (m)
Overhead Assets	400V–22kV	Bare Construction	All	9
		ABC		
		CCT		

ABC = Aerial Bundled Cables CTT = Covered Conductor Thick

This easement width in some circumstances may not be warranted ie. depending on the span, type of conductor, access etc. However as a minimum any buildings, structures, etc. whether temporary or permanent must comply with the minimum safe distances / clearances for voltages up to and including 132,000 volts (132kV) for any building or structure (including fencing, signage, flag poles etc.) whether temporary or permanent must comply with the minimum safe distances / clearances for voltages up to and including 132,000 volts (132kV) as specified in:

- Australian/New Zealand Standard AS/NZS 7000 – 2016: 'Overhead line design' as updated from time to time.
- 'Service and Installation Rules of NSW' which can be accessed via the following link to the Energy NSW website:

https://energy.nsw.gov.au/government-and-regulation/legislative-and-regulatory-requirements/service-installation-rules .

As a guide please find attached a copy of Endeavour Energy Drawing 'Overhead Lines Minimum Clearances Near Structures'. These distances must be maintained at all times to all buildings and structures and regardless of the Council's allowable building setbacks etc. under its development controls.

Even if there is no issue with the safety clearances to the building or structure, ordinary persons must maintain a minimum safe approach distance of 3.0 metres to all voltages up to and including 132,000 volts / 132 kV. Work within the safe approach distances requires an authorised or instructed person with technical knowledge or sufficient experience to perform the work required, a safety observer for operating plant as well as possibly an outage request and/or erection of a protective hoarding.

If there is any doubt whatsoever regarding the safety clearances to the overhead power lines, the applicant will need to have the safety clearances assessed by a suitably qualified electrical engineer / Accredited Service Provider (please refer to the below point 'Network Capacity / Connection'. This will require the provision of a detailed survey plan showing the location of the conductors to enable the assessment / modelling of the clearances for which there are software packages available. If the safety clearances are inadequate, either the parts of the building encroaching the required clearances or the overhead power lines will need to be redesigned to provide the required clearances.

Subject to the foregoing and the following recommendations and comments Endeavour Energy has no objection to the State Significant Development.

- Network Capacity / Connection

Endeavour Energy has noted that the SEARs Request report includes the following:

> 2.2 Site components and activities
>
> 2.2.1 Construction
>
> Given that the RRC site is currently vacant, the project will also require the establishment/construction of infrastructure for essential service (ie electricity, water and sewage).

The availability of electricity supply to a site is based on a wide range of factors eg. the age and design of the network; other development in the locality utilising previously spare capacity within the local network; the progress of nearby / surrounding sites including electricity infrastructure works eg. a smaller and isolated development that may not of its own accord require a distribution substation may require a substation to facilitate the development and from which the spare capacity is made available to subsequent nearby development.

Non-urban / above ground areas of the network utilising pole mounted substations (indicated by the symbol  on the site plan from Endeavour Energy's G/Net master facility model) have comparatively limited capacity of 25 kilovolt amperes (kVA) up to a maximum of 400 kVA. Padmount substations utilised in urban areas can accommodate loads from 315 kVA up to 1,500 kVA ie. there is a significant variation in the number and type of premises able to be connected to a substation.

The closest existing distribution substation is pole mounted substation no. 1163 located approximately 33 metres to the north east of the battle-axe access currently has 5 customer connection points servicing 8 premises – including the connection for the quarry operations which 'will also continue to dispatch 300,000 tpa of clay and shale in parallel to the project'. Although the substation is likely to have some spare capacity, it may not be sufficient to facilitate the RRC ie. depending on the plant and equipment used to process the waste the electrical load can be substantial or if diesel powered equipment is utilised it would be considerably lower. Pole mounted substations are generally not intended or capable of supply significant urban development. The future land use vision envisaging a number (7 additional) light industrial / commercial warehouses would require a significant upgrades to the existing local network.

As well as the capacity of distribution substations, other factors such as the size and rating / load on the conductors and voltage drop (which can affect the quality of supply particularly with long conductor runs) etc. need to be assessed. An extension and/or augmentation of the existing local network is likely to be required for the RRC but this will not be determined until a detailed assessment is undertaken. Endeavour Energy's preference is to alert

proponents / applicants (and the Department) of the potential matters that may arise as further redevelopment of urban areas continues to occur.

In due course the applicant for the proposed development of the site will need to submit an application for connection of load via Endeavour Energy's Network Connections Branch to carry out the final load assessment and the method of supply will be determined. Depending on the outcome of the assessment, any required padmount or indoor substation/s will need to be located within the property (in a suitable and accessible location) and be protected (including any associated cabling) by an easement and associated restrictions benefiting and gifted to Endeavour Energy. Please refer to the attached copy of Endeavour Energy's Mains Design Instruction MDI 0044 'Easements and Property Tenure Rights'.

Further details are available by contacting Endeavour Energy's Network Connections Branch via Head Office enquiries on telephone: 133 718 or (02) 9853 6666 from 8am - 5:30pm or on Endeavour Energy's website under 'Home > Residential and business > Connecting to our network' via the following link:

http://www.endeavourenergy.com.au/ .

Advice on the electricity infrastructure required to facilitate the proposed development (including asset relocations) can be obtained by submitting a Technical Review Request to Endeavour Energy's Network Connections Branch, the form for which FPJ6007 is attached and further details (including the applicable charges) are available from Endeavour Energy's website under 'Our connection services'. The response to these enquiries is based upon a desktop review of corporate information systems, and as such does not involve the engagement of various internal stakeholders in order to develop a 'Connection Offer'. It does provide details of preliminary connection requirements which can be considered by the applicant prior to lodging a formal application for connection of load.

Alternatively the applicant should engage a Level 3 Accredited Service Provider (ASP) approved to design distribution network assets, including underground or overhead. The ASP scheme is administered by Energy NSW and details are available on their website via the following link or telephone 13 77 88:

https://energy.nsw.gov.au/government-and-regulation/legislative-and-regulatory-requirements/asp-scheme-and-contestable-works .

Endeavour Energy is urging applicants /customers to engage with an Electrical Consultant prior to finalising plans to in order to assess and incorporate any required electricity infrastructure. In so doing the consideration can also be given to its impact on the other aspects of the proposed development. This can assist in avoiding the making of amendments to the plan or possibly the need to later seek modification of an approved development application.

- Network Asset Design

Endeavour Energy's Company Policy 9.2.5 'Network Asset Design', includes the following requirements for electricity connections to new urban subdivision / development:

5.11 Reticulation policy

5.11.1 Distribution reticulation

In order to improve the reliability performance of and to reduce the operating expenditure on the network over the long term the company has adopted the strategy of requiring new lines to be either underground cables or where overhead is permitted, to be predominantly of covered or insulated construction. Notwithstanding this strategy, bare wire overhead construction is appropriate and permitted in some situations as detailed below.

In areas with the potential for significant overhanging foliage, CCT is used to provide increased reliability as it is less susceptible to outages from wind-blown branches and debris than bare conductors. CCT must only be used in treed[2] areas as the probability of a direct lightning strike is low. In open areas where the line is not shielded from a direct lightning strike, bare conductors must generally be used for 11kV and 22kV reticulation.

Non-metallic Screened High Voltage Aerial Bundled Cable (NMSHVABC) must be used in areas which are heavily treed and where it is not practicable to maintain a tree clearing envelope around the conductors.

[2] A "treed" area is one with a substantial number of trees adjacent to the line, in each span. In these situations CCT is used to provide increased reliability as it is less susceptible to outages from wind-blown

5.11.1.1 Urban areas

Reticulation of new residential subdivisions will be underground. In areas of low bushfire consequence, new lines within existing overhead areas can be overhead, unless underground lines are cost justified or required by either environmental or local council requirements.

Where underground reticulation is required on a feeder that supplies a mixture of industrial, commercial and/or residential loads, the standard of underground construction will apply to all types of load within that development.

Where ducting is used, adequate spare ducts and easements must be provided at the outset to cover the final load requirements of the entire development plan.

Extensions to the existing overhead 11kV/22kV network must generally be underground. Bare wire will be used for conductor replacements and augmentations except in treed areas where CCT or NMSHVABC must be used.
Extensions to the existing overhead LV network and augmentations must either be underground or ABC. Conductor replacements greater than 100m in route length must utilise aerial bundled cable.

- Earthing

The construction of any building or structure (including fencing, signage, flag poles, hoardings etc.) whether temporary or permanent that is connected to or in close proximity to Endeavour Energy's electrical network is required to comply with Australian/New Zealand Standard AS/NZS 3000:2018 'Electrical installations' as updated from time to time. This Standard sets out requirements for the design, construction and verification of electrical installations, including ensuring there is adequate connection to the earth. It applies to all electrical installations including temporary builder's supply / connections.

Inadequate connection to the earth to allow a leaking/fault current to flow into the grounding system and be properly dissipated places persons, equipment connected to the network and the electricity network itself at risk from electric shock, fire and physical injury.

- Bushfire

Endeavour Energy has noted in the Scoping Report indicates that 'The RRC site is within a designated bush fire prone area'.

Although commercial and industrial uses are not covered by Chapters 5 to 7 of NSW Rural Fire Service 'Planning for Bush Fire Protection 2019' (PBP), the aim and objectives of PBP still need to be considered and a suitable package of bush fire protection measures should be proposed commensurate with the assessed level of risk to the development. PBP provides the following advice regarding electricity services:

5.3.3 Services – Water, electricity and gas

Intent of measures: *to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.*

Table 5.3c

Performance criteria and acceptable solutions for water, electricity and gas services for residential and rural residential subdivisions.

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
ELECTRICITY SERVICES	› location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	› where practicable, electrical transmission lines are underground; › where overhead, electrical transmission lines are proposed as follows: › lines are installed with short pole spacing of 30m, unless crossing gullies, gorges or riparian areas; and › no part of a tree is closer to a power line than the distance set out in ISSC3 *Guideline for Managing Vegetation Near Power Lines*.

The following is an extract of Endeavour Energy's Company Policy 9.1.1 Bushfire Risk Management:

9.1.1 BUSHFIRE RISK MANAGEMENT

1.0 POLICY STATEMENT

The company is committed to the application of prudent asset management strategies to reduce the risk of bushfires caused by network assets and aerial consumer mains to as low as reasonably practicable (ALARP) level. The company is also committed to mitigating, the associated risk to network assets and customer supply reliability during times of bushfire whilst achieving practical safety, reliability, quality of supply, efficient investment and environmental outcomes. The company is committed to compliance with relevant acts, regulations and codes.

Accordingly the electricity network required to service the proposed development must be fit for purpose and meet the technical specifications, design, construction and commissioning standards based on Endeavour Energy's risk assessment associated with the implementation and use of the network connection / infrastructure for a bushfire prone site. In assessing bushfire risk, Endeavour Energy has traditionally focused on the likelihood of its network starting a bushfire, which is a function of the condition of the network. Risk control has focused on reducing the likelihood of fire ignition by implementing good design and maintenance practices. However the potential impact of a bushfire on its electricity infrastructure and the safety risks associated with the loss of electricity supply are also considered.

- Flooding and Drainage

Endeavour Energy has noted in the Scoping Report identifies flooding as a hazard and risk as the lowest points of the RRC site are at the Oaky Creek, which is at the eastern boundary of the site, and accordingly a flood assessment will be prepared.

The electricity network required to service an area / development must be fit for purpose and meet the technical specifications, design, construction and commissioning standards based on Endeavour Energy's risk assessment associated with the implementation and use of the network connection / infrastructure for a flood prone site. Risk control has focused typically on avoiding the threat, but where this is not possible, reducing the negative effect or probability of flood damage to assets by implementing good design and maintenance practices.

Distribution substations should not be subject to flood inundation or stormwater runoff ie. the padmount substation cubicles are weatherproof not flood proof and the cable pits whilst designed to be self-draining should

not be subject to excessive ingress of water. Section 7 'Substation and switching stations' of Endeavour Energy's Mains Construction Instruction MCI 0006 'Underground distribution construction standards manual' provides the following details of the requirements for flooding and drainage in new padmount substation locations.

7.1.6 Flooding and drainage

Substations are to be located such that the risk of flooding or stormwater damage is minimal.

As a minimum the level at the top of the transformer footing, HV and LV switchgear, shall not be lower than the 1:100 year flood level.

All drains within the substation site area or in the vicinity shall be properly maintained to avoid the possibility of water damage to Endeavour Energy's equipment.

In areas where, as determined by the Network Substation Manager, there is a high water table or a heightened risk of flooding, indoor substations will not be permitted.

All materials used in the construction below the substation (ground level) shall be capable of withstanding prolonged immersion in water without swelling or deterioration.

Figure 51 - Example substation raised above 1:100 flood level

- Vegetation Management

The planting of large trees near electricity infrastructure is not supported by Endeavour Energy. Suitable planting needs to be undertaken in proximity of electricity infrastructure (including any new electricity infrastructure required to facilitate the proposed development). Only low growing shrubs not exceeding 3.0 metres in height, ground covers and smaller shrubs, with non-invasive root systems are the best plants to use. Larger trees should be planted well away from electricity infrastructure (at least the same distance from overhead power lines as their potential full grown height) and even with underground cables, be installed with a root barrier around the root ball of the plant.

Landscaping that interferes with electricity infrastructure may become a potential safety risk, cause of bush fire, restrict access, reduce light levels from streetlights or result in the interruption of supply. Such landscaping may be subject to Endeavour Energy's Vegetation Management program and/or the provisions of the *Electricity Supply Act 1995* (NSW) Section 48 'Interference with electricity works by trees' by which under certain circumstances the cost of carrying out such work may be recovered.

In regards to the possible padmount substation site required to facilitate the proposed development , please find attached for the applicant's reference a copy Endeavour Energy's 'Guide to Fencing, Retaining Walls and Maintenance Around Padmount Substations'.

- Prudent Avoidance

The electricity network is operational 24/7/365 ie. all day, every day of the year. The electricity industry has adopted a policy of prudent avoidance by doing what can be done without undue inconvenience and at modest expense to avert the possible risk to health from exposure to emissions form electricity infrastructure such as electric and magnetic fields (EMF) and noise (both overhead power lines and transformers can produce an audible sound or buzz as a side effect of carrying electricity) which generally increase the higher the voltage ie. Endeavour Energy's network ranges from low voltage (normally not exceeding 1,000 volts) to high voltage (normally exceeding 1,000 volts but not exceeding 132,000 volts / 132 kV).

In practical terms this means that when designing new transmission and distribution facilities, consideration is given to locating them where exposure to the more sensitive uses is reduced and increasing separation distances. These emissions are generally not an issue but with councils permitting or encouraging development with higher density, reduced setbacks and increased building heights, new development can impact on existing electricity infrastructure.

Where development is proposed in the vicinity of electricity infrastructure, Endeavour Energy is not responsible for any amelioration measures for such emissions that may impact on the nearby proposed development. Even with less sensitive non-residential development, Endeavour Energy believes that likewise applicants (and) Council should also adopt a policy of prudent avoidance by the siting of more sensitive uses eg. those parts of the site regularly occupied by people such as office components of a building, away from any electricity infrastructure – including any possible future electricity infrastructure required to facilitate the proposed development.

Please find attached a copy of Energy Networks Association's 'Electric & Magnetic Fields – What We Know' which can also be accessed via their website at https://www.energynetworks.com.au/electric-and-magnetic-fields and provides the following advice:

> *Electric fields are strongest closest to their source, and their strength diminishes rapidly as we move away from the source.*
>
> *The level of a magnetic field depends on the amount of the current (measured in amps), and decreases rapidly once we move away from the source.*

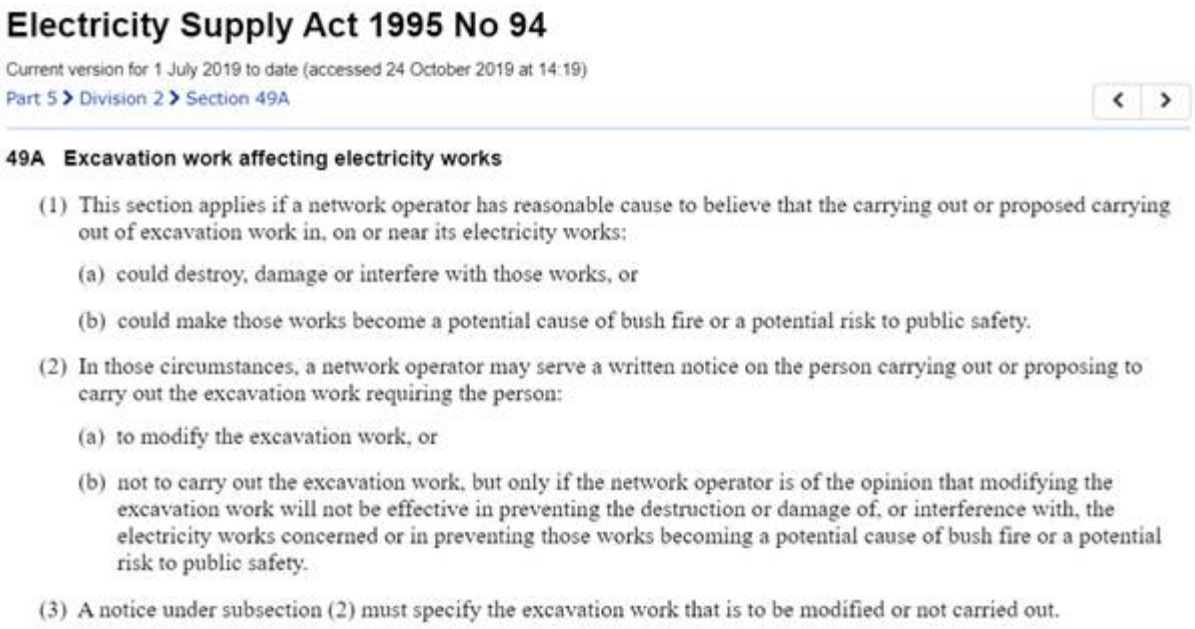
Typical magnetic field measurements associated with Endeavour Energy's activities and assets given the required easement widths, safety clearances etc. and having a maximum voltage of 132,000 volt / 132 kV, will with the observance of these separation distances not exceed the recommended magnetic field public exposure limits.

- Dial Before You Dig

Before commencing any underground activity the applicant is required to obtain advice from the ***Dial Before You Dig*** **1100** service in accordance with the requirements of the *Electricity Supply Act 1995* (NSW) and associated Regulations. This should be obtained by the applicant not only to identify the location of any underground electrical and other utility infrastructure across the site, but also to identify them as a hazard and to properly assess the risk.

- Excavation

The applicant should be advised of the following object of Section 49A 'Excavation work affecting electricity works' of the of *Electricity Supply Act 1995* (NSW) covering the carrying out or proposed carrying out of excavation work in, on or near Endeavour Energy's electrical infrastructure.



Electricity Supply Act 1995 No 94

Current version for 1 July 2019 to date (accessed 24 October 2019 at 14:19)

Part 5 > Division 2 > Section 49A

49A Excavation work affecting electricity works

(1) This section applies if a network operator has reasonable cause to believe that the carrying out or proposed carrying out of excavation work in, on or near its electricity works:

(a) could destroy, damage or interfere with those works, or

(b) could make those works become a potential cause of bush fire or a potential risk to public safety.

(2) In those circumstances, a network operator may serve a written notice on the person carrying out or proposing to carry out the excavation work requiring the person:

(a) to modify the excavation work, or

(b) not to carry out the excavation work, but only if the network operator is of the opinion that modifying the excavation work will not be effective in preventing the destruction or damage of, or interference with, the electricity works concerned or in preventing those works becoming a potential cause of bush fire or a potential risk to public safety.

(3) A notice under subsection (2) must specify the excavation work that is to be modified or not carried out.

If any excavation work affects Endeavour Energy's electricity infrastructure, prior contact must be made to Endeavour Energy's Regional Services Central via Head Office enquiries on telephone: 133 718 or (02) 9853 6666 from 8am - 5:30pm or alternately email Regional.ServicesCentral@endeavourenergy.com.au .

- Public Safety

Workers involved in work near electricity infrastructure run the risk of receiving an electric shock and causing substantial damage to plant and equipment. I have attached Endeavour Energy's public safety training resources, which were developed to help general public / workers to understand why you may be at risk and what you can do to work safely. The public safety training resources are also available via Endeavour Energy's website via the following link:

http://www.endeavourenergy.com.au/wps/wcm/connect/ee/nsw/nsw+homepage/communitynav/safety/safety+brochures .

If the applicant has any concerns over the proposed works in proximity of the Endeavour Energy's electricity infrastructure to the road verge / roadway, as part of a public safety initiative Endeavour Energy has set up an email account that is accessible by a range of multiple stakeholders across the company in order to provide more effective lines of communication with the general public who may be undertaking construction activities in proximity of electricity infrastructure such as builders, construction industry workers etc. The email address is Construction.Works@endeavourenergy.com.au .

- Emergency Contact

In case of an emergency relating to Endeavour Energy's electrical network, the applicant should note the Emergencies Telephone is 131 003 which can be contacted 24 hours/7 days. Endeavour Energy's contact details should be included in any relevant risk and safety management plan.

I appreciate that not all the foregoing issues may be directly or immediately relevant or significant to the request for SEARs / Development Application. However in keeping with the Department's aim of earlier and better engagement, Endeavour Energy's preference is to alert proponents / applicants of the potential matters that may arise should development within closer proximity of the existing and/or required electricity infrastructure needed to facilitate the proposed development on or in the vicinity of the site occur.

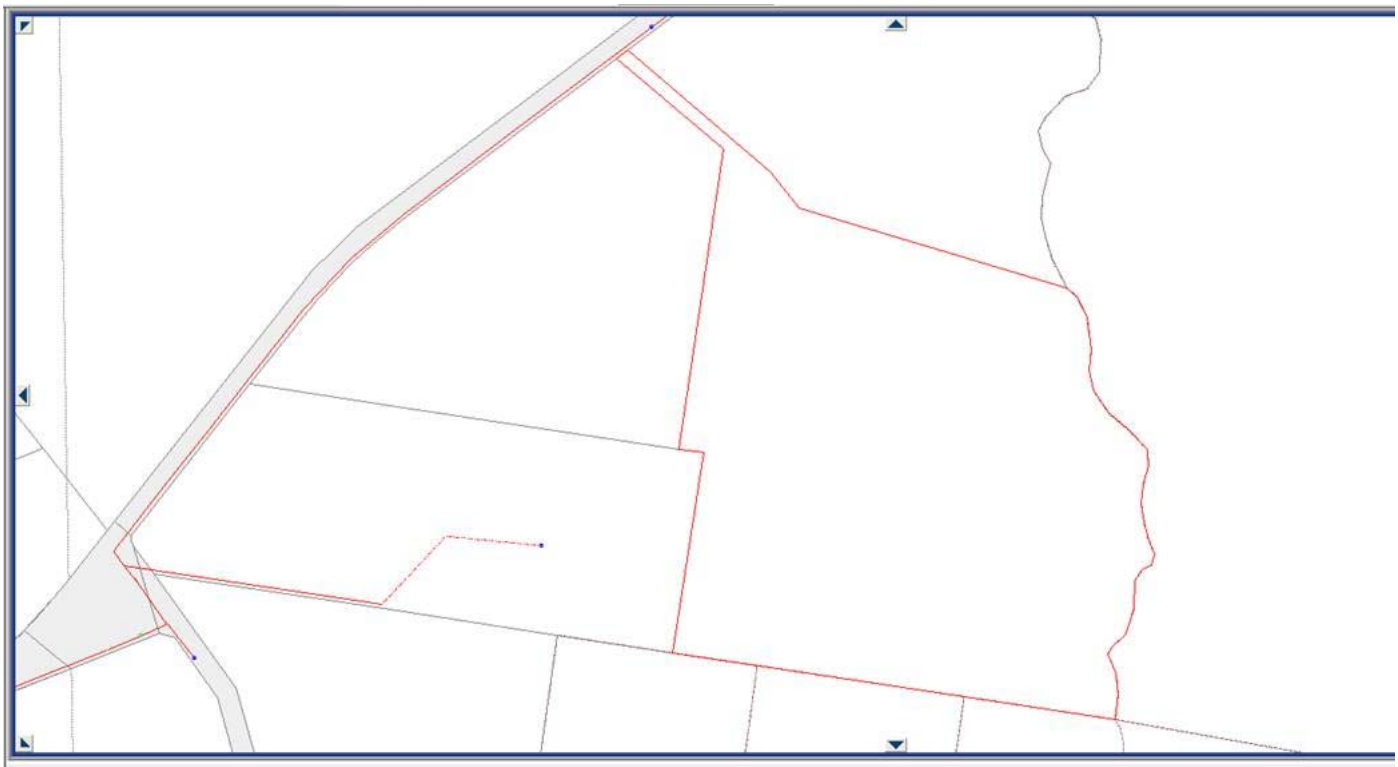
Could you please pass on a copy of this submission and the attached resources to the applicant? Should you wish to discuss this matter, or have any questions, please do not hesitate to contact me or the contacts identified above in relation to the various matters. Due to the high number of development application / planning proposal

notifications submitted to Endeavour Energy, to ensure a response contact by email to property.development@endeavourenergy.com.au is preferred.

Due to the current COVID-19 health risk, as many as possible of Endeavour Energy staff are working from home. As a result there is only a small contingent located at the Huntingwood head office for essential operations. Although working from home, access to emails and other internal stakeholders is now somewhat limited and as a result it may take longer than usual to respond to enquiries. Thank you for your understanding during this time.

Yours faithfully

Cornelis Duba
Development Application Specialist
Network Environment & Assessment
M: 0455 250 981
E: cornelis.duba@endeavourenergy.com.au
51 Huntingwood Drive, Huntingwood NSW 2148
www.endeavourenergy.com.au



G3E_FID	Feature Name	Component Name	G3E_CID	G3E_ID	LOT	S
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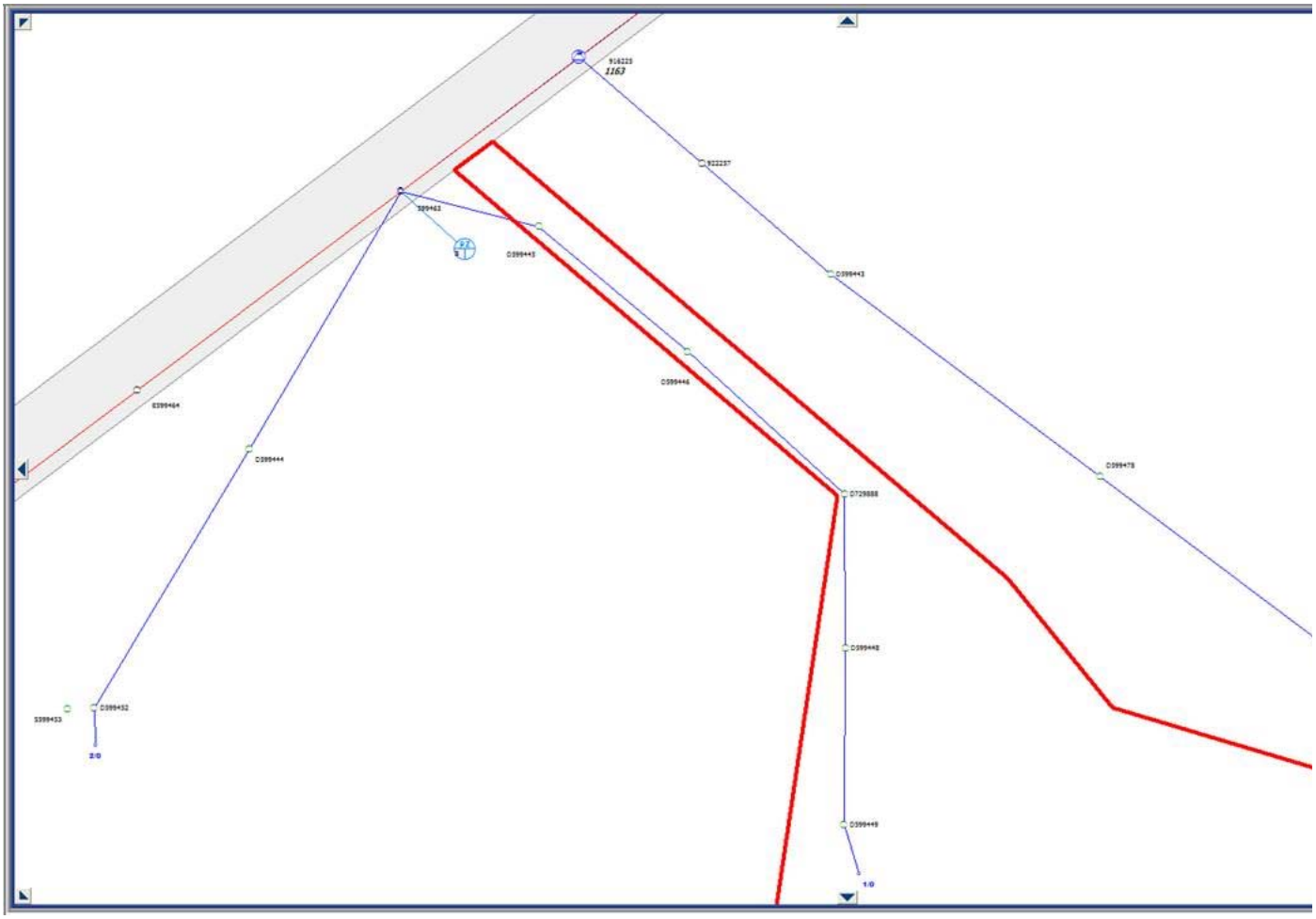


Adams Rd
Luddenham, New South Wales
Google
Street View
Google
Image capture: Feb 2019

From: William Hodgkinson <William.Hodgkinson@planning.nsw.gov.au>
Sent: Wednesday, 1 April 2020 12:25 PM
Subject: SSD-10446 Luddenham Resource Recovery Facility - Request for Input on SEARs

Good afternoon,

The Department of Planning, Industry and Environment has received a request for Secretary's Environmental Assessment Requirements (SEARs) for the Luddenham Resource Recovery Facility at 275 Adams Road, Luddenham. The proposed development is a State Significant Development under the Environmental Planning and Assessment Act 1979.

Please provide input into the SEARs for the proposal including details of any key issues and assessment requirements by **14 April 2020.**

The scoping report prepared by the Applicant for the proposed development can be accessed at the link below

https://www.planningportal.nsw.gov.au/major-projects/project/30151

If you have any enquiries, please let me know.

Regards,

Will Hodgkinson
A/ Principal Planner
Industry Assessments

4 Parramatta Square, 12 Darcy Street | Locked Bag 5022 | Parramatta NSW 2124
T 02 8275 1055 **E** william.hodgkinson@planning.nsw.gov.au

NSW GOVERNMENT | Planning, Industry & Environment

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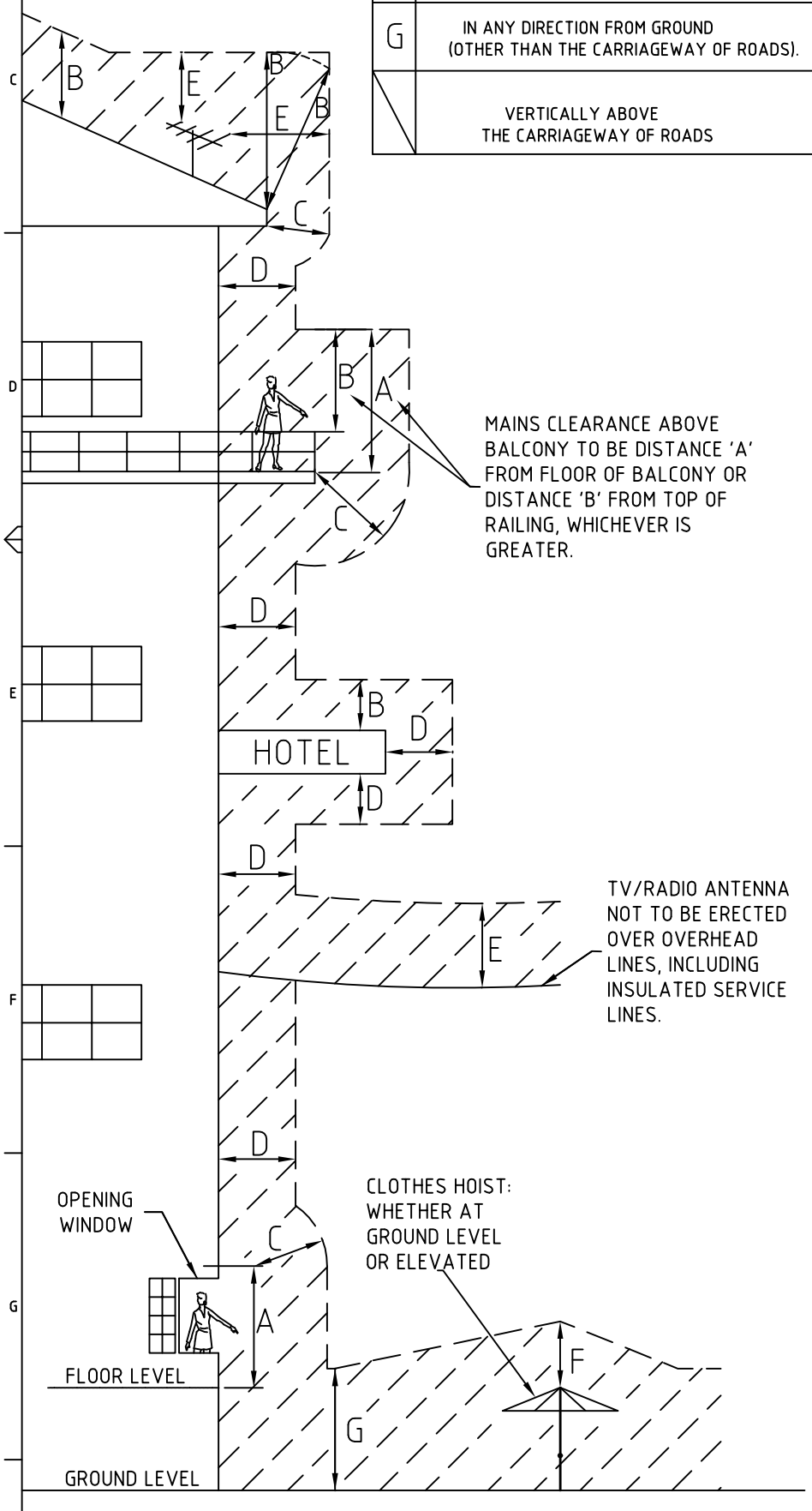
AMENDMENTS	
A	ORIGINAL ISSUE
J R No.	NA
DR'N	C.R.T.
CH'D	C.R.T.
DATE	16-2-95
JR No	930208
REDRAWN: OH SHEET	
SEO	C.H.B.
DR'N	C.R.T.
CH'D	C.R.T.
DATE	13-7-95
JR No	950099
TABLE AMENDED.	
SEO	C.H.B.
DR'N	C.R.T.
CH'D	C.R.T.
DATE	15-8-96
JR No	950156
NTEGRAL WAS PE, SHEET WAS A2.	
MPDO	CHB
DR'N	C.R.T.
CH'D	C.R.T.
DATE	03-3-97
JR No	950156
VOLT BANDS REVISED	
MPDO	CHB
DR'N	F.M.
CH'D	F.M.
DATE	28/2/03
JR No	XD3MAINO
FORMAT WAS GDS. DIM 1250 WAS 1800 ROW E. REGULATION TITLE ALTERED. YR 1999 WAS 1991.	
DMC	GB

G	
DR'N	KT
CH'D	MC
DATE	24.08.06
JR No	
ROW G ADDED TO TABLE. VOLT BANDS REVISED. ROWS B,C AND LAST ROW AMENDED. NOTES AMENDED. DIAGRAM AMENDED.	
TME	MC
H	
DR'N	BF
CH'D	SD
DATE	05.09.08
JR No	XD5STD
CLEARANCES - INSULATED WITHOUT EARTH SC WAS 5500,BARE CONDUCTORS WERE 5500,6700	
DMC	S. DANIEL
J	
DR'N	G.S.F.
CH'D	SD
DATE	27.03.09
JR No	--
CLEARANCES - INSULATED ROW E WAS 1250 NOW 1800	
DMC	S. DANIEL
K	
DR'N	DC
CH'D	SD
DATE	30.07.13
JR No	--
OH&UG MM	D.MATE
NOTE 5-7500 WAS 7300 AND BRACKETED NUMBERS REVERSED. INSULATED VALUES CHANGED FOR B&C.	

