Your ref: MP06_0139-Mod-9
File no: MC-06-1449/9

21 October 2021

Industry Assessments - NSW Department of Planning, Industry and Environment
Locked Bag 5022
PARRAMATTA NSW 2124

Attention: Ms Bianca Thornton

Dear Ms Thornton

SSD MP06_0139-Mod-9 – Western Operational Area, Eastern Creek Recycling Ecology Park, 1 Kangaroo Avenue, Eastern Creek

Thank you for your correspondence of 1 October 2021 inviting us to provide input to the Secretary's environmental assessment requirements (SEARS) for the Eastern Creek Recycling Ecology Park Mod 9 - Western Operational Area Site Improvements. The proposed development is a State Significant Development Modification under the Environmental Planning and Assessment Act 1979.

The Scoping Report (prepared by Arcadis and dated September 2021) has been reviewed by our officers and we have identified a range of additional critical issues that the applicant must address in the statement of environmental effects to be submitted with the modification application. We request that these matters detailed in the attachment to this letter be included in the final SEARs issued to the applicant to be addressed in the statement of environmental effects prepared for this proposal.

We also trust that all owners and occupiers within a suitable catchment from the proposed development will be informed of the environmental impact statement when it is lodged by the applicant. We consider it appropriate that all the properties in Minchinbury, Eastern Creek and Erskine Park (within the Penrith City Council area) are notified, in particular all the residential properties.

If you would like to discuss this matter further, please contact our Manager, Development Assessment, Judith Portelli on 9839 6228.

Yours faithfully

Peter Conroy
Director City Planning and Development

Blacktown Council's submission to SSD MP06_0139-Mod-9 – Western Operational Area, Eastern Creek Recycling Ecology Park, 1 Kangaroo Avenue, Eastern Creek

Matters to be included in the SEARs to be addressed in the statement of environmental effects:

1. Planning requirements

a. The statement of environmental effects is to address compliance with State Environmental Planning Policy (Western Sydney Employment Area) 2009 and the Eastern Creek Precinct Plan – Stage 3.

b. This is the 9th modification application for this development in relation to this development application. We are of the belief that a masterplan for the whole site should be prepared and demonstrate how this proposal fits in with the existing site operations and any future plans for the site. We are also concerned that every new proposal at the Genesis/Bingo site is ad hoc and individual and does not have adequate regard to the whole of site operation.

c. Further to the point above, we question at what point does this development no longer remain 'substantially the same development' and a new development application and environmental impact statement is required. In this regard, we are concerned that the development of the site is ever expanding under a very old development application.

d. In addition, the statement of environmental effects is to include a:

- detailed description of the site, and any existing or approved operations
- detailed description of the development, including:
    - need for the development
    - alternatives considered
    - justification for the development taking into consideration its location, any environmental impacts of the development, the suitability of the site and whether the development is in the public interest
    - likely staging of the development
- detailed analysis of the likely interactions between the development and existing, approved and proposed operations in the vicinity of the site and on the site
- consideration of any relevant statutory provisions
- risk assessment of the potential environmental impacts of the development, identifying the key issues for further assessment
- detailed assessment of the key issues specified below, and any other significant issues identified in this risk assessment, which includes:

- description of the existing environment
- detailed assessment of the potential impacts of all stages of the development, including any cumulative impacts, taking into consideration relevant guidelines, policies, plans and statutes
- description of the measures that would be implemented to avoid, minimise and if necessary, offset the potential impacts of the development, including proposals for adaptive management and/or contingency plans to manage significant risks to the environment
- consolidated summary of all the proposed environmental management, mitigation and monitoring measures, highlighting all commitments
- demonstration that the development is consistent with the Broader Western Sydney Employment Area draft Structure Plan 2013
- justification that the site is suitable for the proposed development
- demonstration that satisfactory arrangements have been or would be made to provide, or contribute to the provision of, the necessary local and regional infrastructure required to support the development.

e. The statement of environmental effects is to also address the impact of this proposal on:

- the nearby flora and fauna habitat including the Cumberland Plain Woodland
- viewlines to the motorways and nearby residential areas
- any Aboriginal and non-indigenous heritage on the land.

2. Engineering requirements

a. Water Quality: to meet the required water quality targets from Part J of Blacktown DCP 2015.

b. Water conservation: we request that the applicant identify all non-potable uses and achieve 80% non-potable reuse through either rainwater or stormwater.

c. Water quantity: we request that the applicant assess the impacts of the new development on the existing detention basins and adjust the size and discharge relationship of the basins to ensure that there are no adverse impacts.

3. Traffic requirements

a. Traffic Impact Assessment to be prepared for additional traffic movements generated resulting from processing additional waste.

b. All necessary upgrades to the road network necessary to facilitate the proposals are to be identified, costed and paid for by the developer.

c. A review of existing road network characteristics and performance and access arrangements.

d. An overview of the existing vehicle movements associated with the Approved Project.

e. Identification of heavy and light vehicle traffic expected to be generated as a result of the Modification Proposal during construction and operation and any changes from existing traffic numbers.

f. Details of the proposed vehicle access and parking arrangements (including any changes to existing arrangements, new access roads and connections to the existing roads) for construction and operation.

g. Details of the proposed vehicle circulation and traffic management during construction and operations, including waste unloading/loading points, and how heavy vehicles would manoeuvre within the Eastern Creek REP and enter and exit the proposed new waste facilities and storage areas.

h. An assessment of traffic, access and car and truck parking during both construction and operation including potential impact on road network and intersection performance.

i. Identification of traffic, access and parking management and mitigation measures to be implemented as part of construction and operation of the Modification Proposal.

4. Environmental health requirements

Noise and vibration

a. A quantitative assessment of noise and vibration impacts for both the construction and operation and demolition (if required) including the following:

- an overview of the noise and vibration complaints and compliance history of the Approved Project
- a detailed assessment of construction noise in accordance with the Interim Construction Noise Guideline (DECC 2009) and with reference to the Draft Construction Noise Guideline (EPA 2020)
- a detailed assessment of operational noise in accordance with the Noise Policy for Industry (NSW EPA 2017) including the potential for sleep disturbance impacts during the night period
- assessment of construction and operational road traffic noise consistent with the NSW Road Noise Policy (DECCW 2011)
- consideration of any existing site noise limits as part of the assessment
- identification of vibration impacts during construction and operation.

b. A cumulative assessment of noise and vibration impacts with other existing operations at the Eastern Creek REP, other relevant industrial sources and planned developments in the locality.

c. Identification of noise and vibration management and mitigation measures to be implemented as part of construction and operation of the Modification Proposal.

Air quality

a. A review of the air quality and odour complaints and compliance history of the Approved Project.

b. Identification of and a description of the proposed activities with potential for air quality and odour impacts.

c. A detailed assessment of air quality impacts from the Modification Proposal for construction and operation in accordance with the Approved Methods for the Modelling and Assessment of Air.

d. Pollutants in New South Wales (NSW EPA 2016) and Assessment and Management of Odour from Stationary Sources in NSW (DEC 2006).

e. A cumulative assessment of air quality and odour impacts with other existing operations at the Eastern Creek REP, other relevant industrial sources and planned developments in the locality.

f. Review of the potential for any human health impacts relating to air emissions from the proposed operations.

g. Identification of air quality and odour management and mitigation measures to be implemented as part of construction and operation of the Modification Proposal.

Water quality

a. Details of the existing stormwater, water quality, storage and leachate management infrastructure and systems at the Eastern Creek REP – including any discharge points.

b. Details of the existing water demand, water supply arrangements and any off-site discharge.

c. A description of the existing water quality and/or leachate monitoring program and performance.

d. A detailed description of the proposed (or amendments to the existing) stormwater, water quality, storage and leachate management infrastructure and systems for the Modification Proposal – including how it would integrate with the overall Eastern Creek REP water management strategy and how the design meets relevant standards and guidelines.

e. Details of how potential leachate from waste in stockpile areas would be managed.

f. Plan/s showing the proposed operational stormwater, water quality, storage and leachate management infrastructure and systems.

g. Details of the expected water demand, water reuse, water supply and associated discharges associated with the Modification Proposal, including a detailed site water balance.

h. An assessment of the potential impacts of the Modification Proposal on hydrology, surface water and groundwater quality during construction and operation.

i. Identification of water quality and hydrology management and mitigation measures to be implemented as part of construction and operation of the Modification Proposal

including any proposed changes to the surface water, groundwater and leachate monitoring program.

Soil contamination

a. An assessment of existing contamination at the Site for the Modification Proposal and the suitability of the Site for the intended use per State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55).

b. Assessment of the potential to encounter or disturb contamination at the Site as a result of construction or operation of the Modification Proposal and measures to be adopted to manage and mitigate contamination risks – including remediation where necessary.

c. A description of the existing soil environment of the Site.

d. A description of the proposed measures to manage erosion and sedimentation during construction and operation.

e. Plan/s showing the proposed construction water management and erosion and sediment control measures consistent with the requirements of Managing Urban Stormwater: Soils and Construction – Volume 1 and 2 series (Landcom 2004).

f. Identification of soils and contamination management and mitigation measures to be implemented as part of construction and operation of the Modification Proposal, including the proposed measures to manage potential spills and leaks.