NOMINAL VOLTAGE (U) & CONDUCTOR / APPLICATION		U ≤ 1000V			U > 1000V		1000V < U ≤ 33kV	33kV < U ≤ 132kV
		INSULATED (mm)	BARE NEUTRAL (mm)	BARE ACTIVE (mm)	INSULATED WITHOUT EARTHED SCREEN (mm)	INSULATED WITH EARTHED SCREEN (mm)	BARE CONDUCTORS (mm)	BARE CONDUCTORS (mm)
A	VERTICALLY ABOVE THOSE PARTS OF ANY STRUCTURE NORMALLLY ACCESSIBLE TO PERSONS	2700	2700	3700	3700	2700	4500	5000
B	VERTICALLY ABOVE THOSE PARTS OF ANY STRUCTURE NOT NORMALLY ACCESSIBLE TO PERSONS BUT ON WHICH A PERSON MAY STAND	2000	2700	2700	2700	2700 NOTE 4	3700	4500
C	IN ANY DIRECTION (OTHER THAN VERTICALLY ABOVE) FROM THOSE PARTS OF ANY STRUCTURE NORMALLY ACCESSIBLE TO PERSONS, OR FROM ANY PARTS NOT NORMALLY ACCESSIBLE TO PERSONS BUT ON WHICH A PERSON CAN STAND	1000	900 NOTE 5 (1000)	1500	1500	1500 NOTE 4	2100	3000
D	IN ANY DIRECTION FROM THOSE PARTS OF ANY STRUCTURE NOT NORMALLY ACCESSIBLE TO PERSONS	100 NOTE 2	300 NOTE 2	600 NOTE 2	600	100	1500	2500
E	IN ANY DIRECTION FROM ANY PART OF AN OUTDOOR TELEVISION ANTENNA OR PART OF A STAYWIRE	1800	1800	1800	3000	3000	3000	3000
F	IN ANY DIRECTION FROM CLOTHES LINE	2000	3000	3000	3000	3000	3000	3000
G	IN ANY DIRECTION FROM GROUND (OTHER THAN THE CARRIAGEWAY OF ROADS).	5500 NOTE 6	5500	5500	5500 NOTE 5 (7500)	5500	5500 NOTE 5 (7500)	6700 NOTE 5 (7500)
	VERTICALLY ABOVE THE CARRIAGEWAY OF ROADS	5500	5500	5500	6000 NOTE 5 (7500)	5500	6700 NOTE 5 (7500)	6700 NOTE 5 (7500)



GENERAL NOTES

1. THE POINT OF ATTACHMENT IS HERE DEFINED AS THE POINT AT WHICH Endeavour Energy'S AERIAL SERVICE MAINS JOIN ONTO THE CONSUMERS BUILDING OR STRUCTURE OR ELSE THE FIRST POLE PAST THE BOUNDARY OF THE CONSUMERS PREMISES.
2. THIS CLEARANCE MAY BE REDUCED TO ALLOW FOR TERMINATION AT POINT OF ATTACHMENT.
3. FOR CLEARANCE REQUIREMENTS OF INSULATED AERIAL SERVICE MAINS, REFER Endeavour Energy'S DRAWING 011985.
4. HIGH VOLTAGE NON-METALIC SCREENED AERIAL BUNDLED CONDUCTOR (NMS-HV ABC) IS CLASSIFIED AS INSULATED WITH EARTHED SCREEN FOR CLEARANCE PURPOSES, EXCEPT FOR DIMENSIONS B & C.
5. TO KEEP LINES BEYOND THE REACH OF PERSONS, THE DESIGN CLEARANCES (SHOWN IN BRACKETS) REQUIRED BY Endeavour Energy IN THESE SITUATIONS ARE GREATER THAN THOSE REQUIRED BY INDUSTRY GUIDELINES.
6. DOES NOT INCLUDE INSULATED SERVICE LINES.

MINIMUM CLEARANCE REQUIREMENTS

MINIMUM SAFE CLEARANCES ARE SPECIFIED IN ELECTRICITY SUPPLY (SAFETY & NETWORK MANAGEMENT) REGULATION 2008, & GUIDELINES FOR DESIGN & MAINTENANCE OF OVERHEAD DISTRIBUTION & TRANSMISSION LINES (ENA C(b)1-2006).
DETAILS SHOWN ON THIS DRAWING COMPLY WITH ENDEAVOUR ENERGY PRACTICE.

THESE CLEARANCES ARE THE MINIMUM NECESSARY WHEN ANY Endeavour Energy OVERHEAD LINE WILL BE IN ITS CLOSEST POSITION TO THE BUILDING OR OTHER STRUCTURE DURING STRONG WINDS OR MAXIMUM OPERATING TEMPERATURE (EXCLUDING FAULT CURRENTS OR EMERGENCY LOAD CURRENTS). UNDER THESE CONDITIONS, CONDUCTOR MAY SWING OR SAG CONSIDERABLY TOWARDS THE BUILDING OR STRUCTURE COMPARED WITH NORMAL CONDITIONS.
ADEQUATE ALLOWANCE SHOULD BE MADE FOR THIS POSSIBLE SWING OR SAG OF CONDUCTORS.

OVERHEAD LINES MUST NOT COME WITHIN HATCHED AREAS.
MINIMUM CLEARANCES SHOWN ARE FOR Endeavour Energy OVERHEAD LINES UP TO THE POINT OF ATTACHMENT (AS DEFINED IN NOTE 1).
MINIMUM CLEARANCES PAST THE POINT OF ATTACHMENT ARE TO BE IN ACCORDANCE WITH SAA WIRING RULES (AS/NZS3000).

Endeavour Energy

ORIGINAL SCALE	APPROVED	REFERENCE DRAWINGS	
NONE	C.BROWN	DO NOT SCALE DIMENSIONS IN MILLIMETRES	AUTHORISED W.ISLEY

DRAWN	C.R.T.	MGR TRANSMISSION MAINS	16-2-95
DATE	16-2-95		
CH'D			

Endeavour Energy OVERHEAD LINES
MINIMUM CLEARANCES NEAR STRUCTURES

A2P 086232 K

SHEET No 1 OF 1 SHEETS

ELECTRICAL SAFETY

FOR BUILDING AND CONSTRUCTION WORKERS

WORKPLACE FACT SHEET

KNOW THE DANGERS

Employees and contractors in the building and construction industry may run the risk of receiving an electric shock and causing substantial damage to plant and equipment when operating plant near overhead power lines or when excavating. This fact sheet has been developed to help you understand why you may be at risk and what you can do to work safely.

THINGS YOU SHOULD DO BEFORE STARTING WORK

- Complete a risk assessment. This should identify hazards (including work practices and procedures) and help you implement appropriate control measures.
- Find out the location of underground and overhead power lines and their proximity to your work activities and transit routes before commencing digging or other activities by phoning **131 081**.
- Know the location of underground and overhead power lines and their proximity to your work activities and transit routes before commencing digging or other activities.
- Dial **1100** or visit **www.1100.com.au** when planning underground work.
- Visually inspect points of attachment, at both ends, before commencing work as gutters and metal roofs may become "alive" due to deteriorating insulation on electrical wiring.
- Use a safety switch to reduce the risk of shock from portable tools.
- Before commencing work, install eye level visual markers in any area where overhead power lines are identified.
- Carefully monitor weather conditions – power lines can sway in the wind, sag as temperatures increase and are difficult to see at dawn and dusk.
- Ensure operators are aware of the height and reach of their machinery in their travel, stowed and working positions to ensure that minimum approach distances to power lines are maintained. For more information refer to *Work Near Overhead Power Lines Code of Practice 2006*, WorkCover NSW.
- Determine electricity asset safety clearances and whether an isolation needs to occur by referring to *Where to draw the line on safety clearances from electricity assets*, available at www.endeavourenergy.com.au
- Ask the occupant if they have experienced any minor electrical shocks from plumbing or appliances.

Call 131 081 and put safety first.
www.endeavourenergy.com.au

Endeavour Energy

BEFORE YOU DIG

- Apply for Dial Before You Dig plans for each location where you intend to dig.
- Use cable location services and technologies such as Global Positioning Systems (GPS) and Ground Penetrating Radar (GPR) to accurately identify the location of underground utilities.
- Pothole once you reach the applicable approach distance – for more information on approach distances for underground assets refer to *Work Near Underground Assets Guide 2007*, WorkCover NSW.

SAFE WORK HABITS

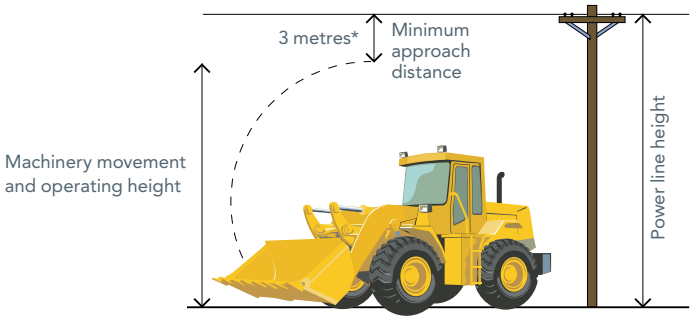
- Look up and locate overhead power lines and maintain at least the minimum approach distance from them.

Minimum safe approach distances when working near power lines

Workers and their equipment should not approach overhead power lines any closer than the following, when machinery is being operated:

Power lines with voltages up to 132,000 volts	e.g. low voltage distribution and subtransmission lines, usually on poles	3 metres
Between 132,000 and 330,000 volts	e.g. subtransmission and transmission lines, usually on either poles or towers	6 metres
More than 330,000 volts	e.g. transmission lines usually on towers	8 metres

The distance that must be assessed prior to work



*Voltages up to 132,000 volts.

- Remember that WorkCover requires a minimum approach distance of at least three metres from overhead power lines (up to 132,000 volts).
- Exercise extreme caution when working near the point of attachment of the electrical service line to the house/building.
- Look for cables and the signs of underground assets whenever digging, such as changes in grass, depressions or mounds and pipe work.
- Look out for electrical arcs. If identified, do not commence work and contact Endeavour Energy immediately on **131 003**.
- To eliminate the possibility of making contact with power lines on a job site, plan and communicate safe traffic paths by providing diagrams of plant and vehicle travel paths away from overhead power lines.
- Assign a spotter to each operator of high machinery and excavators to guide movements near overhead power lines and underground cables and ensure that minimum approach distances are maintained.
- Before every relocation, lower all machinery into the transport position.
- Use proximity sensor technologies on plant while you dig.

PERMIT TO WORK SYSTEMS

Using a permit to work (PTW) system can be an effective way to be sure preventative measures have been taken before any digging commences. It acts as a checklist that can only enable digging work to commence (usually with supervisor sign off) once all preventative actions have been taken *first*.

A typical permit to work checklist should ask/specify the following:

01 Has Dial Before You Dig been undertaken?

02 Have cable location services/technologies been used and their results compared with the DBYD plans?

03 Have the plans been marked up to reflect any new information/changes?

04 Has the safest plant suitable for the job been selected and ordered?

05 Has a spotter been allocated to this job to observe hand, mechanical or powered digging?

06 Is potholing included in the safe work procedure?

07 Has the job been assessed to use non-destructive digging?

08 Have overhead power lines been identified as a risk? If so, has this risk been managed as low as reasonably practicable?

09 Have all persons who may face/are affected by the risk of hitting underground utilities been consulted/made aware of the safe work procedures?

SAFETY EXCELLENCE

IN EMERGENCIES CALL 131 003

24 hours a day, 7 days a week

If you have any questions about what you should do to stay safe please call 131 081 or visit us at www.endeavourenergy.com.au

0611-ENE2352_BC

Technical Review Request

Please return completed form along with all attachments to: Endeavour Energy, PO Box 811 Seven Hills NSW 1730
Email: cwadmin@endeavourenergy.com.au | **Fax:** 02 9853 7925 | For enquiries about this form, please contact 02 9853 7977

This form can be used for requesting technical assistance to determine preliminary connection requirements prior to lodging a formal application for large or complex developments including master planning for major projects or subdivisions, embedded networks, asset relocations and embedded generator connections.

Site Details

Lot / DP No. _____/_____ Street No. _____ Street Name _____

Suburb/Town _____ Postcode _____ UBD Ref _____

Nearest Substation: _____ Pole/Pillar _____ Cross Street _____

Retailer NMI for Existing Sites: _____ (Can be found on your electricity bill)

Retail Customer or Developer Details

Name / Company_____ Contact Person _____

Street No. _____ Street Name _____

PO Box _____ Suburb / Town _____ Post Code _____

Phone _____ Mobile _____ Fax _____

Email: _____

Applicant / Applicant's Representative Details

Name / Company_____ Contact Person _____

Street No. _____ Street Name _____

PO Box _____ Suburb / Town _____ Post Code _____

Phone _____ Mobile _____ Fax _____

Email: _____

Preferred method of contact: ☐ Mail ☐ Phone ☐ Email

Nature of Request

Please Note: To ensure an accurate and meaningful response, please provide detailed information describing the proposed development and attachments to support this request. Endeavour Energy will use all reasonable endeavours to keep confidential any information provided as part of this request as required under Clause 8.6 of the National Electricity Rules.

The Customer/Developer is the Landowner: ☐ Yes ☐ No

☐ I am authorised by the customer/proponent to make enquiry to Endeavour Energy for this development.

Important Information

Planning for supply to large or complex developments including master planning for major projects, subdivisions or establishment of embedded networks, asset relocations or connection of large embedded generators, these often involve options analysis and consideration of longer term network development. Preliminary information regarding conditions of supply can be obtained prior to lodging an application for connection services by submitting a Technical Review Request.

A technical review may involve a simple or complex enquiry or the provision of a detailed planning study. A corresponding ancillary network service charge, Preliminary Enquiry Service fee for the provision of these services applies and can be found in our Network Price List Ancillary Network Services (ANS). ANS fees are approved annually by the Australian Energy Regulator and typically change each financial year.

If you are able to submit an application for connection service, this may represent a more cost-effective option as an application will require a similar review of supply availability or connection/network requirements in order to receive a binding offer to proceed.

Simple requests for technical review are basic reviews of existing data systems to provide a summary response. Complex requests require input from Endeavour Energy internal stakeholders and specialist project management services to determine likely connection voltage, connection point, available capacity and/or required connection assets provided in a detailed response. The table below generally represents minimum hours applied for typical requests.

Common types of requests for technical review	Preliminary Enquiry Service fee category	Minimum hours
All simple	Simple	1
Connection of Load at LV	Complex	5
Subdivision up to 300 lots	Complex	5
Asset Relocations without Transmission	Complex	5
Master Planning without Transmission	Complex	9
Master Planning with Transmission	Complex	11

Use of Fencing for security and the reduction of visual impact of a Padmount substation:

- Appropriate screening made of metal, timber, plastic or masonry fencing is allowable outside the easement.
- No sail clothes, covers or tarps of any kind are allowable in the easement.
- Carport posts, metallic clothes hoists poles or posts cannot be located inside the padmount substation easement area nor encroach into it.
- Dial before You Dig (DBYD) service plans are required prior to any property excavation. Contact **1100**. Note: DBYD service plans do not indicate underground electrical service mains.
- Ground excavation must be done manually or by a toothless mechanical scraping device within the easement with an approved safety observer at all times.
- Easement dimensions must not be reduced by any structures e.g. fences, retaining walls, brick walls, terrace work or vegetation etc.
- Ongoing clear entry and exit access around the substation easement area is paramount for Work Health & Safety (WH&S) requirements.
- No trees, shrubs or bushes nor planter boxes or pot plants or decorative features are allowed in the easement.
- No slip or trip hazards allowed in the easement. Tree stumps must be cut to ground level or below**.**
- Ventilation is required around and through the base of the substation.
- No placing of Council bins or stock piling of any materials is allowed in the easement.
- If the substation is fenced out or gated, ongoing maintenance of the easement area is still the responsibility of the owner of the property.
- If the substation is enclosed and gated and locked, it must open outwards towards the street, and have an Endeavour Energy locking system installed for 24hr 7days access. Contact Integrity locking on **1300 366 488** for assistance.
- Endeavour Energy will provide the appropriate reflective signage for the asset when contacted.

NOTE: The easement must be maintained on a regular basis for work health and safety WH&S regulations. The following suggestions are provided to property owners who may find it onerous to maintain the easement on a regular basis. The property owner may install the following within the easement at their cost:

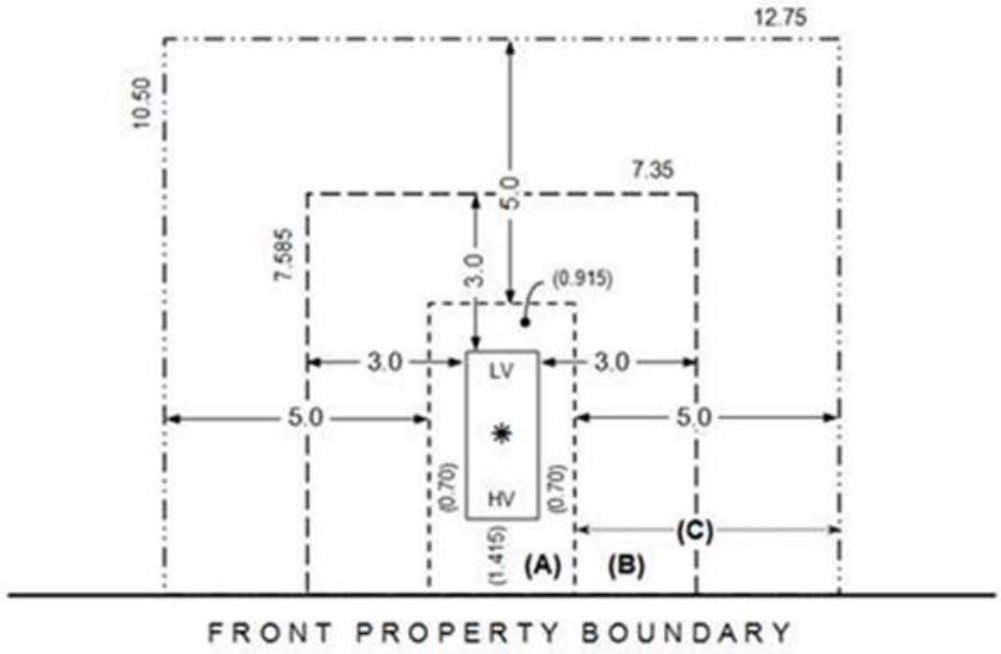
- Remove or spray all vegetation with a non-toxic grass and weed deterrent;
- Remove all foreign objects leaving the easement in an approved and level state;
- Form up the easement perimeter with treated timber minimum 75-100mm deep;
- Followed with the laying of a suitable porous weed mat; and
- Then covering the easement with 20mm min. size blue metal or coloured stones, wood bark/chips, asphalt or install pavers that are easily lifted. Alternately, lay lawn and maintain periodically.

The above suggestions, if employed correctly, will require less ongoing maintenance ensuring a clear firm footing for staff to carry out electrical maintenance or emergency works. This will also ensure an approved aesthetic state for your local community.

Retaining Walls

The final height of a retaining wall should comply with the Local Council and not exceed 1m.
The finished ground surface of the uphill of the retaining wall should batter down and finish below the top of the wall's capping to mitigate direct water flow into the substation easement.
The finished wall should be completely constructed in the same type of brick or concrete blocks / material for safety as well as aesthetic reasons.
The finished wall should not trap or promote pooling of water in the easement.
The wall should comply with all relevant building and council codes e.g. drainage material inclusion behind the retaining wall to include min. 100mm ag-line, aggregate and geo tech fabric.
The side walls can be extended minimally in order to accommodate a raised surrounding ground level.
Any future wall extension would need to be properly footed.
Dial before You Dig (DBYD) service plans are required before excavating for retaining wall footings and fence posts. Contact DBYD on 1100 for assistance.
Retaining walls must be constructed outside of and not encroach the electricity easement.

Easement and Restriction Sites for Padmount Substations
- Common Earthing, Residential -



- No building must be erected or permitted to remain within the restriction site marked (B) unless:
  - the external surface of the building erected within 1.5 metres from the substation footing has a 120/120/120 fire rating; and
  - the external surface of the building erected between 1.5 metres and 3.0 metres from the substation footing has a 60/60/60 fire rating; and
  - the owner provides Endeavour Energy with an engineer's certificate to this effect.
- No swimming pool or spa must be erected or permitted to remain within the restriction site marked (C).

The foregoing easement and restrictions apply to a padmount substation with a common earth system where the high voltage and low voltage equipment, the local neutral and other metallic parts are electrically bonded together and connected to one earth grid. Common earthing must be used where a new earthing installation is being established and interconnected to 5 or more other substations through the neutral conductor. If the conditions for a common earthing system cannot be achieved economically eg. in non-urban areas, then two separate and distinct earthing systems, one for the high voltage and the other for low voltage must be used. Substation separate earthing changes the dimensions of the restriction sites.

- No fencing must be erected or permitted to remain within 4 metres from the substation footing.
- No swimming pool or spa must be erected or permitted to remain within 30 metres from the substation footing.

For further details refer to Endeavour Energy's Mains Design Instruction Document No: MDI 0044 'Easements and Property Tenure' or contact Endeavour Energy's Head Office enquiries on telephone: 133 718 or (02) 9853 6666 from 8am - 5:30pm.

Document No: MDI 0044

Amendment No: 1

Mains Design Instruction

Easements and Property Tenure

IMPORTANT DISCLAIMER

As the information contained in this publication is subject to change from time to time, Endeavour Energy gives no warranty that the information is correct or complete or is a definitive statement of procedures. Endeavour Energy reserves the right to vary the content of this publication as and when required. You must make independent inquiries to satisfy yourself as to correctness and currency of the content. Endeavour Energy expressly disclaims all and any liability to any persons whatsoever in respect of anything done or not done by any such person in reliance, whether in whole or in part, on this document.

51 Huntingwood Drive Huntingwood NSW 2148
PO Box 811, Seven Hills NSW 1730
T: 131 081 • F: 61 2 9853 6000
www.endeavourenergy.com.au
ABN 59 253 130 878

MAINS DESIGN INSTRUCTION

ASSET STANDARDS & DESIGN	Document No Amendment No Approved By Approval Date	MDI 0044 1 GMAM 06/03/2017

MDI 0044 – Easements and Property Tenure

CONTENTS

1.0 PURPOSE

To set out Endeavour Energy's design requirements for new easements, other property tenure requirements, and the management of existing easements.

2.0 SCOPE

This instruction covers:

- The rights Endeavour Energy has within its own easements;
- The determination of the minimum easement size for an asset;
- Process for acquiring, modifying and removing easements;
- The definition of controls for the safe operation of activities within easements; and,
- The definition of activities which are prohibited within easements.

The instruction does not cover:

- The release process of easements, which is covered in Company Policy 9.2.4.
- The process for managing existing encroachments, which is defined in Company Procedure GAM 0098.

3.0 REFERENCES

Internal

- Company Policy 9.2.3 – Property Tenure for Network Assets
- Company Policy 9.2.4 – Network Easement Release
- Company Procedure GAM 0098 – Management of Existing Encroachments
- Company Procedure GAM 0114 – Granting Dispensation for Engineering Documents
- Environmental Management Standard EMS 0006 - Maintenance and construction of access tracks
- Mains Construction Instruction MCI 0006 – Underground distribution construction standard
- Mains Design Instruction MDI 0028 – Underground distribution design
- Mains Design Instruction MDI 0031 – Overhead distribution: Design standards manual
- Mains Design Instruction MDI 0047 – Overhead transmission design
- Substation Design Instruction SDI 100 – Distribution Earthing Design, Construct and Test
- Endeavour Energy General Terms & Conditions for Connection of Public Lighting Assets (March 2011)
- Network Management Plan November 2013

External

- *Electricity Supply Act* 1995*
- *Roads Act* 1993*
- *Land Acquisition (Just Terms Compensation) Act* 1991*
- *Conveyancing Act* 1919*
- State Environmental Planning Policy (Infrastructure) 2007
- ISSC 20 - Guidelines for the Management of Activities within Electricity Easements and close to Electricity Infrastructure (April. 2012)
- ENA National Electricity Network Safety Code (Doc 001-2008)

- AS / NZS 7000:2016 Overhead Line Design – Detailed procedures
- AS / NZS 4853:2012 – Electrical hazards on metallic pipelines

** - Act current as of 19/02/2016*

4.0 DEFINITIONS AND ABBREVIATIONS

4.1 Abbreviations

EPR
Earth Potential Rise

HV
High voltage

LV
Low voltage

LPI
Land and Property Information

4.2 Definitions

Easement
An easement is an encumbrance on the title of land (which may be limited in width and height above or below the land) conferring a right to inspect, construct, operate, maintain, repair, renew, replace or upgrade electrical infrastructure.

Positive Covenant
A type of property tenure that requires expenditure by the land owner is required to meet the terms of the covenant.

Property tenure
A broad term covering the rights of the company to carry out network operations within land not owned by the company – exercising statutory rights in accordance with relevant legal requirements and the creation of appropriate recognised property rights. Typical property tenure include easements, Restrictions on Use, Positive Covenant and long term leases.

Public road
Defined under the Roads Act 1993. A road usually includes a vehicle carriageway and associated footpath areas on each side of the carriageway.

Restrictions on use of land
Conditions imposed on the use of the land, to inform the landowner and put limitations on the use of land due to the risk that exists by the electrical asset being located within the burdened lot.

5.0 ACTIONS

5.1 General Requirements

This standard covers two aspects of easement (and other types of property tenure) management:

- The design requirements relating to easements – easement size, creation, modification and release, rights of way and community titles.
- The management of existing easements – encroachments, transfer hazards and rights granted by the Electricity Supply Act 1995.

The general philosophy behind Endeavour Energy's approach to design and management of easements is to secure both the safe operation of the electrical network and, the safety of its employees, contractors and the public. Where a design, activity or proposal could compromise the electrical network or put an employee or the public at risk, the Electricity Supply Act 1995 allows Endeavour Energy to restrict and/or prohibit the activity. Refer to Clause 5.11 for further details.

All Endeavour Energy easements must comply with the requirements of this document, which is based on ISSC 20 "Guidelines for the Management of Activities within Electricity Easements and close to Electricity Infrastructure". However, where this standard and ISSC 20 differ, this standard will take precedence.

All new/proposed transmission and distribution infrastructure, which is not constructed on public roads, an easement in favour of Endeavour Energy must be created in accordance with the requirements of this standard.

5.2 Management process of easements

The following flowchart details the management process for easements.

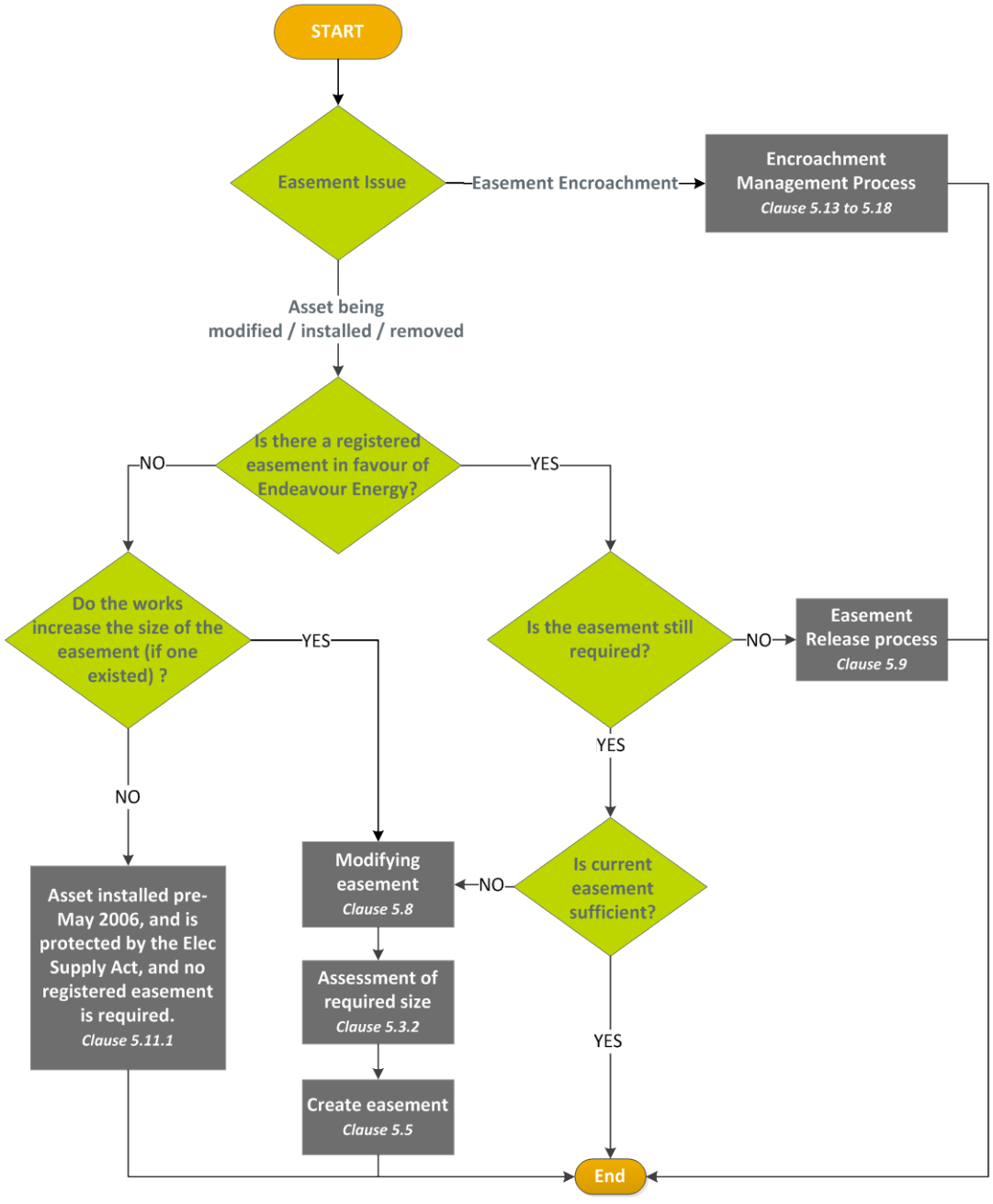


Figure 1 - Easement Management Flowchart

5.3 Minimum easement widths

The minimum easement widths are specified in Table 1. Larger easements may be specified and/or required on a project by project basis. All designs must certify that the easement widths in Table 1 are suitable for the span lengths / conductors used in the design.

5.3.1 Minimum easement required for overhead lines

For overhead lines, the minimum easement width for each span must be the greater width of the following three criteria:

- The width of the structure plus, two (2) times the sum of:
  - Conductor blowout, including insulator swing where applicable, (at 50°C and 500 Pa wind pressure); and,
  - The appropriate clearance from Table 3.7 of AS/NZS 7000 (Refer to Figure 2)
- Minimum maintenance requirements for the type of construction.
- The easement widths specified in Table 1.

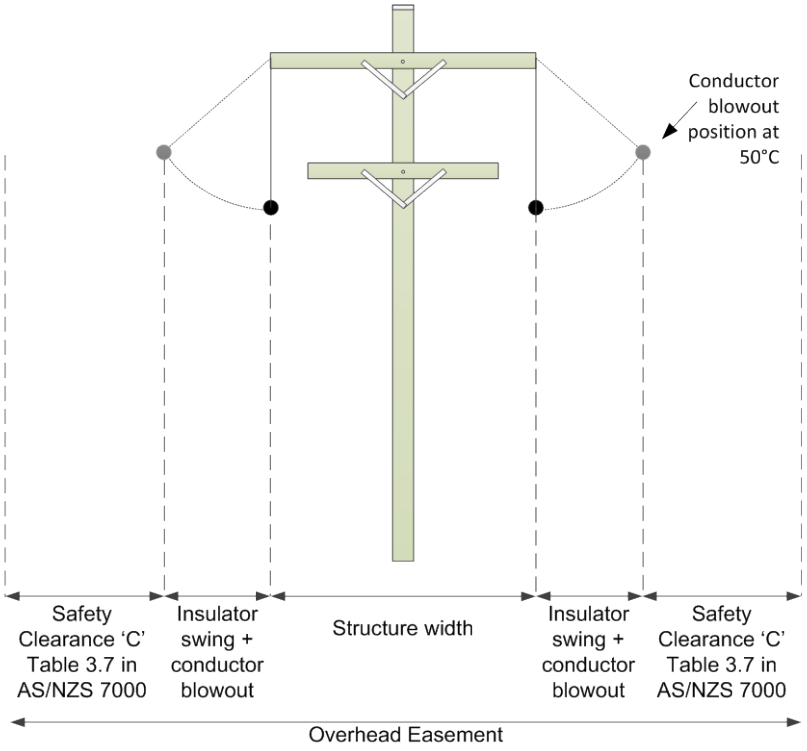


Figure 2 - Minimum overhead easement

New overhead assets must be fully contained within an easement (or other types of property tenure) and not encroach adjoining properties. Existing lines encroaching a property (without a formal easement) are permitted to remain, and may be replaced or uprated, as long as there is no increase in this encroachment. Refer to Figure 5.

5.3.2 Minimum easement required for network assets

The table below details the minimum easement widths for various network assets. Refer to Annexure 4 for graphical representation for a cable joint system; pole stay and padmount clearances.

Table 1 - Minimum easement widths

	Voltage	Asset Type	Construction	Minimum Easement (m)
Overhead Assets	400V–22kV	Bare Construction	All	9
		ABC		
		CCT		
	33kV / 66kV	Bare conductor *(see Note 2)*	Line post insulators	18
			33kV Suspension Insulators	18
			66kV Suspension Insulators	25
			H pole Structures	30
	132kV	Bare conductor *(see Note 2)*	Line post insulators	25
			H pole Structures	30
			Steel tower	30
Underground Assets	400V - 22kV	Cables	Underbore / Ducted / Direct buried	3
			Ducted < 100m and with concrete protection *(min 50 mm concrete cover at standard burial depth)*	1
	33kV - 132kV	Cables *(single feeder only)*	Ducted / Direct buried	5
			Cable Pits / Joint Bays	6
	-	Communications cables	Ducted / Direct Buried	1
		Earthing conductors		1
		Bonding leads		1
		Link Box / Comms Pit		2.0 x 2.0
Other	-	Streetlight Column / Service Pillar	-	1.0 x 1.0
		Switching Station		2.75 x 2.75 *(see clause 5.3.6)*
		Padmount Substation		2.75 x 5.5 *(see clause 5.3.6)*
		Auto Transformer		
		Indoor Substation		See clause 5.3.5
		Pole stays / Ground stays		See Note 2
	Rights of Access	Vehicle access tracks easement in rural areas *(see Note 3)*		5
		Vehicle access in urban areas		5 *(see Note 5)*
		Pedestrian access only		1.2

Notes:

1. All Network assets, except for padmounts / switching stations, must be positioned in the centre of the easement. Refer to Drawings 016665 and 282551 for easement details of padmounts and switching stations. For non-symmetrical assets, such as post insulators, the centre must be measured from the position of the conductors at rest.
2. The easement for a termination pole/structure or for an aerial / ground stay must extend at least half the easement width beyond the last network pole or stay.
3. For further details regarding the construction and maintenance requirements of access tracks, refer to EMS 0006.
4. For an overhead line which its operating voltage differs from its constructed voltage, the easement must be for the constructed voltage.
5. Applies to straight line of access only. If angles or bends are required in the access path, then width to be determined by assessing a truck turning diagram, and gaining approval from the relevant Endeavour Energy Operations Manager. .

5.3.3 Parallel overhead feeders

When considering overhead lines installed in parallel, an optimised easement width may be determined in accordance with the following principles:

- It is not necessary to consider the lines blowing toward each other with the maximum wind load. Instead consider the line with the larger sag blowing under maximum wind load toward the other line in its vertical position.
- Allowance must be given for physical movement of the line (conductors and insulators swinging), as well as electrical clearances and climbing corridors.
- Minimum horizontal separation between the two centrelines of the two feeders must be no less than 10m.

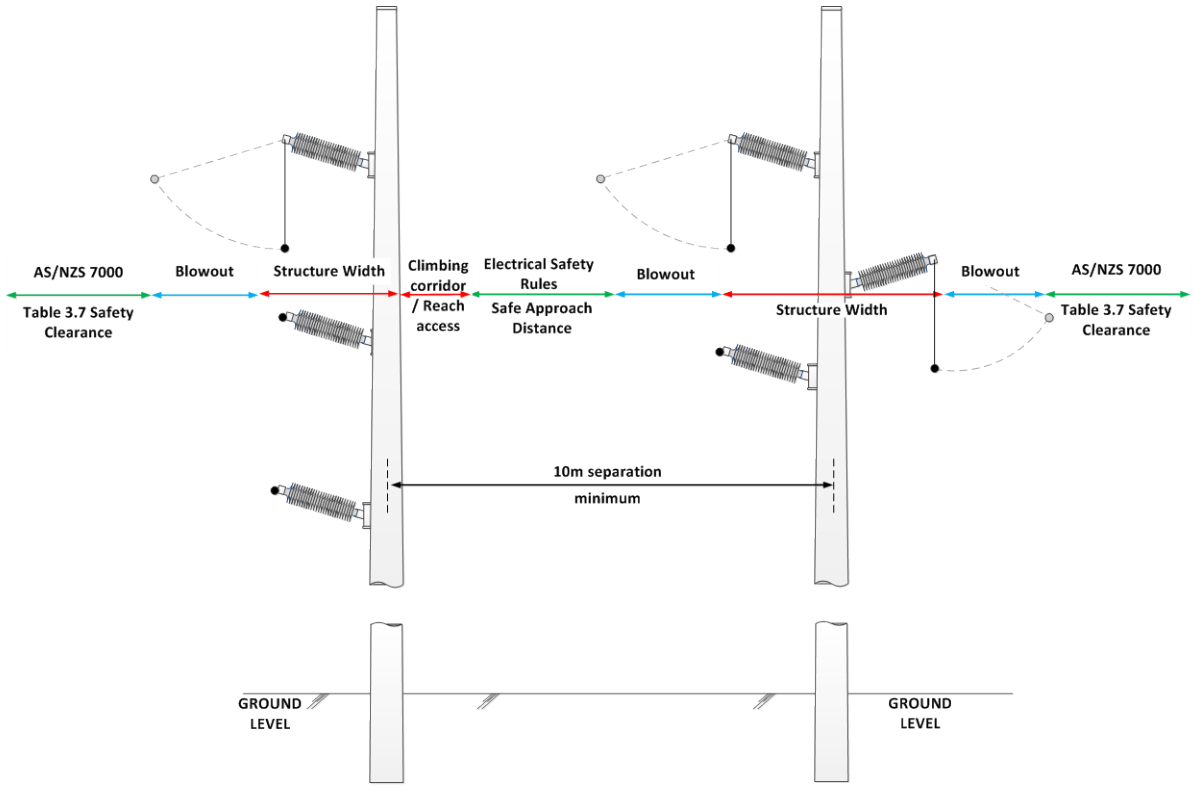


Figure 3 – Easement requirements for parallel feeders
(Structure on the right assumed to have the greatest conductor blowout)

5.3.4 Request for dispensation to the minimum easement width

A request for dispensation must be made to Endeavour Energy's Mains Assets Manager for any proposed easement that is smaller than the stated minimum width listed in Table 1. The submission must show there is no reduction in access for maintenance purposes and that the easement provides adequate electrical clearance to any existing and/or planned structures that may be built adjacent to the easement.

All designs must consider the following factors when determining an easement width:

- Electrical safety clearance
- Insulator and conductor blowout
- Access for maintenance, repair and upgrading
- Future requirement for additional feeder(s)
- Public safety based on potential earth potential rise (EPR) and electromagnetic field (EMF) issues
- Radio and television interference
- Audible noise
- Cable duct / jointing bay requirements

5.3.5 Indoor substations

The boundaries of an easement for indoor substation must be defined by the internal face of the walls, ceiling, floor, and cable trenches of the substation room.

An easement for the cables that enter and exit the substation room will also be required if they are not installed within public roads and/or existing Endeavour Energy easements.

A right of access may also be required to give Endeavour Energy employees, vehicles, and equipment unrestricted access to the indoor substation at all times.

5.3.6 Padmount substations and switching stations

The easement size for a padmount substation must be increased when a retaining wall or safety bollard has been installed/built to protect a padmount substation from vehicle impact, as indicated in Figure 4.

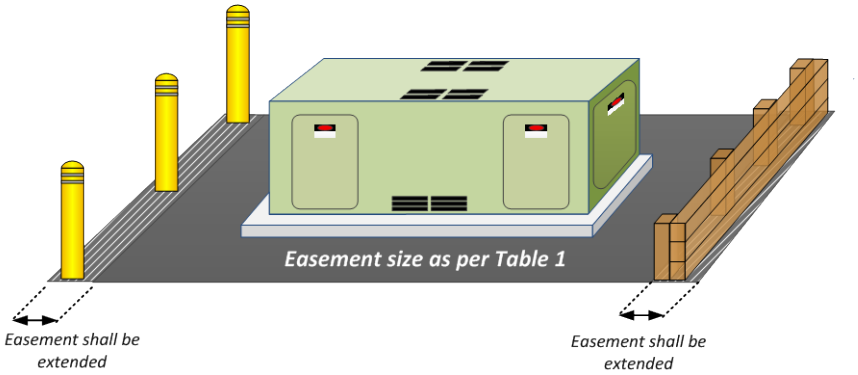


Figure 4 - Easements to include retaining wall or safety bollard

5.4 Assets within special areas

5.4.1 Assets within the road verge

Assets installed within a road carriageway cannot be provided with an easement. However, overhead assets proposed to be installed within the road verge still require the clearances specified in Table 1 and Clause 5.3.1.

As a minimum, the separation between the power line and the property line, must be the conductor blowout (at 50°C and 500 Pa wind pressure) and Safety Clearance 'C' from Table 3.7 of AS/NZS 7000.

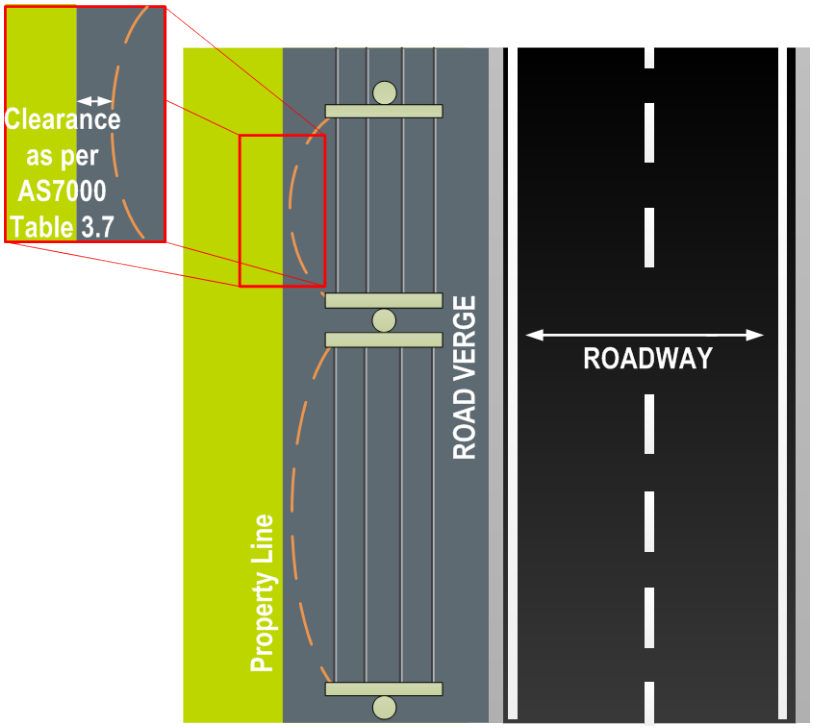


Figure 5 - Roadway requirements

5.4.2 Assets within roadways

Assets installed within a public road (as defined in the *Roads Act 1993*) requires the consent of the appropriate road authority to be obtained prior to the construction of any electrical works. Neither the *Roads Act 1993* or the *Electricity Supply Act 1995* requires an easement within public roads.

5.4.3 Overhead lines crossing private property

Where Endeavour Energy overhead lines cross private property, the line must be protected by a registered easement. The minimum width of this easement must be in accordance with the requirements in Clause 5.3.1 and 5.3.2.

5.4.4 Easement over Railway Corridor land

In 2002, Endeavour Energy entered into a *Master Access Deed* with Transport for NSW (then Railcorp), covering all new and existing Endeavour Energy network assets located within any rail corridor. This deed defines a rail corridor as any land owned by Transport for NSW. Network assets located within a rail corridor under the provisions of the *Master Access Deed* do not require easements.

Transport for NSW may also permit developers to install network assets in a rail corridor under an *Individual Access Deed* or *Deed of Release and Indemnity*. Any deed between the developer and Transport for NSW, will need to provide the same minimum requirements as those under the Master Access Deed and be transferable to Endeavour Energy for any new network assets installed by the developer.

Transport for NSW's process for third party works within the rail corridor is documented on its website, which includes the application form. Applications for rail corridor access must be submitted to the Rail Corridor Management Group in Sydney.

The ARTC website must be consulted for contact information regarding proposed rail corridor access.

5.4.5 Easements over National Park Land

Land dedicated as a wilderness area, national park, state recreation area, regional park, or nature reserve is managed by the NSW Office of Environment & Heritage.

Endeavour Energy is usually required to enter into a Formal Deed of Easement under Section 153 of the National Parks & Wildlife Act 1974 whereby compensation or an annual rent may be payable. The minimum easement dimensions given in Table 1 still apply, however, specific requirements will need to be negotiated with NSW Office of Environment & Heritage.

5.4.6 Easements over Forestry Land

Land dedicated as state forest is managed by Forests NSW/Department of Primary Industries and may be subject to native title.

Forests NSW will grant a limited form of property tenure under an Occupation Permit and an annual rent may be payable. The minimum easement dimensions given in Table 1 still apply, however, specific requirements will need to be negotiated with Forests NSW.

5.4.7 Easements in water catchment areas

Land that is classed as a water catchment area by the Sydney Catchment Authority, the standard easement terms do not always apply fully. The minimum easement dimensions given in Table 1 still apply, however, specific requirements will need to be negotiated with Sydney Catchment Authority.

5.4.8 Community Title developments

5.4.8.1 Asset ownership

The ownership of electrical assets (both HV and LV) within a community title development will only be accepted (owned and maintained) by Endeavour Energy if they are installed in accordance with Endeavour Energy's standard requirements and installation practices.

Endeavour Energy will generally own and maintain all high voltage electrical equipment within the development.

Endeavour Energy or the Community Title Association may own and maintain the low voltage electrical equipment and/or street lighting network.

Annexure 3 outlines the relevant by-laws that must be incorporated into the Community Title Management Plans to define the ownership and access requirements for the electricity assets within the development.

Community title developments and their management associations or developers are not considered to be public lighting customers under the NSW Public Lighting Code and therefore must meet the requirements stated in Endeavour Energy's *"General Terms and Conditions for Connection of Public Lighting Assets".*

5.4.8.2 Asset construction

For all assets the installation must provide the same level of security and access as normally would be found in standard urban residential development, this includes:

- All cables / spare conduits being located in the standard allocation within the road verge

- All pillars, padmount substations and switching stations are located in acceptable areas as stated in MDI 0028.
- No other assets and/or utilities being installed directly above the electrical assets
- Minimum distances between electrical assets and other utility services being maintained
- Sufficient access for Endeavour Energy vehicles (including trucks and EWP's) to access and maintain the assets without the need to close and/or block private roads.

5.4.8.3 Easements within Community Title developments

All assets owned by Endeavour Energy within a Community Title development and not installed within a public road, are to be provided with an easement to allow for future maintenance and repair.

For assets other than underground cables, the minimum easement widths defined in Table 1 must be achieved. However, the minimum easement widths for underground cables defined in Table 1, do not apply to Community Title developments. An easement the size of the trench width plus 500mm either side must be achieved as a minimum,

All easements must be created under a Section 88B of the Conveyancing Act 1919.

5.5 Easement creation

Easements must be created in favour of Endeavour Energy and can be created by one of the following three methods:

- Creation by Section 88B of the Conveyancing Act;
- Creation by Deed or transfer granting easement; and,
- Creation by compulsory process.

The easement must be defined on a plan, and registered at LPI.

A restrictive or positive covenant cannot be compulsory acquired.

5.6 Easement terms

The easement terms defines the rights and restrictions for an easement for Endeavour Energy and the landowner. The terms of an easement must be defined to the landowner in writing. Annexure 1 contains the standard easement terms for Endeavour Energy's:

- Overhead Lines, Underground Cables, Padmounts, Switching Stations and streetlighting;
- Indoor Substations; and,
- Rights of Access.

There may be additional rights and restrictions required for certain easements so that Endeavour Energy interests are protected.

An owner may have specific site requirements that require amendment to the standard terms. The details of any proposed amendment are to be submitted to Endeavour Energy's Mains Assets Manager for review prior to certification of the design for approval.

5.7 Other types of Property Tenure

Restrictions on the use of land are sought by Endeavour Energy on land on which its infrastructure exists to protect the integrity and security of its network, whilst still allowing the landowner to own and make use of their land.

A positive covenant is sought when Endeavour Energy will allow activities on the site but only with additional controls. An example of a positive covenant is requiring the installation of fire proof screen walls near Endeavour Energy's electrical assets.

In situations where Endeavour Energy requires covenants to be provided around electrical equipment / assets, the following standards terms defined in Annexure 3 must be used.

5.8 Modifying assets with an easement

Where an existing asset (post May 2006) is to be replaced/upgraded/modified, and there will be an increase to the existing easement size, then the designer must go through the process of applying for a new easement.

An easement may be reduced in size if:

- The easement meets the minimum size requirements as detailed in Table 1;
- If approval is sought and granted from Capacity Planning Manager, and the corresponding Regional Transmission/Distribution Manager.
- A design for the existing line demonstrating the asset will have sufficient access and clearance.

5.9 Easement release

Easements may be released if the need arises and the easement has no / limited benefit to Endeavour Energy. Easements releases must be managed in accordance with Company Policy 9.2.4.

5.10 Easement height

Easements do not have a specified height to which they apply. Endeavour Energy does not allow assets to be installed above its assets, as this presents access, safety and reliability risks. Where all other options have been exhausted, a dispensation must be submitted as described in Company Procedure GAM 0114.

5.11 Rights granted by the Electricity Supply Act

5.11.1 Protection of assets installed before May 2006

Section 53 of the Electricity Supply Act 1995, protects Endeavour Energy infrastructure that was constructed prior to the commencement of the *Electricity Supply Amendment (Protection of Electricity Works) Act* 2006 (26th May 2006), from action from the owner of the land in which Endeavour Energy infrastructure exists.

Endeavour Energy may maintain, operate, repair, replace or upgrade the infrastructure despite whether a registered easement exists. However, this protection does not exist for new assets which are constructed on private land after the 26th of May 2006, and as such, easements must be acquired for new assets.

5.11.2 General protection of network assets

The following summarises the powers Section 49 and 49A of the Electricity Supply Act 1995, grants Endeavour Energy:

Section 49 – Endeavour Energy may serve a written notice to a person who has control of a structure, which may interfere, destroy or damage Endeavour Energy's network to remove the imposing structure. This is regardless if the person owns the land on which Endeavour Energy's asset exists.

Section 49A - Endeavour Energy may serve a written notice to a person who is carrying out excavation work in, on or near its network which may destroy or damage Endeavour Energy's network to cease work immediately.

5.12 Works on assets without a registered easement

Endeavour Energy is legally required to provide a safe and reliable network. As such, where the need arises where a network asset is required to be modified or replaced, and does not have the benefit of an easement (installed before May 2006), Endeavour Energy will evaluate all possible options in the refurbishment/replacement of the asset.

In assessing the upgrade of the asset the following factors will be considered:

- If there will be an increase in the required size of the easement;
- Is it a like-for-like replacement.
- The impact on the customer and the aesthetic nature of the new asset;
- The risk to the customer, to the public or to Endeavour Energy employees of the current installation;
- The preference of the customer;
- The required access to maintain and install the new asset.

Where the evaluation has concluded that the asset needs to be replaced/modified, Endeavour Energy reserves the right to do so. However, where the rectification works will increase the size of the required easement width, an easement must be created for the rebuilt asset.

5.13 General requirements on encroachment management

For easements managed by Endeavour Energy, encroachments fall into three (3) categories – *permitted*, *prohibited* or *controlled*.

- Permitted activity – An activity which is allowed within an easement, but must still adhere to the minimum safety requirements within the easement.
- Prohibited activity – An activity that must not be performed under any circumstance within the easement.
- Controlled activity – An activity which is allowed only if it meets both the minimum safety requirements for that type of easement with additional controls which are specified in the appropriate clause detailed below. Approval from Endeavour Energy is required for any controlled activity.

The main principle behind these categories is to maintain a high level of safety of the public and Endeavour Energy employees, whilst also allowing Endeavour Energy to inspect, operate, maintain, access and upgrade its network.

The activities listed below are not exhaustive, and where an activity/encroachment is not covered, a request to Mains Assets Manager must be submitted, which is to include:

- a full risk assessment detailing the risk to the network and safety and suitable controls.
- an overview of the easement, all current and proposed Endeavour Energy assets as well as all current and proposed encroachments

Refer to Annexure 5 for the current list of identified encroachments, how Endeavour Energy manages these, and the applicable clauses.

Encroachments on assets which do not have a formal easement, must be treated as though an easement does exist as per clause 5.11, and how the applicable encroachment is handled in the following sections. Table 1 may be used as an indication as to the applicable easement width, however, an assessment of the minimum easement size required to maintain access and safe operation of the asset is required.

5.14 Encroachments on overhead line easements

5.14.1 Minimum safety requirements for overhead line easements

For an overhead line easement, the following criteria must always be met, to maintain the safe operation of the network and employees:

- Minimum ground clearances, as defined in MDI 0031 and MDI 0047 are maintained, when the conductor is operating at maximum design temperature;
- Sufficient clearance is maintained to accommodation for overhead line blowout (500Pa, with the conductor operating at 50ºC);
- Minimum separation clearances between the network and objects/structures are maintained to this standard and AS/NZS 7000.
- Does not allow a person to breach the safety clearances to the network, namely, allow any part of a person to be greater than 4.3m above the ground (See Figure 6) ;
- Access to Endeavour Energy assets are not reduced and the minimum requirements of Figure 6 and clause 5.19 are adhered to.

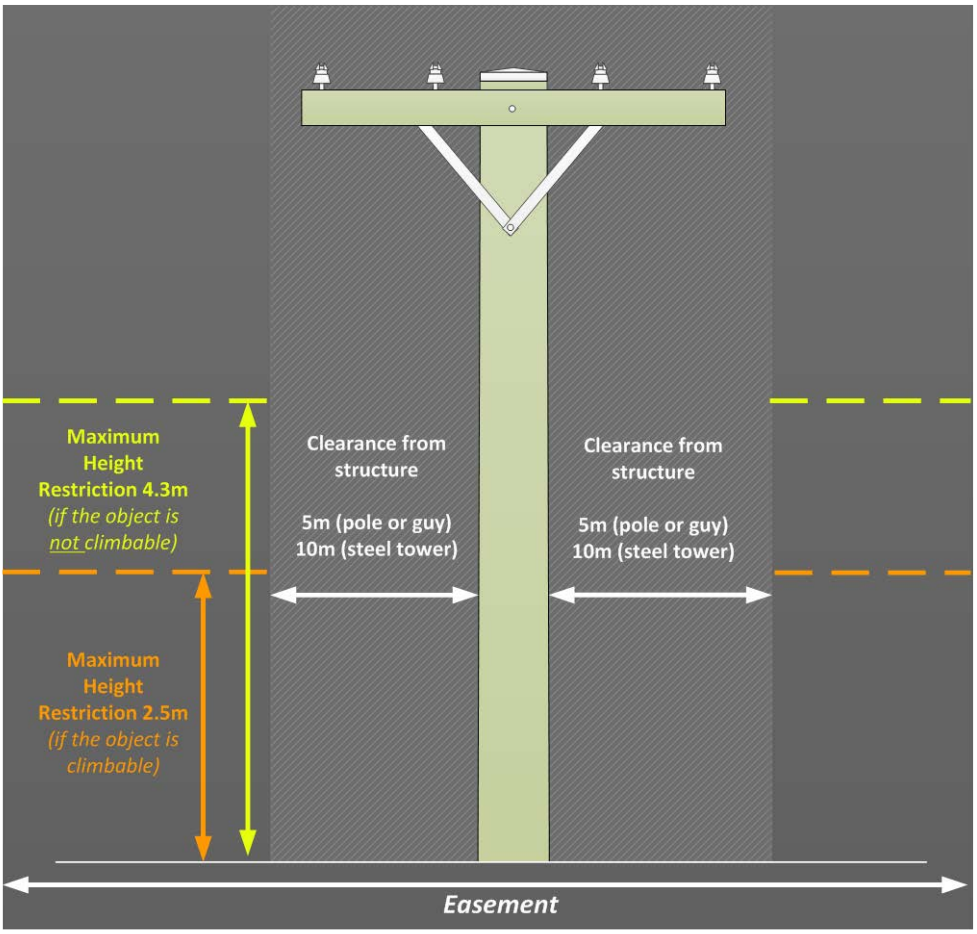


Figure 6 - Overhead line restriction within easement

5.14.2 Prohibited activities / encroachments

The following activities / encroachments listed below are prohibited within all Endeavour Energy easements and will not be approved:

- Construction of habitable buildings (permanent or temporary);
- Construction of garages or large sheds, whether permanent or temporary, or any other structure which may allow safety clearances to be breached;
- The installation of fixed plant (such as conveyor belts) or equipment, or its footings;
- The planting of trees that exceed a height of three (3) metres ;
- The placement of obstructions which may hinder access requirements;
- In-ground or above-ground swimming pools (permanent and / or temporary constructions);
- The storage and / or use of flammable, combustible, corrosive or explosive material;
- The storage and / or handling of conductive material of lengths in excess of three (3) metres;
- Lighting of any fires (this does not include back burning, refer to section 5.14.4.8);
- Parking of large vehicles (such as tankers and semi-trailers with large loads);
- The setting up of campervans or tents, which would allow persons to reside in the easement;
- The construction of flag poles and/or weather vanes which are taller than 4.3m;
- Electric fencing;
- Ploughing near electricity structures or stay poles/wires, that may impact the assets structural integrity;
- Use of any types of explosives;
- Flying of kites, model aircraft or drones;
- BMX bike riding (with jumps);
- Installation of flood lighting;
- Any activity which involves firearms.

Where an activity or encroachment is found to be being undertaken/installed and is on the above list, arrangement of its removal must be made. Any cost incurred will be at the expense of the owner of the land.

5.14.3 Permitted activities / encroachments

The following activities/encroachments are allowed within Endeavour Energy easements if it meets the minimum safety requirements detailed in clause 5.14.1:

- Low growing vegetation;
- Ground cover/surfaces such as wood chips and bluemetal stones;
- Storage of non-combustible, non-explosive, non-conductive, non-corrosive materials.

5.14.4 Controlled activities / encroachments

All controlled activities require approval to be sought from the applicable Regional Easement Officer of Endeavour Energy, in writing as set out in Clause 5.18.2. The Easement Officer will assess the activity/encroachment as defined Clause 5.18. The proposed activity must not commence unless approval is received in writing from Endeavour Energy Regional Easement Officer.

All these controlled activities must meet the required minimum safety requirements detailed in clause 5.14.1, as well as any additional controls listed below.

5.14.4.1 Minor structures

The following minor structures are permitted:

- clothes hoists;
- playground equipment;

- shade cloths / umbrellas;
- non-metallic fences (Endeavour Energy may require gates);
- small brick barbecues.

All metallic parts must be effectively earthed and no electrical supply must be brought within the easement.

If Endeavour finds that a structure impedes access or presents an unacceptable level of risk, Endeavour Energy reserves the right to have the structure removed, or to remove it at the owner's expense.

5.14.4.2 Non-habitable buildings (carports and metallic garden sheds)

Carports or metallic garden sheds can be installed within an overhead line easement provided they are effectively earthed, and no power is connected to the structure. Only metallic sheds which will not be inhabited must be approved.

5.14.4.3 Erection of conductive fencing / sound walls

All conductive fencing and/or sound walls crossing or running parallel to an easement are to be effectively earthed and / or have interval breaks in electrical continuity to prevent electromagnetic induction and transferred voltage hazards. Refer to drawing 242450, 242451 and 069575 for requirements for fencing.

A minimum 4.2 metre wide opening or gate (with provision to accept Endeavour Energy locks) for vehicle access will be a condition of approval.

5.14.4.4 Metal safety barriers and guardrails

Where a metal barrier (Armco guardrail or similar) crosses and continues beyond an easement, the following is required:

- The section of barrier within the easement must be earthed.
- A minimum 300 mm clear air gap must be left between the end of the barrier within the easement boundary and the starting point of the barrier beyond the easement boundary.

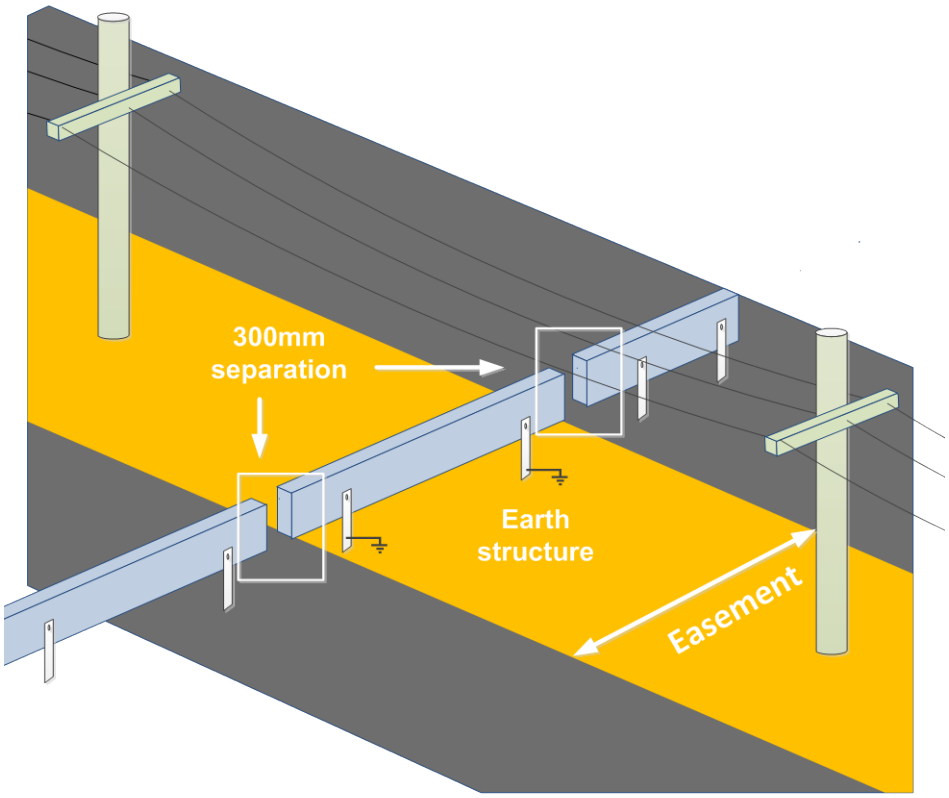


Figure 7 - Safety Barrier Requirement

5.14.4.5 Retaining walls

All proposed retaining walls must be made as to provide sufficient strength for any future work to be performed by Endeavour Energy, and must not impact the maintenance activities required on any assets within the easement.

5.14.4.6 Parking of vehicles or mobile plant

Parking within an overhead easement is subject to the vehicle:

- having a height limitation of 4.3 metres;
- is not occupied;
- is not connected to power; and,
- must be able to be readily removed if Endeavour Energy requires access to its assets.

5.14.4.7 Operation of mobile plant and equipment

No mobile plant and equipment must exceed a maximum height of 4.3 metres.

Within an overhead easement area, approval for the operation of mobile plant and equipment is dependent upon available clearances to the conductors under maximum operating conditions, power line voltages, vehicle operating heights and the level of accreditation of the vehicle operator.

Consequently, each application for the operation of mobile plant and equipment will be processed by the Regional Easement Officer and assessed for compliance with relevant Safework NSW legislation. A dedicated observer must also be present so that clearances are maintained.

Precautions must be taken to prevent collision or interference with overhead structures or stay poles.

5.14.4.8 Back burning

Back-burning operations carried out by fire authorities or bushfire brigades must be referred to Endeavour Energy's Control Room Manager and must include a map of the area showing the time, date and the area of the burn. An Endeavour Energy representative may attend back-burning procedures to maintain the safety of structures and conductors.

5.14.4.9 Agricultural pursuits

Agricultural pursuits, such as dusting, harvesting, netting and irrigation must have the following controls:

- Clear, defined vehicle access to structures is required to prevent damage to crops.
- Irrigation systems must not be placed within five (5) metres of the overhead conductors at any time.
- The location of any irrigation equipment must be such that it is not capable of projecting a solid jet of water to within three (3) metres of any overhead conductor.
- Gun type irrigators must have the water jet directed away from the conductors.
- Care must be taken when moving equipment around such as irrigation pipes or equipment, grain augers and the like.
- The equipment must not interfere with maintenance or safe operation of the power line, nor must it interfere with access to electricity assets.
- No electrical supply brought within the easement without prior approval of Endeavour Energy..

5.14.4.10 Rainwater tanks

Rainwater tanks must have the following controls:

- Above ground rainwater tanks, either for fire-fighting purposes or rainwater harvesting, erected within an easement, must be fully enclosed and of non-conducting material. (Concrete is considered to be a conductive material)
- All pipework is to be non-conductive and no electrical supply must be supplied to the tank for any purpose (including pumps and/or lighting).
- Any pumps and/or lights must be installed outside the easement.
- Ladders must not be installed on the rainwater tank.
- Rainwater tanks must not be installed within five (5) metres of a pole or stay pole, 10 metres from a steel structure or within five (5) metres of the vertical projection of the conductor.
- The tank and associated pipe work must not interfere with maintenance or access to electricity assets.

5.14.4.11 Detention basins

Applications for detention basins will be considered, subject to:

- The location has local council approval;
- The location is not within five (5) metres of a pole or stay pole or 10 metres from a steel structure;

- Sufficient clearance is maintained to all structures along the easement to allow unrestricted access.

5.14.4.12 Quarrying, filling, earthworks, or change of ground contours

Approval by the Easement Officer may be given, subject to:

- The maintenance of standard ground clearances (if conductor heights need adjustment, this will be at the proponents expense);
- Equipment/machinery performing earth works maintains standard clearances to the overhead lines;
- access maintained to all line structures;
- the subsoil stability and surface drainage in the vicinity of structures is not adversely affected; and,
- excessive quantities of dust are not generated.

5.14.4.13 Roads (other than access tracks)

For roads proposed within an existing easement, the minimum ground clearances as specified in MDI 0047 and MDI 0031 must be achieved.

Where alterations to conductor height and/or relocation of poles are required for the development of the road, this will be at the cost of the developer. This will include any work required to maintain safety clearances arising from activities in the easement after the road works are completed.

Where a road is proposed to run parallel to a feeder, a risk assessment evaluating the risk of impact with each structure as outlined in MDI 0031 must be submitted.

Earthing conductors may have been laid near, around and between the structures and must not have their electrical integrity compromised. Where a developer plans to construct a road which crosses the easement, the onus is on the developer to locate and avoid all earthing cables. If earthing cables are damaged, Endeavour Energy must be notified immediately.

Roads and driveways that are required for access to electrical infrastructure must be capable of carrying a 30 tonne truck.

5.14.4.14 Installation of utility services

Applications for the installation of telephone, water and sewerage services (overhead, underground, or on the surface) may be considered for approval by Endeavour Energy's Mains Assets Manager. The approval of the installation of these services will be based on:

- There is no practical alternative available;
- Any services within 15 metres of a structure must be constructed of non-conducting materials;
- The integrity of all line structures and stay pole/wires are to be maintained at all times;
- Designers and installers of utility services must consider any hazards associated with induced voltages and transferred earth potentials, in accordance with AS 4853, which must be controlled. Applications will require a risk assessment and proposed controls for each of the identified hazard.

Establishment of an easement for other utilities assets within Endeavour Energy's easement may be required.

5.14.4.15 Residential/Commercial subdivisions

Where subdivisions of property are proposed for land in which Endeavour Energy has an easement, the following requirements must be met:

- Unrestricted access to Endeavour Energy's structures are retained;
- No structures are to be erected within the easement;
- Structures suitably protected against motor vehicle impact;
- The number of crossings of Endeavour Energy's overhead line by utilities must be minimised, and complies with 5.14.4.14.

5.14.4.16 Domestic recreational activities and recreational facilities

Approval will be given for domestic recreation activities, but will not include activities that may interfere with clearances to the conductors, such as those listed in 5.14.2.

Approval will be given for recreational facilities, such as tennis courts, subject to:

- fencing is to be non-conductive material or must be effectively earthed (refer to section 5.14.4.3);
- Height of any fence is 4.3 metres or less;
- facilities surface construction will be required to withstand the movement of large heavy plant up to a 30 tonne truck; and,
- not located within five (5) metres from a power pole or ten (10) metres from a steel structure.

5.14.4.17 Storage of organic materials

Small amounts of organic materials, such as leaves and compost, may be stored underneath overhead powerlines, provided they do not impede access to structures and do not create a fire hazard.

5.15 Encroachments on underground easements

5.15.1 General information for underground asset easements

Where relocation of existing assets are proposed, the costs to enable the activity to proceed, will be borne by the applicant.

Safework NSW (previously Workcover Authority of NSW) Publications provides guidance on risk control measures when working close to electricity infrastructures both below and above ground. Refer to *Code of Practice – Work near Overhead Power Lines* or *Work Near Underground Assets Guide*.

5.15.2 Minimum safety requirements for underground asset easements

For an underground asset easement, the following criteria must **always** be met, to maintain the safe operation of the network and employees:

- Before commencing any underground activity, all applicants are required to obtain advice from the ***Dial before You Dig*** **1100** service in accordance with the requirements of the Electricity Supply Act and associated Regulations.
- Ground contour does not substantially change, which would impact the rating of the conductors;
- Any storage of an asset is temporary in nature and can be moved at a given notice or the cost of removal of the encroachment will be at the expense of the owner, if Endeavour Energy requires access to its asset;
- No mechanical compacting is to occur within an easement.
- Access to Endeavour Energy joints/joint bays are not impeded.
- No excavation which is greater than 300mm deep must occur.

5.15.3 Prohibited activities / encroachments

The following activities / encroachments listed below are prohibited within all Endeavour Energy easements and will not be approved:

- Construction of habitable buildings (permanent or temporary)
- Installation of minor structures (such as shade cloths, clothes lines, flood lights, playground equipment, fences and BBQs.)
- Installation of all types of garages, sheds, shipping containers, or carports.
- Installation of sound walls or safety barriers.
- Installation of conductive fencing which runs through an easement.
- Installation of rainwater tanks;
- Electric fencing;
- Retaining walls running longitudinally above underground assets;
- The installation of footings for fixed plant or equipment;
- Plants with significant root systems that grow greater than 400 mm below ground level;
- In-ground or above-ground swimming pools and spas (permanent and / or temporary constructions)
- Ploughing that is greater than 300mm deep, or at a depth greater than 400mm above underground assets
- The storage and / or use of flammable, combustible, corrosive or explosive material
- Changing of the ground level such that relative depth of underground cables increases or decreases
- Permanent surfaces, such as asphalt or concrete;
- The placement of obstructions which may hinder access requirements
- Concrete driveways located above and/or that restrict access to existing cable joints/pits.
- Use of explosives;
- Installation of tennis courts;

Where an activity or encroachment violates the above requirements, arrangement of its removal must be made. Any cost incurred will be at the expense of the owner of the land.

5.15.4 Permitted activities / encroachments

The following activities/encroachments are allowed within Endeavour Energy easements if it meets the minimum safety requirements detailed in clause 5.15.2:

- Tents;
- Flag poles and/or weather vanes;
- Sound walls;
- Metal safety barriers;
- Parking of small vehicles;
- Shrubs with root systems that are less than 400mm;
- Alternative ground surfaces (such as Bluemetal stones and woodchips);
- Storage of non-combustible, non-flammable, non-explosive material;
- Rainwater tanks;
- Detention basins;
- General recreational activities, the flying of kites and model aircraft, and the use of firearms;

5.15.5 Controlled activities / encroachments

All controlled activities require approval to be sought, from Endeavour Energy's Regional Easement Officer, in writing as set out in Clause 5.18.2. The Easement Officer will assess the activity/encroachment as defined Clause 5.18. The proposed activity must not commence unless approval is received in writing from Endeavour Energy Regional Easement Officer.

Controlled activities must meet the minimum safety requirements detailed in clause 5.15.2, as well as any additional controls listed below.

5.15.5.1 Fencing

A minimum 4.2 metre wide opening or gate (with provision to install Endeavour Energy locks) for vehicle access will be a condition of approval of fencing on the boundary of the easement.

Where fencing runs through an easement, the posts must be located outside the easement.

5.15.5.2 Metallic pipes (greater than 3 metres)

The storage of metallic pipes greater than three (3) metres is acceptable provided the metallic pipes can be moved upon request.

5.15.5.3 Fixed plant and/or equipment

Fixed plant is generally not allowed within Endeavour Energy's underground easement areas. This is due to potential access issues as well as risk of damage to Endeavour Energy's assets for the installation fixed plant footings. A proposal where fixed plant crosses an underground easement perpendicularly, will be considered upon application.

5.15.5.4 Parking of Mobile plant, equipment or vehicles

Within an underground easement area, approval is dependent upon an adequate surface to support the mobile plant/vehicle (up to 30 tonne) or equipment likely to be parked to prevent the crushing of the cables/ducts or erosion of the ground. In some instances, the activity may require supervision by an Endeavour Energy representative at the operator's expense.

5.15.5.5 Agricultural pursuits

Agricultural pursuits, such as dusting, irrigation and grazing are permitted within an underground easement. However, any activity which is likely to affect the ground level (such as ploughing and the planting of crops) is not allowed within the easement.

Equipment and/or crops must not interfere with access to electricity assets.

5.15.5.6 Roads and concrete driveways

Roads and concrete driveways are permitted within Endeavour Energy underground easements where:

- Cables are in existing continuous ducts;
- The roadway/driveway is capable of supporting the heaviest vehicle likely to traverse the driveway;
- The thermal rating of the cable is not compromised by the installation;
- The concrete driveway is not proposed to be installed within a distance that would restrict access / maintenance of a joint / pit.
- The concrete driveway is not proposed to be installed over a joint / pit.

The need for (including size and quantity) spare conduits must be confirmed with Network Capacity Planning prior to construction within Endeavour Energy's easements. All required conduits must be funded by the applicant.

If a roadway/driveway is found to be installed without the installation of spare ducts, the owner of the driveway must bear the cost of installing additional ducts, which will be done either by digging up the driveway or under-boring if required by Endeavour Energy at a future stage.

5.15.5.7 Installation of utility services

The installation of underground services must comply with MCI 0006 and Drawing 403230 Sheets 1 – 12.

5.15.5.8 Residential/Commercial subdivisions

Where subdivisions of property are proposed for land in which Endeavour Energy has an easement, the following requirements must be met:

- Unrestricted access to Endeavour Energy's structures are retained;
- No structures are to be erected within the easement;

5.15.5.9 Retaining walls

Retaining walls must not be approved where they run longitudinally over an underground easement.

Retaining walls which encroach on an underground easement, must be:

- Built using concrete material (for example, *Besser* blocks, concrete / clay bricks);
- Have mustow foundations;
- Must be a maximum of one (1) metre in height

Where foundations require digging post holes, these must be located outside the easement.

5.16 Encroachments on Padmount Substation or Switching Station easements

5.16.1 General information for padmount substation easements

For the purpose of this section, wherever a padmount substation is referenced, this also applies a ground substation, padmount substation and switching station.

Where the relocation of existing assets is proposed, the costs to enable the activity to proceed will be borne by the applicant.

Workcover Authority of NSW Publications provides guidance on risk control measures when working close to electricity infrastructures both below and above ground. Refer to *Code of Practice – Work near Overhead Power Lines* or *Work Near Underground Assets Guide*.

5.16.2 Minimum safety requirements for padmount substation easements

The minimum safety requirements padmount substations easements are outlined below and must **always** be met to maintain the safe operation of the network and employees:

- Screening vegetation for padmount substations must be planted outside the easement. Any vegetation adjacent to the easement must not obstruct access to the padmount substation and must be maintained in such a manner as to allow easy access to Endeavour's assets.
- The ground contour surrounding the padmount substation does not substantially change;
- Storage of an object/machinery is temporary in nature and can be moved at a given notice and if Endeavour Energy requires access to its asset the cost of removal of the encroachment will be at the expense of the owner;
- No building overhangs within the six (6) metre airspace above a padmount substation site;
- No construction must occur within the padmount substation / switching station easement;
- No mechanical compacting is to occur within an easement.
- Access to Endeavour Energy joints/joint bays and the padmount substation must not be impeded and must comply with clause 5.19.