Hazards and risks

a. Details of the proposed types, quantities, storage locations, storage conditions and transport frequency of any dangerous goods or hazardous chemicals/materials proposed to be transported to and/or stored on-site.

b. A preliminary risk screening of the Modification Proposal in accordance with Applying SEPP 33 – Hazardous and Offensive development Application Guidelines (DoP 2011) and with reference to the Australian Code for the Transport of Dangerous Goods by Road & Rail (NTC 2020).

c. Should the preliminary risk screening identify that the Modification Proposal is a potentially hazardous industry, the Modification Application should include a Preliminary Hazard Analysis (PHA) prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis (DoP 2011). The PHA should estimate the cumulative risks from the existing operations and the Modification Proposal.

d. Identification of potential hazards associated with construction and operation of the Modification Proposal.

e. An assessment of fire safety including:

- identification of the aggregate quantities of combustible waste proposed to be stockpiled on-site
- a description of technical information of the proposed fire protection and management system

- details of the fire hydrant system and its minimum water supply capabilities appropriate to the proposed combustible waste stockpiles
- details of the proposed sizes and volumes of stockpiles and the proposed management and separation in order to minimise fire spread and facilitate emergency vehicle access
- an assessment of the consistency of Modification Proposal with the Fire safety guideline – Fire safety in waste facilities (Fire and Rescue NSW 2020).

f. Identification of management and mitigation measures to be implemented as part of construction and operation of the Modification Proposal to manage hazards and risks.

Waste

a. Identification of the waste streams, quantities and classifications based on the Waste Classification Guidelines (EPA 2014) expected to be generated from construction of the Modification Proposal.

b. A description of the proposed handling, storage, recovery/recycling or disposal for each construction waste stream – including measures to ensure waste is avoided, reused and recycled where possible and how cross-contamination would be avoided.

c. A description of the waste feedstock currently received or approved to be received at the Eastern Creek REP including waste types, quantities and classifications and confirmation that no changes to feedstock types or quantities are proposed to occur as a result of the Modification Proposal.

d. A description of the finished products/outputs currently received or approved to be generated at the Eastern Creek REP and details of any changes to products/outputs proposed to occur as a result of the Modification Proposal.

e. A description of the proposed waste receival, handling, processing (including equipment), storage and stockpiling activities associated with the proposed new facilities under the Modification Proposal.

f. Identification of waste and resource management and mitigation measures to be implemented as part of construction and operation of the Modification Proposal.

5. Drainage requirements

a. Water Quality: to meet the required water quality targets from Part J of Blacktown DCP 2015.

b. Water conservation: we request that the applicant identify all non-potable uses and achieve 8 % non-potable reuse through either rainwater or stormwater.

c. Water quantity: we request that the applicant assess the impacts of the new development on the existing detention basins and adjust the size and discharge relationship of the basins to ensure that there are no adverse impacts.

DOC21/900988

Ms. Bianca Thornton
Environmental Assessment Officer - Industry Assessments
Department of Planning, Industry and Environment
Locked Bag 5022
PARRAMATTA NSW 2124

Email: bianca.thornton@planning.nsw.gov.au

ELECTRONIC MAIL
14 October 2021

Dear Ms Thornton,

Request for Advice - SSD-11606719 – Modification 9 – Application to modify the existing project approval (MP06_0139) - Eastern Creek Recycling Ecology Park & Landfill - Western Operational Area – 1 Kangaroo Drive, Eastern Creek (Lot 2 DP1145808)

The Environment Protection Authority (EPA) refers to your email dated 1 October 2021 requesting input into Bingo Industries Pty Ltd (Proponent) request for Secretary's Environmental Assessment Requirements (SEARs) for preparation of an Environmental Impact Statement (EIS) for the above proposed development.

The EPA has reviewed the following documents:

- *"Eastern Creek Recycling Ecology Park – Modification 9 Scoping Report' – Section 4.55(2) - Application (MP06_0139) – September 2021"* (Proposal).

The EPA understands the Proposal is for:

- Expansion of the Eastern Creek REP's operational footprint to incorporate additional land within the Project Approval boundary to the west of the current operational footprint (the Western Operational Area),
- Construction and operation of a waste processing facility for wood and timber derived from building and demolition waste, connected to existing onsite processing facilities via transfer conveyors, to relocate and enclose existing timber waste processing and storage operations,
- Construction to enclose currently approved non putrescible organic waste receival and processing operations and expand operations to include an organics transfer station,
- Establishment of new internal roads within the Western Operational Area, and
- Establishment of ancillary features such as water management infrastructure, signage and landscaping, as required.

EPAs Advice

Based on the information provided, if the modification is approved a licence variation may be required to accommodate new and/or updated conditions on the existing environment protection licences (Licences) under the *Protection of the Environment Operations Act 1997* (POEO Act) that are currently held by the Proponent for the existing operational parts of the Premises. It will be the Proponent's responsibility to apply for the applicable licence variation if the modification approval is granted.

The EPA understands that the modification will not increase the volume of waste accepted on site as per the current limits on the Licences.

The Proposal states that:

> *"A preliminary screening of environmental issues was undertaken to identify the matters for consideration for further assessment and has identified minimal environmental impacts associated with the Proposal."*

The EPA has concerns regarding the Proposal as there have been significant historical issues associated with odour, dust and sediment tracking from the Premises. The addition of this type of expansion to the waste facility will pose a moderate risk of generating additional impacts on the surrounding residential communities and other sensitive receivers. Historically these impacts have not been adequately controlled through mitigation procedures.

The EPA therefore requests that these concerns be noted and considered up front. Should the proposal proceed to the assessment stage, the EPA requests that the EIS explicitly demonstrates how the location is appropriate for the proposed use, taking into account its proximity to residential and other sensitive receivers. The EIS will also need to include a detailed assessment of the potential odour impacts (including assessment of cumulative potential odours by the existing operations and new proposed additional operations) and the specific mitigation measures that will be implemented to control these impacts.

The EPA requests that the EIS provide this information, as well as the requirements outlined in Attachment A.

If you have any questions about this request, please contact William Marshall on (02) 9860 1455 or via email at RegOps.MetroRegulation@epa.nsw.gov.au (Attention: William Marshall).

Yours sincerely,

Ruth Owler
A/Unit Head
Regulatory Operations Metropolitan West
Environment Protection Authority

ATTACHMENT A

1. The EPA requests that the following matters are to be addressed within the EIS:

a). **Air Quality Impacts**

The assessment should include a detailed Air Quality Impact Assessment (AQIA) for construction and operation of the project in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW.
The AQIA should:

- Demonstrate how the development will comply with the relevant regulatory framework, specifically the POEO Act and the POEO (Clean Air) Regulation (2010), and
- Include a cumulative local and regional air quality impact assessment.

Technical standards and guidelines

- *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA, 2016)*
- *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DECC, 2006)*
- *Ground-level ozone impact assessment framework (EPA, 2015)*

In addition to the above standard environmental assessment guidelines, the EPA requests that specific information regarding the following air quality impacts are adequately addressed:

- Air quality process controls and monitoring;
    - Enclosure design of the facility;
    - Point source controls for higher odorous activities;
    - General emissions controls within the facility;
    - Use of automatic roller doors, airlocks and other air quality zoning mechanical features;
- Identify all sources or potential sources of air emissions from the development[1]
- Provide details of the project that are essential for predicting and assessing air impacts including:
    - the quantities and physio-chemical parameters (e.g. concentration, moisture content, bulk density, particle sizes, etc) of materials to be used, transported, produced or stored;
    - an outline of procedures for handling, transport, production and storage;
    - the management of solid, liquid and gaseous waste streams with potential to generate emissions to air.
- Air quality assessment's that identifies;
    - Baseline conditions of existing air quality and meteorology;

[1] Note: Emissions can be classed as either a. Point (eg emissions from stack or vent) or; b. Fugitive (from wind erosion, leakages or spillages, associated with loading or unloading, conveyors, storage facilities, plant and yard operation, vehicle movements (dust from road, exhausts, loss from load), land clearing and construction works)

- All potential air emissions from the premises[2]
- Assess impacts of proposed activities upon air quality, including:
    - Identify all pollutants of concern and estimate emissions by quantity (and size for particles), source and discharge point.
    - Estimate the resulting ground level concentrations of all pollutants. Where necessary (e.g. potentially significant impacts and complex terrain effects), use an appropriate dispersion model to estimate ambient pollutant concentrations
    - Describe the effects and significance of pollutant concentration on the environment, human health, amenity and regional ambient air quality standards or goals
    - Describe the contribution that the development will make to local and regional pollution, particularly in sensitive locations
- Cumulative impact upon background air quality as a result of proposed activities;
- Management and mitigation measures
    - Outline specifications of pollution control equipment (including manufacturer's performance guarantees where available) and management protocols for both point and fugitive emissions
    - Where possible, this should include cleaner production processes

b). **Odour**

The assessment should include a detailed Odour Impact Assessment, for the operation of the project in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW.
The assessment should:

- demonstrate how the development will comply with the relevant regulatory framework, specifically the POEO Act and the POEO (Clean Air) Regulation (2010), and
- include cumulative local and regional odour impact assessment.

Technical standards and guidelines

- *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA, 2016)*
- *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DECC, 2006)*
- *Technical Framework – Assessment and Management of Odour from Stationary Sources in NSW (DEC, 2006)*

In addition to the above standard environmental assessment guidelines, the EPA requests that specific information regarding the following odour impacts are adequately addressed:

- Odour assessment process controls and monitoring;
    - Enclosure design of the facility;

[2] Including but not limited to PM10 and PM2.5

  - Point source controls for higher odorous activities;
  - General emissions controls within the facility;
  - Use of automatic roller doors, airlocks and other air quality zoning mechanical features;

- Identify all sources or potential sources of odour emissions from the development[3]
- Provide details of the project that are essential for predicting and assessing odorous impacts including:
  - the quantities and physio-chemical parameters (e.g. concentration, moisture content, bulk density, particle sizes, etc) of materials to be used, transported, produced or stored;
  - an outline of procedures for handling, transport, production and storage;
  - the management of solid, liquid and gaseous waste streams with potential to generate emissions to air.
- Odour assessment's that identifies;
  - Baseline conditions of existing air quality (in relation to odour) and meteorology;
  - All potential odour emission from the premises
  - Assess impacts of proposed odorous activities upon air quality, including:
    - Identify all pollutants of concern and estimate emissions by quantity (and size for particles), source and discharge point.
    - Estimate the resulting ground level concentrations of all pollutants. Where necessary (e.g. potentially significant impacts and complex terrain effects), use an appropriate dispersion model to estimate ambient pollutant concentrations
    - Describe the effects and significance of odour concentration on the environment, human health, amenity and regional ambient air quality standards or goals
    - Describe the contribution that the development will make to local and regional pollution, particularly in sensitive locations
    - For odorous emissions provide the emission rates in terms of odour units (determined by techniques compatible with EPA procedures). Use sampling and analysis techniques for individual or complex odours and for point or diffuse sources, as appropriate
  - Cumulative impact upon background air quality as a result of proposed odorous activities;
  - Management and mitigation measures

[3] Note: Emissions can be classed as either a. Point (eg emissions from stack or vent) or; b. Fugitive (from wind erosion, leakages or spillages, associated with loading or unloading, conveyors, storage facilities, plant and yard operation, vehicle movements (dust from road, exhausts, loss from load), land clearing and construction works)

- Outline specifications of pollution control equipment (including manufacturer's performance guarantees where available) and management protocols for both point and fugitive odour emissions.
- Where possible, this should include cleaner production processes.