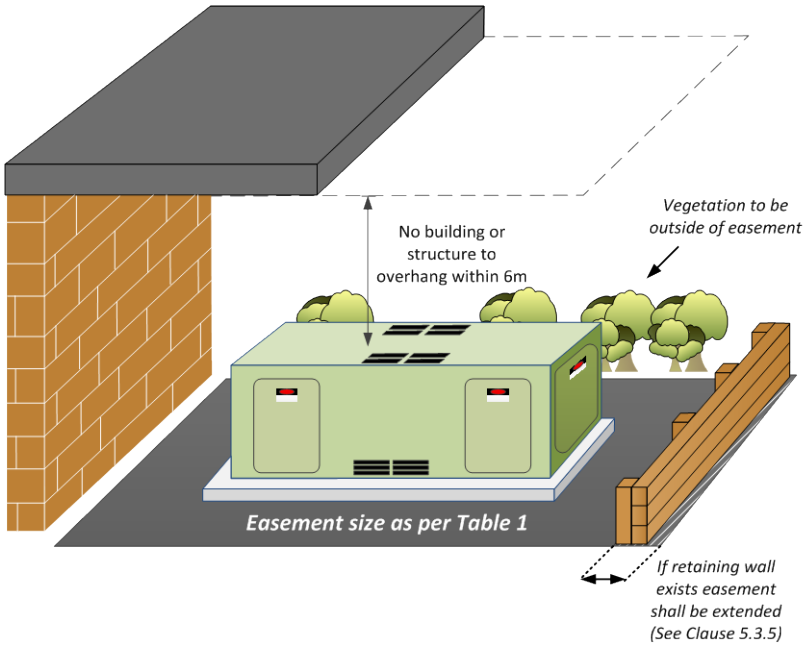


Figure 8 - Padmount Substation Easement Requirements

5.16.3 Prohibited activities / encroachments

Most activities are prohibited within the padmount substation easement. For a full list refer to Annexure 5 – Encroachment reference guide.

5.16.4 Permitted activities / encroachments

The following activities/encroachments are allowed within Endeavour Energy easements if it meets the general requirements in Clause 5.16.2.

- The use of mobile plant and/or equipment;
- Planting of vegetation with a root system not greater than 400mm;
- The installation of easily removable surfaces other than grass (bluemetal or woodchips);

5.16.5 Controlled activities / encroachments

All controlled activities require approval to be sought, from Endeavour Energy's Regional Easement Officer, in writing as set out in Clause 5.18.2. The Easement Officer will assess the activity/encroachment as defined Clause 5.18. The proposed activity must not commence unless approval is received in writing from Endeavour Energy Regional Easement Officer.

All controlled activities must meet the minimum safety requirements detailed in Clause 5.16.2, as well as any additional controls listed below.

5.16.5.1 Mobile plant/equipment and Parking of vehicles

Where a padmount substation is in the vicinity of a parking facility, suitable crash and impact protection from vehicles must be installed. These must be positioned in such a way to allow access to the substation to be maintained. Any proposals for the installation of suitable vehicle impact protection measures are subject to approval from the Regional Easement Officer.

5.16.5.2 Agricultural pursuits

Agricultural pursuits are prohibited within a padmount substation easement. Grazing would be the only activity that would be permitted.

5.16.5.3 Roads and concrete driveways

Roads and concrete driveways are permitted within the padmount easements where:

- Cables are in existing continuous ducts;
- The roadway/driveway is capable of supporting the heaviest vehicle likely to traverse the driveway;
- The thermal rating of the cable is not compromised by the installation;
- Suitable crash and impact protection must be installed, positioned in such a way to allow access to the substation to be maintained.

5.16.5.4 Retaining walls

Retaining walls built around distribution substations or switching stations, as part of reticulation requirements, must be outside the standard easement Refer to 5.3.6.

Proposed retaining walls must not impact the maintenance activities performed by Endeavour Energy on any assets within the easement.

5.16.5.5 Fencing

For fencing requirements around a padmount substation refer to MCI 0006 – Section 7.

Fencing surrounding an easement must comply with Table 2.

Table 2: Fencing near a Padmount Substation

Padmount Earthing	Fence Allowed	
	On easement boundary	Through easement
Common Earthed	YES	NO
Separately earthed	If within 4m of padmount, fence posts must be insulated and a touch-voltage assessment required.	NO

5.17 Transfer earth hazards

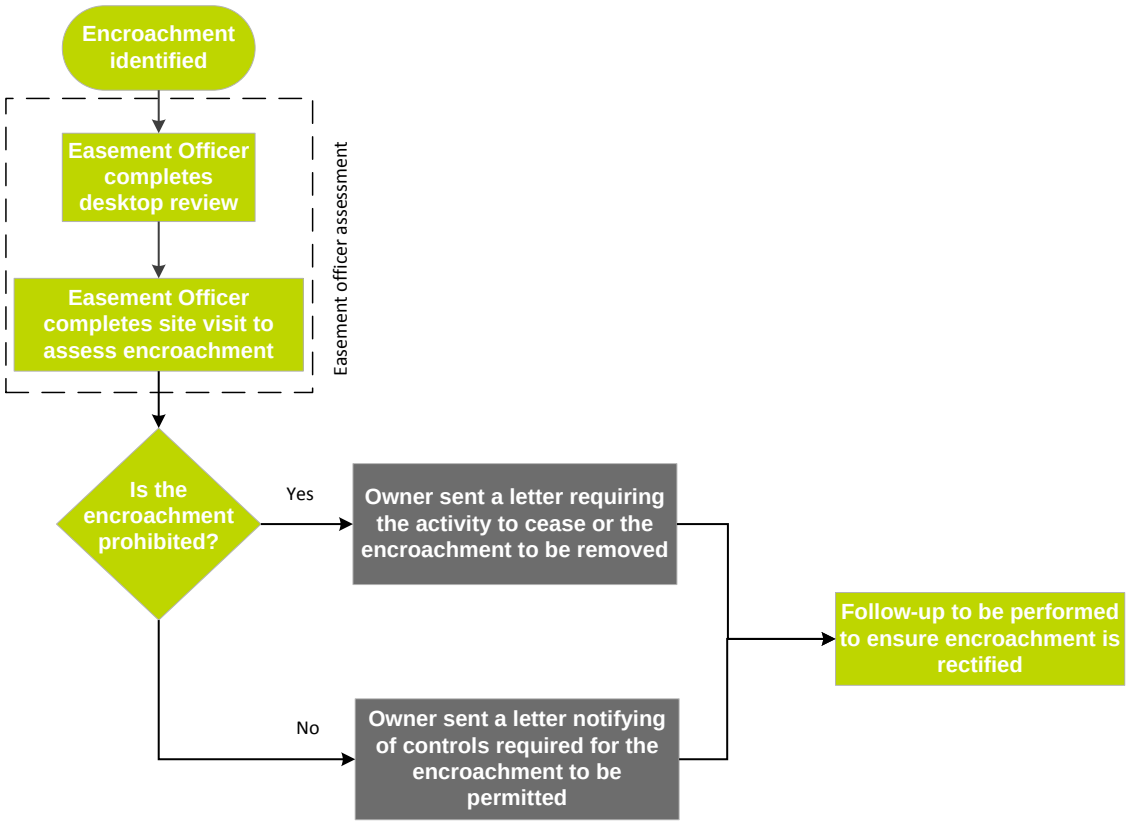
In addition to all requirements stipulated in this standard the risk of transfer earth hazards associated with Endeavour Energy's assets and/or equipment, structures or objects must be managed in accordance with SDI 100 "Distribution earthing design, construct and test".

This requirement may impose restriction zones around Endeavour Energy's assets limiting the use of land within the defined area(s).

5.18 Encroachment management process

5.18.1 Existing encroachment management process

Endeavour Energy will manage existing encroachments that have not been previously approved, according to the flowchart below:



5.18.1.1 Easement Officer Review

Once identified, the Easement Officer will perform both a desktop assessment and a site visit to determine whether the encroachment is permitted, controlled or prohibited, as defined in Clause 5.11, or whether with possible controls can overcome / lessen the encroachment.

On completion of the assessment, a letter will be sent to the owner, identifying:

- Explanation of the terms of the easement;
- Identifying the hazards to themselves, members of the public and Endeavour Energy's employees;
- Providing advice on possible solutions to overcome / lessen the encroachment.
- The outcome of the assessment:
    - Where the encroachment is determined to be a "controlled activity", conditional approval for it to continue must be given only if the applicable controls (as defined in Clause 5.11) are used.
    - Where the encroachment is determined to be a prohibited activity/structure, the owner will be required to remove the encroachment or cease the activity.

A follow-up site visit will be completed within 30 days to check whether the encroachment has been adequately managed.

Legal action will be considered when all other avenues are exhausted.

The local council must be included in correspondence to highlight the need for their approval process to include a corresponding approval from Endeavour Energy where easements are involved.

5.18.2 Applications for controlled encroachments

All applications for an activity or encroachment, or requests for advice, must be referred to Endeavour Energy's Regional Easement Officers. Applications must be addressed to:

Regional Easement Officer – North / Central / South *(see table below)*
Endeavour Energy
PO Box 811
Seven Hills NSW 1730

Endeavour Energy's network franchise area has three (3) regions, responsible for the local government areas set out in the following table:

Region	Local government areas
North	Bathurst, Baulkham Hills, Blacktown, Blue Mountains, Hawkesbury, Lithgow, Parramatta, Penrith, plus parts of Hornsby, Mid-Western and Ryde.
Central	Camden, Campbelltown, Fairfield, Cumberland (Holroyd), Liverpool, Wingecarribee, Wollondilly, plus parts of Bankstown.
South	Kiama, Shellharbour, Shoalhaven, Wollongong.

5.18.2.1 Application requirements

Due to the varied circumstances that apply to easements, all applications will be assessed individually, and will be site specific.

All applications require the following:

- The application is to be made in writing.
- The application is to include detailed plans, drawn to scale and with full dimensions, showing property boundaries, lot number, Deposited Plan (DP) number, any electricity structures, and other relevant information.
- A survey plan of an easement for padmount substation must show the substation number and at least two (2) offsets from adjacent sides of the concrete plinth to the easement boundary.
- Each application will require an impact and risk assessment and must be assessed on the site-specific circumstances and Endeavour Energy's risks assessment company procedure of the proposal.

5.18.2.2 Easement Officer Review

After the application has been received, the easement officer will perform a desktop review of the application and if required, a site visit.

Where Endeavour Energy is uncertain about the impact of the controlled activity or encroachment, the applicant/s will be asked to arrange an independent study of the risk at their own expense. Endeavour Energy will consider the outcome of the study when deciding on the application.

Where additional testing is required, the applicant will be responsible for:

- Arranging the test with an organisation acceptable to Endeavour Energy;
- Paying for the test;
- Supplying the test results to Endeavour Energy.

5.19 Access and Rights of Way

Where possible, access to Endeavour Energy assets must be made possible by access tracks located within Endeavour Energy easements.

Consideration must be given to securing access by the way of a land tenure agreement and/or other legal instruments such as 'Right of Ways', where:

- access tracks must traverse outside of easements;
- access options to assets is limited;
- significant investment has been outlaid to upgrade and/or construct an access; or,
- there is future development planned for an area that may affect or obstruct access routes.

The appropriate land tenure agreement and or legal instrument must be discussed with the Property, People and Services Branch.

5.19.1 Locking arrangements for shared access gates

In some cases, access to land with electricity easements is shared by Endeavour Energy with others – utilities, customers, and organisations such as the NSW National Parks and Wildlife Service or the Rural Fire Service.

Where access is through a gate protected by dedicated locks, an EL specification lock must be installed. The preferred arrangements for single or multiple locks are shown in Figure 9. Where there is more than one lock, the locks must be spaced as evenly as possible by joining with equal lengths of chain.

The entire chain must be of exact length to allow the gate to be fully secured, while allowing for the chain to be rotated so that access to the locks is possible from either side of the gate.

When replacing locks after entering or leaving, the correct ends of the chain must be connected with the lock, so that it remains a continuous loop.

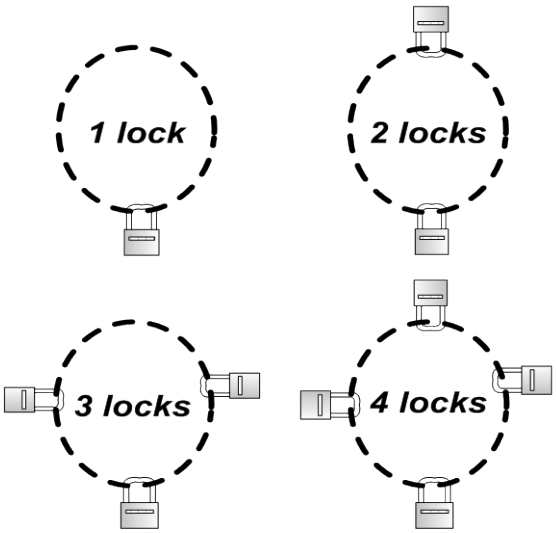


Figure 9 – Locking arrangements for shared access gates

5.20 Recording of easements in GIS

When an easement is created, the easements must be reflected in the Endeavour Energy's GIS system.

5.21 Drawings

Drawing No	Amendment	Title
016665	S	11kV and 22kV Padmount substation easement layout
086232	K	Minimum clearances near structures
282551	A	Size 16 Switching Station easement layout
289702 (Sheets 1 – 7)	A	Fencing arrangement for padmount substation easement details
403230 (Sheets 1 – 12)	A	Shared trenching arrangements
242451	B	Chain wire fence – isolation panel and earthing installation detail
069575	G	Solid Metallic Fence – Isolated panel and earthing installation detail
242450	A	Transmission Line Structure – Metallic fence clearance and isolation panel requirements.

6.0 AUTHORITIES AND RESPONSIBILITIES

General Manager Asset Management has the authority and responsibility for approving this instruction.

General Manager, Network Services has the authority and responsibility for all new distribution and transmission projects complying with the contents of this instruction.

Manager Asset Standards & Design has the delegated authority and responsibility for approving this instruction and the endorsing of non-standard/reductions in easement widths.

Manager Network Connections has the authority and responsibility for new contestable works electrical designs complying with this instruction.

Mains Assets Manager has the authority and responsibility for:

- Endorsing the content of this instruction;
- Keeping the content of this instruction is kept up to date;
- Approval for encroachments within easements.

Substation Assets Manager has the authority and responsibility for providing input into the content of this instruction.

Earthing and Power Quality Manager is responsible for the assessment and approval of earthing issues within easements.

Easements Officers are responsible for:

- Reviewing easement encroachment applications;
- Performing investigations into possible encroachments;
- Providing advice and consultation to stakeholders.

7.0 DOCUMENT CONTROL

Documentation content coordinator: Mains Assets Manager

Documentation process coordinator: Branch Process Coordinator

Annexure 1 STANDARD EASEMENT TERMS

A1.1 - Overhead Lines, Underground Cables, Padmounts, Switching Stations, Street Lighting, Pole/Ground Stays

1.0 Definitions:

1.1 **easement site** means that part of the lot burdened that is affected by this easement.

1.2 **electrical equipment** must be defined as stated below for each of the easement terms associated with the following asset classes:

1.2.1 *Overhead Power Lines* - includes pole, tower, overhead electrical conductors, underground earthing system, and ancillary equipment.

1.2.2 *Underground Cables* - includes underground electrical cable, duct, service pillar, underground earthing system, and ancillary equipment.

1.2.3 *Padmount Substation / Switching Station* - includes electrical transformer (padmount only), switchgear, protective housing, concrete plinth, underground electrical cable, duct, underground earthing system, and ancillary equipment.

1.2.4 *Pole Stays / Ground Stays* – includes stay pole, concrete strainer block, stay cable, stay wire, and ancillary equipment.

1.2.5 *Street Lighting* – includes the column, lantern and foundations of the street light.

1.3 **Endeavour Energy** means Endeavour Energy and its successors (who may exercise its rights by any persons authorised by it).

1.4 **install** includes construct, repair, replace, maintain, modify, use, and remove.

1.5 **owner** means the registered proprietor of the lot burdened and its successors (including those claiming under or through the registered proprietor).

1.6 **services** includes Network gas, telephone, communications, water, sewage, and drainage services.

1.7 **structure** includes building, wall, retaining wall, carport, and swimming pool; but excludes garden furniture and garden ornaments.

2.0 Endeavour Energy may:

2.1 install electrical equipment within the easement site,

2.2 excavate the easement site to install the electrical equipment.

2.3 use the electrical equipment for the transmission of electricity,

2.4 enter the lot burdened using the most practical route (with or without vehicles, machinery or materials) at all reasonable times (and at any time in the event of an emergency) and remain there for any reasonable time. This may include the installation of gates in existing fencing if access is not readily available,

2.5 install its own access gates and locks,

2.6 trim or remove any vegetation from the lot burdened that interferes with or prevents reasonable access to the easement site or the electrical equipment, and

2.7 remove any encroachments from the easement site and recover the costs of carrying out the removal work and repairing any damage done to the electrical equipment by the encroachment.

3.0 In exercising its rights under this easement Endeavour Energy will take reasonable precautions to minimise disturbance to the lot burdened and will restore the lot burdened as nearly as practicable to its original condition.

4.0 The owner agrees that, without the written permission of Endeavour Energy and in accordance with such conditions as Endeavour Energy may reasonably impose, it will not:

4.1 install or permit to be installed, any services or structure within the easement site, or

4.2 alter the surface level of the easement site, or

4.3 do or permit to be done anything that restricts access to the easement site by Endeavour Energy

5.0 Lessee of Endeavour Energy's Distribution System

5.1 Notwithstanding any other provision in this easement, the owner grants to Endeavour Energy the easement and acknowledges and agrees that any lessee of Endeavour Energy's distribution system, and any nominee of such lessee (which may include a sublessee of Endeavour Energy's distribution system from that lessee), may, without the need for any further approvals or agreements, exercise the rights and perform the obligations of Endeavour Energy as if that lessee or nominee were Endeavour Energy, but only for so long as the lessee leases Endeavour Energy's distribution system from Endeavour Energy.

5.2 The owner must do all things reasonably necessary to ensure any such lessee, and any such nominee, is able to exercise the rights and perform the obligations of Endeavour Energy.

A1.2 - Indoor Substation

1.0 Definitions:

1.1 **building** means the building within which the electrical equipment is located.

1.2 **easement site** means that part of the lot burdened that is affected by this easement.

1.3 **electrical equipment** includes electrical transformer, electrical switchgear, electrical cable, duct, services, ventilation, and ancillary equipment.

1.4 **Endeavour Energy** means Endeavour Energy and its successors (who may exercise its rights by any persons authorised by it).

1.5 **install** includes construct, repair, replace, maintain, modify, use, and remove.

1.6 **owner** means the registered proprietor of the lot burdened and its successors (including those claiming under or through the registered proprietor).

1.7 **services** includes Network gas, telephone, communications, water, sewage, and drainage services.

2.0 Endeavour Energy may:

2.1 install electrical equipment within the easement site,

2.2 use the electrical equipment for the transmission of electricity,

2.3 enter the lot burdened using the most practical route (with or without vehicles, machinery or materials) at all reasonable times (and at any time in the event of an emergency) and remain there for any reasonable time. This may include the installation of gates in existing fencing if access is not readably available,

2.4 install its own security doors to gain access to the electrical equipment and to prevent access by others, and

2.5 install conduits, cables, and pipes on, under or through the building for the purpose of connecting the electrical equipment with any services and to operate those services.

3.0 Endeavour Energy agrees that it will not cut, drill, alter or demolish any part of the building necessary to install or operate the electrical equipment without the written permission of the owner and in accordance with such conditions as the owner may reasonably impose.

4.0 In exercising its rights under this easement Endeavour Energy will take reasonable precautions to minimise disturbance to the lot burdened and will restore the lot burdened as nearly as practicable to its original condition.

5.0 The owner agrees that, without the written permission of Endeavour Energy and in accordance with such conditions as Endeavour Energy may reasonably impose, it will not:

5.1 install or permit to be installed any thing within the easement site, or

5.2 interfere with, allow to be interfered with, or prevent the ventilation of the easement site, or

5.3 direct or allow to be directed drainage into the easement site, or

5.4 do or permit to be done anything that restricts access to the easement site by the Endeavour Energy

6.0 Lessee of Endeavour Energy's Distribution System

6.1 Notwithstanding any other provision in this easement, the owner grants to Endeavour Energy the easement and acknowledges and agrees that any lessee of Endeavour Energy's distribution system, and any nominee of such lessee (which may include a sublessee of Endeavour Energy's distribution system from that lessee), may, without the need for any further approvals or agreements, exercise the rights and perform the obligations of Endeavour Energy as if that lessee or nominee were Endeavour Energy, but only for so long as the lessee leases Endeavour Energy's distribution system from Endeavour Energy.

6.2 The owner must do all things reasonably necessary to ensure any such lessee, and any such nominee, is able to exercise the rights and perform the obligations of Endeavour Energy.

A1.3 – Rights of Access

1.0 Definitions:

1.1 **access site** means that part of the lot burdened that is affected by this right of access.

1.2 **Endeavour Energy** means Endeavour Energy and its successors (who may exercise its rights by any persons authorised by it).

1.3 **owner** means the registered proprietor of the lot burdened and its successors (including those claiming under or through the registered proprietor).

2.0 Endeavour Energy may:

2.1 by any reasonable means pass across the access site for the purpose of exercising or performing any of its powers, authorities, duties or functions, and

2.2 do anything reasonably necessary for passing across the access site, including:

2.2.1 Entering the lot burdened;

2.2.2 taking anything on to the lot burdened; and,

2.2.3 carrying out work within the site of the easement, such as constructing, placing, repairing or maintaining trafficable surfaces, driveways or structures.

3.0 In exercising its rights set out in Clause 2.0, Endeavour Energy must:

3.1 complete all work properly;

3.2 take reasonable precautions to minimise disturbance to the lot burdened and owner of the lot;

3.3 cause as little damage as is practicable to the lot burdened;

3.4 restore the lot burdened as nearly as practicable to its former condition; and,

3.5 make good on any collateral damage;

4.0 Lessee of Endeavour Energy's Distribution System

4.1 Notwithstanding any other provision in this easement, the owner grants to Endeavour Energy the easement and acknowledges and agrees that any lessee of Endeavour Energy's distribution system, and any nominee of such lessee (which may include a sublessee of Endeavour Energy's distribution system from that lessee), may, without the need for any further approvals or agreements, exercise the rights and perform the obligations of Endeavour Energy as if that lessee or nominee were Endeavour Energy, but only for so long as the lessee leases Endeavour Energy's distribution system from Endeavour Energy.

4.2 The owner must do all things reasonably necessary to ensure any such lessee, and any such nominee, is able to exercise the rights and perform the obligations of Endeavour Energy.

Annexure 2 Terms of Restrictions on the Use of Land

A3.1 Safety Clearance between Padmount Substations and Adjacent Buildings

Terms of Restrictive Covenant numbered [xx] in the plan

1.0 Definitions:

1.1 **"120/120/120 fire rating"** and **"60/60/60 fire rating"** means the fire resistance level of a building expressed as a grading period in minutes for structural adequacy / integrity failure / insulation failure calculated in accordance with Australian Standard 1530.

1.2 **"building"** means a substantial structure with a roof and walls and includes any projections from the external walls.

1.3 **"erect"** includes construct, install, build and maintain.

1.4 **"restriction site"** means that part of the lot burdened affected by the restriction on the use of land as shown on the plan.

2.0 No building must be erected or permitted to remain within the restriction site unless:

2.1 the external surface of the building erected within 1.5 metres from the substation footing has a 120/120/120 fire rating and

2.2 the external surface of the building erected between 1.5 metres and 3.0 metres from the substation footing has a 60/60/60 fire rating

2.3 and the owner provides the authority benefited with an engineer's certificate to this effect.

3.0 The fire ratings mentioned in Clause 2.0 must be achieved without the use of fire fighting systems such as automatic sprinklers.

4.0 Lessee of Endeavour Energy's Distribution System

4.1 Notwithstanding any other provision in this easement, the owner grants to Endeavour Energy the easement and acknowledges and agrees that any lessee of Endeavour Energy's distribution system, and any nominee of such lessee (which may include a sublessee of Endeavour Energy's distribution system from that lessee), may, without the need for any further approvals or agreements, exercise the rights and perform the obligations of Endeavour Energy as if that lessee or nominee were Endeavour Energy, but only for so long as the lessee leases Endeavour Energy's distribution system from Endeavour Energy.

4.2 The owner must do all things reasonably necessary to ensure any such lessee, and any such nominee, is able to exercise the rights and perform the obligations of Endeavour Energy.

A3.2 Fire Proof Screen Walls

Terms of Positive Covenant numbered [xx] in the plan:

1.0 Definitions

1.1 **"fire proof screen wall"** means a wall of brick or concrete necessary to achieve a 120/120/120 fire rating up to a minimum height of **[***xx***]** metres from the level of the substation footing.

1.2 **"owner"** means the registered proprietor of the lot burdened and its successors (including those claiming under or through the registered proprietor).

1.3 **"prescribed authority"** means Endeavour Energy (and its successors).

1.4 **"120/120/120 fire rating"** means the fire resistance level of a building structure expressed as a grading period in minutes for structural adequacy/integrity failure/insulation failure calculated in accordance with Australian Standard 1530.

2.0 The owner covenants with the prescribed authority that the owner:

2.1 Will construct fire proof screen **[***wall/s***]** adjacent to the **[***northern, southern, eastern, western***] [***boundary/ies***]** of the easement for padmount substation.

2.2 Will maintain the fire proof screen **[***wall/s***]** in a satisfactory state of repair and in accordance with any reasonable conditions that the prescribed authority may impose.

3.0 Lessee of Endeavour Energy's Distribution System

3.1 Notwithstanding any other provision in this easement, the owner grants to Endeavour Energy the easement and acknowledges and agrees that any lessee of Endeavour Energy's distribution system, and any nominee of such lessee (which may include a sublessee of Endeavour Energy's distribution system from that lessee), may, without the need for any further approvals or agreements, exercise the rights and perform the obligations of Endeavour Energy as if that lessee or nominee were Endeavour Energy, but only for so long as the lessee leases Endeavour Energy's distribution system from Endeavour Energy.

3.2 The owner must do all things reasonably necessary to ensure any such lessee, and any such nominee, is able to exercise the rights and perform the obligations of Endeavour Energy.

A3.3 Fire Proof Walls and Roof

Terms of Positive Covenant numbered [xx] in the plan:

1.0 Definitions

1.1 **"fire proof wall"** means a wall of brick, concrete or other material necessary to achieve a [60/60/60 or 120/120/120] fire rating up to a minimum height of 6 metres from the level of the substation footing. It also includes any structures attached to the wall such as eaves and gutters.

1.1 **"fire proof roof"** means a roof constructed of concrete or other material necessary to achieve a [60/60/60 or 120/120/120] fire rating.

1.2 **"owner"** means the registered proprietor of the lot burdened and its successors (including those claiming under or through the registered proprietor).

1.2 **"padmount substation"** means padmount substation No. [xxxx]

1.3 **"prescribed authority"** means Endeavour Energy (and its successors).

1.4 **"60/60/60 or 120/120/120 fire rating"** means the fire resistance level of a building structure expressed as a grading period in minutes for structural adequacy/integrity failure/insulation failure calculated in accordance with Australian Standard 1530.

2.0 The owner covenants with the prescribed authority that the owner:

2.1 Will construct fire proof **[***wall/s***]** adjacent to the **[***northern, southern, eastern, western***] [***boundary/ies***]** of the easement for padmount substation.

2.2 Will maintain the fire proof **[***wall/s***]** in a satisfactory state of repair and in accordance with any reasonable conditions that the prescribed authority may impose.

2.3 Will construct fire proof roof above the padmount substation.

2.4 Will maintain the fire proof roof in a satisfactory state of repair and in accordance with any reasonable conditions that the prescribed authority may impose.

3.0 Lessee of Endeavour Energy's Distribution System

3.1 Notwithstanding any other provision in this easement, the owner grants to Endeavour Energy the easement and acknowledges and agrees that any lessee of Endeavour Energy's distribution system, and any nominee of such lessee (which may include a sublessee of Endeavour Energy's distribution system from that lessee), may, without the need for any further approvals or agreements, exercise the rights and perform the obligations of Endeavour Energy as if that lessee or nominee were Endeavour Energy, but only for so long as the lessee leases Endeavour Energy's distribution system from Endeavour Energy.

3.2 The owner must do all things reasonably necessary to ensure any such lessee, and any such nominee, is able to exercise the rights and perform the obligations of Endeavour Energy.

A3.4 Separation of Metal Structures to an Earth Grid

Terms of Restrictive Covenant numbered [xx] in the plan

1.0 Definitions:

1.1 **"erect"** includes construct, install, build and maintain.

1.2 **"restriction site"** means that part of the lot burdened affected by the restriction on the use of land as shown on the plan.

2.0 Except as provided in Clause 3.0, no metal structure must be erected or permitted to remain within the restriction site.

3.0 Metallic fencing may be erected within the restriction site if the fence panels are insulated from the fence posts and from the ground.

4.0 Lessee of Endeavour Energy's Distribution System

4.1 Notwithstanding any other provision in this easement, the owner grants to Endeavour Energy the easement and acknowledges and agrees that any lessee of Endeavour Energy's distribution system, and any nominee of such lessee (which may include a sublessee of Endeavour Energy's distribution system from that lessee), may, without the need for any further approvals or agreements, exercise the rights and perform the obligations of Endeavour Energy as if that lessee or nominee were Endeavour Energy, but only for so long as the lessee leases Endeavour Energy's distribution system from Endeavour Energy.

4.2 The owner must do all things reasonably necessary to ensure any such lessee, and any such nominee, is able to exercise the rights and perform the obligations of Endeavour Energy.

A3.5 Separation of Swimming Pools to an Earth Grid

Terms of Restrictive Covenant numbered [xx] in the plan

1.0 Definitions:

1.1 **"erect"** includes construct, install, build and maintain.

1.2 **"restriction site"** means that part of the lot burdened affected by the restriction on the use of land as shown on the plan.

2.0 No swimming pool or spa must be erected or permitted to remain within the restriction site.

3.0 Lessee of Endeavour Energy's Distribution System

3.1 Notwithstanding any other provision in this easement, the owner grants to Endeavour Energy the easement and acknowledges and agrees that any lessee of Endeavour Energy's distribution system, and any nominee of such lessee (which may include a sublessee of Endeavour Energy's distribution system from that lessee), may, without the need for any further approvals or agreements, exercise the rights and perform the obligations of Endeavour Energy as if that lessee or nominee were Endeavour Energy, but only for so long as the lessee leases Endeavour Energy's distribution system from Endeavour Energy.

3.2 The owner must do all things reasonably necessary to ensure any such lessee, and any such nominee, is able to exercise the rights and perform the obligations of Endeavour Energy.

Annexure 3 COMMUNITY TITLE BY-LAWS

To maintain access to assets the following by-law must be incorporated into all community title management statements where HV or LV (including street lighting) assets are owned and maintained by Endeavour Energy:

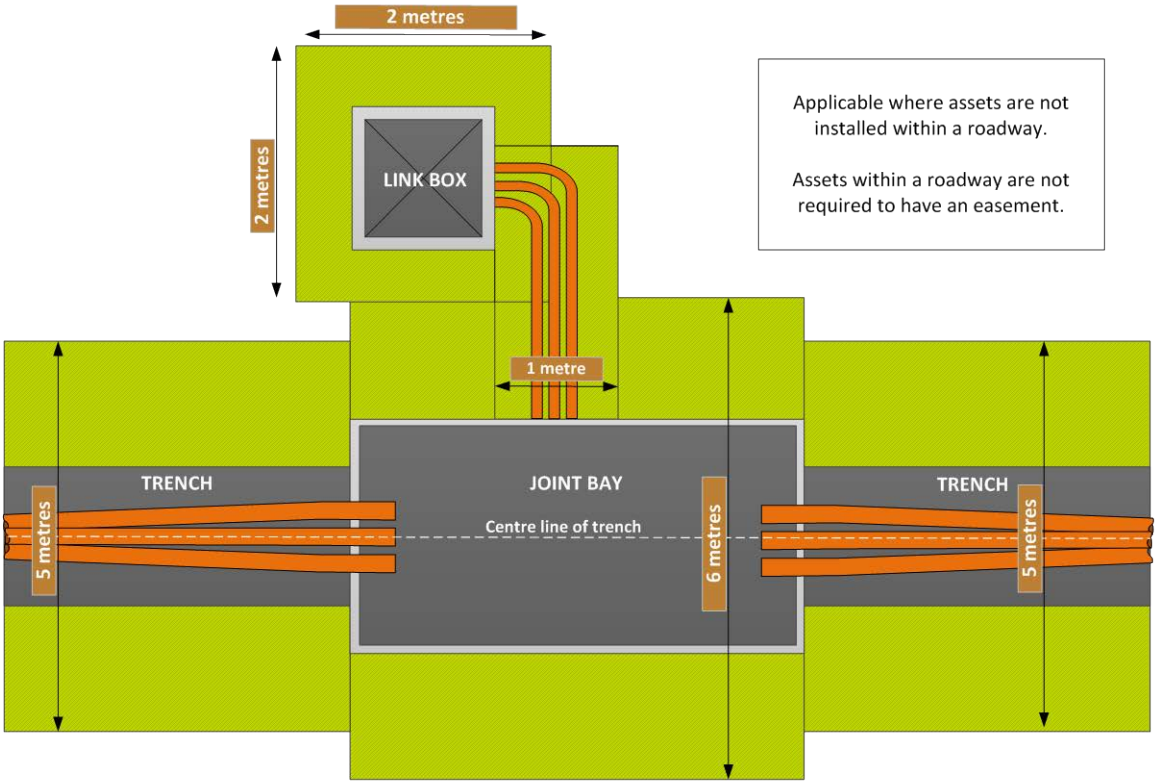
> **BY-LAW [X] ENDEAVOUR ENERGY – Access Ways**
>
> *The Association agrees that if the surface of the access ways does not support the heavy vehicles, machinery and materials necessary to maintain Endeavour Energy's electrical equipment, the Association will be responsible for repairing any damage caused to the surface of the access ways during such maintenance.*
>
> *This provision applies despite any other easement term to the contrary.*

Where the ownership of any part of the electricity network (HV, LV or street lighting) within the community title development is to be the responsibility of the community association, the following by-law must be incorporated into the community title management statement:

> **BY-LAW [X] ENDEAVOUR ENERGY – Ownership of Assets by the Association**
>
> *The low voltage electricity system is defined on the prescribed diagram as [eg "electricity"].*
>
> *This electricity system is Association property.*
>
> *The Association is responsible for the maintenance, repair, refurbishment, and augmentation of this electricity system.*
>
> *The design of this electricity system has been based on a maximum demand of [as advised by the designer] Amps per dwelling.*

Annexure 4 Typical easement layouts

A4.1 - Underground assets



A4.2 – UGOH and Stay pole easements

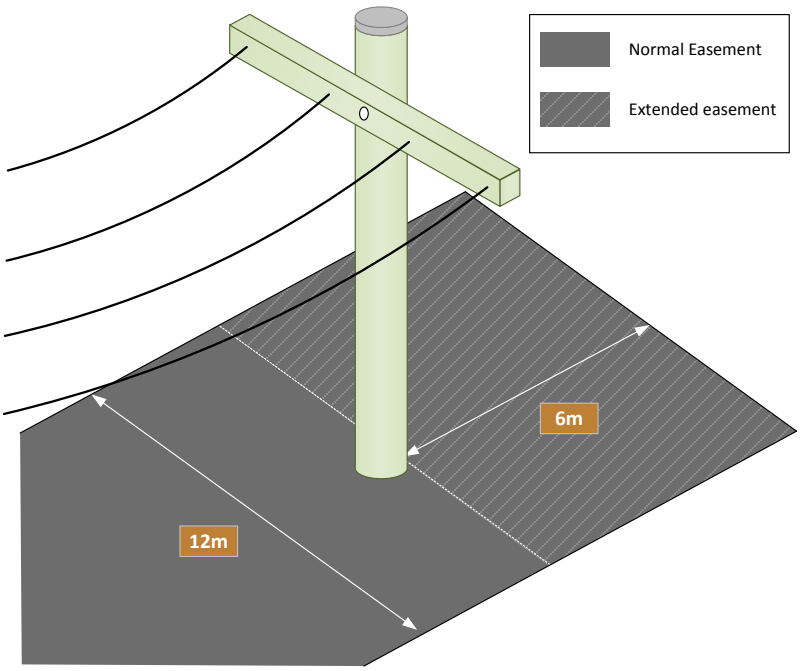


Figure 10 –UGOH pole easement

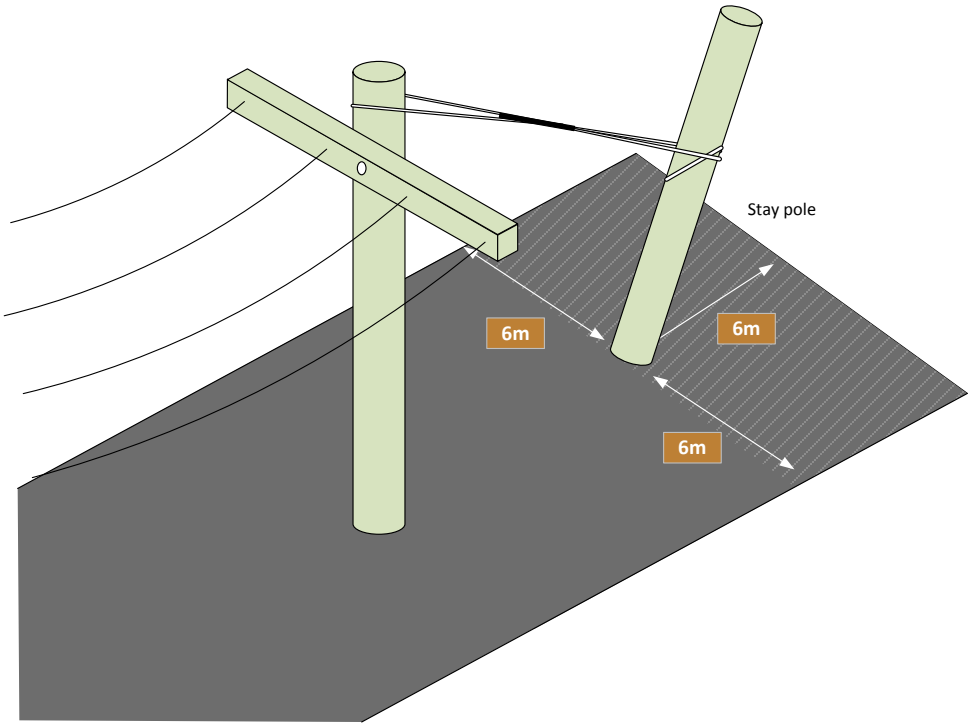


Figure 11 – Stay / Ground pole easement

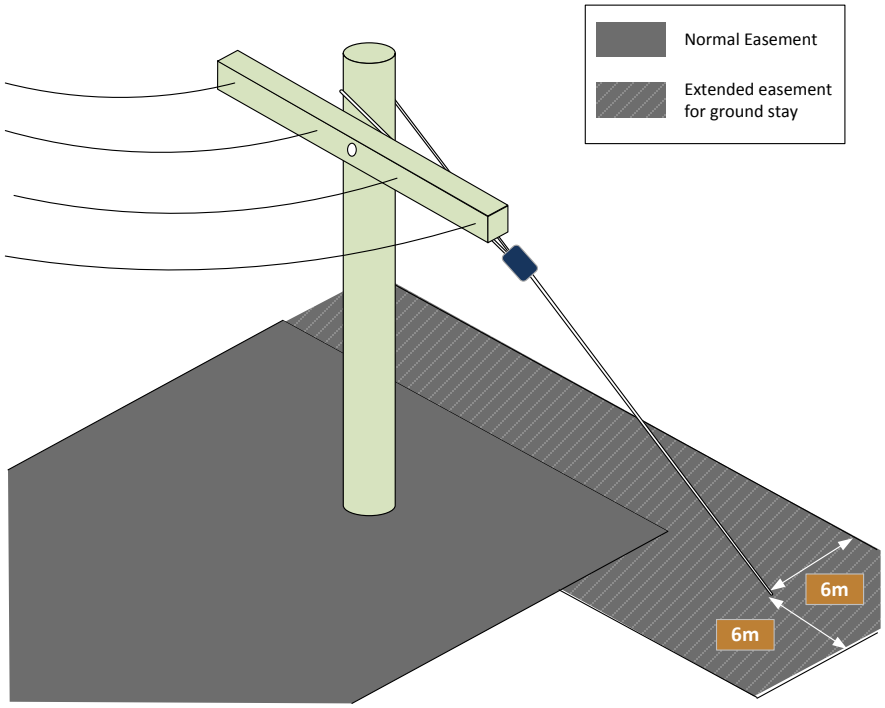
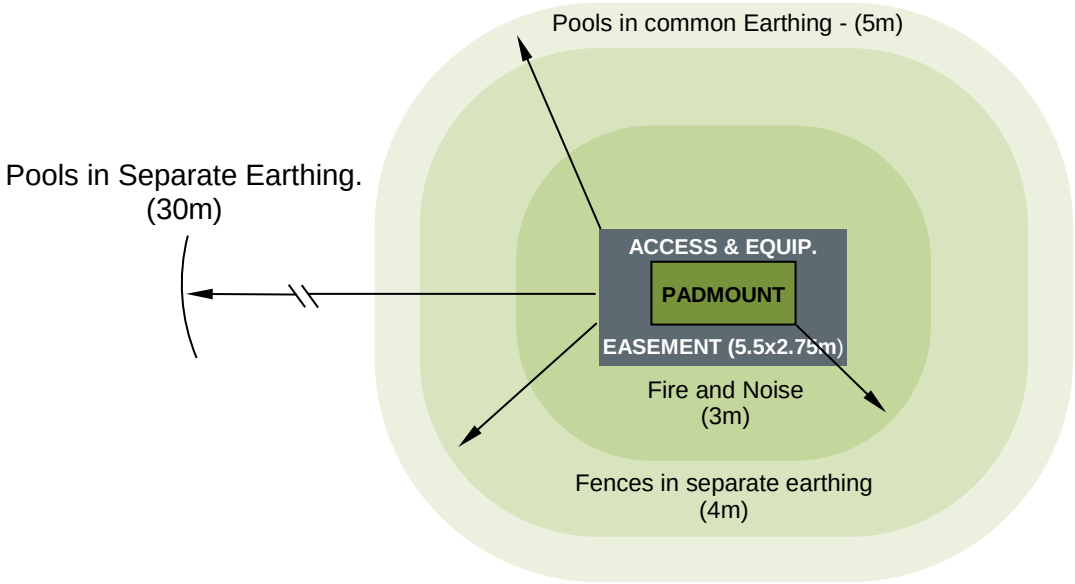


Figure 12 – Ground stay easement

A4.3 - Padmount easements and clearances



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Annexure 5 – Encroachment reference guide

Allowed - An activity which is allowed within an easement, but must still adhere to the minimum safety requirements within the easement stated in this document.
Prohibited - An activity that must not be performed under any circumstance within the easement.
Controlled - An activity which is allowed only if it meets both the minimum safety requirements for that type of easement with additional controls which are specified in the corresponding clause. Approval from Endeavour Energy is required for any controlled activity.

Category	Encroachment	Overhead				Underground				Padmount Substations			
		Allowed	Prohibited	Controlled	Clause	Allowed	Prohibited	Controlled	Clause	Allowed	Prohibited	Controlled	Clause
Buildings/ Structures	Buildings (habitable)		✓				✓				✓		
	Tents – Commercial or Recreational		✓			✓					✓		
	Shade Cloths / Umbrellas			✓	5.14.4.1		✓				✓		
	Minor structures (clothesline, playground equipment, non metallic fences and bbqs)			✓			✓				✓		
	Garages, large sheds and shipping containers (habitable)		✓				✓				✓		
	Non-habitable buildings (Carports and metallic sheds), and shipping containers (uninhabited)			✓	5.14.4.2		✓				✓		
	Flag pole / weather vane		✓				✓				✓		
Barriers/Walls	Sound walls			✓			✓				✓		
	Conductive fencing through an easement			✓	5.14.4.3			✓	5.15.5.1		✓		5.16.5.5
	Conductive on boundary of an easement			✓				✓			✓		
	Metal safety barriers			✓	5.14.4.4		✓				✓		
	Electric fencing		✓				✓				✓		
	Retaining walls			✓	5.14.4.5			✓	5.15.5.9			✓	5.16.5.4
	Metallic pipes in lengths greater than 3m		✓					✓	5.15.5.2		✓		
Fixed/ Mobile plant	Footings of Fixed plant		✓				✓				✓		
	Fixed Plant or equipment		✓				✓		5.15.5.3		✓		
	Mobile plant or equipment			✓	5.14.4.7			✓	5.15.5.4	✓			5.16.5.1
	Parking of tall vehicles, trucks, caravans, campervans		✓					✓			✓		
	Parking of other vehicles			✓	5.14.4.6	✓					✓		5.16.5.1
Vegetation	Shrubs with roots < 400mm	✓				✓				✓			
	Planting of trees which grow less than 3m	✓					✓				✓		
	Planting of trees which exceed 3m		✓				✓				✓		
	Storage of organic matter (leaves, compost)			✓	5.14.4.17			✓	5.14.4.17		✓		
Swimming Pools	Spas and Swimming pools – above ground		✓				✓				✓		
	Swimming pools – in ground		✓				✓				✓		

Category	Encroachment	Overhead				Underground				Padmount Substations			
		Allowed	Prohibited	Controlled	Clause	Allowed	Prohibited	Controlled	Clause	Allowed	Prohibited	Controlled	Clause
Fires	Lighting of fires		✓				✓				✓		
	Back burning			✓	5.14.4.8		✓				✓		
Agricultural use of the land	Agricultural pursuits such as dusting, harvesting, netting, irrigation			✓	5.14.4.9			✓	5.15.5.5			✓	5.16.5.2
	Ploughing near structures		✓			N/A					✓		
	Ploughing not near structures	✓					✓				✓		
Other	Objects which may hinder access		✓				✓				✓		
	Storage of combustible/flammable/corrosive material		✓				✓				✓		
	Storage of non-combustible, non-flammable, or non-corrosive material	✓				✓					✓		
	Rainwater tanks			✓	5.14.4.10		✓				✓		
	Detention basins			✓	5.14.4.11		✓				✓		
	Earth works – reducing cover or filling			✓	5.14.4.12		✓				✓		
	Permanent surfaces (asphalt, concrete etc)	✓					✓				✓		
	Different surfaces (bluemetal, woodchips)	✓				✓				✓			
	New Roads			✓	5.14.4.13			✓	5.15.5.6			✓	5.16.5.3
	Concrete driveways			✓				✓					
	Installation of Utility services – telecoms, water, LV elec, sewerage			✓	5.14.4.14			✓	5.15.5.7		✓		
	Residential/ Commercial subdivision lots			✓	5.14.4.15			✓	5.15.5.8	N/A			
	Use of explosives		✓				✓				✓		
Recreational Activities	Recreational activities – general (not including activities listed below)	✓				✓					✓		
	Recreational activities – flying kites, model aircraft, balloons		✓			✓					✓		
	Recreational activities – Flood lighting, grandstands		✓				✓				✓		
	Recreational activities – firearms		✓			✓					✓		
	Recreational activities – tennis courts			✓	5.14.4.16		✓				✓		

Note: Highlighting within the Encroachment column indicates a category which has been added since the last amendment. However, highlighting within the Overhead, Underground or Padmount columns represents a change in approach to the management of the encroachment since the last amendment.

LIVING SAFELY WITH ELECTRICITY

When working outside, whether it's a small job or large job or even something you do every day, you need to be aware of the electrical dangers of working near overhead power lines or underground cables.

Endeavour Energy wants to help protect you from potential electrical dangers on your work site. In turn, this will ensure families, households and businesses can continue to enjoy a safe and reliable electricity supply.

This brochure highlights some of the things you can do to avoid electrical dangers on the job.

Did you know?

Australian households receive communication, gas, water and electrical services via a labyrinth of cables stretching millions of kilometres underground. If just one of these cables is damaged, you could potentially be seriously injured and/or isolate thousands of households from essential services. Such incidents can result in hefty fines.

01 Call Emergency Services on **000**.

02 Request an ambulance if anyone is injured.

03 Report the incident to Endeavour Energy on **131 003** as soon as possible.

SAFETY EXCELLENCE

IN EMERGENCIES CALL 131 003

24 hours a day, 7 days a week

If you have any questions about what you should do to stay safe around damaged power lines and other electrical infrastructure please call 131 081 or visit us at www.endeavourenergy.com.au

0611-ENE2351-CONT

SAFETY ON THE JOB

51 Huntingwood Drive
Huntingwood NSW 2148
PO Box 6366 Blacktown NSW 2148
T: 131 081 • F: 61 2 9853 6000

Endeavour Energy

Call 131 003 and put safety first.
www.endeavourenergy.com.au

Endeavour Energy

BE ALERT AT WORK

Do you know where the underground cables are?

Unfortunately, serious incidents occur when excavators hit underground cables because cables aren't identified before work has commenced. Obtaining information about underground cable locations once involved making numerous calls to many utility providers.

Now there's really no excuse. Information and site maps showing the general location of underground services can be obtained by calling **1100** or visit **www.1100.com.au**. Remember it's the law.

Check, double check, triple check and reassess

Always check, double check, triple check and reassess for electrical dangers on the job. Remember, earthmoving operations often require material to be relocated to mounds or piles. When this happens under and around power lines it reduces the clearance distances between plant and the electrical infrastructure.

Completed your job?

Stay alert when packing up or removing scaffolding or equipment or when returning plant to its transit position.

Transporting trees?

Remember tall trees and shrubs such as palms can come into contact with power lines. Water is a good conductor of electricity and can therefore conduct through vegetation due to its water content.

Excavating?

Always check the voltage of cables listed on plans so that you can then apply this to *Work Near Underground Assets Guide 2007*, WorkCover NSW, to determine what the clearance and other requirements are to commence excavation. Select the safest plant for the job, e.g. toothless buckets and blunt hand tools. Before using mechanical plant to dig, use a cable location service to check the accuracy of plans. Always pothole by hand with non-conductive, blunt hand tools.

Look up and live

If a tip-truck, scaffolding, pump, ladder, crane or metal platform approaches or comes in contact with overhead power lines, the operator and even people nearby, could be electrocuted. Before starting work always look up and identify the location of any overhead power lines. Plan the job to minimise work near and around power lines.

Compare the height of power lines to the maximum height of your equipment, and ensure the full reach of your equipment will not breach the approach distances outlined in the *Work Near Overhead Power Lines Code of Practice 2006*, WorkCover NSW. For "ordinary persons" WorkCover requires an approach distance of at least three metres from overhead power lines (up to 132,000 volts).

Additional clearances are required when working near power lines carrying higher voltages. It's also a good idea to nominate a co-worker to observe and check that you and your equipment do not go into the approach distance zone.

HOW CAN YOU HELP?

Electricity can jump

You don't have to be touching power lines to get an electric shock because electricity can 'jump' – also known as arcing. A safe 'clearance' distance needs to be maintained to prevent electricity from arcing across to you and your equipment.

Five things to remember

01 Check, double check, triple check and reassess – always assess your work site for electrical dangers before you start and stay alert until you've left the site.

02 Look up and live – identify the location of overhead power lines and plan your job away from them.

03 Dial **1100** or visit **www.1100.com.au** before you dig – confirm the location of all underground cables before you begin any excavation work.

04 Before using mechanical plant to dig, check the accuracy of your plans using a cable location service. Pothole by hand using blunt plant items.

05 Always maintain a minimum approach distance from power lines and assign a co-worker as an observer while you operate and move machinery around power lines.

DIAL BEFORE YOU DIG® www.1100.com.au

SAFETY PLAN FOR PLUMBERS

Purpose

This brochure outlines risks, and how to avoid receiving an electric shock from metallic water pipes due to faults within the electricity supply system.

Metallic water pipe systems are used extensively as a means of earthing the electricity supply system, even in properties built after 1976 that are required to have the main earth wire connected to an earthing electrode (rod) driven into the ground.

If an electrical fault occurs then the water pipe can become 'alive' – and therefore dangerous.

Bridge the gap

If there is a fault you may feel a tingle from pipes or taps. Stop work immediately and contact Endeavour Energy.

When cutting water pipes or removing a meter, ensure that you always use a bridging conductor across the cut/break before cutting and keep it in place until the pipe is permanently rejoined. Such work should only be undertaken by qualified people using the appropriate bridging conductor in accordance with AS/NZS 3500.1:2003 Part 5.2, Electrical Safety Precautions and Earthing.

Get a sparky

In circumstance where an earth wire needs to be disconnected from a pipe and/or reconnected to a pipe, an electrical contractor must be contacted to perform the task and ensure the system is safe. Similarly, when replacing part of a copper water system with plastic pipes or non-metallic fittings or couplings, an electrical contractor must be engaged to install an earthing electrode and ensure the system is effectively earthed.

Storm precautions

Lightning can also damage electrical equipment and can conduct through metallic pipes and fittings. To improve plumbing safety when lightning is about, you should cease contact with any metal pipes and fittings.

Check power points

If you plug your equipment into a faulty power point your whole machine could become 'alive'. That's why it is important to use a power point safety tester to check a customer's power point before you use it. For added protection against electric shock from damaged cords or faulty equipment, use a portable safety switch (Residual Current Device).

HOW CAN YOU HELP?

Be aware

When an electrical fault occurs, metallic water pipes can become 'alive' resulting in an electric shock which could be fatal.

The risks increase if you:

- Cut a water pipe
- Remove a water meter
- Disconnect the main earth wire from the water pipe.

Plan the job

01 Find the main switches for the premises and then turn them off. Attach 'Danger Tags'. Be aware this step alone will not guarantee your safety as other faults elsewhere could still make the water pipes 'alive'.

02 If you are replacing all or part of the metallic water system with a plastic pipe, ask a qualified electrician to check the installation to ensure the electricity system is still effectively earthed.

03 Contact an electrical contractor when an earth wire needs to be disconnected or reconnected to a water pipe or when replacing part of a copper water system with plastic pipes or non-metallic fittings or couplings.

04 Test power points and use a safety switch to reduce the risk of shock from your portable tools. Make sure you have your tool and extension leads tested regularly and tagged including bridging conductors.

05 Stop immediately if you feel a tingle or see electrical arcs. Contact Endeavour Energy immediately on **131 003**.

YOUR SAFETY IS OUR PRIORITY

The danger

Under normal operations electricity flows through the active conductor into a premises, whilst the neutral conductor provides the return path for electric current to the substation. If a fault occurs at the customer's or neighbouring premises or in the mains neutral in the street, the electricity may not be able to follow its normal course and flow along metallic water pipes instead. Such faults may remain undetected for prolonged periods of time, especially if nobody has received a shock or noticed a tingling sensation from taps or pipes. Under these conditions the pipe can be energised and cause dangerous shocks if safe work procedures are not applied prior to and during any work on the pipe.

DANGER IN THE PIPELINE

SAFETY EXCELLENCE

IN EMERGENCIES CALL 131 003

24 hours a day, 7 days a week

If you have any questions about what you should do to stay safe around damaged power lines and other electrical infrastructure please call 131 081 or visit us at www.endeavourenergy.com.au

0611-ENE2351-PLMB

51 Huntingwood Drive
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Endeavour Energy

Call 131 003 and put safety first.
www.endeavourenergy.com.au

Endeavour Energy

energy networks association

ELECTRIC & MAGNETIC FIELDS – WHAT WE KNOW

ABOUT EMFS

ELECTRIC AND MAGNETIC FIELDS – OR EMFS – ARE FOUND EVERYWHERE THERE IS ELECTRICITY. THEY ARE INVISIBLE.

Electric and magnetic fields - or EMFs - are found everywhere there is electricity. This includes around electrical appliances, equipment and the wiring we use in our homes, workplaces and schools, as well as powerlines and utility facilities. As electricity is so widespread in our society, questions about electricity and health are important to people. Research over more than 40 years has greatly increased our understanding of EMFs. The purpose of this brochure is to inform the public about what we know, and what we are doing about it.

WHAT ARE ELECTRIC FIELDS?

Electric fields are related to the voltage, or the pressure which pushes electricity along wires. The higher the voltage, the higher will be the electric field. Electric fields are present in any appliance plugged into a power point which is switched on. Even if the appliance itself is turned off, if the power point is on, an electric field will be present.

Electric fields are strongest closest to their source, and their strength diminishes rapidly as we move away from the source. The many common materials such as brickwork or metal will block electric fields. Walls, tables and bench tops can act as shields.

WHAT ARE MAGNETIC FIELDS?

Magnetic fields are produced by the flow of electricity, commonly known as current. Unlike electric fields, magnetic fields are only present when electric current is flowing. In other words, if an appliance is operating (even while in 'standby' mode), a magnetic field is produced.

The level of a magnetic field depends on the amount of the current (measured in amps), and decreases rapidly once we move away from the source. While electric fields are shielded by many common materials, this is not the case with magnetic fields. This is one reason why power lines may contribute to magnetic fields in the home and why burying power lines will not eliminate magnetic fields.

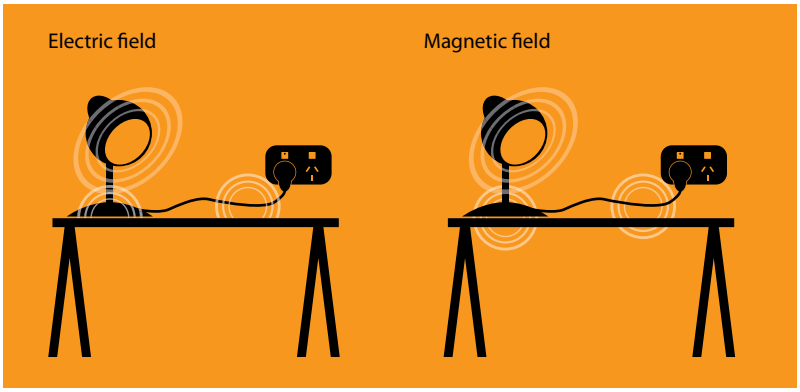
EMFS AND HEALTH

Research on EMFs and health has been conducted for over 40 years. This includes over 2,900 studies at a cost of more than $490 million internationally.

The research has generally focused on the magnetic fields with two main areas of research, *epidemiology* and *laboratory* studies. Both areas would need to provide links between EMFs and adverse health effects for causality to be accepted by health authorities.

Epidemiology (population).

This research looks at statistics to see if there are patterns of disease in large groups of people. The difficult with large statistical studies is that they take several years to produce meaningful results and even then, there are different opinions about how the results should be interpreted.



There may be other factors in the study which could complicate the interpretation of the results. Scientists generally agree that epidemiological studies aren't strong enough by themselves to establish that adverse health effects exist.

Laboratory

In the laboratory researchers have studied animals cells, as well as human volunteers under controlled circumstances to see if EMFs have any effects.

There have been many hundreds of these studies, and scientists look for results which can be successfully repeated in different laboratories. In over 40 years of research there have been no such consistently reproducible results for exposures below the guidelines.

AUTHORITATIVE REVIEWS

It is well accepted by scientists that no one study considered in isolation will provide a meaningful answer to the question of whether or not EMF can contribute to adverse health effects. In order to make an informed conclusion from all of the research, it is necessary to consider the science in its totality.

All of the research is reviewed periodically by expert panels which are established by national or international bodies with the purpose of trying to determine whether or not human exposure to EMF is related to adverse health effects.

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is a Commonwealth Government agency charged with the responsibility for protecting the health and safety of people and the environment from EMF. ARPANSA advises that:

"The scientific evidence does not establish that exposure to ELF EMF found around the home, the office or near powerlines and other electrical sources is a hazard to human health".

"There is no established evidence that ELF EMF is associated with long term health effects. There is some epidemiological research indicating an association between prolonged exposure to higher than normal ELF magnetic fields (which can be associated with residential proximity to transmission lines or other electrical supply infrastructure, or by unusual domestic electrical wiring), and increased rates of childhood leukaemia.

However, the epidemiological evidence is weakened by various methodological problems such as potential selection bias and confounding. Furthermore this association is not supported by laboratory or animal studies and no credible theoretical mechanism has been proposed."

These findings are consistent with the views of other credible public health authorities. For example the World Health Organisation (WHO) advises that:

"Despite the feeling of some people that more research needs to be done, scientific knowledge in this area is now more extensive than for most chemicals. Based on a recent in-depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields."

Similarly, the US National Cancer Institute concludes that:

Currently, researchers conclude that there is little evidence that exposure to ELF-EMFs from power lines causes leukemia, brain tumors, or any other cancers in children."

"No mechanism by which ELF-EMFs could cause cancer has been identified. Unlike high-energy (ionizing) radiation, ELF-EMFs are low energy and non-ionizing and cannot damage DNA or cells directly."

"Studies of animals exposed to ELF-EMFs have not provided any indications that ELF-EMF exposure is associated with cancer, and no mechanism has been identified by which such fields could cause cancer."

EMF GUIDELINES FOR ESTABLISHED HEALTH EFFECTS

The two internationally recognised exposure guidelines are:

» International Commission in Non-Ionizing Radiation Protection (ICNIRP) 2010; and

» International Committee on Electromagnetic Safety, Institute of Electrical and Electronics Engineers (IEEE) 2002.

ARPANSA's advice is:

» *"The ICNIRP ELF guidelines are consistent with ARPANSA's understanding of the scientific basis for the protection of the general public (including the foetus) and workers from exposure to ELF EMF".*

» Under the ICNIRP guidelines of 2010 the recommended magnetic field public exposure limit is 200 microtesla.

Under the IEEE Standard of 2002 the recommended magnetic field public exposure limit is 904 microtesla.

FIGURE 1: TYPICAL MAGNETIC FIELD MEASUREMENT RANGES

Magnetic Field Source	Range of Measurements in μT*
Electric stove	0.2 – 3
Refrigerator	0.2 – 0.5
Electric kettle	0.2 – 1
Toaster	0.2 – 1
Television	0.02 – 0.2
Personal computer	0.2 – 2
Electric blanket	0.5 – 3
Hair dryer	1 – 7
Pedestal fan	0.02 – 0.2
Substation	
» substation fence	0.1 - 0.8
Distribution line	
» under line	0.2 – 3
» 10m away	0.05 – 1
Transmission Line	
» under line	1 – 20
» edge of easement	0.2 - 5

* Note: Levels of magnetic fields may vary from the range of measurements shown. Appliance measurements at normal user distance.

Source: ARPANSA, Measuring magnetic fields

GUIDE TO COMMON EMFS

It is possible to measure magnetic fields using a gaussmeter.

The fields are measured in a unit of microtesla (μT) or milligauss (mG). 1 Microtesa (μT) equals 10 milligauss (mG).

To give you an idea of the relative strengths of EMF, the following guide shows the typical magnetic fields close to appliances and under power lines.

Due to variations in the design of electrical appliances / powerlines and the power consumed or transmitted, the levels of magnetic fields will vary.

ENA'S RESPONSE?

Electricity utilities review scientific developments related to EMFs and are guided by relevant health authorities. In Australia, the Energy Networks Association (ENA) recommends that electricity utilities provide balanced and accurate information to the community and design and operate electrical power systems prudently within relevant health guidelines. This includes such actions as:

- providing training to staff;
- informing the community;
- ensuring that fields are within established guidelines set by health authorities; and
- practising "prudent avoidance" when building new electrical facilities.

Prudent avoidance involves reducing magnetic field exposure where this is practicable and can be done at no cost or very low cost.

The industry has followed this reasonable, common sense approach for many years.

INDIVIDUALS RESPONSE

There are some things you can do very easily to reduce exposure to EMF. Since EMFs drop off rapidly as you move away from their source, you can modify your use of electrical appliances such as clock radios. You can locate beds away from a wall that has a switchboard outside and you can switch off your electric blanket before you get into bed. These actions may reduce exposure to EMFs but it cannot be said that doing any of these things will have any health benefit.

For further information about EMFs:

- your local electricity utility or the Energy Networks Association (ENA) www.ena.asn.au;
- the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) - www.arpansa.gov.au
- the World Health Organisation (WHO) – www.who.int

Energy Networks Association Ltd
P +61 2 6272 1555 **E** info@ena.asn.au
Level 1, 110 Giles St, Kingston ACT 2604
www.ena.asn.au

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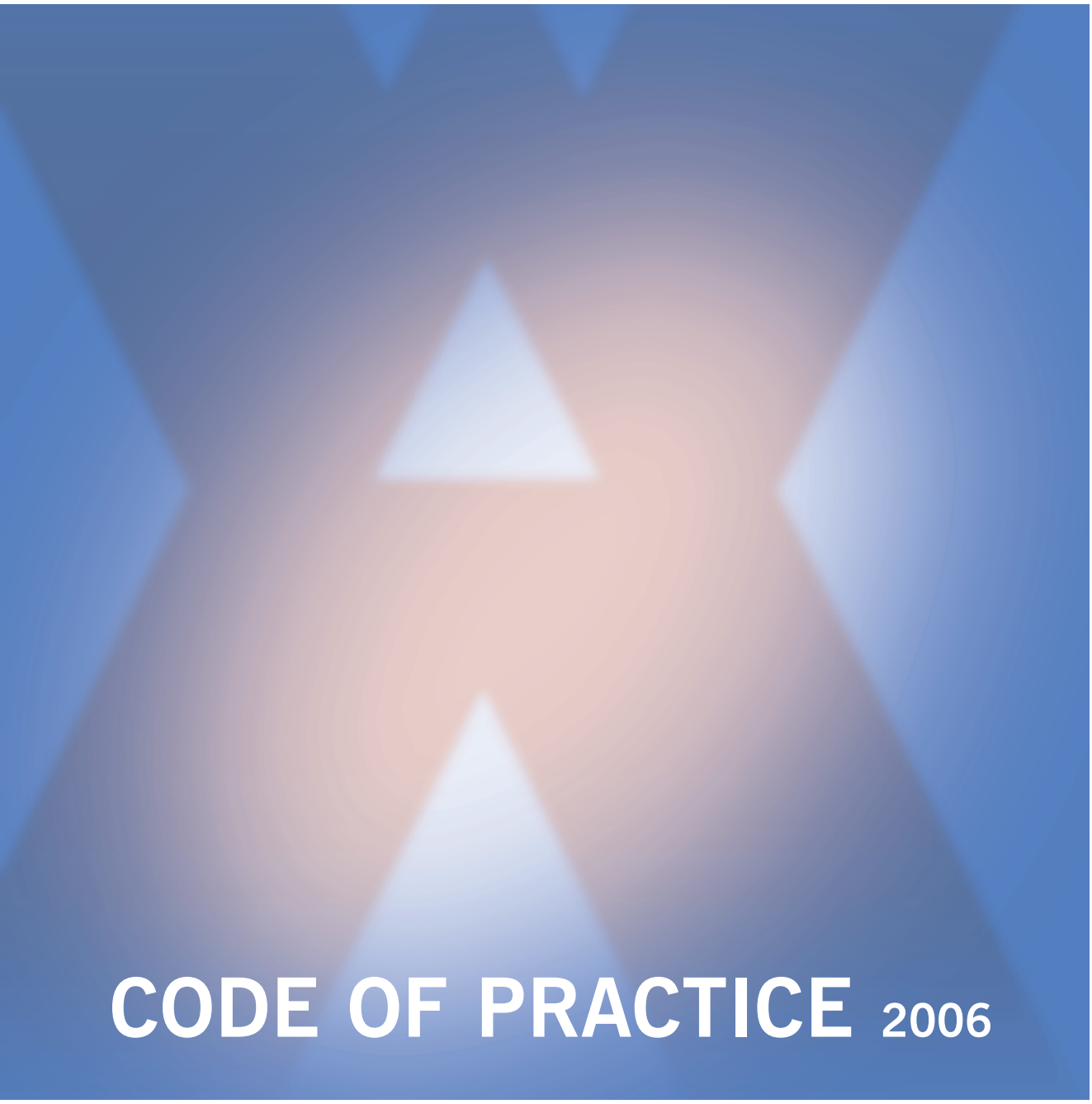
WorkCover
NEW SOUTH WALES

WORK NEAR
OVERHEAD POWER LINES



CODE OF PRACTICE 2006

WorkCover. **Watching out for you.**

New South Wales Government

CONTENTS

WHAT IS AN INDUSTRY CODE OF PRACTICE?

An approved industry code of practice is a practical guide to employers and others who have duties under the *Occupational Health and Safety Act 2000* (OHS Act) and the *Occupational Health and Safety Regulation 2001* (OHS Regulation) with respect to occupational health, safety and welfare.

An industry code of practice is approved by the Minister administering the OHS Act. It comes into force on the day specified in the code or, if no day is specified, on the day it is published in the NSW Government Gazette. An approved industry code of practice may be amended from time to time (or it may be revoked) by publication in the Gazette.

An approved industry code of practice should be observed unless an alternative course of action that achieves the same or a better level of health, safety and welfare at work is being followed.

An approved industry code of practice is intended to be used in conjunction with the requirements of the OHS Act and the OHS Regulation but does not have the same legal force. An approved industry code of practice is advisory rather than mandatory. However, in legal proceedings under the OHS Act or OHS Regulation, failure to observe a relevant approved industry code of practice is admissible in evidence to establish an offence under the OHS Act or OHS Regulation.

A WorkCover Authority inspector can draw attention to an approved industry code of practice in an improvement or prohibition notice as a way of indicating the measures that could be taken to remedy an alleged contravention or non-compliance with the OHS Act or OHS Regulation. Failure to comply with an improvement or prohibition notice without reasonable excuse is an offence.

In summary an approved **INDUSTRY CODE OF PRACTICE**:

- ✓ gives practical guidance on how health, safety and welfare at work can be achieved;
- ✓ should be observed unless an alternative course of action that achieves the same or a better level of health, safety and welfare in the workplace is being followed;
- ✓ can be used in support of the preventive enforcement provisions of the *Occupational Health and Safety Act*;
- ✓ can be used to support prosecutions for failing to comply with or contravening the OHS Act or OHS Regulation.

PREFACE

The aim of this code of practice is to protect the health and safety of persons from the risks arising when they are working near overhead power lines and associated electrical apparatus. It provides practical advice on implementing the requirements of the *Occupational Health and Safety Act 2000* and the *Occupational Health and Safety Regulation 2001*.

This code of practice provides practical guidance on the risk control measures, competency requirements and approach distances for workers working near overhead power lines. It applies to people with varying levels of qualification, training or knowledge.

This code of practice will assist employers, self-employed persons, employees, contractors and other parties involved in managing electrical risks associated with work near overhead power lines.

Use this code of practice to assess the effectiveness of your present arrangements when working near overhead power lines, and to check that all risks have been identified, assessed and eliminated or controlled.

This code of practice has been developed in consultation with members of the NSW electricity supply industry, including relevant unions and employer bodies. It is based on the earlier Electricity Association of N.S.W publication, *Interim Guide for Operating Cranes & Plant in Proximity to Overhead Power Lines*, and the Australian Standard *AS 2550.5 – 2002 Cranes, hoists and winches – Safe use Part 5: Mobile and Vehicle Loading Cranes*, which was gazetted as an approved industry code of practice on 21 September 2001 in the *Code of Practice: Technical Guidance*. In the event of any inconsistencies between the Standard and this code, the code shall prevail.

WHAT IS WORK NEAR OVERHEAD POWER LINES?

There are legislative obligations on employers, self-employed persons and controllers of premises in regard to undertaking work in close proximity, or at an unsafe distance, to overhead power lines. The term ‘near’ is utilised as a reference point for persons planning and undertaking this work.

Work ‘near’ overhead power lines means a situation where there is a reasonable possibility of a person, either directly or through any conducting medium, coming closer than the approach distances specified in this code. For the purposes of this code the term ‘near’ can be interchanged with other legislative or commonly used industry terms ie ‘close proximity’, ‘unsafe distance’ or ‘in the vicinity of’.

PERSONNEL WORKING NEAR OVERHEAD POWER LINES

This code of practice is based on the assumption that without appropriate technical knowledge and experience of electricity distribution networks and associated electrical apparatus, untrained personnel working or operating cranes or plant near overhead power lines will not be able to identify the operating voltage concerned, and will therefore not be able to recognise and avoid the inherent dangers of live overhead power lines. These personnel are termed ***ordinary persons***.

The approach distances specified in this code of practice take account of differing levels of technical knowledge, and are substantially greater for ordinary persons than for personnel who have been trained and assessed as having the necessary technical knowledge. These personnel are termed **accredited persons**.

HOW CAN WORKING NEAR LIVE OVERHEAD POWER LINES BE DANGEROUS?

Overhead power line contact is one of the largest single causes of fatalities associated with mobile plant and equipment.

Contact with live overhead power lines is a serious risk because any voltage that causes sufficient current to pass through the heart is potentially injurious or even fatal.

Contact with live electricity can also cause serious burns arising from the discharge of electrical energy. Other risks include fires and explosions that may immobilise the equipment involved.

You don't have to have a direct contact with a high voltage overhead power line to receive a fatal electric shock. ***Simply being too close can kill***.

WHAT DO THE SYMBOLS IN THE CODE OF PRACTICE MEAN?

To help you work out what you require, a number of symbols are used to highlight things you need to take into account and tools to help you do the job.

Consult and communicate with employers

Legal obligations that must be followed

The process of finding things that cause harm, working out how big a problem they are and fixing them.

Assess the risks in your workplace

Tools that can help you work out your plan

ACKNOWLEDGEMENT

In developing this code of practice WorkCover NSW has drawn on information contained in a number of codes of practice and industry guidelines issued by other State regulators or organisations. WorkCover NSW acknowledges the following publications, which have been incorporated in parts of this code.

- *Code of practice – Working near exposed live parts* – Queensland, Department of Industrial Relations, and
- *Framework for undertaking work near overhead and underground assets* – WorkSafe, Victoria, and
- *NENS 04-2003 National guidelines for safe approach distances to electrical apparatus* – Energy Networks Association.

CHAPTER 1 – ESTABLISHMENT

1.1 Title

This is the Code of Practice – Work near Overhead Power Lines.

1.2 Purpose

This code of practice provides practical guidance in order to protect the health and safety of persons working near overhead power lines and associated electrical apparatus. It provides guidance on the risk control measures, competency requirements and approach distances to live electrical conductors, including no go zones for cranes and plant (and their loads), as well as for vehicles, individuals and hand-held tools. It applies to persons with varying levels of qualification, training or knowledge.

This code of practice should be used instead of the *Interim Guide for Operating Cranes and Plant in Proximity to Overhead Power Lines – ISSC 26* issued by the Electricity Association of NSW in September 2001.

1.3 Scope

This code of practice applies to work, which is carried out near overhead power lines and associated electrical apparatus excluding:

- work on electricity network assets where the work is carried out in accordance with the requirements of the *Electricity Supply (Safety and Network Management) Regulation 2002* and the work is either:
    - by or for an electricity network operator, or
    - by an accredited service provider, or
    - by a telecommunications network operator.
- mobile plant or vehicles operating on a public road where the design envelope is not greater than the transit envelope and is in any case not greater than 4.6 metres in height (eg a side loading waste collection vehicle collecting waste bins from the side of a public road under overhead power lines);
- when the crane or item of plant is correctly stowed for travelling on a public road;
- work on a mine site;
- work involving low flying aircraft (eg crop dusting, pesticide or herbicide spraying, etc);
- work carried out by emergency services personnel, including state emergency service, fire, police, volunteer rescue association and ambulance personnel during a declared emergency or other local emergency incident. In this situation the agency should advise the network operator of the circumstances of the emergency work and ensure a safe system of work is applied by those emergency services personnel undertaking the work.

This Chapter 1 is introductory, describes the purpose of this code, and provides definitions. Chapter 2 explains the regulatory principles in the occupational health and safety legislation, which this code is intended to complement. Chapter 3 describes a framework for work near overhead power lines by outlining general risk management principles, competency requirements and approach distances for the work. More detailed risk management requirements for specific workplace activity are set out in Chapters 4 to 9 inclusive.

1.4 Authority

This is an industry code of practice approved by the Minister for Commerce, under section 43 of the *Occupational Health and Safety Act 2000*, on the recommendation of the WorkCover Authority of New South Wales ('WorkCover NSW').