The EPA is aware that the processing and storing of green waste in the facility can have significant odorous impacts upon surrounding environmental receptors. Therefore, the EPA will not consider the storage and/or processing of waste (including finished product) outside the enclosed building, specifically to mitigate the odorous impacts that outdoor activities could generate.

The EIS must adequately outline how the facility can implement appropriate controls and management procedures to prevent offensive odours from leaving the premises. Please note, that in relation to odour impacts, a place where someone works may be considered a sensitive receiver. Therefore, industrial neighbours to the premises must be included as sensitive receivers when conducting odour impact assessments.

c). **Water Quality Impacts**

The assessment should demonstrate that:

- All practical options to avoid discharge have been investigated and implemented, and
- Measures have been taken to reduce the level of contaminants in the discharge, so that any impact is reduced where a discharge is necessary.

Applicants must:

- Describe existing surface and groundwater quality – an assessment needs to be undertaken for any water resource likely to be affected by the proposal and for all conditions (e.g. a wet weather sampling program is needed if runoff events may cause impacts).
- Provide site drainage details and surface runoff yield.
- Provide an outline of baseline groundwater information, including, but not restricted to, depth to water table flow direction and gradient, groundwater quality, reliance on groundwater by surrounding users and by the environment
- Identify and estimate the quality and quantity of all pollutants that may be introduced into the water cycle by source and discharge point;
- Describe the nature and degree of impact that any discharge(s) will have on the receiving environment. This includes consideration of all pollutants that pose a risk of non-trivial harm to human health and the environment (this should also include intercepted saline groundwater or acidic runoff generated by acid sulphate soil, where appropriate);
- Demonstrate assessment against the ambient NSW Water Quality Objectives and environmental values for the receiving waters. This includes the indicators and associated trigger values or criteria for the identified environmental values (this information should be sourced from the ANZECC (2000) criteria); and
- Assess the significance of any identified impacts, including consideration of the relevant environmental values and ambient water quality outcomes. Assessment of discharges to surface waters should be guided by the ANZECC (2000) guidelines, using local Water Quality Objectives.

- Identify and estimate the quantity of all pollutants that may be introduced into the water cycle by source and discharge point including residual discharges after mitigation measures are implemented
- Describe management and mitigation measures:
  - Outline stormwater management to control pollutants at the source and contain them within the site. Also describe measures for maintaining and monitoring any stormwater controls;
  - Outline erosion and sediment control measures directed at minimising disturbance of land, minimising water flow through the site and filtering, trapping or detaining sediment. Also include measures to maintain and monitor controls as well as rehabilitation strategies;
  - Describe hydrological impact mitigation measures including:
    - Site selection (avoiding sites prone to flooding and waterlogging, actively eroding or affected by deposition);
    - Minimising runoff;
    - Minimising reductions or modifications to flow regimes;
    - Avoiding modifications to groundwater.

Technical standards and guidelines

- *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DECC, 2008)*
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Governments and Australian State and territory governments).*
- *Using the ANZECC guidelines and Water Quality Objectives in NSW (DEC, 2006)*
- *Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004)*
- *Storing and Handling Liquids: Environmental Protection (EPA, 2007)*

d). **Noise Impacts**

The impact of noise and vibration to protect the amenity and wellbeing of the community must be managed. Potential impacts should be minimised through the implementation of all feasible and reasonable mitigation measures.

Technical standards and guidelines

- *Noise Policy for Industry*
- *Interim Construction Noise Guideline*
- *Assessing Vibration: A Technical Guide*

In addition to the above standard environmental assessment guidelines, the EPA requests that specific information regarding the following noise and vibration impacts are adequately addressed:

- A noise and vibration impact report, which addresses:

- Identify any noise sensitive locations likely to be affected by activities at the site, such as residential properties, schools, churches, and hospitals;
    - Included on a map of the locality.
- Background noise and vibration levels surrounding the proposed development;
    - During proposed operation hours in both peak and off-peak periods, with consideration to;
        - Surrounding industrial and residential activities; and
        - Public transportation infrastructure;
- Proposed scheduling of heavy and/or noisy equipment and transport vehicles;
- Operating noise and vibration levels of facility equipment;
    - Operating hours of these, and whether these encroach within time periods where sleep disturbance impacts are likely (nominally 10pm – 7pm).
- Predictive modelling of noise and vibration, and their potential impacts; and
- Mitigation and management efforts

e). **Waste Management**

The EIS must include a detailed assessment of the waste management processes to be undertaken at the area of the Premises that relates to this Proposal.

This includes but is not limited to:

- Details of the sources of waste to be received at the new part of the Premises,
- Details of the types and quantities of each type of waste to be received at the new part of the Premises,
- Details of the maximum annual throughput of waste to be processed at the new part of the Premises,
- A description of waste processing procedures for each waste type,
- A description of how the Proponent will meet the EPA's record keeping and reporting requirements, including weighing material in and out of the new part of the Premises (refer to the EPA's Waste Levy Guidelines for more information – available at http://www.epa.nsw.gov.au/your-environment/waste/waste-levy);
- A detailed site plan(s) identifying areas for:
    - Haulage,
    - Waste receival, processing, storage and loading (for each waste type)
    - Quarantine,
    - Infrastructure for environmental controls including dust, odour, noise, water and wheelwash,
    - Weighbridge,
    - Site boundaries,

- Stormwater drainage areas, and
- Unused stabilised areas.

- Details of the type and quantities of materials to be produced and their intended fate,
- A description of procedures for dealing with non-conforming waste (i.e. waste not permitted to be received at the new part of the Premises), and
- Provide a vehicle flow plan of the waste facility indicating the proposed vehicle flow controls, including the entry and exit points where waste is transported into and out of the waste facility. This must be in accordance with clause 36 of the *Protection of the Environment (Waste) Regulation 2014.*

20 October 2021

TfNSW Reference: SYD10/00814/09
Client Reference: MP06_0139 MOD 9

The General Manager
Department of Planning, Industry and Environment
GPO Box 39
SYDNEY NSW 2001

Attention: Bianca Thornton

SEARS FOR MODIFICATION TO EASTERN CREEK WASTE MANAGEMENT FACILITY - WESTERN OPERATIONAL AREA - HONEYCOMB DRIVE, EASTERN CREEK

Dear Sir/Madam,

Reference is made to your correspondence dated 7 October 2021, requesting Transport for NSW (TfNSW) to provide details of key issues and assessment requirements regarding the abovementioned modification for inclusion on the Secretary's Environmental Assessment Requirement (SEARs).

TfNSW requires the following requirements to be included in the SEARs:

Consultation

1. During the preparation of the EIS, the proponent must consult with TfNSW regarding the Archbold Road Extension due to the potential impact of the proposed development on the Archbold Road Extension project.

Transport and accessibility (construction and operation)

2. Provide a transport and accessibility impact assessment, which includes, but is not limited to the following:
   - Details of all traffic types and volumes likely to be generated by the proposed development during construction and operation, including predicted haulage routes, including over size over mass vehicles, and consider any impacts to the state road network (i.e. where the haulage route meets the state road);
   - Daily inbound and outbound traffic profile by time of day and day of week broken down per vehicle types;
   - Details of the origin/destination of dangerous goods movements to/from the site (if any);

- Detailed plan site layout to demonstrate that the site will be able to accommodate the most productive vehicle types as well as the worst performing vehicles (sufficient loading/ unloading) and parking on site in accordance with the relevant Australian Standard and Council's Development Control Plan;
- Details of the driver facilities provided on site;
- Swept path diagrams to demonstrate the largest vehicles as well as the worst performing vehicles entering, exiting and manoeuvring throughout the site;
- An assessment of the predicted impacts of this traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts at key intersections using SIDRA or similar traffic model. This is to include the identification and consideration of approved and proposed developments/planning proposals/road upgrades in the vicinity.
- Detailing how the proposed development connects to adjoining sites to facilitate their future development for their intended purposes;
- Traffic management plan on how to manage number of vehicles likely to be generated during construction and operation and awaiting loading, unloading or servicing that can be accommodated on the site to avoid queuing in the surrounding road network. This to demonstrate how internal and external traffic can be managed in conjunction with existing traffic on site;
- Detailed plans of the site access and proposed layout of the internal road and pedestrian network and parking on site in accordance with the relevant Australian Standards and Council's DCP;
- Swept path diagrams depicting vehicles entering, exiting and manoeuvring throughout the site;
- Details of road upgrades, infrastructure works, or new roads or access points required for the development;
- Details of travel demand management measures to minimise the impact on general traffic and bus operations, including details of a location-specific sustainable travel plan (Green Travel Plan and specific Workplace Travel Plan) and the provision of facilities to increase the non-car mode share for travel to and from the site;
- Details of the adequacy of existing public transport or any future public transport infrastructure within the vicinity of the site, pedestrian and bicycle networks and associated infrastructure to meet the likely future demand for the proposed development; and
- Measures to integrate the development with the existing/future public transport network.