1.5 Commencement

This code takes effect on [Gazettal /date]

1.6 Interpretation

1.6.1 Recommended practices

Words such as 'should' indicate recommended courses of action. 'May' or 'consider' indicate a possible course of action the duty holder should consider. However, you may choose an alternative method of achieving a safe system of work. For a further explanation, see 'What is an industry code of practice'.

1.6.2 Legal obligations

Words such as 'must', 'requires' and 'mandatory' indicate obligations, which must be complied with. Failure to comply with the code can be used as evidence in proceedings for an offence against the OHS Act or OHS Regulation (where the code is relevant to any matter, which it is necessary for the prosecution to prove to establish the commission of the offence).

1.7 Applicable legislation

Consult the OHS Act and the OHS Regulation for the specific legal requirements regarding occupational, health and safety responsibilities for work near overhead power lines.

Specific responsibilities:

Clause 41(4) of the OHS Regulation requires a controller of premises to ensure that persons working in, or undertaking maintenance on, the premises (apart from those undertaking electrical work) are prevented from coming within an unsafe distance from any overhead power lines or live electrical installations unless a risk assessment determines otherwise.

Clause 64(2)(e) of the OHS Regulation requires employers to ensure that persons at work, their plant, tools or other equipment and any materials used in or arising from the work do not come into close proximity with overhead electrical power lines (except if the work is done in accordance with a written risk assessment and safe system of work and the requirements of the relevant electricity supply authority).

Other significant legislation:

The *Electricity Supply (Safety and Network Management) Regulation 2002*, which is administered by the Department of Energy, Utilities and Sustainability, requires that a person must not carry out work on or near a network operator's transmission or distribution system and a network operator must not allow a person to carry out work on or near its transmission or distribution system unless the person is qualified under the relevant requirements of the network operator's network management plan, to carry out the work; and the work is carried out in accordance with the relevant requirements of that plan.

1.8 Definitions

The following definitions are used for the purposes of this code of practice:

access authority means a written authorisation, issued by a network operator, which allows persons to work within the no-go zone.

accredited person means a person who has successfully completed a recognised training course relating to work near overhead power lines that has been conducted by a registered training organisation.

accredited service provider means a person who has been accredited by the Department of Energy, Utilities and Sustainability to undertake work on the electricity network.

approach distance means the minimum separation in air from an exposed overhead conductor that must be maintained by a person, or any object held by or in contact with that person. **Note:** Refer to Chapter 3 for relevant approach distances.

approved means approved in writing. This can be achieved by any, or a combination, of the following:

- providing a paper document;
- sending a facsimile;
- other equivalent means (eg e-mail).

authorised person means a person with technical knowledge or sufficient experience who has been approved by the network operator.

authorised representative of an industrial organisation of employees means an officer of that organisation who is authorised under the *Industrial Relations Act 1996*.

competent person for any task means a person who has acquired through training, qualification, experience, or a combination of them, the knowledge and skills to carry out the task.

conductor means a wire, cable or form of metal designed for carrying electric current.

construction work means any of the following:

(a) excavation, including the excavation or filling of trenches, ditches, shafts, wells, tunnels and pier holes, and the use of caissons and cofferdams,

(b) building, including the construction (including the manufacturing of prefabricated elements of a building at the place of work concerned), alteration, renovation, repair, maintenance and demolition of all types of buildings,

(c) civil engineering, including the construction, structural alteration, repair, maintenance and demolition of, for example, airports, docks, harbours, inland waterways, dams, river and avalanche and sea defence works, roads and highways, railways, bridges and tunnels, viaducts, and works related to the provision of services such as communications, drainage, sewerage, water and energy supplies.

control measures measures taken to minimise a risk to the lowest level reasonably practicable.

crane	means an appliance intended for raising or lowering a load and moving it horizontally, and includes the supporting structure of the crane and its foundations, but does not include industrial lift trucks, earth moving machinery, amusement devices, tractors, industrial robots, conveyors, building maintenance equipment, suspended scaffolds or lifts.
de-energised	means not connected to any source of electrical supply but not necessarily isolated.
earthed	means directly electrically connected to the general mass of earth so as to ensure and maintain the effective dissipation of electrical energy.
earth moving machinery	means an operator controlled item of plant used to excavate, load or transport, compact or spread earth, overburden, rubble, spoil, aggregate or similar material, but does not include a tractor or industrial lift truck.
electrical apparatus	means any electrical equipment, including overhead power lines and cables, the conductors of which are live or can be made live.
electricity network	means transmission and distribution systems consisting of electrical apparatus which are used to convey or control the conveyance of electricity between generators' points of connection and customers' points of connection. **Note:** Overhead power lines on private property come under the control of the controller of the premises.
elevating work platform	means a telescoping device, scissor device or articulating device, or any combination of those devices, used to move personnel, equipment or materials to and from work locations above the support surface.
envelope	means the space encapsulating a plant item, including attachments such as rotating / flashing lights or radio aerials and is categorised as: **Design:** the space encapsulating all possible movements of the plant and any load attached under maximum reach. **Transit:** the area encompassing the normal height and width of a vehicle or plant when traveling to or from a worksite.
employee	means an individual who works under a contract of employment or apprenticeship.
employer	means a person who employs persons under contracts of employment or apprenticeship. **Note:** In some chapters of the OHS Regulation, the term 'employer' includes a self-employed person in relation to duties to other persons. See the definition of 'employer' in clause 3 of the OHS Regulation.
energised	means connected to a source of electrical supply.
exposed conductor	an electrical conductor that is hazardous because it has not been protected by a barrier of rigid material or by insulation that is adequate for the voltage concerned, under a relevant Australian Standard specification.
hazard	means anything (including work practices and procedures) that has the potential to harm the health or safety of a person.

high-risk construction work	means any of the following construction work, • involving structural alterations that require temporary support • at a height above 3 metres • involving excavation to a depth greater than 1.5 metres • demolition work for which a licence is not required • in tunnels • involving the use of explosives • near traffic or mobile plant • in or around gas or electrical installations • over or adjacent to water where there is a risk of drowning.
high voltage (HV)	means a nominal voltage exceeding 1,000 V a.c. or exceeding 1,500 V d.c.
hoarding	for the purposes of this code is containment sheeting positioned on the external face of a scaffold that serves as a physical barrier between a worker and live overhead power lines and associated electrical apparatus.
insulated	means separated from adjoining conducting material by a non-conducting substance which provides resistance to the passage of current, or to disruptive discharges through or over the surface of the substance at the operating voltage, and to mitigate the danger of shock or injurious leakage of current.
Interim Guide	means the *Interim Guide for Operating Cranes and Plant in Proximity to Overhead Power Lines – ISSC 26* issued by the Electricity Association of NSW.
isolated	means disconnected from all possible sources of electricity supply by means which will prevent unintentional energisation of the apparatus and which is assessed as a suitable step in the process of making safe for access purposes.
live	means connected to any source of electrical supply or subject to hazardous induced or capacitive voltages.
low voltage (LV)	means a nominal voltage exceeding 50 V a.c. or 120 V d.c. but not exceeding 1000 V a.c. or 1500 V d.c.
LV – ABC (Aerial Bundled Cable)	means an insulated cable system used for low voltage overhead distribution of electricity that is manufactured in accordance with the Australian Standard, AS/NZS 3560.
mobile crane	means a crane capable of travelling over a supporting surface without the need for fixed runways (including railway tracks) and relying only on gravity for stability, that is, with no vertical restraining connection between itself and the supporting surface and no horizontal restraining connection (other than frictional forces at supporting-surface level) that may act as an aid to stability.

mobile plant	includes plant that: (a) moves either under its own power, or is pulled or pushed by other mobile plant (b) moves on or around the work site, enters or leaves the site, or moves past the site (c) includes road vehicles operating at a worksite **Note:** This definition has been adopted for the purposes of this code of practice. This includes items such as earthmoving machinery, concrete boom pumps and tipper trucks operating at a worksite.
near	means a situation where there is a reasonable possibility of a person, either directly or through any conducting medium, coming closer than the relevant approach distances specified in this code.
network operator	means the owner, controller or operator of an electricity network also known as an electricity supply authority.
no go zone	means the area around overhead power lines into which no part of a person or material or cranes or vehicles or items of mobile plant may encroach without the approval of the network operator. **Note:** • person includes hand tools, equipment or any other material held by a person. • plant includes the load, controlling ropes and any other accessories.
occupier	of premises includes: (a) a person who, for the time being, has (or appears to have) the charge, management or control of the premises, or (b) a person who, for the time being, is in charge (or appears to be in charge) of any operation being conducted on the premises.
operating voltage	means the a.c. voltage (phase to phase RMS) or d.c. voltage by which a system of supply is designated.
ordinary person	means a person without sufficient training or experience to enable them to avoid the dangers which overhead power lines and associated electrical apparatus may create.
overhead power line	means any bare or covered aerial conductors and other associated electrical parts that make up an aerial line for the distribution and transmission of electrical energy.
personal protective equipment (PPE)	items that workers can use to protect themselves against hazards. PPE includes insulating gloves, mats or sheeting, glasses and face protection. **Note:** A number of items of PPE are made and tested to Australian Standards. PPE that is not designated as meeting a recognised Standard may be unreliable in service, as its performance is unknown.

place of work	means premises where persons work.
plant	includes any machinery, equipment or appliance. **Note:** For the purposes of this code the definition includes a broad range of machinery and equipment, but not limited to, cranes, mobile plant, scaffolding, load shifting equipment, industrial lift trucks, earth moving machinery, amusement devices, tractors, rural machinery, vehicles, conveyors, building maintenance equipment, suspended scaffolds or lifts, implements or tools and any component or fitting of those things.
premises	includes any place, and particularly includes: • any land, building or part of a building • any vehicle, vessel or aircraft, or • any installation on land, on the bed of any waters or floating on any waters, or • any tent or movable structure.
OHS Act	means the *Occupational Health and Safety Act 2000*.
OHS Regulation	means the *Occupational Health and Safety Regulation 2001*.
safety observer	means an accredited person specifically assigned the duty of observing and warning against unsafe approach to overhead power lines and associated electrical apparatus, or other unsafe conditions.
safe work method statement (SWMS)	means a statement that: • describes how the work is to be carried out • identifies the work activities assessed as having safety risks • identifies the safety risks; and • describes the control measures that will be applied to the work activities, and includes a description of the equipment used in the work, the standards or codes to be complied with, the qualifications of the personnel doing the work and the training required to do the work.
self-employed person	means a person who works for gain or reward otherwise than under a contract of employment or apprenticeship, whether or not they employ others.
tiger tails	means pipe type cable covers, used as a warning to visually indicate the position of overhead power lines. **Note:** A tiger tail is also known as a torapoli pipe.
vehicle	means a truck (non tipping), car or utility, or other general purpose conveyance used for the carriage of persons, materials or goods.
voltage	means a potential difference between conductors or between conductors and earth.
work	means work as an employee or as a self-employed person.

CHAPTER 2 – CONSULTATION AND RISK MANAGEMENT

The OHS Act and the OHS Regulation require employers to address workplace health and safety through a process of risk management and consultation.

To effectively implement this code, employers need to be aware of these requirements and have procedures in place to apply them. Employers are advised to consult the OHS Act and the OHS Regulation as well as the *Code of Practice: Occupational Health and Safety Consultation* and the *Code of Practice: Risk Assessment* for details of these requirements and how they can be met. The following information is designed to provide an overview of legislative requirements.

The OHS Regulation requires employers (and self-employed persons) to identify hazards and to ensure that any risk of injury from electricity at a place of work is eliminated, or if elimination is not reasonably practicable, the risk is controlled.

Other legislative requirements particularly relevant to this code are clause 64 of the OHS Regulation, which requires that employers must ensure that persons at work, their plant, tools or other equipment and any materials used in or arising from the work do not come into close proximity with overhead power lines.

Controllers of premises also have obligations under section 10 of the OHS Act and clause 41 of the OHS Regulation for work that is carried out near overhead power lines.

This code of practice provides guidance on ensuring these requirements are met and should be implemented within a risk management framework. Risk management is a way of organising your efforts to determine safe systems of work. Following this procedure will help you identify the safety issues for work that is to be carried out near overhead power lines.

The following information is designed to provide an overview of:

- consultation
- risk management
- information, instruction, training and supervision

2.1 Consultation at the workplace

Employers must consult with employees when taking steps to assess and control workplace risks.

In order to consult with employees, employers are required to set up consultation arrangements and develop consultation procedures.

2.1.1 Consultation arrangements

The OHS Act provides three options for consultation arrangements under sections 16 and 17:

Arrangement	Number of employees	Requirement
OHS committee	20 or more employees	• requested by a majority of employees, or • directed by WorkCover
OHS representative	any size	• at least one employee requests an election, or • directed by WorkCover
Other agreed arrangements	any size	agreed to by both the employer and employees (in a small workplace it may be a regular safety meeting with employees)

Before using this code, an employer should ensure that consultation arrangements are in place. An employer may initiate the establishment of an OHS Committee or the election of an OHS Representative if the employees have not made such a request. When the consultation arrangements have been decided, clause 27 of the OHS Regulation requires employers to record them and advise all existing and new employees.

2.1.2 Consultation procedures

After setting up the consultation arrangements, employers need to consider when and how these consultation arrangements need to be applied.

2.1.3 When should consultation be undertaken?

Under section 13 of the OHS Act, employers have a general duty to consult employees when decisions are being considered that may affect their health, safety and welfare at work. Therefore, employers are required to consult with their OHS Committee, OHS representative or other agreed arrangement when such decisions are being considered. Decisions, which could affect health, safety and welfare for work near overhead power lines include:

- eliminating or controlling risks to health and safety from work
- assessing, reviewing and monitoring risks to health and safety from work
- planning, designing or changing work tasks or jobs
- purchasing new plant and equipment or substances
- using contractors at the workplace
- investigating incidents or accidents
- developing emergency procedures
- determining or reviewing consultation arrangements

Note: Any procedures that are developed to encompass these activities should incorporate consultation.

It may not be practical or reasonable to involve the OHS committee or the OHS representative in every decision. However, the employers or committee or representatives should agree on what process is needed to ensure that affected employees are consulted.

2.1.4 How should consultation be undertaken?

When engaged in consultation, section 14 of the OHS Act requires employers to:

- Share all relevant information with employees – for example, if an employer is going to change a work task, employees need to be told of any risk to health and safety that may arise and what will be done to eliminate or control these risks.
- Give employees reasonable time to express their views – employees need adequate time to assess the information given to them, obtain relevant safety information and consult with fellow employees to enable them to form their views.
- Value the views of employees and take into account when the decision is made to resolve the matter – in many cases, agreement will be reached on how the safety issues are to be addressed. When agreement cannot be reached, the employer should explain how the employee's concerns have been addressed.

2.2 Risk management at the workplace

Employers and self-employed persons must identify any foreseeable hazards, assess their risks and take action to eliminate or control them. Employees must be consulted as part of this process.

A hazard identification and risk assessment process must be carried out at the planning and preparation stage by the employer/contractor, in consultation with the persons doing the work near overhead power lines to determine what risks may arise when the work is being carried out. Safe systems of work must then be put in place to eliminate or control these risks. **Note:** For some work activities carried out near overhead power lines the safe system of work must also be documented in a safe work method statement. Refer to section 2.4.1.

The process of risk assessment and control is made up of the following steps:

- identify the hazards
- assess the risk(s) to the health and safety of persons arising from the hazards
- use appropriate control measures to eliminate or control the risk(s)
- monitor and review the control measures to ensure on-going safety.

2.2.1 Identify hazards

To ensure a safe and healthy workplace, employers must take reasonable care to identify all the foreseeable health and safety hazards, which could harm their employees or other persons in the workplace. Hazards may arise from the work process, the equipment and materials in use, the work environment, or other people involved.

Live overhead power lines are a potential hazard posing substantial risk of death or serious injury. In addition to electrical shock and electrocution, contact with overhead power lines, can result in:

- the electrifying of other objects such materials, tools and items of plant, with the potential for electric shock or electrocution;
- a rain of molten metal caused by contact between an energised conductor and another conducting medium;
- fire;

- explosion; or
- swift, unpredictable power line whiplash.

2.2.2 Assess risks

Once hazards have been identified, the risk they pose to health and safety needs to be assessed. Some hazards pose a greater risk than others do, and the frequency and duration of exposure can also affect the risk. Risk assessment involves considering the likelihood and severity of injury or illness being caused by exposure to the risk. Therefore the factors that need to be considered in a risk assessment should include the:

- harm that can be caused by exposure to the hazard
- number of people and the duration and frequency of exposure to the hazard
- capability, skill and experience of people exposed to the hazard.

The risk assessment process provides information on the factors, which contribute to the risk. This information will assist in determining what needs to be done to eliminate or control the hazard.

2.2.3 Eliminate or control the risk

The OHS Regulation prescribes the following hierarchy of controls that must be used to eliminate or control a risk to health and safety in the workplace. Refer to the following chapters of this code of practice to see how this must be applied to work near overhead power lines. In particular, consider the following:

Level 1: Eliminate the hazard by:

- discontinuing the work activity or arranging for the de-energising of the overhead power lines during the work or re-routing the overhead power lines away from the work activity.

Level 2: Minimise the risk by:

- substituting the system of work or plant (with something safer that does not come near the overhead power lines). This could mean using an alternate crane or mobile plant, which cannot encroach the approach distances specified in this code.
- separating the hazard. This could mean erecting a physical barrier to prevent a person or anything held by a person, or attached to the person, coming near the overhead power lines.
- introducing engineering means. This could mean substituting with a less hazardous process or modifying an item of plant or equipment to ensure it does not come near the overhead power lines.
- adopting administrative controls, by example, signage, warning barriers marking the worksite, safe work procedures such as maintaining a safe distance from overhead power lines and using a safety observer to warn people before they encroach the approach distances specified in this code.
- using personal protective equipment (PPE). (eg insulating gloves, safety helmets, eye protection).

The control measures at Level 1 give the best results and should be adopted where possible. The Level 2 measures apply in descending order of effectiveness and require more frequent reviews of the hazards and systems of work. In some situations a combination of control measures may be used such as engineering means and administrative controls.

2.2.4 Review risk assessment and control measures

Control measures should be reviewed on a regular basis. The frequency of their review should be determined by considering the significance of the risks associated with the hazard. However, a review should be undertaken in the following circumstances:

- new information is made available about the risks associated with the hazard
- an accident or incident occurs
- significant changes are proposed to the workplace or work system.

2.3 Information, instruction, training, and supervision

The OHS Act requires employers to provide such information, instruction, training and supervision as may be necessary to ensure the health, safety and welfare of their employees while at work.

Work near overhead power lines should not be performed unless those performing the work have received appropriate instruction and training. For example, the operator of any crane or mobile plant and the safety observer who carry out work within the accredited person zone specified in this code must have received training for work near overhead power lines conducted by a Registered Training Organisation. Refer to Appendix 4.

Employers must provide appropriate supervision and should recognise their supervisor's role in the management of the risks and the protection of employees. Close liaison between supervisors and employees is vital in ensuring the work is carried out in a safe manner.

Supervision of crane and plant operators working near overhead power lines should ensure that the control measures are fully implemented and followed at all times by employees. If you are supervising, it is your responsibility to ensure that the situation is safe for everyone.

The level and extent of supervision required will vary according to the safety aspects of each task and the skills of the worker. In determining the necessary level of supervision, an employer should consider:

- the complexity of the job environment in which the job is being done;
- the hazards at each work site;
- the worker's level of competence, experience and age.

The levels of supervision required for various tasks need to be described in policies and procedures.

2.4 Provision of information

Health and safety information may include:

- the results of any applicable written risk assessment;
- requirements of safe work method statements;
- a review of the written risk assessment and/or safe work method statements and standard operating procedures;
- any other relevant OHS information, such as type test information, documentation and signage.

Persons working near overhead power lines should always have, on request, access to written risk assessments and safe work method statements at the work site. Employers should brief employees and other workers as to the contents of written risk assessments and safe work method statements when work begins near overhead power lines, at regular intervals thereafter, and whenever there are changes to written risk assessments or new information about health and safety risks becomes available.

The employer should consult with their employees to ensure that such information and training is in a form that is accessible and easily understood. This is important where employees are from a non-English speaking background and/or have special needs or disabilities, and may have specific language or literacy requirements.

2.4.1 Safe work method statements

Chapter 8 of the OHS Regulation requires that safe work method statements (SWMS) be used for high risk construction work.

High-risk construction work may include, for example the following activities that may occur near overhead power lines:

- construction work involving structural alterations that require temporary support;
- construction work at a height above 3 metres;
- construction work involving excavation to a depth greater than 1.5 metres;
- demolition work for which a licence is not required;
- construction work involving the use of explosives;
- construction work near traffic or mobile plant;
- construction work in or around gas or electrical installations.

An example of a safe work method statement is included at Appendix 3 to assist in this.

2.5 Preparation for work to commence

Careful planning and preparation is an essential step to ensure that work is done safely. When preparing for the commencement of work all controls indicated by the risk assessment(s) and safe work method statement(s) as applicable must have been put in place and that no new hazards exist, or have been created.

Preparation should include:

- nature of the work planned and ways of dealing with changes as the work proceeds;
- the possible hazards and risks associated with the work;
- consultation with the network operator;
- communication and interaction between workers at the site;
- training, qualifications and competency of workers;
- checking the operation of plant and equipment, including the operation of limiting devices;
- proximity of persons, cranes, mobile plant, material and tools to overhead powerlines;
- proximity of persons to cranes and mobile plant;
- specific instructions for employees;
- workplace access and egress;
- emergency procedures, including first aid, evacuation and rescue; and
- environmental factors.

CHAPTER 3 – APPROACH DISTANCES WHEN WORKING NEAR OVERHEAD POWER LINES

3.1 Scope

This Chapter introduces a framework for work near overhead power lines. It provides guidance on general risk management principles, competency requirements and approach distances to live electrical conductors, including no go zones for cranes and plant (and their loads), as well as for vehicles, individuals and hand-held tools. It applies to persons with varying levels of qualification, training or knowledge.

This Chapter should be read in conjunction with the following Chapters, which provide risk management requirements for various types of workplace activity, including scaffolding (Chapter 6) and work near low voltage overhead service lines (Chapter 8), which specify a different set of approach distances to those described in this Chapter.

3.2 Basis of approach distances

This code is based on the assumption that without appropriate technical knowledge and experience of electricity distribution networks, workers that have not received training in overhead power line electrical hazards (ordinary persons) will not be able to identify the operating voltage of the live overhead power lines. When working near or operating cranes or plant near live overhead power lines such persons will not be able to recognise and avoid the inherent electrical hazards.

The approach distances specified in this Chapter take account of differing levels of technical knowledge and items of plant, and are substantially greater for ordinary persons than for personnel who are accredited. The approach distances for ordinary persons and accredited persons are based on those specified in the *National Guidelines for Safe Approach Distances to Electrical Apparatus*. In the National Guidelines, the approach distances were derived by –

- determining a distance to avoid electrical flashover; and
- providing additional allowance for inadvertent movements of the person, crane or plant relative to the overhead power lines, or the movement of the overhead power lines relative to the person, crane or plant.

3.2.1 Assessing the relevant approach distance

Prior to the start of any work near overhead power lines it is essential that the height and voltage of the overhead power lines (and if applicable the horizontal safety clearance) be assessed at the worksite. When assessing the relevant approach distances for the work a number of factors must be taken into account including,

- the possibility of errors in estimating distances, especially at higher voltages, where the approach distance is large. It may be necessary either to allow more clearance or to use methods that provide more accurate estimation of distances, for example, an ultrasonic cable height indicator, which provides a safe and accurate method of estimating distances near overhead power lines. If the height or voltage of the overhead power lines cannot be accurately determined consult the network operator.

WARNING

Do not attempt to directly measure the height of overhead power lines. Do not use conductive metallic objects or measuring devices such as metal tape measures for estimating the height of overhead power lines.

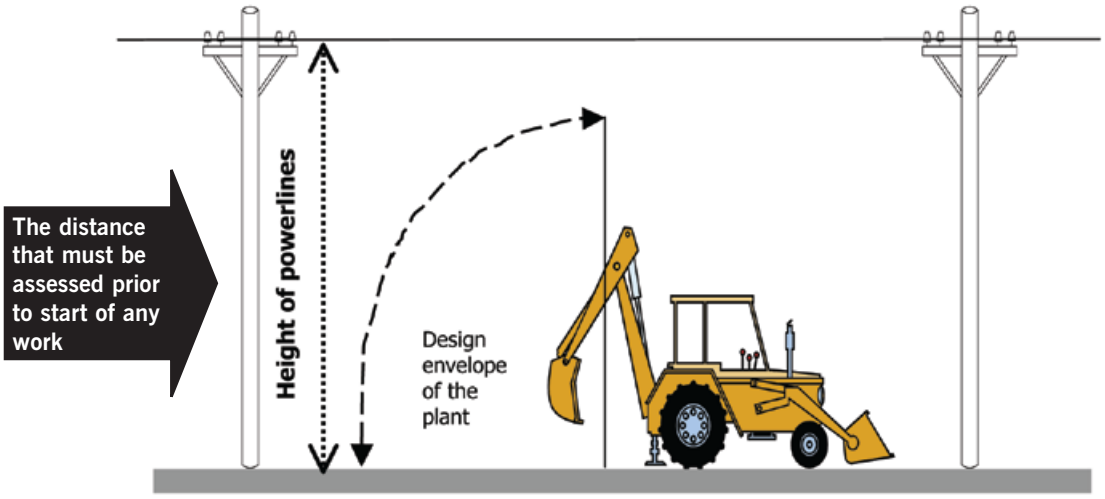


Figure 1: Distance that must be assessed for each worksite

- overhead power lines are made of metal and are therefore subject to expansion and contraction when heated and cooled. This can be a direct result of high ambient air temperature and/or excessive electrical load current passing through the conductors. Regardless of the cause, any expansion will result in gravity causing the power lines to sag downwards. Wind can also cause the power lines to swing from side to side. For this reason the approach distances must be increased either vertically or horizontally by the amount of conductor sag or swing at the point of work. Refer to Figure 2.

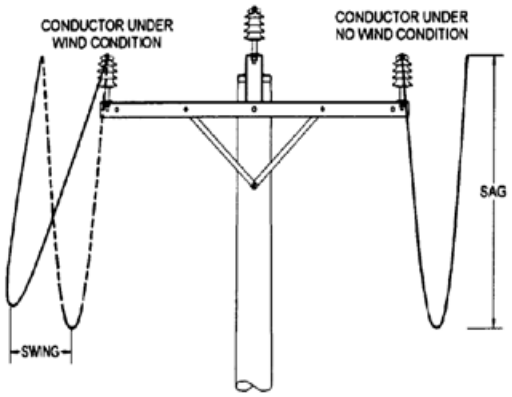


Figure 2: Illustration of overhead power line 'sag or swing'

- where more than one voltage is present, eg overhead power lines where two or more circuits operating at different voltages are supported on the same poles, the approach distance appropriate to each voltage must be maintained independently.
- increased clearances must be allowed where a risk assessment identifies a reasonable possibility of the load or lifting gear (crane hook, chains, slings, etc) moving or swinging towards the overhead power lines or associated electrical apparatus when the crane or item of mobile plant is operated.

3.2.2 Increases to approach distances

It is recognised that certain Australian Standards and industry practice in some States require greater approach distances than those described in this code. For certain types of work or classes of authorisation and competency, greater distances than that described in this code may be appropriate.

For example, the approach distances shown in Table 1 are less than those described in the Australian Standard AS 2550.5 Cranes, hoists and winches – Safe use Part 5: Mobile and Vehicle Loading Cranes, which is also gazetted as an approved industry code of practice. In the event of any inconsistencies between the Australian Standard and this code the approach distances specified in this code shall prevail.

Employers, self-employed persons and controllers of premises should determine the applicability of the approach distances described in this code for particular work circumstances and, if considered appropriate, specify greater approach distances for the work.

3.2.3 How close can I go to overhead power lines?

Once an assessment has been carried out of the worksite and the overhead power lines, a decision can be made on the approach distance for the proposed work. The approach distances and work zones described in this Chapter and illustrated in Figure 3 vary with the voltage of the overhead power lines and the level of accreditation of the person/s performing the work. The relevant approach distances are set out in the following tables:

- Table 1 provides the approach distances for ordinary persons. These are workers who have not received training in overhead power line electrical hazards and are restricted to work in the ordinary person zone. Refer to Section 3.3 and Figure 3.
- Table 2 provides reduced approach distances for accredited persons. These are workers who have successfully completed a recognised training course in overhead power line electrical hazards and are therefore permitted to work closer to the overhead power lines in the accredited person zone. Refer to Section 3.4 and Figure 3.
- Table 3 provides the approach distances for vehicles that are driven under overhead power lines. Refer to Section 3.6.

The approach distances vary with the voltage. They apply to:

- any part of a crane or item of mobile plant, including vehicles,
- any load being moved, including the slings, chains and other lifting gear,
- any person working at heights eg from an elevating work platform, scaffold, or other structure, or
- any hand tools, hand control lines, equipment or other material held by a person.

Note: Special approach distances apply for scaffolding work (Chapter 6) and work near low voltage overhead service lines (Chapter 8).

3.3 Ordinary Person Zone

Table 1 provides approach distances for:

- ordinary persons performing work near overhead power lines, (including plant, hand tools, equipment or any other material held by a person); or
- cranes (and their loads) and items of mobile plant operated by an ordinary person near overhead power lines.

Note: Where a written risk assessment determines it necessary, the use of a safety observer should also be considered for work performed by ordinary persons working outside but up to the approach distances specified in Table 1. The duties of the safety observer are described in Section 3.8.

TABLE 1

Approach distances for work performed by Ordinary Persons

Nominal phase to phase a.c. voltage (volts)	**Approach distance (m)**
Up to and including 132,000	3.0
Above 132,000 up to and including 330,000	6.0
Above 330,000	8.0
Nominal pole to earth d.c. voltage (volts)	**Approach distance (m)**
Up to and including +/- 1500 Volts	3.0

Note: Special approach distances apply for scaffolding work (Chapter 6) and work near low voltage overhead service lines (Chapter 8).

3.4 Accredited Person Zone

Table 2 provides approach distances for:

- accredited persons, with a safety observer who are performing work near overhead power lines (including plant, hand tools, equipment or any other material held by a person); or
- cranes (and their loads) and items of mobile plant operated by an accredited person with a safety observer near overhead power lines.

The approach distances in Table 2 are based on

- completion of a written risk assessment prior to the commencement of work,
- application of a safe system of work, which includes the use of a safety observer, and
- if determined by the written risk assessment, consultation with the network operator regarding the proposed work and compliance with any conditions imposed by the network operator for the work.

TABLE 2

Approach Distances for work performed by Accredited Persons, with a Safety Observer

Nominal phase to phase a.c. voltage (volts)	**Approach distance (m)**
Insulated low voltage cables up to 1000, including LV ABC	0.5
Un-insulated low voltage conductors up to 1000	1.0
Above 1000 up to and including 33,000	1.2
Above 33,000 up to and including 66,000	1.4
Above 66,000 up to and including 132,000	1.8
Above 132,000 up to and including 220,000	2.4
330,000	3.7
500,000	4.6
Nominal pole to earth d.c. voltage (volts)	**Approach distance (m)**
Up to +/- 1,500	1.0

Note: Special approach distances apply for scaffolding work (Chapter 6) and work near low voltage overhead service lines (Chapter 8).

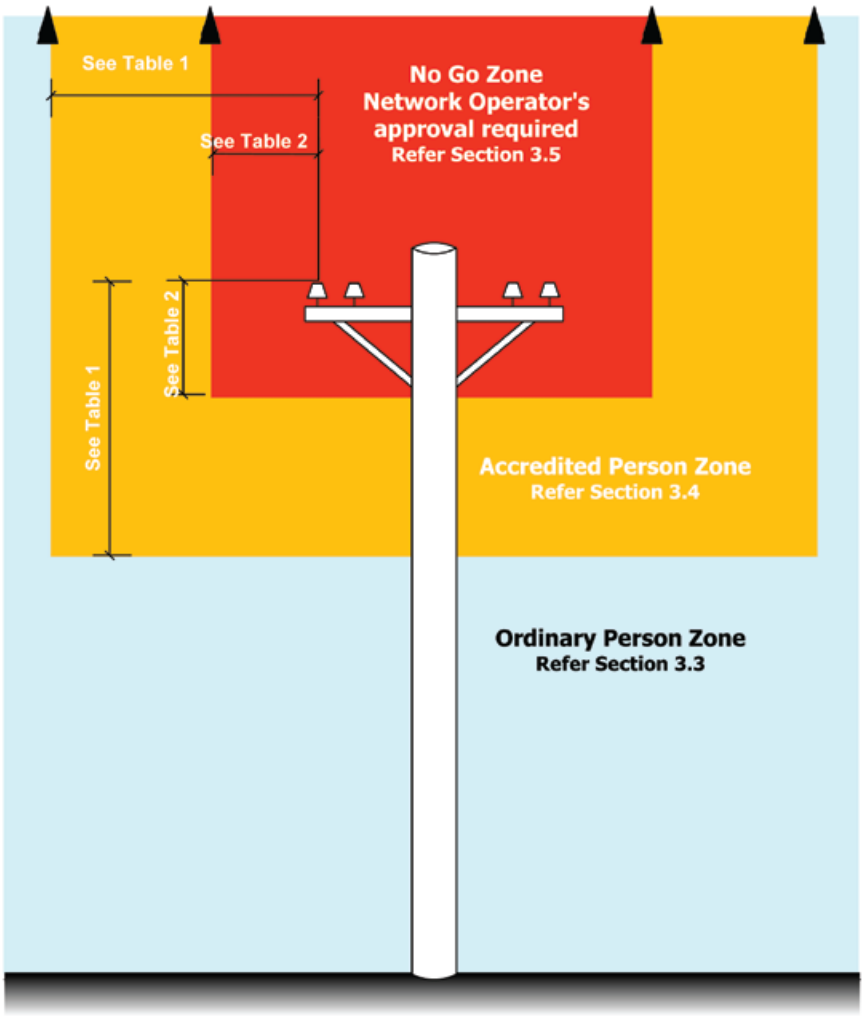


Figure 3 – Approach distances and work zones near overhead power lines

3.5 Work inside the No Go Zone – Approval of the network operator

The no go zone is the area around overhead power lines into which no part of a person or material or cranes or vehicles or items of mobile plant may encroach without the approval of the network operator.

Note:

- person includes hand tools, equipment or any other material held by a person.
- plant includes the load, controlling ropes and any other accessories associated with the plant.

If the work cannot be carried out without coming inside the no-go zone (closer than the approach distances listed in Table 2 or above the overhead power lines), prior to commencing work the employer must consult with and obtain the written approval of the network operator.

Note: The written approval should be available at the worksite and be able to be produced to a WorkCover Inspector, Principal Contractor, elected OHS representative, authorised representative or network operator.

3.6 Approach Distances for Vehicles

Table 3 provides approach distances for vehicles, mobile plant stowed for transit or with a design envelope up to an including 4.6 metres in height, which are driven by or operated by persons under overhead power lines.

When assessing the approach distance for a vehicle driven under overhead power lines a number of factors should be taken into account including:

- the approach distances specified in Table 3 are based on the fact that the design or transit envelope of the vehicle does not allow any part of the vehicle to come closer than the approach distances specified. This includes the load, exhaust pipe and attachments such as rotating/flashing lights or radio aerials. Refer to Figure 5 below.

Figure 5: Transit envelope – The maximum overall height of the vehicle

- where a work activity involves a person working from, standing on or walking across the top of a vehicle the relevant approach distance specified in either Table 1 or Table 2 must be maintained. This may include for example the driver of a livestock transporter who may need to access the top of the vehicle to check livestock.
- where, as a result of the work being performed the distance between the conductors and the ground may decrease (for example when constructing a road or levee bank beneath overhead power lines or where the ground level is raised during the work), then the distance between the vehicle must be continually re-assessed to ensure that the relevant approach distances are being maintained.
- any additional assessment factors that may be relevant for the operation of the vehicle as described in section 3.2.1.

TABLE 3

Approach Distances for Vehicles

Nominal phase to phase a.c. voltage (volts)	**Approach distance (m)**
Low voltage conductors up to 1000	0.6
Above LV, up to and including 33,000	0.9
Above 33,000 up to and including 132,000	2.1
Above 132,000 up to and including 220,000	2.9
330,000	3.4
500,000	4.4
Nominal pole to earth d.c. voltage (volts)	**Approach distance (m)**
Up to and including +/- 1500 Volts	0.9

3.7 Work near overhead power lines – General risk management principles

The approach distances set out in this Chapter are only part of an overall safe system of work, which must be implemented by employers and self-employed persons working near overhead power lines and associated electrical apparatus. In implementing a safe system of work consideration should be given to the following risk control measures:

- The employer has in place an effective risk management process, as part of a systematic occupational health and safety management system.
- Appropriate workplace hazard identification and written risk assessments are carried out as required by the OHS Regulation in consultation with the workers performing the work.
- Consultation with the network operator regarding the proposed work and compliance with any conditions imposed by the network operator for the work.
- The approach distances used are appropriate for the levels of accreditation of the workers performing the work. Refer to Sections 3.3 and 3.4
- Operators and other workers are provided with information and instruction about the safety precautions needed and the requirements of this code, as well as appropriate training, supervision and safe work practices and procedures.
- An essential requirement of a safe system of work is that workers are competent to carry out the work concerned. This code specifies the competency requirements (in respect of overhead power line electrical safety awareness) for crane and mobile plant operators and safety observers. Refer to Sections 3.8 and 3.9.
- An effective communication system is in place for the personnel performing the work.
- An effective process is in place to monitor compliance with the adopted risk control measures, safe work practices and procedures for work carried out near overhead power lines and associated electrical apparatus.

3.8 Competence and knowledge of this code

In order to carry out work at distances less than the approach distances specified in Table 1 the following workers must be accredited in accordance with Section 3.9 of this code,

- the operator of a crane,
- the operator of mobile plant (including an elevating work platform),
- a safety observer.