Relevant Policies and Guidelines:

- Guide to Traffic Generating Developments (Roads and Maritime Services, 2002).
- NSW Freight and Ports Plans 2018-2023.
- Guidelines for Planning and Assessment of Road Freight Access in Industrial Areas.
- Cycling Aspects of Austroads Guides, 2017.
- NSW Planning Guidelines for Walking and Cycling (Department of Infrastructure, Planning and Natural Resources (DIPNR), 2004).
- Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments (Austroads, 2020).
- Australian Standard 2890.3 Parking facilities, Part 3: Bicycle parking (AS 890.3).

If you have any further questions, Mr. Felix Liu would be pleased to take your call on 8849 2113 or email development.sydney@rms.nsw.gov.au. I hope this has been of assistance.

Yours sincerely,

Malgy Coman
Senior Land Use Planner

Our ref: DOC21/915652
Senders ref: MP06_0139- MOD 9

Bianca Thornton
Energy Resource Assessments
Planning and Assessment Group
Department of Planning, Industry and Environment
4 Parramatta Square, 12 Darcy Street
Parramatta NSW 2150

Dear Ms Thornton

Subject: Request for SEARs for Eastern Creek REP Mod 9 - Western Operational Area (MP06_0139-Mod-9) (Blacktown)

Thank you for your e-mail received on 7 October 2021, requesting input from Environment, Energy and Science Group (EES) in the Department of Planning, Industry and Environment (DPIE) on the SEARs for Eastern Creek REP Mod 9 - Western Operational Area (MP06_0139-Mod-9) located at 1 Kangaroo Avenue, Eastern Creek.

EES has reviewed the scoping report prepared by Arcadis dated September 2021 and provides recommendations for the SEARs at Attachment A.

EES notes that the Eastern Creek Recycling Ecology Park (MP 06_0139) was originally approved under Part 3A of the *Environmental Planning and Assessment Act, 1979* in November 2009. Regarding biodiversity assessment requirements for the proposal, Clauses 30 and 30A of the *Biodiversity Conservation (Savings and Transitional) Regulation 2017* specify requirements for modification of planning approvals granted or applied for before the commencement of the *Biodiversity Conservation Act, 2016.* Specifically, a biodiversity development assessment report (BDAR) is required unless the authority or person determining the application for modification (or determining the environmental assessment requirements for the application) is satisfied that the modification will not increase the impact on biodiversity values.

Recommended SEARs for a biodiversity development assessment report are included in Attachment A. Please note in relation to point (4) of the standard EES biodiversity environmental assessment requirements the minimum information and spatial data requirements are in Tables 24 and 25 of the Biodiversity Assessment Method (BAM), and as required more broadly by the revised BAM 2020. Other requirements, such as those relating to the BAM Calculator and Biodiversity Offsets and Agreements Management System (BOAMS), are detailed in various guidelines, practice notes, updates and other advices issued by EES to BAM accredited assessors – see https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/accredited-assessors/assessor-resources.

Should you have any queries regarding this matter, please contact Marnie Stewart, Senior Project Officer - Planning on 9995 6868 or Marnie.stewart@environment.nsw.gov.au

Yours sincerely

20/10/21

Susan Harrison
Senior Team Leader Planning
Greater Sydney Branch
Biodiversity and Conservation

Attachment A – EES Environmental Assessment Requirements

Biodiversity
1. Biodiversity impacts related to the proposed development are to be assessed in accordance with the Biodiversity Conservation Act 2016 the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and Biodiversity Assessment Method 2020, including an assessment of the impacts of the proposal (including an assessment of impacts prescribed by the regulations). 2. The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the Biodiversity Assessment Method 2020. 3. The BDAR must include details of the measures proposed to address the offset obligation as follows: • The total number and classes of biodiversity credits required to be retired for the development/project; • The number and classes of like-for-like biodiversity credits proposed to be retired; • The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules; • Any proposal to fund a biodiversity conservation action; • Any proposal to conduct ecological rehabilitation (if a mining project); • Any proposal to make a payment to the Biodiversity Conservation Fund. If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits. 4. The BDAR must be submitted with all spatial data associated with the survey and assessment as per the BAM. 5. The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the Biodiversity Conservation Act 2016.

Water and soils

6. The EIS must map the following features relevant to water and soils including:
    a. Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map).
    b. Rivers, streams, wetlands, estuaries (as described in s4.2 of the Biodiversity Assessment Method).
    c. Wetlands as described in s4.2 of the Biodiversity Assessment Method.
    d. Groundwater.
    e. Groundwater dependent ecosystems
    f. Proposed intake and discharge locations

7. The EIS must describe background conditions for any water resource likely to be affected by the development, including:
    - Existing surface and groundwater.
    - Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations.
    - Water Quality Objectives (as endorsed by the NSW Government http://www.environment.nsw.gov.au/ieo/index.htm) including groundwater as appropriate that represent the community's uses and values for the receiving waters.
    - Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and/or local objectives, criteria or targets endorsed by the NSW Government.
    - Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions http://www.environment.nsw.gov.au/research-and-publications/publications-search/risk-based-framework-for-considering-waterway-health-outcomes-in-strategic-land-use-planning

8. The EIS must assess the impact of the development on hydrology, including:
    a. Water balance including quantity, quality and source.
    b. Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas.
    c. Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems.
    d. Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches).
    e. Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water.
    f. Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options.
    g. Identification of proposed monitoring of hydrological attributes.

Flooding and coastal hazards

9. The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including:
    a. Flood prone land.
    b. Flood planning area, the area below the flood planning level.
    c. Hydraulic categorisation (floodways and flood storage areas)
    d. Flood Hazard.
10. The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 5% Annual Exceedance Probability (AEP), 1% AEP, flood levels and the probable maximum flood, or an equivalent extreme event.
11. The EIS must model the effect of the proposed development (including fill) on the flood behaviour under the following scenarios:
    a. Current flood behaviour for a range of design events as identified above. This includes the 0.5% and 0.2% AEP year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.
12. Modelling in the EIS must consider and document:
    a. Existing council flood studies in the area and examine consistency to the flood behaviour documented in these studies.

b. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood, or an equivalent extreme flood.
c. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazard categories and hydraulic categories
d. Relevant provisions of the NSW Floodplain Development Manual 2005.

13. The EIS must assess the impacts on the proposed development on flood behaviour, including:
    a. Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure.
    b. Consistency with Council floodplain risk management plans.
    c. Consistency with any Rural Floodplain Management Plans.
    d. Compatibility with the flood hazard of the land.
    e. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land.
    f. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.
    g. Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.
    h. Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the NSW SES and Council.
    i. Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the NSW SES and Council.
    j. Emergency management, evacuation and access, and contingency measures for the development considering the full range or flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the NSW SES.
    k. Any impacts the development may have on the social and economic costs to the community as consequence of flooding.

End of Submission

Our reference: DOC21/875268-1
Date:13 October 2021

HERITAGE NSW – Aboriginal Cultural Heritage - SEARs

Project Name: Heritage NSW, Aboriginal Cultural Heritage - Major Projects – New Request for Advice - Eastern Creek REP Mod 9 - Western Operational Area (MP06_0139-Mod-9) (Blacktown) - SEARs

1. The EIS must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development and document these in an Aboriginal Cultural Heritage Assessment Report (ACHAR). This may include the need for surface survey and test excavation. The identification of cultural heritage values must be conducted in accordance with the Code of Practice for Archaeological Investigation in NSW (DECCW 2010), and be guided by the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales (OEH 2011).
2. Consultation with Aboriginal people must be undertaken and documented in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.
3. Impacts on Aboriginal cultural heritage values are to be assessed and documented in the ACHAR. The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the EIS must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to Heritage NSW.
4. The assessment of Aboriginal cultural heritage values must include a surface survey undertaken by a qualified archaeologist. The result of the surface survey is to inform the need for targeted test excavation to better assess the integrity, extent, distribution, nature and overall significance of the archaeological record. The results of surface surveys and test excavations are to be documented in the ACHAR.
5. The ACHAR must outline procedures to be followed if Aboriginal objects are found at any stage of the life of the project to formulate appropriate measures to manage unforeseen impacts.
6. The ACHAR must outline procedures to be followed in the event Aboriginal burials or skeletal material is uncovered during construction to formulate appropriate measures to manage the impacts to this material.

NOTE: The process described in the *Due Diligence Code of Practice for the protection of Aboriginal objects in NSW* (DECCW 2010) is not sufficient to assess the impacts on Aboriginal cultural heritage of Major Projects.

Level 6, 10 Valentine Ave Parramatta NSW 2150 ■ Locked Bag 5020 Parramatta NSW 2124
P: 02 9873 8500 ■ E: heritagemailbox@environment.nsw.gov.au

Bianca Thornton

From: Easements&Development <Easements&Development@transgrid.com.au>
Sent: Friday, 22 October 2021 10:19 AM
To: Bianca Thornton
Subject: 2021-533 Request for SEARs advice - Bingo Eastern Creek Recycling Ecology Park Mod 9 (MP06_0139-Mod-9)
Attachments: easement-guidelines.pdf

Good Morning,

TransGrid Reference Number: **2021-533**

Proposal: **Request for SEARs advice - Bingo Eastern Creek Recycling Ecology Park Mod 9 (MP06_0139-Mod-9)**

Please find Transgrid response to Request for SEARs advice - Bingo Eastern Creek Recycling Ecology Park Mod 9 (MP06_0139-Mod-9) below:

1. This isn't a customer project nor does it propose to connect to Transgrid network for load supply/generation
2. It seems the Modification Proposal within Lot 2 DP 1145808 borders Transgrid's *Sydney West – Sydney North No 1 330kV Transmission Line (Feeders 14 Structures 93-94) and (Feeder 20 Structures 6-7)*. It also shows that we access these structures along Archbold Road onto a locked gate and travel within Lot 2 DP 1145808 to get to Transgrid's infrastructure.
3. Based on the below TSS plan and diagram provided on the attached Scoping Report, Transgrid's access and easement will not be affected by the Modification Proposal however, suggest we provide copies of TransGrid's easement guidelines to ensure safety requirements are met and ensure access remains available moving forward.