3.8.1 Training and Competence – Accredited Person

Accredited persons such as operators of cranes, mobile plant and elevating work platforms who carry out work closer than the approach distances specified in Table 1 and safety observers who observe the work must have successfully completed an appropriate training course (eg Crane and Plant Electrical Safety Course) relating to work near overhead power lines that has been conducted by a registered training organisation. Refer to Appendix 4 of this code for a training course framework, which is recognised by WorkCover NSW and network operators.

Note: 'Successful completion' includes a satisfactory competency assessment.

The registered training organisation, which provides the training and competency assessment required by this code must provide the person concerned with a statement of attainment or written certification of his/her successful completion of assessment, that has an identifying number particular to that person.

Employers should maintain appropriate training and assessment records for 'accredited persons' and other employees who carry out work near overhead power lines.

3.8.2 Maintenance of competency

The employer of accredited persons must ensure that those persons are either re-assessed or re-trained annually to ensure their on-going competency to perform activities associated with work near overhead power lines.

Re-assessment or re-training must cover as a minimum the knowledge and skills necessary to ensure safe work practices near overhead power lines, approved resuscitation procedures and emergency procedures to be followed in the event of an accident.

Following re-assessment, persons who have failed to maintain competency through the regular on the job application of learnt skills and knowledge must undertake refresher training and competency assessment.

3.9 Safety Observer – General requirements

The safety observer is a person specifically assigned the duty of observing the work near live overhead power lines and associated electrical apparatus in order to –

- warn personnel or the crane or plant operator so as to ensure the approach distances are being maintained, and
- warn of any other unsafe conditions.

The safety observer must –

- be used whenever the work activity is likely to be performed in the Accredited Person Zone.

Note: Where a written risk assessment determines it necessary, the use of a safety observer should also be considered for work outside but up to the Accredited Person Zone.

- be positioned at a suitable location to effectively observe both the overhead power lines and plant;
- be able to immediately and effectively communicate with the operator of the crane or mobile plant, or other personnel if required;
- ensure that all personnel stay outside the specified approach distance (unless performing a rescue in accordance with approved procedures or carrying out a specific task that is described in the safe work method statement eg a crane dogman holding a non-conductive tag line attached to a load suspended from a mobile crane);
- not carry out any other work while acting as a safety observer, which includes the passing of tools, equipment or materials directly to the personnel performing the work;
- not observe more than one work activity at a time; and
- continue to monitor the work activity being carried out and have the authority to suspend the work at any time.

CHAPTER 4 – OPERATING CRANES AND MOBILE PLANT NEAR OVERHEAD POWER LINES

4.1 Scope

In addition to the general requirements described in Chapter 3, this chapter details any variations applicable where a person operates a crane or an item of mobile plant near overhead power lines, including, but not limited to the following items of mobile plant:

- cranes (including mobile cranes and vehicle loading cranes);
- concrete placing booms;
- elevating work platforms (EWPs);
- mobile plant (including truck operators engaged in tipping loads, restraining loads or other associated work);
- load shifting equipment (including forklifts).
- excavation and earthmoving equipment
- high load transportation vehicles

However, the application of this Chapter is not limited to any particular type or class of mobile plant or equipment.

Note: This chapter is not intended to cover cranes and mobile plant when they are retracted and correctly stowed when travelling on a public road or where the design envelope of the crane or item of mobile plant is less than 4.6 metres in height.

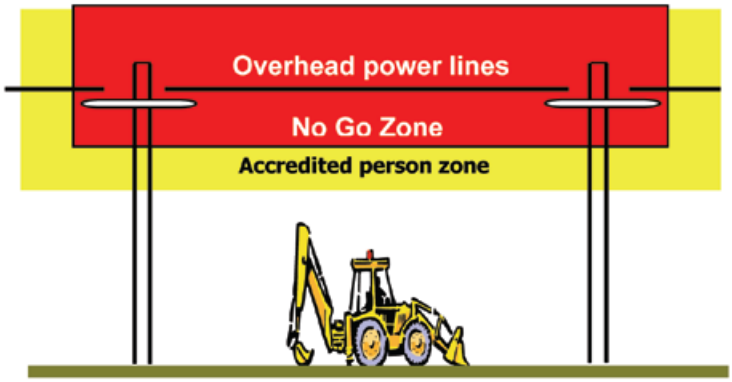
WARNING

For the operation of cranes, mobile plant and other types of load shifting equipment the approach distances specified in this code of practice are greater than those described in the National Certificate of Competency – Assessment Instruments. Where any discrepancy exists between the National Assessment Instruments and this code, the code shall prevail.

4.2 Hazard identification

Before operating a crane or item of mobile plant, the operator or other person in control of the work must take reasonable care to inspect the workplace to identify potential hazards, including any live overhead power lines or other associated electrical apparatus in the vicinity of the workplace.

All overhead power lines should be treated as live unless the operator of the crane or mobile plant has received an access authority or other form of written documentation from the network operator.



Mobile plant including cranes, excavators, EWPs, earth moving machinery, tipper trucks and concrete placing booms whose design envelope is within the approach distances specified in Table 1 must be controlled by safe systems of work as described in this chapter.

Figure 6: Cranes and mobile plant working near overhead power lines

4.3 Risk assessment

Risk assessment involves looking at the:

- likelihood (which is a combination of length of time and frequency of exposure); and the
- likely severity, of any injury or illness that may occur.

If you have identified a hazard involving overhead power lines where it is foreseeable that the work activity, crane or item of mobile plant will be required to or might inadvertently encroach on the approach distances specified for ordinary persons set out in Table 1, a written risk assessment must be completed which considers the following factors:

- consulting the network operator regarding the proposed work;
- can the electricity supply be de-energised?
- the location and voltage of the overhead power lines;
- the number of people involved and their individual needs;
- the nature of work undertaken;
- the nature, size and shape of the load to be moved, eg dimensions, surface area and whether the load is conductive;
- the setting up and packing up processes;
- the safe work practices and procedures in use;
- the type of crane, mobile plant, machinery and equipment to be used and its design envelope;
- site conditions, stability of crane or mobile plant and suspended loads;
- the potential for inadvertent movement of the crane or mobile plant, the load, persons and electrical equipment in the area;
- the qualifications, competency, skill and experience of people doing the work;
- vehicular traffic, pedestrians, or livestock that could interfere with the work;
- prevailing or unexpected wind strength and direction and weather conditions;
- foreseeable abnormal conditions that may exist at the worksite.

Having assessed the risks, action must now be taken to ensure that the risks are eliminated or controlled. Employers need to ensure adequate supervision of workers to make sure that control measures are applied.

Listed below in section 4.4 are steps to consider. Every workplace is different, so select the controls that are the right ones for you.

4.4 Control measures for cranes and mobile plant operating near overhead power lines

The highest practical level of control should be used. This does not preclude the additional use of appropriate lower level controls. In determining the control measures appropriate for a particular task consideration must be given to the terrain and ground conditions, weather conditions, lighting, and other work in the vicinity as well as the nature of the actual task to be carried out.

4.4.1 Elimination

Eliminate the risk of electrocution, electric shock or burns by arranging for the network operator to isolate the electricity supply for the duration of the work. Consideration may also be given, following consultation and agreement of the network operator, to re-route the overhead power lines away from the crane or mobile plant or replace existing overhead powerlines with underground cables.

WARNING

Even if it is believed that the supply has been isolated, it must be assumed that all conductors and components are live until an access authority or other form of written documentation has been received from the network operator.

The employer, self-employed person or operator of the crane or mobile plant should:

(a) discuss options for de-energising or re-routing the electricity supply with the network operator or in the case of work involving private overhead power lines, the person in control of the premises;

(b) consider working at another time when the electricity supply can be isolated; and

(c) investigate whether the section of the overhead power lines that needs to be de-energised can be isolated, while leaving the remainder connected.

4.4.2 Separation

If the risk cannot be eliminated, then separate the hazard from the crane or mobile plant and the personnel by:

(a) using an alternative crane or mobile plant which cannot encroach on the approach distances;

(b) limiting the hoisting, slewing or other movements of the crane or mobile plant such as:

- mechanical stops or interlocking of the motion of the crane or mobile plant to prevent it from being moved by power within the approach distance;
- mechanical constraints on the jib, boom, or other part of the crane or mobile plant likely to contact live overhead power lines or associated electrical apparatus as a result of surge or backlash;
- using cranes or mobile plant fitted with programmable zone limiting devices.

(c) setting up the crane or mobile plant in a position that keeps the design envelope outside the approach distance.

Note: Consideration should be given to any loads suspended by the crane or mobile plant or when being moved by load shifting equipment.

(d) minimising unexpected movement of the crane or mobile plant through:

- additional outriggers, supports or packing to increase the stability of the crane or mobile plant;
- preparation of the ground or surface, or adjustment or servicing of the crane or mobile plant, to minimise surge or backlash;

Increased clearances must also be allowed where there is a reasonable possibility the load or lifting gear (crane hook, chains, slings, etc) moving or swinging towards the overhead power lines or associated electrical apparatus when the crane or item of mobile plant is operated.

(e) providing marking barriers to define areas that the crane or mobile plant should not enter such as by:

- using rigid or tape barriers to mark off areas under overhead power lines;
- arranging for the network operator to mark the limit of the approach distance with high visibility 'bunting' or similar. Refer to Figure 7 below.

Figure 7: Illustration of a visual tape bunting fitted under overhead power lines.

(f) providing electrical separation between the people and hazard in accordance with the guidance outlined in Section 4.5 – Workers in contact with the crane, load or mobile plant.

4.4.3 Administrative controls

Support elimination and separation controls by taking the following precautions:

(a) managing and supervising the work to ensure that:

- the work is done very carefully and in an un-hurried, considered manner (haste can be dangerous);
- the employer's safe work method statements are rigorously followed;
- the appropriate persons involved in the work are accredited in accordance with the requirements of Section 3.8 of this code.

(b) making the hazard visible by arranging for the network operator to effectively identify exposed live low voltage conductors (up to an including 1000 volts) by using approved visual indicators such as sheeting or sleeves eg 'tiger tails'. In this situation the 'tiger tails' should extend a minimum distance of 5 metres beyond the extremities of where the crane or item of mobile plant will be operating. A competent person should visually inspect the tiger tails each day prior to commencing the crane, or mobile plant operations. If they have moved or been damaged the network operator should be contacted to ensure the tiger tails are replaced or located in the correct position. Refer to Section 9.1 of this code.

(c) planning for emergencies including:

- having fire-fighting equipment that is suitable for electrical fires at the site and readily accessible;
- having an appropriate first aid kit available at the worksite.

(d) ensuring that a safety observer is used whenever a crane, mobile plant or load is in motion and is likely to come closer than the approach distances listed in Table 1 and illustrated in Figure 3. The duties of the safety observer for work involving cranes and mobile plant is described in Section 3.9 of this code.

(e) considering the fitting of a warning device to the crane or mobile plant that alerts the operator when the crane or mobile plant has entered energised high voltage overhead power line zones. Warning: These devices are not a substitute for the proper management of safe work practices and procedures.

(f) using warning signs to indicate the location of overhead power lines and/or defined work areas. Refer to Figure 8 below.

Figure 8: Overhead power lines warning sign

4.5 Workers in contact with the crane, load or mobile plant

No-one may remain in contact with any part of a crane, load or mobile plant and the ground or other earthed situation while the crane or mobile plant is being operated closer than the approach distances listed for ordinary persons in Table 1 of this code, unless additional precautions are taken to prevent electric shock, as follows.

4.5.1 Operators

The operator may handle the controls of a crane or item of mobile plant while standing on the ground or while in an earthed situation only if -

- the controls are effectively insulated (consultation with the network operator will be necessary to verify effective insulation); or
- are wireless remote control; or
- the operator wears low voltage insulating gloves – provided that the live electrical apparatus is low voltage; or
- for low voltage, the operator stands on a rubber insulating mat 900mm x 900mm x 6 mm thick that is clean and dry; or
- the operator stands on an 'equipotential conductive mat' which is electrically connected to all metalwork associated with the controls.

4.5.2 Other workers

Other workers at the workplace may contact the crane, mobile plant or load while standing on the ground or while in an earthed situation only if one of the following control measures is observed -

- they wear low voltage insulating gloves – provided that the overhead power lines or electrical apparatus is low voltage; **or**
- effective insulation is provided on the overhead powerlines or electrical apparatus, or the crane, load or mobile plant or it's parts to ensure that even if it contacts the overhead powerlines or electrical apparatus, no–one would receive an electric shock; **or**
- control of the load by non-conductive tail ropes whenever uncontrolled motion could allow it to come within the approach distance (as long as the insulating properties of the rope are appropriate to the operating voltage), **or**
- they are positioning or removing lifting gear from a crane hook or the load while it is stationary; **or**
- they are adjusting outriggers, jacks, packing's, chocks or similar, as long as the crane, load or mobile plant is not being moved.

4.6 Competency requirements

In order to carry out crane and mobile plant operations closer than the approach distances specified in Table 1, the following personnel must be accredited as described in section 3.8 of this code,

- the operator of a crane,
- the operator of mobile plant (including an elevating work platform),
- a safety observer.

4.7 Safety observer for crane and mobile plant operations

A safety observer as described in Section 3.9 must be assigned the duty of observing the approach of a crane or mobile plant (and its load) to the live overhead power lines and associated electrical apparatus.

The safety observer must –

- be used whenever the crane, load, mobile plant or persons working from the plant are in motion and are likely to come closer than the approach distances specified in Table 1;

Note: Where a written risk assessment determines it necessary, the use of a safety observer should also be considered for work performed by ordinary persons working outside the approach distances specified in Table 1.

- be positioned at a suitable location to effectively observe both the overhead power lines and plant;
- be able to immediately and effectively communicate with the operator of the crane or mobile plant, or other personnel if required;
- ensure that all personnel stay outside the specified approach distance (unless performing a rescue in accordance with approved procedures or carrying out a specific task that is described in the safe work method statement eg a crane dogman holding a non-conductive tag line attached to a load suspended from a mobile crane);
- not carry out any other work while acting as a safety observer, which includes the passing of tools, equipment or materials directly to the personnel performing the work;
- not observe more than one crane or item of mobile plant at a time; and

- continue to monitor the work activity being carried out and have the authority to suspend the work at any time,

In addition to the above requirements, the safety observer must not be located on the workbasket of an elevating work platform while observing the work being undertaken from that workbasket.

A safety observer is not necessary in the following circumstances –

- for an item of stationary plant, once completely erected, if it is not located below the overhead power lines or electrical apparatus and is located horizontally outside the approach distances specified in Table 2;
- if an effective limiting device has been set to prevent any component of a crane, mobile plant or load coming closer than the approach distances in Table 2, as long as the limiting device is effective under stress conditions and is regularly inspected and tested by a competent person; or
- where, the design of the crane or mobile plant limits movement so that no part of the crane, mobile plant or load can come closer than the approach distances specified in Table 2.

4.8 Earthing systems for cranes and mobile plant

The chassis of a crane or item of mobile plant may, where practical, be earthed and bonded. A system of work must be adopted that ensures workers are kept clear of cranes and mobile plant when work is carried out near live overhead power lines and workers be advised of the effectiveness of the earthing system.

For specific advice and guidance about the earthing of a crane or item of mobile plant consult with the network operator.

4.9 Notices to be fixed to cranes and mobile plant

Cranes or items of mobile plant intended for use, or used, near live overhead power lines must be fitted with a warning notice or label, conforming to Appendix 1 of this code, listing the approach distances for ordinary persons as set out in Table 1.

The notice or label must be maintained in a legible condition and be displayed at each set of controls and must be readily visible to the operator.

Note: Where a crane or item of mobile plant is fitted with notices in accordance with the Interim Guide, the existing notices may be retained provided the plant is operated to the distances shown on the notice. Only columns described in the Table A notice for 'non-electrical work' or Table B for 'unqualified personnel' must be applied in relation to work under this code.

CHAPTER 5 – TREE AND VEGETATION MANAGEMENT NEAR OVERHEAD POWER LINES

5.1 Scope

In addition to the general requirements described in Chapter 3, this chapter details any variations applicable where a person works on trees such as, cutting, trimming, treating with chemicals or other processes, trees and other foliage near live overhead power lines where:

- a person or something the person is holding or is in contact with or could come closer than the relevant approach distance specified in either Table 1 or Table 2 of this code or;
- the work creates risk of damage to overhead power lines or electrical apparatus.

Tree and vegetation management carried out by or for network operators is excluded from this section as it is covered by the requirements of the *Electricity Supply (Safety and Network Management) Regulation 2002*.

5.2 Hazard identification and risk assessment

When carrying out the work, live overhead power lines are a potential hazard posing substantial risk of death or serious injury.

During tree and vegetation management electrical hazards can be encountered through a variety of circumstances. These include but are not limited to:

- branches or other vegetation falling onto power lines during trimming operations
- tools such as power saws or power trimmers coming into direct contact with power lines or other associated electrical apparatus
- mobile plant, for example an elevating work platform (EWP), coming into contact with overhead power lines or other associated electrical apparatus
- power lines becoming broken and falling on the ground, footpath or road
- wind blowing branches or limbs against overhead power lines
- high winds resulting in the loss of control while lowering materials
- unexpected movement of the worker, mobile plant or the vegetation relative to the worker.

If a hazard involving tree management work near overhead power lines has been identified, a written risk assessment must be undertaken by the employer to determine the risk to persons encroaching within the relevant approach distances. This step will help determine the level of risk associated with the identified hazards and establish a priority list based on the level of risk.

5.3 Eliminating or controlling risks – General risk factors

The risks associated with electrical hazards arise from coming near live conductors. The best means of eliminating the risks is to prevent people, their plant and equipment, as well as any materials from coming close enough to live conductors for direct contact or flash over to occur.

Care needs to be taken in planning the work to identify the ways in which people may be exposed to electrical hazards when the work is undertaken and determine the most effective means to ensure the approach distances are maintained from the live overhead power lines.

In addition to ensuring that the work near overhead powerlines is avoided, other factors should be considered:

- always assume an overhead power line or associated electrical apparatus to be energised or 'live' unless an access authority or other written documentation is received from the network operator.
- if a telecommunication cable is encountered, never assume that the operating voltage is harmless.
- a tree or branch of a tree can conduct electricity even in dry conditions. Never assume that a tree branch can safely rest on or against overhead power lines. If the tree or branch has the potential during the felling or cutting process to come closer than the approach distances specified in Table 1 the overhead power lines should be de-energised.
- trees that have grown into contact with live overhead power lines must not be cut by a person who is in an earthed situation (such as a standing on the ground or working from within the tree) unless a safe system of work is used that meets the requirements of the network operator.
- plant that comes near an overhead power line may become energised and pose a serious danger to the operator and any bystanders. Ensure that when operating plant (ie any machines (including chain saws), tools or equipment) near live overhead powerlines that the relevant approach distances are maintained. Operations should cease where trees or persons are in danger of coming closer than the relevant approach distances.
- manage traffic and pedestrians at the worksite to ensure approach distances are maintained and that members of the public are kept at a safe distance. If the work near overhead power lines requires a change in traffic direction or vehicle speed limits, full traffic control is required in accordance with the Roads and Traffic Authority's requirements.
- assess the weather conditions, including electrical storms, significant rain or excessive wind velocities that could impact on the proposed work.

5.4 Requirements for Ordinary Persons carrying out tree and vegetation management

An ordinary person must not:

- climb a tree closer than 3 metres to live overhead power lines, or cut any branch that may come closer than 3 metres to live overhead power lines as a result of the work, or
- allow any part of their body or anything they are holding or that is attached to their body, or anything they are using, to come closer than the approach distances specified in Table 1 of this code when carrying out the work near live overhead power lines.

Ensure the work is not carried out above overhead power lines or where any part of the tree or vegetation could fall or otherwise be carried closer than the approach distances specified in Table 1.

If there is a reasonable possibility of the work being carried out above overhead power lines or coming closer than the approach distances specified in Table 1 the work must be carried out by accredited persons who have been trained and have current competency to carry out 'tree and vegetation management' near live overhead power lines. See Section 5.5 of this code.

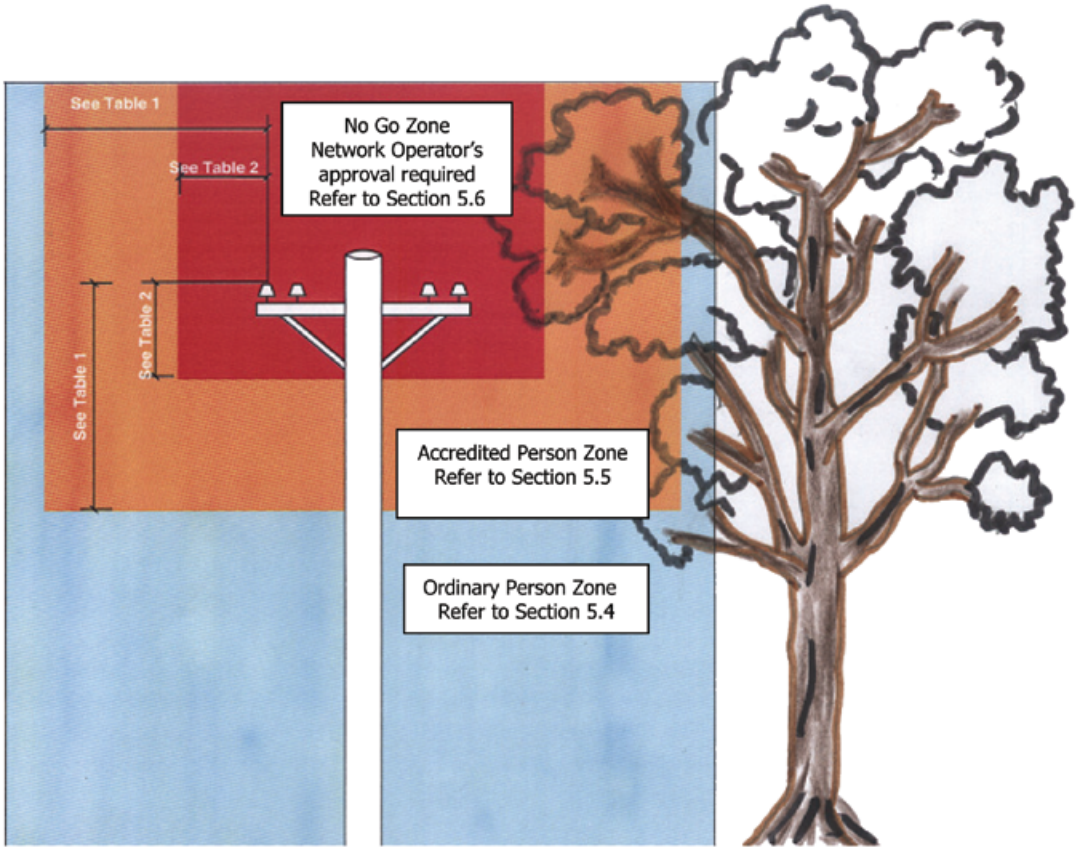


Figure 9 – Work zones for tree management near overhead power lines

5.5 Requirements for Accredited Persons carrying out tree and vegetation management

Accredited persons who have current competency to carry out 'tree and vegetation management' near live overhead power lines may carry out the work in accordance with the approach distances specified in Table 2 of this code provided the following requirements are observed,

- a written risk assessment is completed for the work and a safe system of work is implemented, which includes a safety observer, and
- if determined by the written risk assessment, consultation with the network operator regarding the proposed work and compliance with any conditions imposed by the network operator for the work.

Note: Training and assessment requirements for accredited persons, which include safety observers are described in Sections 3.8 and 3.9 of this code.

5.6 Tree management inside the No Go Zone – Approval of the network operator

The no go zone is the area around overhead power lines into which no part of a person or material or cranes or vehicles or items of mobile plant may encroach without the written approval of the network operator.

- person includes hand tools, equipment or any other material held by a person.
- plant includes the load, controlling ropes and any other accessories associated with the plant.

Work required on tree and vegetation that is inside the no-go zone (closer to live overhead power lines than the approach distances specified in Table 2 of this code) must only be performed by authorised persons approved by the network operator.

5.7 Trees or branches contacting live overhead power lines

While it is not permitted to work on trees where they (or their branches) may fall on overhead power lines, it is important to know what action to take if a branch or tree comes into contact with a live overhead power line, whether through pruning, wind, storm or other damage.

When this situation arises, *do not touch any part of the branch or tree*. If any part of a branch is touching live power lines, the entire branch may be 'live', including the leaves. Contact with any part of it may result in electric shock, burns or electrocution.

Immediately contact the network operator and keep all persons clear of the area while waiting for assistance.

Other aspects of tree and vegetation management safe work practices and procedures can be found in the *Code of Practice – Amenity Tree Industry.*

CHAPTER 6 – WORK INVOLVING SCAFFOLDING NEAR OVERHEAD POWER LINES

6.1 Scope

In addition to the general requirements described in Chapter 3, this chapter details any variations applicable where the work involves the erection, dismantling and use of fixed scaffolding near overhead power lines and associated electrical apparatus with an operating voltage up to and including 33 kV a.c. For scaffolding work above this voltage the network operator must be consulted and any special conditions imposed by the network operator complied with.

The guidance provided in this Chapter should be read in conjunction with AS/NZS 4576 – Guidelines for Scaffolding, which is an approved industry code of practice. In the Standard a 4 metre approach distance is provided for metallic scaffolding used near overhead power lines. This approach distance is used as a reference point for persons planning and undertaking scaffolding work as described in this Chapter.

For work involving the use of mobile aluminium scaffolding refer to the risk control measures for mobile plant that are described in Chapter 4 of this code.

6.2 Hazard identification

Before undertaking any scaffolding work where the work might come closer than the 4 metre approach distance specified in AS/NZS 4576 – Guidelines for Scaffolding, an inspection must be carried out at the worksite and reasonable care taken to identify any potential hazards.

Hazards may include:

- live overhead power lines and associated electrical apparatus;
- deteriorated or broken down insulation on the conductors or electrical apparatus;
- scaffolding coming into contact with overhead power lines; and
- possibility of hand held tools, equipment or materials coming into contact with overhead power lines.

6.3 Risk assessment

If a hazard involving overhead power lines has been identified, a written risk assessment must be undertaken by the employer to determine the risk to persons encroaching within the 4 metre approach distance. This step will help determine the level of risk associated with the identified hazards and establish a priority list based on the level of risk. If the scaffolding work is above 3 metres in height it must also be supported by a safe work method statement for the work. Refer to Appendices 2 and 3 of this code.

The following factors may be included in the risk assessment:

- the type of work activities being undertaken, tools, equipment, scaffolding and materials being used;
- proximity of the work activity or scaffolding to the overhead power lines;
- environmental conditions, such as rain, wind or uneven terrain, which may be bring a risk of unexpected movement of tools, equipment, scaffolding or material held by workers.

6.4 Eliminating or controlling risks – general risk factors

Once the hazards associated with scaffolding work near the overhead power lines have been identified and assessed, then control measures must be implemented to eliminate the risk. If it is not practicable to do so, the risks associated with the hazard must then be controlled.

The use of specific control measures to eliminate or control identified risks should be done on the basis of the risk assessment. In particular, consider the following:

1. Eliminating the hazard. This could involve de-energising the overhead power lines during the work. Consideration may also be given, following consultation and agreement of the network operator, to re-route the overhead power lines away from the scaffolding or replace existing overhead powerlines with underground cables.
2. Separating the hazard. This could mean erecting a physical barrier on the scaffold to prevent a person or anything held by a person, or attached to the person, encroaching with the 4 metre approach distance.
3. Minimising the risk by engineering means. This could mean substituting the scaffold with another means of access and egress, such as an elevated work platform or using an insulated fibreglass extension handle on a paint roller, instead of a conductive aluminium extension handle.
4. Introduce administrative controls. This may include planning and where relevant documenting the safe work method statements before starting work or using a safety observer to warn people before they encroach within the 4 metre approach distance. The duties of a safety observer are outlined in Section 3.9 of this code. Making the hazard visible by arranging for the network operator to effectively identify exposed live low voltage conductors (up to an including 1000 volts a.c.) by using approved visual indicators eg 'tiger tails'. Refer Section 9.1 of this code.
5. Use appropriate personal protective equipment. This includes the use of electrically tested insulating gloves by anyone who may be at risk of coming closer than the 4 metre approach distance.

A combination of the above control measures is required to be taken to minimise the risk to the lowest level reasonably practicable if no single measure is sufficient for that purpose.

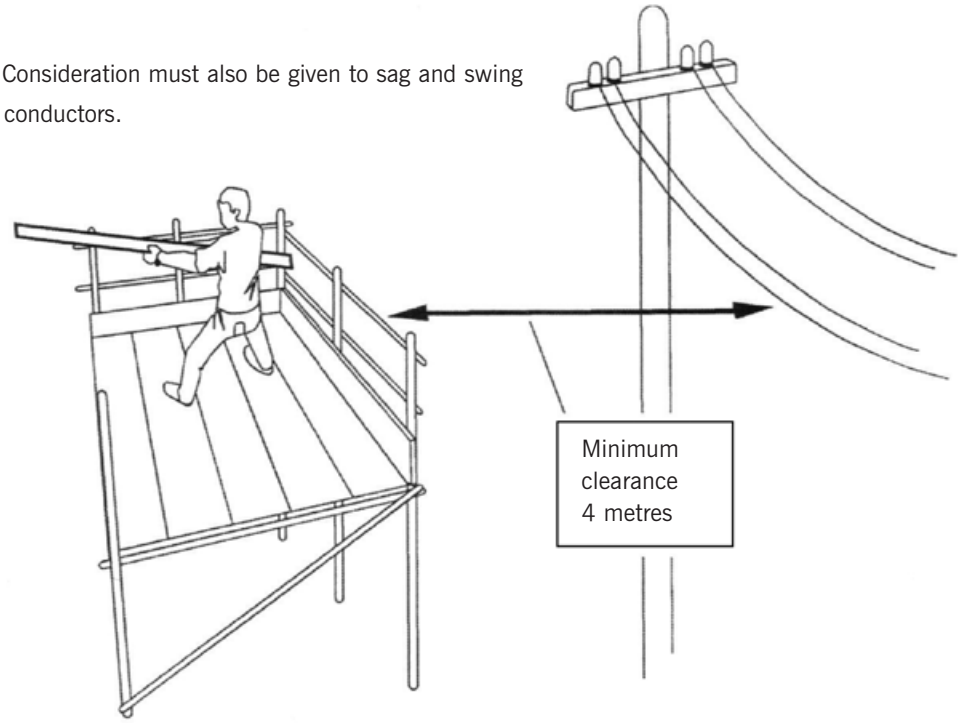
6.5 Control measures for the erection and dismantling of scaffolding near overhead power lines up to and including 33kV

(a) Ensure a thorough examination and assessment is undertaken of the surroundings prior to the erection or dismantling of the scaffold near overhead powerlines. No scaffold work should commence until the presence, location, type and operating voltage of all overhead power lines are determined by a competent person.

(b) Overhead powerlines should be de-energised and an access authority or other form of written documentation obtained from the network operator if the scaffold and the overhead powerlines is or has the potential to come within the 4 metre approach distance. Refer to Figure 10 below.

(c) If there is the risk that the 4 metre approach distance cannot be maintained, the network operator must be contacted and a written risk assessment and safe work method statement including safe systems of work developed for the activities associated with the erection, use and dismantling of the scaffolding.

Note: Consideration must also be given to sag and swing of the conductors.



Note: End protection omitted for clarity

Figure 10 – A 4 metre approach distance applies in any direction where metallic scaffold is erected, used or dismantled near overhead power lines.

(d) Where low voltage overhead powerlines (up to and including 1000 volts) cannot be de-energised and isolated, 'tiger tails' should be provided and installed by the network operator for the full length of the scaffolding plus a minimum distance beyond each end of the scaffolding of 5 metres. A competent person should visually inspect the tiger tails each day prior to commencing scaffolding operations. If the tiger tails have moved or been damaged the network operator must be contacted to ensure the tiger tails are replaced or located in the correct position.

Note: Tiger tails may be used to provide a useful visual indication to people working in the area of overhead power lines. They should not be regarded as providing protection against mechanical interference nor should they be regarded as providing electrical protection from electrical hazards. Refer to Section 9.1 of this code for further guidance.

(e) Electrical wires or apparatus that pass through a scaffold must be de-energised or fully enclosed to the requirements of the network operator. These requirements must incorporate full enclosure of the wires or electrical apparatus by a non-conductive material such as moisture resistant flooring – grade particle board, dry timber, dry plywood or similar dry non-conductive material as approved by the network operator. Refer to Section 6.6 and Figure 11.

(f) To prevent a person or anything held by a person, or attached to the person, coming closer than the 4 metre approach distance the network operator may require the erection of a hoarding on the external face of the scaffolding and, if applicable a suitable enclosure on the internal side of the scaffold. Refer to Section 6.6 and Figure 11.

Example of live low voltage overhead power lines passing through a scaffold that has been fully enclosed in a non-conductive material to the requirements of the network operator.

Figure 11 – Enclosure of overhead powerlines

6.6 Erected Scaffolding – Use of a hoarding and enclosure for reduced safety clearances

This section describes the requirements for the use of a hoarding and, if applicable, a suitable enclosure between an erected scaffolding and a live overhead power line when a non-conductive hoarding and enclosure is used to provide an impenetrable barrier to persons, tools, materials and equipment.

The A and B clearances shown in Figure 12 are horizontal safety clearances and vertical mechanical clearances from the conductors and will be advised by the network operator prior to the erection of the scaffolding near the overhead power lines.

The following installation conditions apply for the use of a hoarding and enclosure for reduced safety clearances,

- Gaps between fitted sheets of plywood must not exceed 3mm.
- No exposed cut or drilled holes are permitted in the sheets of plywood.
- Scaffolder is responsible for attaching plywood to the scaffold, and ensuring that the arrangement can sustain an appropriate wind load.
- Warning signs must be affixed to the safe side of the hoarding warning of the presence of the electrical hazard on the other side of the hoarding and warning that the hoarding must not be removed.
- A competent person should visually inspect the hoarding and, if applicable the enclosure on a daily basis to ensure the hoarding and enclosure are in a satisfactory condition and remain impenetrable.

Further guidance on the erection, dismantling and use of scaffolding can be found in the Australian Standard AS/NZS 4576 – Guidelines for Scaffolding.

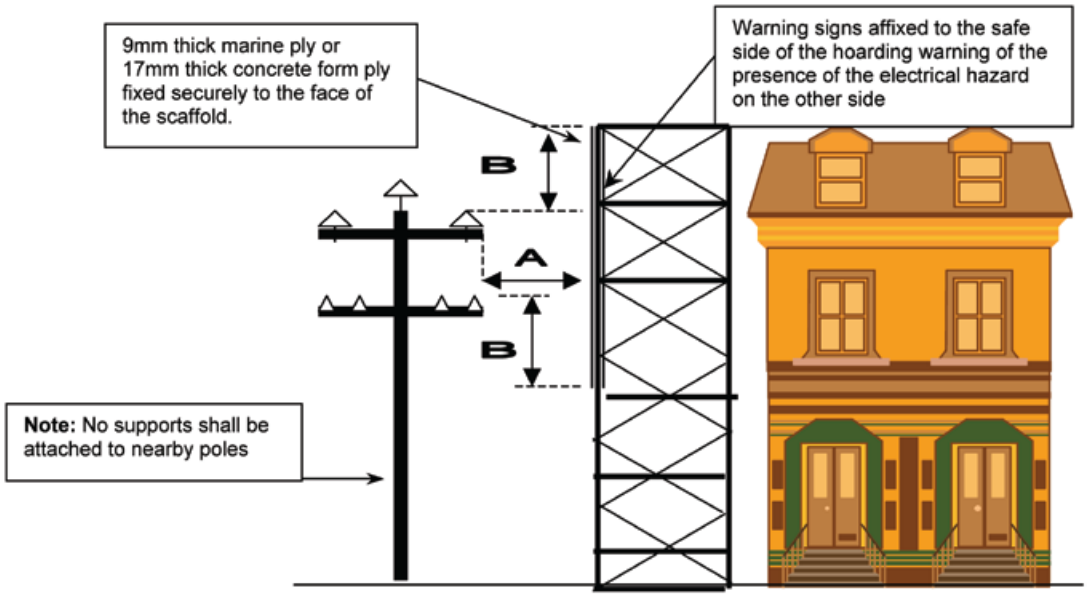


Figure 12 – Scaffolding with hoarding

CHAPTER 7 – AGRICULTURAL WORK NEAR OVERHEAD POWER LINES

7.1 Scope

In addition to the general requirements listed in Chapter 3, this chapter details any variations applicable where work is being conducted at rural workplaces where:

- the person or something the person is operating or holding could contact overhead power lines or come closer than the approach distances specified in Table 1 of this code or;
- the work creates risk of damage to overhead power lines or electrical apparatus.

Examples of such work include:

- the use of lifting or elevating plant or agricultural plant such as grain augers, hay bale elevators, cotton harvesting equipment, tipper and livestock transport trucks, travelling irrigators or harvesters under or near overhead power lines;
- handling irrigation pipes under or near overhead power lines;
- moving or relocating agricultural plant, such as folding cultivators, where the transit (stowed) height of the equipment is greater than its operating height;
- any other work that involves the risk of a person or anything attached to or held by a person, coming into contact with overhead power lines.

7.2 Hazard identification

Many people have been killed by electrocution when metal parts of agricultural plant (such as augers, field bins, harvesters or tip trucks) have come into contact with or close to live overhead power lines. Such accidents usually occur when the operator has not lowered the equipment before moving it or has raised the item of mobile plant upwards into the live overhead power lines. For example,

- working near and in the process may come into contact with machinery operating near overhead powerlines;
- driving machinery with tall attachments through paddocks where overhead powerlines exist; or
- operating or moving tipper trucks, mobile silos, field bins, harvesters or other large rural machinery (cotton harvesters, field irrigators) under or near live overhead power lines; or
- moving or re-arranging long metallic irrigation pipes.

Where work is carried out near live overhead power lines, the height and location of the power lines needs to be identified as part of an overall site hazard identification process. Contact should be made with the electricity network operator who can assist with this process.

Operators of agricultural plant and equipment also must be made aware of the design height and the transit (stowed) height of the mobile plant they operate.