Regards

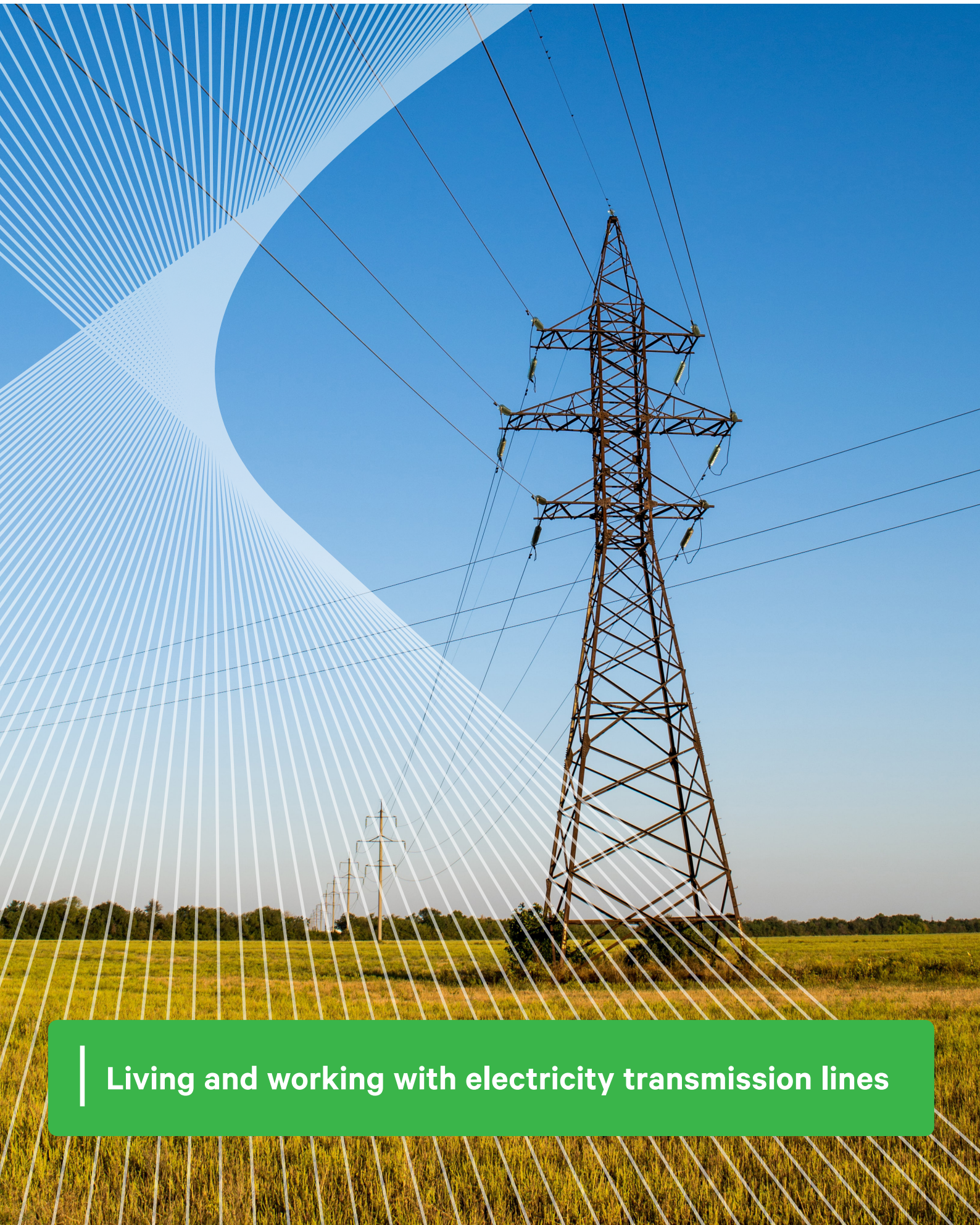
Michael

Michael Platt
Development Assessment & Control Officer | Network Planning and Operations
_____
Transgrid | 200 Old Wallgrove Road, Wallgrove, NSW, 2766
T: (02) 9620 0161 **M:** 0427 529 997
E: Michael.Platt@transgrid.com.au **W:** www.transgrid.com.au

"COVID-19 UPDATE: TransGrid office personnel have transitioned to working remotely, staying home to keep our people and community safe while working to ensure that we continue to provide the support you need during these uncertain times. We appreciate staying connected is important so while face-to-face meetings have been suspended due to physical distancing requirements, we offer other ways for you to contact us, meet with us and access the people, information and resources you require." Please consider the environment before printing this e-mail.

Transgrid

People. Power. Possibilities.



Living and working with electricity transmission lines

We all rely on electricity to power our homes and businesses, however coming into contact with high voltage electricity can cause serious injury or death.

To protect your safety and provide a safe, reliable network, Transgrid has easements over its transmission lines, which restrict the activities that can be carried out. Easements are also "rights of way", which allow our staff and contractors access to construct, operate and maintain Transgrid's infrastructure.

Transgrid's primary concern is the **safety of people and the environment**, and we are committed (and required by legislation) to providing a safe and reliable transmission network.

For more information on potential electrical safety risks, please see our **Electrical safety risks fact sheet**. You can learn more about electricity infrastructure by reading our **High voltage transmission line fact sheet**.

What activities may be carried out within or adjacent to transmission line easements?

High voltage transmission lines have different safety risks from urban powerlines, and this is why Transgrid encourages the principle of "prudent avoidance"[1]. When planning houses, schools, sensitive land uses and other types of new development, proximity to existing or planned high voltage transmission lines should always be considered.

Where developments cannot avoid transmission line easements, open space uses – that do not encourage people to congregate under the transmission lines or close to electricity infrastructure – should be given preference over other land uses, such as residential or commercial.

These guidelines will assist you to work out:

- whether your proposed activity or development within (or adjacent to) an electricity easement is **permitted**; **requires Transgrid's permission**; or is **prohibited**; and
- the process for seeking Transgrid's permission prior to carrying out the activity or lodging your development application with a consent authority.

Transgrid can only give its permission to your proposal as holder of the easement. Transgrid's permission is not a development consent.

Councils are required to refer development applications that affect Transgrid's transmission line easements to Transgrid. Seeking Transgrid's permission prior to lodging your development application will help expedite this process.

If you undertake an activity or development that is not in accordance with the Easement guidelines, you may be required to remove it or relocate it at your expense.

Please note that if you have received Transgrid's written permission under previous guidelines, this permission remains valid.

Is your proposal located within or adjacent to a Transgrid easement?

Transmission line easements vary in width depending on the operating voltage and design of the infrastructure.

Generally, the higher the voltage, the wider the easement. Figure 1 below shows the typical widths of transmission line easements.

The distances in the Easement guidelines are based on the typical easement widths shown in Figure 1. However, because there are some variations to easement widths, you will need to know the width of the easement near your proposal.

To work out whether there is a Transgrid easement on your property and how wide it is, you can contact the New South Wales Land Registry Services for a detailed survey plan.

NSW Land Registry Services can be contacted on 1300 052 637 or via their website at www.nswlrs.com.au.

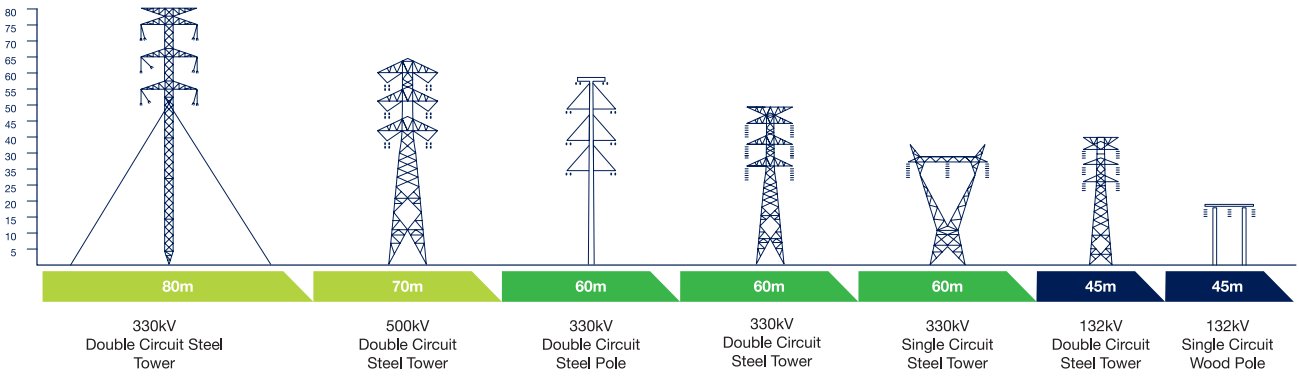


Figure 1: Figure not to scale. Typical easement widths only, may vary on a case by case basis.

1. As identified by The Right Honourable Harry Gibbs Report, Inquiry into Community Needs and High Voltage Transmission Line Development, 1991.

Is your proposal outside the exclusion zone?

Transgrid has developed an **exclusion zone** to enable suitable activities within easements, while providing a safe clearance area around Transgrid transmission lines and structures to protect public safety and the network.

Please check the criteria and diagrams below to ensure that your proposal is outside the **exclusion zone**.

If your proposal is located within the **exclusion zone**, you will need to relocate it or seek permission from Transgrid.

Most activities are prohibited within the **exclusion zone**, to meet Transgrid's public safety obligations.