7.3 Risk assessment

If a hazard involving overhead power lines has been identified, a written risk assessment must be undertaken to determine the risk of any part of the agricultural plant or equipment coming near or into contact with the overhead power lines. This step will help to determine the level of risk associated with the identified hazards and establish a priority list based on the level of risk.

The following factors may be relevant to the risk assessment:

- the type of work activities being undertaken or agricultural equipment being used;
- proximity of the work to the overhead power lines and the height of the overhead power lines;
- environmental conditions, such as rain, wind or uneven terrain, which may bring an increased risk;
- visibility of the overhead power lines and their supporting structures;
- location of overhead power lines supporting structures such as poles and towers in relation to the agricultural work to be performed;
- how often the work will need to be done near the overhead power lines;
- proximity of stationery or fixed plant and equipment to overhead power lines.

7.4 Control measures for agricultural work near overhead power lines

Once the hazards associated with agricultural work near overhead power lines have been identified and assessed then control measures must be implemented to eliminate the risk. If it is not practicable to do so, the risks associated with the hazard must then be controlled.

The use of specific control measures to eliminate or control identified risks should be done on the basis of the risk assessment. In particular, consider the following:

1. Eliminating the hazard. Identify the location of overhead power lines and relocate the plant and equipment, such as a mobile silo or tipper trucks away from the overhead power lines. Lower augers before transporting to eliminate the risk of contacting overhead power lines. Keep mobile irrigator sprayed water at least 8 metres away from overhead power lines. Consideration may also be given, following consultation and agreement of the network operator, to relocating the overhead power lines or having them run underground. In this case consult with the network operator.
2. Separating the hazard. This could mean erecting a physical barrier to prevent any part of the agricultural plant encroaching the approach distance specified in Table 1.
3. Minimising the risk by engineering means. This could mean substituting with a less hazardous material, process or equipment. This could mean, for example, filling a silo through a ground-level filler pipe on the silo rather than using a truck-mounted auger or limiting the height of all mobile plant in order to maintain safety clearances from overhead power lines.
4. Introduce administrative controls. These include:
    - planning and documenting a safe system of work before starting work;
    - developing work procedures and travel routes for equipment and vehicles that ensure workers, their equipment and containers such as field bins, stock and tipper trucks do operate near or under live overhead power lines;
    - using another worker (to act as an observer) to ensure the work activity does not come closer than the approach distances specified in Table 1

- installing warning signs on gates to paddocks or on roadways where overhead power lines exist, (Refer to Figure 13 below);

Figure 13 – Overhead power lines warning sign

- having markers installed on overhead powerlines to make them easier to see and locate.

5. Use appropriate personal protective equipment. This includes the use of rubber soled boots, gloves and safety helmets when agricultural plant or equipment is being operated near overhead power lines.

A combination of the above control measures is required to be taken to minimise the risk to the lowest level reasonably practicable if no single measure is sufficient for that purpose.

CHAPTER 8 – WORK NEAR LOW VOLTAGE OVERHEAD SERVICE LINES

8.1 Scope

In addition to the general requirements listed in Chapter 3, this chapter details any variations applicable where an ordinary person is required to carry out work near low voltage overhead service lines where the work involves:

- Minor building work such as painting; or
- Operation of motor vehicles (concrete trucks, furniture removal vans, etc); or
- Any other non-electrical work where there is a risk of contact with low voltage overhead service lines.

For the purposes of this code 'low voltage overhead service lines' covered by this chapter and illustrated in Figure 14 are:

- insulated low voltage aerial conductors and associated electrical apparatus that are connected from the point of supply (either the overhead power pole located on the street or the consumer's boundary) and terminated on the consumer's building, pole or structure at the point of attachment, or;
- insulated low voltage aerial consumers mains and associated electrical apparatus forming part of the consumer's electrical installation.

Note: For work involving cranes or mobile plant or work where any metal material is being handled (scaffolding, roofing materials and guttering) the risk control measures and increased approach distances described in other chapters of this code must be applied to the work.

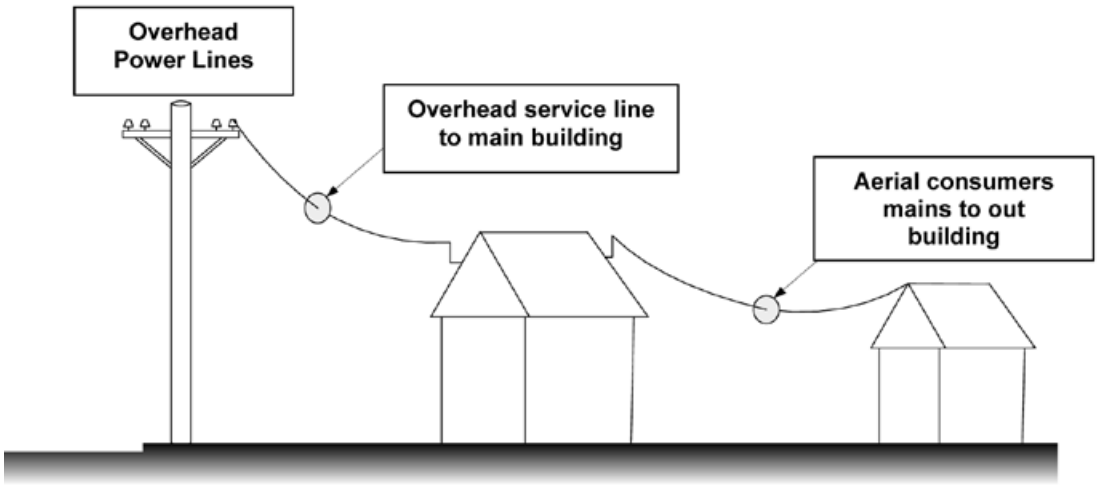


Figure 14 – Low Voltage Overhead Service Lines

8.2 Approach distances for work near low voltage overhead service lines

Table 4 provides approach distances for ordinary persons:

- performing minor building work near low voltage overhead service lines, (including hand tools held by a person); or
- operating cranes (and their loads) and items of mobile plant near low voltage overhead service lines; or
- handling metal materials near overhead service lines (such as scaffolding, roofing materials and guttering); or

- handling non-conductive materials near overhead service lines (such as timber, plywood, PVC pipes and guttering, etc); or
- driving or operating a vehicle under overhead service lines. **Note:** the approach distance specified in Table 4 is based on the fact that the design or transit envelope of the vehicle does not allow any part of the vehicle to come closer than the 0.6 metre approach distance specified.

TABLE 4

Approach distances for work near low voltage overhead service lines

Ordinary Persons (m)				
Hand held tools	**Operation of crane or mobile plant**	**Handling of metal materials (Scaffolding, roofing, guttering, pipes, etc)**	**Handling of non-conductive materials (Timber, plywood, PVC pipes and guttering, etc)**	**Driving or operating vehicle**
0.5	3.0	4.0	1.5	0.6

8.3 Work inside the relevant approach distances

If the work cannot be carried out without coming inside the relevant approach distance (ie closer than the approach distances listed in Table 4), prior to commencing work the employer or self-employed person must comply with the following requirements:

- identify the hazards,
- complete a written risk assessment for the proposed work,
- apply a safe system of work, and
- meet the requirements of the relevant network operator or in the case of overhead service lines forming part of the consumer's electrical installation, the controller of the premises.

8.4 Hazard identification

Before undertaking any work where the work might come closer than the specified approach distances an inspection of the worksite must be carried out and reasonable care taken to identify any potential hazards. Hazards associated with the low voltage overhead service lines may include:

- bare exposed live conductors;
- deteriorated or broken down insulation;
- damaged overhead service line mains connection box or damaged insulation around conductor clamps;
- deterioration of earthing of exposed conductive parts that are required to be earthed;
- voltage of the line is higher than the expected low voltage (240 / 415 volts a.c.); and
- possibility of hand held tools and equipment coming into contact with exposed live parts.

8.5 Risk assessment

If a hazard involving low voltage overhead service lines has been identified, a written risk assessment must be undertaken to determine the risk to persons encroaching within the specified approach distance for the work. This step will help determine the level of risk associated with the identified hazards and establish a priority list based on the level of risk.

The following factors may be relevant to the risk assessment:

- The type of work activities being undertaken, including how safe access and egress will be made to the work area;
- Tools or equipment being used, and the risk of mechanical damage to the low voltage overhead service lines if inadvertent contact is made with the conductors and electrical apparatus; Examples may include:
    - Handling a sheet of roofing material that inadvertently comes into contact with the service lines.
    - Use of cutting or grinding tools where the operator could loose control and come within the 0.5 metre approach distance.
- Proximity of the work to the low voltage overhead service lines;
- Environmental conditions, such as rain, wind or uneven terrain, which may bring a risk of unexpected movement of tools or equipment held by workers.

8.6 Control measures for work near low voltage overhead service lines

Once the hazards associated with work near low voltage overhead service lines have been identified and assessed then control measures must be implemented to eliminate the risk. If it is not practicable to do so, the risks associated with the hazard must then be controlled.

The use of specific control measures to eliminate or control identified risks should be done on the basis of the risk assessment. In particular, consider the following:

- Eliminating the hazard. This could involve de-energising the low voltage overhead service lines by arranging for the Network Operator or in the case of overhead service lines forming part of the consumer's electrical installation the controller of the premises to isolate the supply for the duration of the work or arranging for the re-routing of the low voltage overhead service lines away from the work area.
- Separating the hazard. If work has to be carried out in close proximity to the point of attachment and the power cannot be isolated, arrange for the Network Operator to fit insulated matting and 'tiger tails' at the point of attachment and over the overhead service lines before the work commences. Refer to Figure 15 below.

Figure 15 – Insulated matting and tiger tail fitted to overhead service line

- Minimising the risk by engineering means. This could mean substituting with a less hazardous material, process or equipment, for example, using an insulated fibreglass extension handle on a paint roller, instead of a conductive aluminium extension handle. Or carrying out sanding by hand near the point of attachment rather than using an electric disc sander.
- Introduce administrative controls such as planning and documenting the work procedures before starting work. Another administrative control could be using another worker (to act as an observer) to warn people before they encroach into the relevant approach distance.
- Use appropriate personal protective equipment. This includes the use of electrically tested insulating gloves by anyone who may be at risk of encroaching into the relevant approach distance.

A combination of the above control measures is required to be taken to minimise the risk to the lowest level reasonably practicable if no single measure is sufficient for that purpose.

CHAPTER 9 – ADDITIONAL CONSIDERATIONS FOR WORK NEAR OVERHEAD POWER LINES

9.1 Tiger tails

Tiger tails may be used to provide a useful visual indication to crane, mobile plant operators and other persons working in the area of live overhead power lines, however, they do not protect people from the risk of electrocution or electric shock.

Figure 16 – Tiger tails fitted to overhead power lines

They are **not** to be regarded as effective insulation against contact by cranes or items of mobile plant and are not to be relied upon for mechanical protection. They should not be regarded as providing protection from electrical hazards. As such, the approach distances specified in this code are to be adhered to.

Tiger tails must only be fitted to overhead power lines by an electrically qualified person who is authorised by the network operator.

A competent person should visually inspect tiger tails at the worksite on a regular basis and prior to commencing crane, scaffolding or mobile plant operations. If the tiger tails have moved or been damaged the network operator must be contacted to ensure the tiger tails are replaced or located in the correct position.

WARNING

Tiger tails do not provide protection from electrical hazards and must only be fitted to the overhead power lines by an electrically qualified person who is authorised by the network operator.

9.2 Notification of incidents

The OHS Act and the OHS Regulation require employers to notify certain classes of workplace incidents.

Whether you are an employer, self-employed person and/or occupier you are required by law to notify incidents to WorkCover NSW and/or your workers compensation insurer as soon as practicable after becoming aware of the incident.

An occupier (of premises/workplaces) is someone who, manages or has responsibility for a workplace or a particular operation at a workplace, even though they may not be the employer.

Depending on the type of incident you may need to notify WorkCover and/or your workers compensation insurer. Some incidents classified as 'serious incidents' must be notified to WorkCover immediately. These 'serious incidents' include, but are not limited to the following;

- An incident where there has been a fatality,
- An incident where there has been a serious injury, and
- An incident where there is an immediate threat to life but result in no injury or illness.

In addition to the above, the OHS Act and OHS Regulation requires that certain occurrences that occur at the work place are not to be disturbed for 36 hours, (unless performing a rescue or permission has been given by WorkCover).

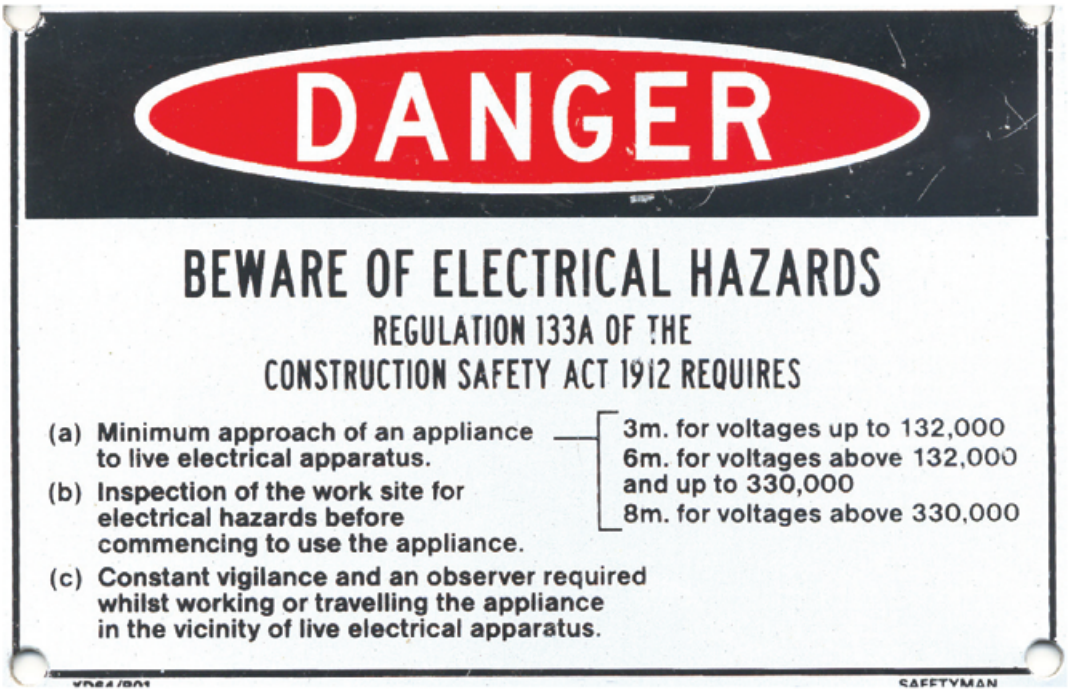
Working near overhead powerlines can be a high-risk activity and any contact with overhead power lines must be notified to WorkCover NSW and the relevant network operator in accordance with the requirements of the relevant legislation.

Serious incidents can be notified to WorkCover on **13 10 50** as an urgent investigation may be needed.

For more information regarding your legal obligations to notify incidents please refer to the OHS Act and OHS Regulation.

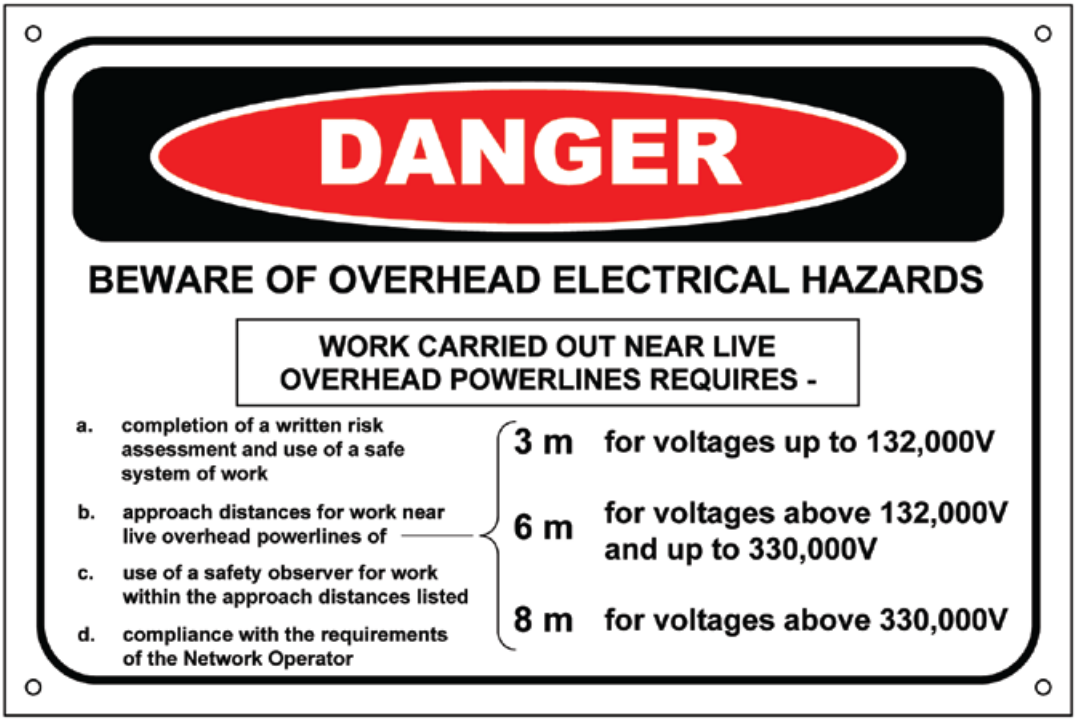
APPENDIX 1– WARNING NOTICE FOR OVERHEAD ELECTRICAL HAZARDS

(Dimensions 150 mm wide, 100 mm high, except if small plant item)



Notice that may remain fitted to cranes and mobile plant commissioned before 1 September 2001 (ie existing Notice as at the date of introduction of the OHS Regulation 2001)

Alternative Notice or Label for cranes and mobile plant commissioned after 1 September 2001



APPENDIX 2 – EXAMPLE OF A RISK ASSESSMENT CHECKLIST

Cranes and mobile plant working near overhead power lines risk assessment checklist

Worksite location:.....

Employer / Principal contractor:.....

Crane / Plant contractor:.....

Site Supervisor:.....

Network Operator:..... Contact phone:.....

This checklist is designed to help identify the hazards associated when operating cranes or mobile plant near overhead power lines that may encroach on the approach distances specified in Table 1 of this code. The checklist covers the main items described in Chapter 4 of this code. This checklist is not designed to cover all of the risks of working near overhead power lines and should be adapted as appropriate to meet the particular circumstances.

If you mark a NO box on the checklist, you need to take appropriate action to eliminate or control the hazard.

Section 1. PROJECT PLANNING AND INITIAL ASSESSMENT	**Yes**	**No**
Has the network operator been consulted regarding the proposed work?		
Do you know the height of the overhead power lines at the worksite?		
Is the voltage of the overhead power lines and associated electrical apparatus known?		
Can the overhead power lines be safely de-energised to allow work to proceed?		
Can the work be rescheduled to another time so that the overhead power lines can be de-energised?		
Has the network operator agreed to de-energise the overhead power lines and issued you with a documented clearance (access authority) so that work may proceed? Record N/A if not applicable.		
Have you ensured appropriate traffic management is in place at the worksite? Record N/A if not applicable.		
Have you assessed environmental conditions, including visibility and wind that could exist for the duration of the project that may adversely affect the work?		
Have you assessed the design and transit envelope of the crane or item of mobile plant being used for the proposed work in relation to the height of the overhead power lines at the worksite?		
Have you assessed the worksite where the crane or item of mobile plant is to be set-up, used and dismantled in relation to the location of overhead power lines?		
Additional planning and assessment factors:		

Section 2 – CONTROL MEASURES – OPERATING A CRANE OR ITEM OF MOBILE PLANT NEAR LIVE OVERHEAD POWER LINES	Yes	No
Have you completed a written risk assessment and identified all electrical hazards and non-electrical hazards, both actual and potential? All materials should be regarded as conductive unless you have definite knowledge to the contrary.		
Have you developed a safe system of work for the proposed work and determined the control measures required to eliminate or control the risks?		
Have you met the requirements of the network operator for the proposed work?		
Are workers trained, competent and confident in applying the particular procedures or techniques that are required for the task at hand?		
Do workers carrying out prescribed work tasks hold the relevant certificates of competency, eg crane operator, dogman, scaffolder, rigger, EWP operator?		
Have workers been authorised by the employer or person in control of the premises to work near live overhead power lines?		
Has a safe work method statement (SWMS) been completed for the task? Note: High-risk construction requires that an SWMS is completed for the work. Refer clause 209 of the OHS Regulation for further information.		
Is the work area clear of obstructions and is there a safe entry and exit?		
Are the necessary first aid and emergency facilities provided and accessible?		
Will an Accredited Safety Observer be present during the work task and assigned the duty of observing and warning against unsafe approach to overhead power lines?		
Additional control measures for the work:		

Section 3 – AFTER COMPLETING THE WORK	Yes	No
Have all workers been advised to treat the power lines as being live from this time?		
Has the network operator and all other relevant parties been advised that the work is completed?		
Additional measures following completion of work:		

_____ _____ ____ /____ /____

Checklist Completed By | Signature | (Date)

APPENDIX 3 – EXAMPLE SAFE WORK METHOD STATEMENT

Safe Work Method Statement (Part 1)		**Accepted:** Yes / No
Employer / Contractor: *Enter the name of the employer or contractor*		**Signed off:** *Enter the name of the person approving the SWMS*
Project: *Enter the name of project*		**Date:**
Job Description: *Enter the task to be undertaken*		
Procedure (in steps):	**Possible Hazards:**	**Safety Risks:**
1. *Write out the job step by step (Include all major phases of the work to be done)*	*Include all possible hazards. Some examples of hazards are: such as* • *Working near live overhead power lines* • *Falls from heights* • *Working near moving plant*	*High, Medium or Low*
2.		
3.		
4.		
5.		

Points to remember when writing out your work method statements:

- **Write out the job procedure step by step**
- **Put the main idea first**
- **Start each step with an action word. For example Isolate, erect**
- **Use active, not passive voice. For example check approach distance, erect ground barriers**
- **Keep sentences short and clear**
- **Choose words carefully**
- **Keep it simple**
- **Get somebody who does not know the job to read the work method statement to check if they understand the job.**

Control measures:

List all safety controls such as:

- *Access authority*
- *Safety Harness*
- *Mechanical Controls / PPE*
- *Safety Observer required*

Write all your work method statements after consulting the workers who are going to use them. You may then need to redraft them to include their suggestions. They may see a better and safer way of doing the job.

Note: The possible hazards, safety risks and control measures are placed side by side. This will make it easier for you to consider the possible hazards for each step and decide on the appropriate controls to over come each hazard.

Safe Work Method Statement (Part 2)

Project: *Enter name of project here*

Personal Qualifications and Experience	**Personnel, Duties and Responsibilities**	**Training required to complete proposed work**
Enter all the qualifications for everybody to undertake the tasks: *WorkCover Certificates, Training Certificates, Network Operator Certificates, experience in doing the tasks that may not require certificates.*		• *Safe electrical approach training*
Engineering Details / Certificates / Approvals	**Legislation / Codes of Practice / Standards**	
Enter details of certification that may be required to undertake tasks. Engineers Certificates for major lifts, plant usage eg EWP's.		
Plant / Equipment	**Maintenance Checks**	
List all major items of Plant and Equipment that will be used during the duration of the task. Eg: Mobile Crane, EWP, Vehicle loading crane, etc.		
Read and signed by all employees on site:		

Enter details of duties and responsibilities of Supervisors, Plant Operators and other employees. Enter such things as daily safety checks, weekly site inspections.

Detail here the training required by all personnel before the activity is commenced.

Enter here all Legislation, Codes of Practice and Standards that is relevant to the work to be undertaken. Refer to the requirements when completing the safe work method statements.

Detail here the system in place to ensure plant and equipment is serviced and maintained. Enter details of tagging for lifting equipment.

Safe Work Method Statement (Part 3) **Read and signed by all employees on site:**			
Project:	*Enter name of project here*		
Job Description:	*Enter the task to be undertaken*		**Revision No.:**
Name	**Company**	**Date Inducted**	**Signature**

APPENDIX 4 – MODEL TRAINING COURSE GUIDELINES – SAFE ELECTRICAL APPROACH TRAINING

Introduction

This model training course framework provides information for registered training organisations (RTO's) wanting to develop a competency assessed training course for non electrical persons wanting to acquire the necessary knowledge and skills of an 'Accredited Person' as described in this code.

The suggested minimum structured learning time for new students is approximately 12 hours, which includes a 2 hour assessment. The subject areas listed should be considered as the minimum course requirements; RTO's may wish to add additional topics as appropriate.

Persons successfully completing the training course are to be awarded a statement of attainment or certificate from the RTO that indicates the person's name and an identifying number particular to the holder of the qualification. The name and contact details of the RTO should also be displayed on the statement of attainment or certificate.

Unit 1 **Preparation to work safely near live overhead power lines as a non electrical worker**	Identification of the relevant legislative requirements including OHS Act 2000 and OHS Regulation 2001 including the Code of Practice – Work near overhead powerlines. Ordinary and Accredited Persons. Principles of electricity, 3 phase power system. Electric shock and resuscitation. Safe work practices and procedures. Identification and confirmation of the approach distances for safe work and access near live overhead power lines and associated electrical apparatus. Identification and implementation of safe systems of work including safe work method statements. Hazard identification, risk assessment and control options prioritised. Development of risk assessment documentation and safe work method statements. Permit systems and established supporting procedural systems. Responsibilities identified for the safety observer, crane and plant operator in accordance with requirements and established procedures /systems of work to ensure safety measures are followed in the event of an incident. Reporting and notification procedures for work closer than the approach distances identified in the Code of Practice – Work near overhead powerlines. Identification of electricity infrastructure for low voltage and high voltage overhead power lines. Relevant approach distances as defined in the Code of Practice – Work near overhead powerlines.

Unit 2 **Carry out the work safely near live overhead power lines as a non electrical worker**	Application of OHS principles and practices to reduce risk of incidents with overhead powerlines. Process for monitoring and reporting hazards and OHS risks to immediate authorised personnel for directions according to established procedures. Non routine events. Emergency procedures in the event of and responding to an incident. Working safely in accordance with instructions and established routines/ procedures.
Unit 3 **Complete the work safely near overhead power lines as non electrical worker**	Work schedules, requirements for returning work permit(s) and/or access authorisation permits. Process for reporting to authorised personnel incidents in accordance with established procedures. Work completion records, reports/data sheets for completed works.

Qualification and experience of the trainer:

Persons presenting the above training course should have relevant industry experience associated with the NSW Electricity Supply Industry and have as a minimum a 'Workplace Trainer and Assessor Certificate 1V 'and be conversant with all the relevant NSW Acts, Regulations, Codes and Industry Guides associated with work near live overhead power lines.

Overview of assessment:

Registered training organisations should ensure that assessment of the above training course be carried out in accordance with accepted industry and regulatory practice. Evidence for competence should be considered holistically and cover the essential knowledge and associated skills for work that is to be carried out safely near live overhead power lines by a non-electrical worker.

Trainees should be assessed across a representative range of contexts from the Units listed in the model training course including,

- Preparation to work safely near live overhead power lines
- Carry out the work safely near live overhead power lines
- Complete the work safely near live overhead power lines.

Further information on training and assessment for work that is to be carried out safely near live overhead power lines by a non-electrical worker can be found in the Australian National Training Authority document UETTDREL04A – Working safely near live electrical apparatus as a non electrical worker.

APPENDIX 5 – EMERGENCY PROCEDURE FOLLOWING CONTACT WITH LIVE OVERHEAD POWER LINES

Should contact be made with a live overhead power line or a flash-over occurs between a live overhead power line and a crane or an item of mobile plant, the following actions shall be taken:

- An attempt should be made to break the machinery's contact with the live overhead power line by moving the jib or driving the machine clear.
- If it is not possible to break the contact with the live overhead power line, the operator of the crane or mobile plant should remain inside the cabin of the crane or on the plant item. The network operator should be called immediately to isolate power to the live overhead power line. The operator must remain in place until the power has been isolated, and the 'all clear' given by the network operator.

WARNING

When a crane or item of plant inadvertently contacts overhead power lines circuit protective devices may operate to automatically turn the power off. However some protection devices are designed to automatically reclose thereby re-energising the powerlines after a short period of time, typically 1 – 4 seconds.

- If it is essential to leave the cabin or the operator's position due to fire or other life threatening reason, then jump clear of the equipment. Do not touch the equipment and the ground at the same time. When moving away from the equipment, the operator should hop or shuffle away from the plant item (with both feet together) until at least eight metres from the nearest part of the crane or plant. Under no circumstances run or walk from the crane or item of plant as voltage gradients passing through the ground may cause electricity to pass through the body resulting in an electric shock.
- Warn all other personnel and members of the public to keep 8 metres clear from the crane or item of plant. Do not touch or allow persons to touch any part of the crane or plant item and do not allow persons to approach or re-enter the vehicle until the network operator has determined the site safe. Remember electricity flows through the ground, so an electric shock could be received from walking close to the scene. If the crane or plant operator is immobilised, ensure the power supply has been isolated and the site made safe before giving assistance.
- Untrained, unequipped persons should not attempt to rescue a person receiving an electric shock. All too often secondary deaths occur because others get electrocuted trying to help earlier victims. If the crane or plant operator is immobilised, ensure the power supply has been isolated and the site has been made safe before giving assistance.

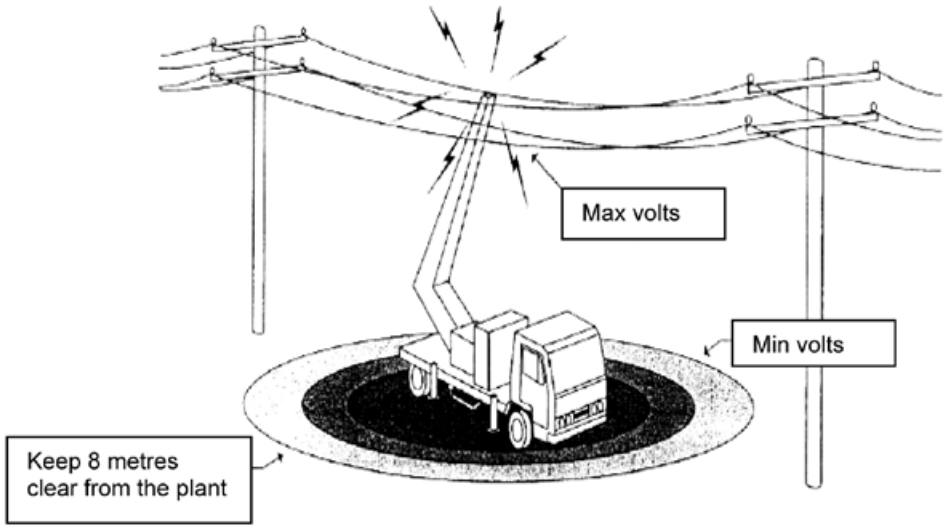


Figure 17: Affected area surrounding mobile plant when in contact with a live overhead power line

Post – incident inspection by a competent person

When a crane or item of mobile plant has been in contact with a live overhead power line, it should checked by a competent person for any damage to the components of the crane or mobile plant. Any actions recommended by the competent person are to be completed before the crane or mobile plant is returned to service.

Tyres on cranes and mobile plant that have been in contact with overhead power lines where electrical flash-over and current flow occurs through the rubber tyres should be considered as a potential hazard. These rubber tyres may catch fire, with the obvious potential for them to explode. Additionally, a lesser known danger may occur, which results when combustion takes place within the tyre, with no apparent external signs. When excessive heat is developed in or applied to a tyre as in the case from contact with overhead power lines, it can initiate a process known as pyrolysis, which is the decomposition of a substance by heat. This can generate a build up of flammable gases and pressure within the tyre, which may ultimately rupture or explode.

Vast amounts of energy can be released by a tyre explosion, often leading to significant equipment damage, serious injures or fatalities. Pyrolysis related explosions are very unpredictable, and have been known to occur immediately or up to 24 hours after initiation. An explosion can occur where no fire is visible and the danger area can be up to 300 metres from the tyre.

Any rubber tyred crane or plant item involved in an incident where contact is made with overhead power lines which results in discharges or flash-over of electrical current through the tyres should be considered as a potential hazard. If any personnel suspect there is a danger of a tyre explosion, as in the case of the mobile crane contacting overhead power lines, then the procedure should include:

- parking the crane in an isolation zone, with a minimum 300 metre radius,
- removing all personnel from the area, and not allowing access to isolation zone for 24 hours, and
- alerting fire fighting services

APPENDIX 6 – CASE STUDIES OF OVERHEAD POWER LINE INCIDENTS

CASE 1

Incident – Mobile Crane Operation

A mobile crane came into contact with 132,000 volt overhead power lines that were located adjacent to a worksite. At the time of the incident the crane driver had slewed the boom of the crane towards the overhead power lines, which resulted in the lifting chains swinging outwards, making contact with the power line.

Luckily no persons were injured, however the crane sustained extensive damage to the tyres, lifting rope and electrical system on the crane.

Contributing factors and relevant sections

Failure to:

- maintain relevant approach distance to the power lines and take outcome of the possibility of the lifting chains swinging towards the overhead power lines when the crane was operated. – Section 3.3
- carry out an adequate risk assessment of the worksite – Section 4.3
- implement appropriate control measures for the work – Section 4.4
- use a safety observer to observe the crane operations near the power lines – Section 4.7

CASE 2

Incident – Scaffolding Work

A worker died and three apprentice roof plumbers were injured when attempting to move an 8.9 metre high aluminium scaffold at a construction site. At the time of the incident the workers were moving the mobile scaffold over soft sand when the castor wheels located at the base of the scaffold sunk into the sand causing it to fall and make contact with 33,000 volt overhead power lines that were located adjacent to the construction site.

As a result of this incident the construction firm and roofing contractor were fined a total of $224,000 by the NSW Industrial Relations Commission.

Contributing factors and relevant sections

Failure to:

- carry out an adequate risk assessment of the worksite that took account of the ground conditions at the worksite – Section 4.3
- implement appropriate control measures for the work – Section 4.4.

CASE 3

Incident – Work on a rural property

The victim, a 17 year old rural worker, received a fatal electric shock due to a flashover when a steel flagpole came into close proximity with an 11kV overhead power line that was located above the entrance to a rural property. At the time of the incident the worker was attempting to erect the 5.2m flag pole at the main entrance gate to the property.

Contributing factors and relevant sections

Failure to

- identify the hazard of the overhead power lines – Section 7.2
- carry out a risk assessment of the worksite and implement appropriate risk controls – Sections 7.3 and 7.4.

CASE 4

Incident – Tipper truck operation

A tipper truck contacted an 11,000 volt overhead power line causing it to break and fall to the ground striking a worker who was at the worksite. At the time of the incident the tip truck was delivering a load of granulated bitumen to the worksite when the tip tray of the truck was raised upwards into the overhead power lines.

As a result of this incident the NSW Chief Industrial Magistrates Court fined the construction firm a total of $15,000.

Contributing factors and relevant sections

Failure to:

- plan the work and identify the hazard of the overhead power lines – Section 2.5 and 4.2
- maintain the relevant approach distance to the overhead power lines and take account of the height of the raised tray when the load was dumped at the worksite. Sections 3.3
- carry out a risk assessment of the worksite – Sections 3.7 and 4.3
- implement appropriate control measures for the work – Section 4.4
- use a safety observer to observe the truck operations near the power lines – Section 4.7.

APPENDIX 7 – USEFUL PUBLICATIONS

WORKCOVER NSW APPROVED INDUSTRY CODES OF PRACTICE

- *Code of Practice: Occupational Health and Safety Consultation*
- *Code of Practice: Risk assessment*
- *Code of Practice: Occupational Health and Safety induction training for construction work*
- *Code of Practice: Moving plant on Construction Sites*
- *Code of Practice: Amenity Tree Industry*
- *Code of practice: Technical Guidance*

Note: The Australian Standards listed below are also WorkCover approved industry codes of practice.

WORKCOVER GUIDES

- *Identification Tool for Electrical Hazards on-site*
- *Subby Pack – OHS contractor management tool*
- *Dangers of Power Lines when Pumping Concrete*
- *WorkCover Safety Alert – Tiger Tails*

Standards and Codes offer practical guidance on health and safety for work. However, these are subject to change from time to time. For further information contact the WorkCover Assistance Service on: **13 10 50**.

For information about the wide range of other codes of practice, certification guides and publications on OHS, rehabilitation and workers compensation, contact the Publications Order line: 1300 797 003.

Information on the latest laws can be checked at www.legislation.nsw.gov.au or contact (02) 9238 0950 or 1800 463 955 (NSW country only).

AUSTRALIAN STANDARDS

Australian Standards can be purchased from SAI Global by contacting the Customer Service Centre on 131 242 or over the net at http://www.saiglobal.com/shop

AS 2550.1 Crane, hoist and winches – Safe use Part 1: General requirements

AS 2550.1 Crane, hoist and winches – Safe use Part 5: Mobile and vehicle loading cranes

AS/NZS 4576 Guidelines for Scaffolding

NATIONAL ELECTRICITY NETWORK SAFETY GUIDELINES

National Guidelines can be purchased from the Electricity Supply Association of Australia by phoning 03 9670 0188 or over the net at http://www.esaa.com.au

- NENS 04-2003 *National guidelines for safe approach distances to electrical apparatus*

NETWORK OPERATORS – CONTACT NUMBERS

- Energy Australia: 13 15 25
- Integral Energy: 13 10 81
- Country Energy: 13 23 56
- Rail Corp: (02) 9379 4911
- Transgrid is divided into three regional areas:
    - Central Region – 1800 625 108
    - Northern Region – 1800 998 049
    - Southern Region – 1800 654 195.

Catalogue No. **WC01394** WorkCover Publications Hotline **1300 799 003**

WorkCover NSW 92-100 Donnison Street Gosford NSW 2250
Locked Bag 2906 Lisarow NSW 2252 WorkCover Assistance Service **13 10 50**
Website **www.workcover.nsw.gov.au**