Exclusion zone criteria activities/developments/ structures must:

1. Not impede Transgrid's access to its transmission infrastructure;
2. Where transmission lines are **132kV and below**:
   - be located at least 20 metres away from any part of a transmission structure or guy wire;
   - for metallic structures, be located at least 22 metres away from any part of a transmission structure or guy wire;
   - be located at least 10 metres from the centre of the transmission line;
3. Where transmission lines are **220kV and above**:
   - be located at least 30 metres away from any part of a transmission line structure or guy wire;
   - be located at least 17 metres from the centre of the transmission line.

If you are uncertain whether your proposal is within the exclusion zone, please contact Transgrid by submitting an enquiry via our online Easement Enquiries Portal: https://www.Transgrid.com.au/being-responsible/public-safety/Living-andworking-with-electricity-transmission-lines

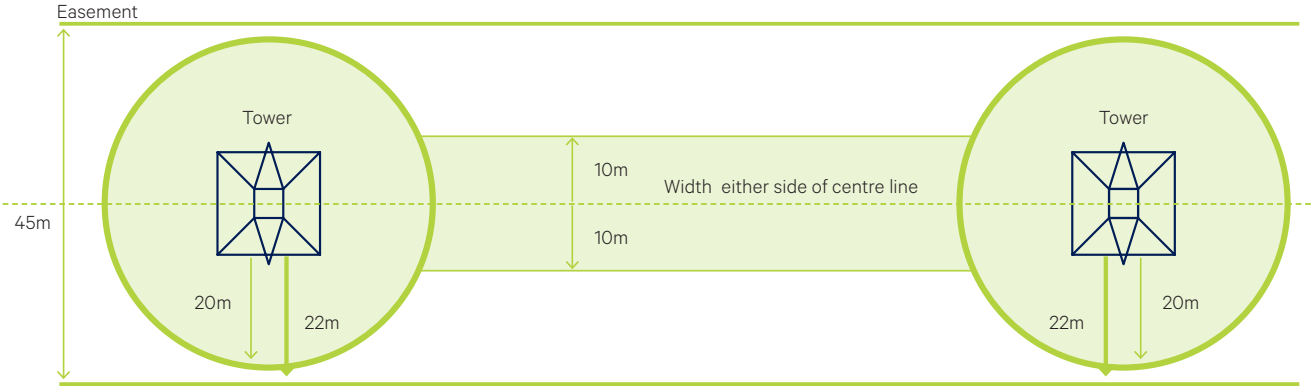


Figure 2: 132kV and below Exclusion Zone (Not to scale. Typical easement widths only. May vary on a case by case basis)

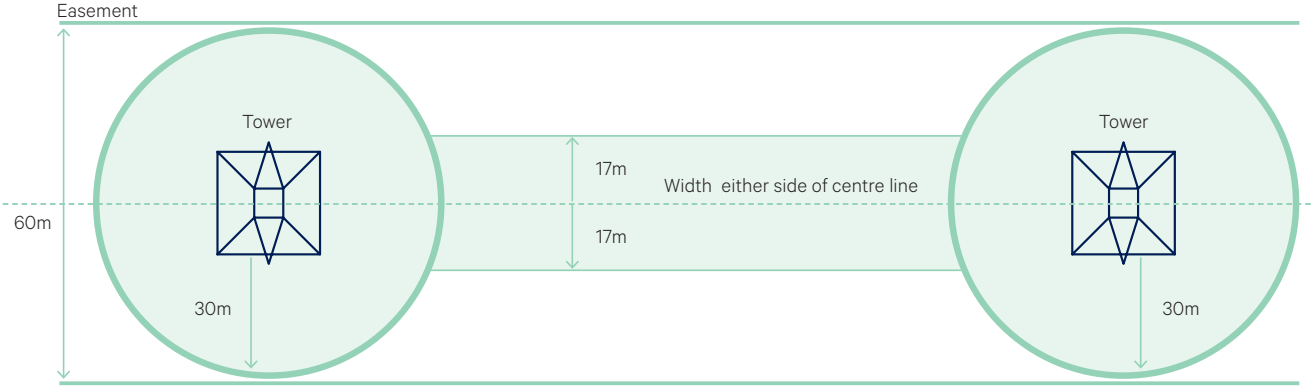


Figure 3: 220kV and above Exclusion Zone (Not to scale. Typical easement widths only. May vary on a case by case basis)

Is your proposal permitted within Transgrid easements?

If your proposal is described below and is outside the exclusion zone, no further permission from Transgrid is required.

Where your proposal within a transmission line easement will require development consent, the consent authority must still refer the development application to Transgrid. For this reason, we recommend you seek Transgrid's confirmation that your proposal is permitted within the easement before you lodge your development application with Council, by submitting an enquiry via Transgrid's online Easement Enquiries Portal.

Please note: Transgrid reserves the right to review each activity individually and apply controls on a case-by-case basis.

Transgrid will take into account public safety risks, and the safe operation, access and maintenance of Transgrid's electricity infrastructure.

If you are unsure whether your proposal is permitted, please contact Transgrid by submitting an enquiry via our online Easement Enquiries Portal.

The following activities where located outside the exclusion zone are permitted within Transgrid's easements:

Cropping and grazing, provided:

1. Machinery cannot extend more than 4.3 metres above ground level

Note: Exclusion zone requirements to be at least 10/17 metres from the centre of transmission lines do not apply to cropping and grazing, however all other exclusion zone requirements apply. Transgrid's Fencing guidelines must be complied with.

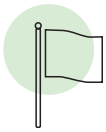
All other agricultural activities including irrigation, provided:

1. Machinery cannot extend more than 4.3 metres above ground level
2. All fixed metallic objects are earthed
3. Machinery, including irrigation, must remain outside the exclusion zone
4. No solid jet of water is to be within 4 metres of overhead conductors
5. Must use non-metallic piping
6. No fuel storage
7. No transmission line outages are required to undertake agricultural activities

Note: Transgrid's Fencing guidelines must be complied with.

Planting or cultivation of trees and shrubs, provided:

1. Mature plant / tree height is less than 4 metres



Short flag poles, weather vanes, single post signs, provided:

1. Height above ground is no greater than 4.3 metres
2. Non-climbable
3. All fixed metallic parts are earthed

Vehicle parking provided:

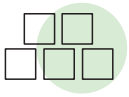
1. Height of vehicles no greater than 4.3 metres
2. No flammable liquid containers or carriers
3. Caravans are not occupied or connected (ie, temporary parking only)
4. All fixed metallic parts are earthed

Note: Lighting requires Transgrid's permission to meet height and electrical safety constraints.

Public open spaces, such as fields, cycle ways, walkways or fenced dog parks, provided:

1. No unmanned aerial vehicles (drones), kite flying or model aircrafts, and "warning signs" are installed
2. Any structures, obstructions, seating or features (such as picnic areas) are located outside the exclusion zone and do not block access tracks to transmission line structures or guy wires
3. Parallel roads, walking tracks, footpaths, cycleways and fenced dog parks are located outside the exclusion zone

Note: Roads, tracks, footpaths, cycleways and fences which propose to cross the transmission line as a thoroughfare, require Transgrid's permission.



Storage, provided:

1. No greater than 2.5 metres height
2. Stored material is non-flammable and non-combustible
3. Non-corrosive or explosive materials
4. No garbage, refuse or fallen timber or other material which could pose a bush fire risk
5. Metallic objects earthed

Operation of mobile plant and equipment, provided:

1. It cannot be extended more than 4.3 metres in height within easement
2. Equipment or plant do not encroach into Ordinary Persons Zone - please refer to the WorkCover NSW Work Near Overhead Power Lines Code of Practice 2006 (https://www.safework.nsw.gov.au/__data/assets/pdf_file/0020/52832/Work-near-overhead-power-lines-code-of-practice.pdf)
3. Work is carried out by accredited persons in accordance with WorkCover NSW Work Near Overhead Power Lines Code of Practice 2006 (https://www.safework.nsw.gov.au/__data/assets/pdf_file/0020/52832/Work-near-overhead-power-lines-code-of-practice.pdf)

Non-electric fencing and yards, provided:

1. No greater than 2.5 metre height
2. Fencing does not restrict access to Transgrid assets
3. Metallic fencing is earthed
4. Transgrid's Fencing Guidelines are complied with

Note: Parallel metallic fencing has specific safety risks and requirements under the Fencing Guidelines.

Domestic recreational activities including structures, provided:

1. Structures must not be identified as requiring Transgrid's permission or prohibited
2. Structures must be non-metallic and no greater than 2.5 metre height
3. Floor area no greter than 20m^2, where any portion is within easement
4. Not connected to electricity supply
5. Structures (including play equipment and BBQs) must remain outside the exclusion zone
6. No unmanned aerial vehicles (drones), kite flying or model aircrafts

What if my activity does not meet the permitted criteria or is not listed above?

You will need to seek Transgrid's permission so that we can assess potential risks to your safety and the electricity transmission infrastructure.

Does your proposal require Transgrid's permission?

If your proposal does not meet the permitted criteria, it may fall within the following categories which require Transgrid's permission. Further information about the process for seeking Transgrid's permission is provided below, under "How can I seek Transgrid's Permission?"

Transgrid reserves the right to assess each request for permission on a case-by-case basis, taking into account public safety risks, and the safe operation, access and maintenance of Transgrid's electricity infrastructure.

Transgrid may grant permission with conditions, or may refuse permission where the activity could put public safety or the operation of the transmission network at risk.

If your proposal is described below and is outside the exclusion zone, you will require Transgrid's permission:

Any proposal which falls within a "permitted" catgegory but does not meet the listed criteria

Detached garages, carports, sheds, stables, pergolas and unroofed verandahs where no practicable alternative exists, provided:

1. Structures are no greater than 4.3 metres height
2. Non-habitable
3. Metallic structures are earthed
4. Floor area no greater than 20m2, where any position is within easement
5. Power connection only permitted if electrically isolated in accordance with AS/NZS 3000:2018 Electrical installations outside easement

Sporting and recreational facilities, including tennis courts, basketball courts, playgrounds, exercise equipment provided:

1. Structures are no greater than 4.3 metres height
2. Metallic structures are earthed

Native plant or other nurseries, community gardens, provided:

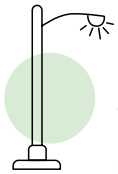
1. Mature plant / tree height is less than 4 metres
2. Structures are no greater than 4.3 metres height
3. Any fixed structures, including pumps, are located outside the exclusion zone
4. Metallic structures must be earthed

Mobile plant with a height greater than 4.3m, provided:

1. It is operated by accredited persons in accordance with WorkCover NSW Work Near Overhead Power Lines Code of Practice 2006 (https://www.safework.nsw.gov.au/__data/assets/pdf_file/0020/52832/Work-near-overhead-power-lines-code-of-practice.pdf)

In-ground swimming pools including coping, provided:

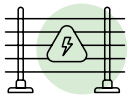
1. It is located at least 30 metres from transmission line structures or supporting guy wires
2. Must be located at least 15 metres from transmission line centre (132kV or below) OR 25 metres from transmission line centre (220kV or above)
3. Power connection only permitted if electrically isolated in accordance with AS/NZS 3000:2018 Electrical installations outside easement
4. Site specific assessment will be required by Transgrid



Lighting/external sources of power no greater than 4.3m height:

1. Non-climbable
2. Must be electrically isolated in accordance with AS 3000 outside easement

Note: Exclusion zone requirements to be at least 10 metres from centre of 132kV and below transmission lines or 17m from centre of above 132kV lines do not apply to lighting and external sources of power, however all other exclusion zone requirements apply.



Electric fencing, where:

1. Height is no greater than 2.5 metres
2. Must be located at least 30 metres from transmission structures or supporting guy wires
3. Transgrid Fencing Guidelines are complied with

Roads and pathways that cross the transmission line as a thoroughfare:

1. Where it is proposed that a road passes within 30 metres of a transmission structure or supporting guy wires:
   - Transgrid may refuse consent or impose additional restrictions and other conditions
   - The structure's earthing system may require modification to prevent fault currents from entering other utility services in the road. The option of raising conductors or relocation of structures, at the full cost to the proponent, may be considered
2. Transgrid may require additional protection (such as safety barriers) where there is a risk of vehicle impact
3. Intersections shall not be located within the exclusion zone

Low voltage utilities and services such as electricity, gas, telephone and water:

1. Not located within the exclusion zone (additional clearances apply to metallic services)
2. Parallel metallic services will require specific safety assessment
3. Additional design and safety requirements will apply

Excavation, quarrying and earth works, including dam and artificial lake construction, basins, swales, drains and dispersion channels, provided:

1. No more than 3 metres in depth
2. No generation of significant amounts of dust or smoke that can compromise the transmission line high voltage insulation
3. Must not raise ground level, or reduce clearances below that required in AS 7000:2010 Overhead line design
4. No ponding or water retention around Transgrid's structures
5. Batter no steeper than 1 in 6 where access is required by Transgrid vehicles

Any other change in ground levels that reduce clearances below that required in AS 7000:2010 Overhead line design:

1. Criteria assessed on a case by case basis

Use of explosives:

1. Criteria assessed on a case by case basis

Mining:

1. Criteria assessed on a case by case basis

Subdivisions (see Subdivision and Development Guidelines):

1. Criteria assessed on a case by case basis
2. Subdivisions that encourage unauthorised encroachments (for example, where the majority of usable outdoor space in a proposed lot is located within a transmission line easement), will not be permitted, due to public safety risks

Is your proposal prohibited within a Transgrid easement?

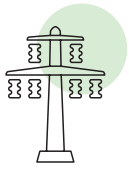
If your proposal is described below, it is prohibited from being carried out within any part of a transmission line easement.

This is due to the inherent risk to people, public safety, and to ensure the safe, reliable operation of the network.

Buildings, accommodation and structures:

1. Buildings or structures which are not listed as permitted or require Transgrid's permission
2. Construction of houses
3. Site construction offices or workshops
4. Camping or occupied caravans or other camping vehicles
5. Above ground pools

Fixed plant or equipments



Interference with transmission lines:

1. The placing of obstructions within 20 metres of any part of a transmission line structure or supporting guy wires
2. Placing any obstructions on access tracks or within the easement area that restricts access
3. Any structure whatsoever that during its construction or future maintenance will require an Accredited Person to access as per the WorkCover NSW Work Near Overhead Power Lines Code of Practice 2006 (https://www.safework.nsw.gov.au/__data/assets/pdf_file/0020/52832/Worknear-overhead-power-lines-code-of-practice.pdf)
4. The attachment of any fence, any signage, posters, or anything else, to a transmission line structure or guy wire
5. Any work that generates significant amounts of dust or smoke that can compromise the transmission line high voltage insulation
6. Movement of any vehicle or plant between tower legs, within 5 metres of a transmission line structure, guy wire or between a guy wire and the transmission pole
7. Kite flying or model aircraft within the easement, flying of remote controlled or unmanned aerial vehicles (such as drones), any manned aircraft or balloon within 60 metres of any transmission line structure, guy wire or conductor
8. Structures or objects that encourage or facilitate climbing (including working from vehicles)

Note: The final structure may meet AS7000 clearances, but may be accessible by Ordinary Persons within the Ordinary Persons Zone.

Storage of flammable, combustible, corrosive or explosive materials, garbage, refuse or fallen timber

Burning off or the lighting of fires

Unsafe work practices under Work Near Overhead Power Lines Code of Practice:

1. Any vegetation maintenance (such as felling tall trees) where the vegetation could come within the Ordinary Persons Zone as per the *WorkCover NSW Work Near Overhead Power Lines Code of Practice 2006*
2. Any activity (including operation of mobile plant or equipment having a height when fully extended exceeding 4.3 metres) by persons not Accredited or not in accordance with the requirements of the *WorkCover NSW Work Near Overhead Power Lines Code of Practice 2006*.

What about underground cable easements

Different risks and requirements apply near Transgrid transmission cables. For further guidance, please see the Working near Transgrid cables guidelines.

Underground cables are not obvious, and you may not know there is one located on your property. A Dial Before You Dig (DBYD) search is essential prior to any excavation works.

Given the nature of underground cables, all proposals within cable easements require Transgrid's permission.

Please note: Transgrid reserves the right to review each activity and apply controls on a case-by-case basis, taking into account public safety risks, and the safe operation, access and maintenance of Transgrid's electricity infrastructure.

How can I seek Transgrid's permission?

You can seek Transgrid's permission to carry out proposals within or adjacent to an easement via Transgrid's online Easement Enquiries Portal: https://www.Transgrid.com.au/being-responsible/public-safety/Living-and-working-withelectricity-transmission-lines

This should be done prior to lodging your development application or planning agreement application with your consent authority. Transgrid's permission is given as holder of the easement only, and does not constitute approval to carry out the activity or development.

Please check that your proposal is consistent with these Easement Guidelines before you seek Transgrid's permission, so that we can respond as efficiently as possible.

Your request for permission should include the following information:

Name of applicant and/or company or Council	✓
Street address and Lot-DP	✓
Description of proposal with height, depth and location of proposed activities/structures/ development and assessment of impact on transmission infrastructure	✓
Contact information including phone number, address and email address	✓
A detailed, legible and to-scale plan showing property boundaries, proposal and distance of proposal to Transgrid's easement and transmission line structures and guy wires (if applicable) For large scale subdivisions, a Site Plan showing all new access points and access ways to the easement and transmission line structures	✓
A three dimensional CAD drawing in 3D-DXF format Only if proposal changes ground levels	✓ Only if proposal changes ground levels

If we do not receive this information we may need to request further details from you, and this will delay your request for permission.

Transgrid has also prepared supplementary Technical Guidelines and Fact Sheets to provide additional information for specific activities:

- High voltage transmissions network fact sheet
- Electrical safety risks fact sheet
- Work near Transgrid cables
- Subdivision and development guidelines
- Fencing guidelines
- Working near Transgrid cables information brochure

These are available on the Transgrid website at www.Transgrid.com.au/being-responsible/public-safety/living-andworking-with-transmission lines.

If your proposal is complex (for example, master-planned subdivision), we recommend a meeting with Transgrid before you submit your application for permission. You can arrange this via our online Easement Enquiries Portal.

Can I use Transgrid's permission as part of my development application to Council?

Your consent authority is required to consult with Transgrid before granting development consent for proposals that impact transmission line easements, or where the proposal might adversely affect electricity infrastructure.

Consent authorities must take into consideration any comments made by Transgrid within 21 days of written notification of a development application.

If you have received Transgrid's permission, this should be included as part of the development application. This will enable the referral process to be as efficient as possible.

If you have changed your proposal, you will need to lodge another request for Transgrid's permission via our online Easement Enquiries Portal, as your original permission will no longer be valid. This may delay the development application process.

Seeking Transgrid's permission and applying for development consent are two separate processes.

Transgrid's permission does not allow you to carry out an activity nor does it guarantee development consent.

What if I build something without Transgrid's permission?

Please contact Transgrid to discuss on:

Telephone: (02) 9620 0515

Email: Easements&Development@Transgrid.com.au

Relocating or modifying infrastructure and interruption to transmission

Some proposals require modifications to existing electricity infrastructure or easements.

A contract may be needed with Transgrid where you will be required to pay Transgrid's costs, such as design and construction works.

You can make a modification enquiry with Transgrid's Infrastructure team at infrastructure@Transgrid.com.au or find further information on our website: https://www.Transgrid.com.au/what-we-do/our-network/connections-andmodifications/network-modifications/Pages/default.aspx

You will also be responsible for any costs incurred as a consequence of interruptions to Transgrid's transmission operations arising from the development.

Contact Transgrid

If you are uncertain or require further information regarding works around or in Transgrid easements, please contact us via our online Easement Enquiries Portal: https://www.Transgrid.com.au/being-responsible/public-safety/Living-andworking-with-electricity-transmission-lines

You can also reach us by contacting:

Telephone: (02) 9620 0515

Email: Easements&Development@Transgrid.com.au

Transgrid

Find out more at:
Telephone: 1800 222 537
www.transgrid.com.au

Bianca Thornton

From: Cornelis Duba <Cornelis.Duba@endeavourenergy.com.au>
Sent: Tuesday, 12 October 2021 7:04 PM
To: Bianca Thornton
Subject: NSW Planning, Industry & Environment Request for SEARs SSD Eastern Creek Recycling Ecology Park MP06_0139-Mod-9
Attachments: EE CNR-28361 BLACKTOWN DA-21-01557 RE 1 KANGAROO AVENUE EASTERN CREEK.pdf; EE General Restrictions OH Power Lines Apr 2020.pdf; EE General Restrictions for UG Cables March 2020.pdf; EE FPJ 6007 Technical Review Request Aug 2019.pdf; EE Drawing 86232 OH lines minimum clearances.pdf; SW08773 Work near underground assets.pdf; SW Work near overhead power lines.pdf; ENA EMF What We Know.pdf; EE Safety Plumbing.pdf; EE Safety on the job.pdf; EE MDI0044 Easements and Property Tenure.pdf; EE Guide for Padmount Substations.pdf

Hello Bianca

I refer to the your below email of 7 October 2021 regarding the request for the Planning Secretary's Environmental Assessment Requirements (SEARs) for State Significant Development (SSD) Eastern Creek Recycling Ecology Park (REP) Mod 9 - Western Operational Area for expansion of the operational boundary of the site to relocate existing waste processing activities, including two new buildings, an extension of the road network and new hardstand area at 1 Kangaroo Avenue, Eastern Creek (Lots 1 and 2 DP 1145808 and Lot 2 DP 1247691) in the Blacktown City Council Local Government Area (LGA). Submissions needed to be made to the Department by 20 October 2021.

Endeavour Energy would expect that the Planning Secretary would require the applicant to address utilities as a key issue in the future Environmental Impact Statement, with the following being an example of the 'Utilities' section for other recent notifications received by Endeavour Energy from the Department.

14. Utilities

- In consultation with relevant service providers:
  - assess of the impacts of the development on existing utility infrastructure and service provider assets surrounding the site.
  - identify any infrastructure upgrades required off-site to facilitate the development and any arrangements to ensure that the upgrades will be implemented on time and be maintained.
  - provide an infrastructure delivery and staging plan, including a description of how infrastructure requirements would be co-ordinated, funded and delivered to facilitate the development.

The following is a combination of the various requests for SEARs for other State Significant Development referred to Endeavour Energy which attempts to capture are the possible 'Utilities' related matters.

Prepare an Infrastructure Management Plan in consultation with relevant agencies / authorities to:

- *address the existing capacity of the site to service the proposed development and any extension or augmentation, property tenure or staging requirements for the provision of utilities, including arrangements for electrical network requirements, drinking water, waste water and recycled water and how the upgrades will be co-ordinated, funded and delivered on time and be maintained to facilitate the development; and*

- *identify the existing infrastructure on the site or within the network which may be impacted by the construction and operation of the proposal and the measures to be implemented to address any impacts on this infrastructure.*

Endeavour Energy believes that either of the foregoing would adequately require the applicant to investigate and address in utilities required for the State Significant Development.

Please find attached a copy of Endeavour Energy's submission made on 29 September 2021 via the NSW Planning Portal regarding NSW Government concurrence and referral request CNR-28361 for Blacktown City Council Development Application DA-21-01557 at 1 KANGAROO AVENUE EASTERN CREEK 2766 (Lot 2 DP 1247691, Lot 1 DP 1145808) for 'Subdivision of site, creation of a pad site for future development, stormwater and civil works, landscaping'. The recommendations and comments provided therein are also likely to be applicable to this Development Application.

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 in the attachment 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.

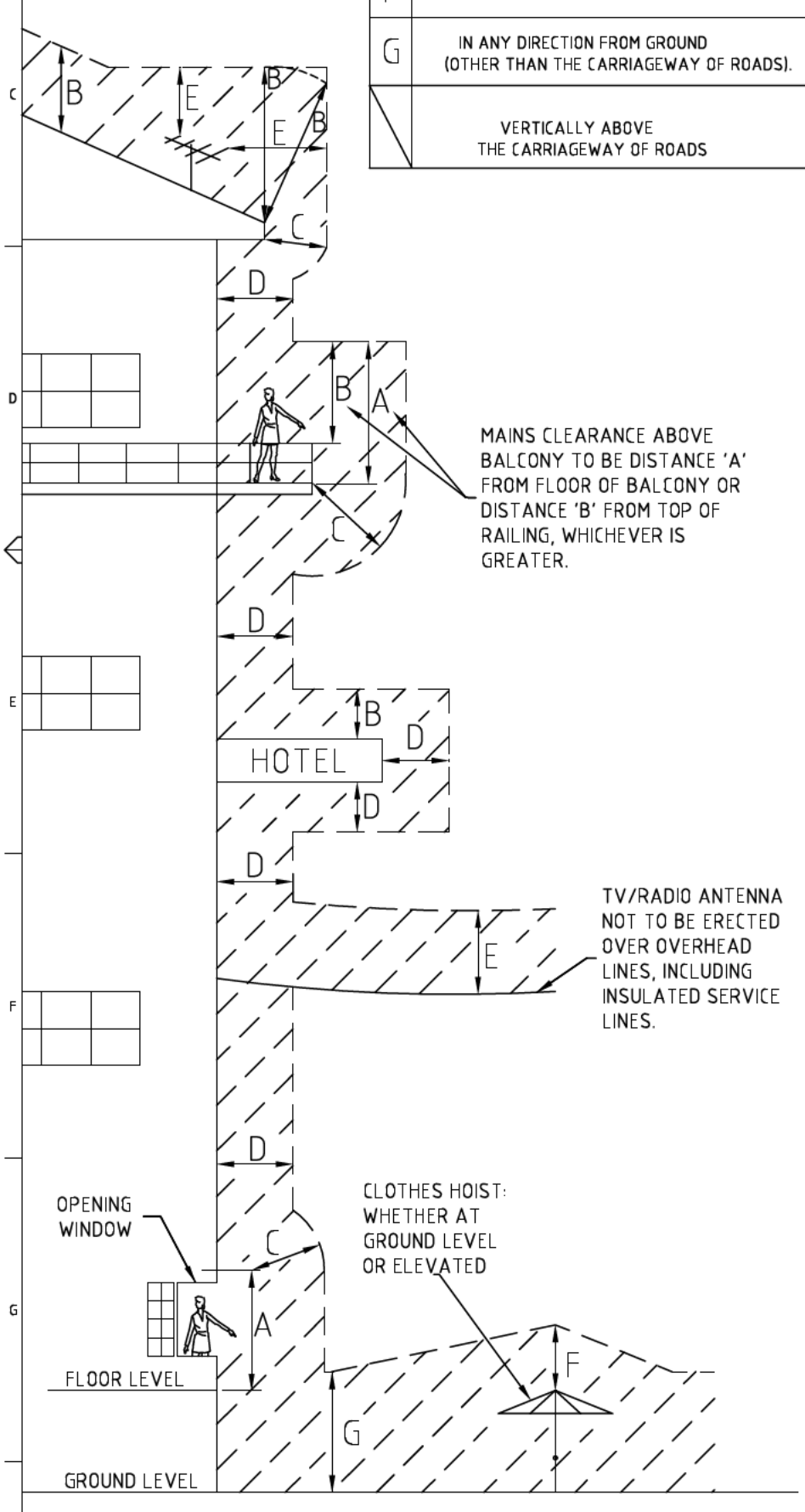
With the COVID-19 health risk a significant number of Endeavour Energy staff are working from home. Access to emails and other internal stakeholders can accordingly be somewhat limited. As a result, it may sometimes take longer than usual to respond to enquiries. Thank you for your ongoing understanding during this time.

Kind regards
Cornelis Duba
Development Application Specialist
Network Environment & Assessment
M: [redacted]
E: cornelis.duba@endeavourenergy.com.au
51 Huntingwood Drive, Huntingwood NSW 2148
www.endeavourenergy.com.au

AMENDMENTS	
A	ORIGINAL ISSUE
J R No.	NA
B	DR'N C.R.T.; CH'D C.R.T.; DATE 16-2-95; JR No 930208
REDRAWN: OH SHEET	
SEQ	C.H.B.
C	DR'N C.R.T.; CH'D C.R.T.; DATE 13-7-95; JR No 950099
TABLE AMENDED.	
SEQ	C.H.B.
D	DR'N C.R.T.; CH'D C.R.T.; DATE 15-8-96; JR No 950156
INTEGRAL WAS PE, SHEET WAS A2.	
MPDO	CHB
E	DR'N C.R.T.; CH'D C.R.T.; DATE 03-3-97; JR No 950156
VOLT BANDS REVISED	
MPDO	CHB
F	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).

ORIGINAL SCALE NONE

APPROVED C.BROWN

Endeavour Energy

REFERENCE DRAWINGS

DO NOT SCALE DIMENSIONS IN MILLIMETRES

AUTHORISED W.ISLEY

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

Endeavour Energy OVERHEAD LINES MINIMUM CLEARANCES NEAR STRUCTURES

MGR TRANSMISSION MAINS 16-2-95

A2P 086232 K

SHEET No 1 OF 1 SHEETS

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

Last reviewed 10/3/2020

Underground Cable Easement Approved Conditions

It should be noted that the points below are guidelines only and **written permission** must be sought for any activity within the easement area. Approval is subject to agreement in writing within 45 days to the following conditions:

- Before any excavation activities commence onsite, current **'Dial before You Dig'** (DBYD) underground services location plans should be obtained and studied. Contact DBYD on 1100.
- All work within easements must be conducted with extreme caution. WorkSafe NSW (formerly WorkCover) guidelines 'Working near Underground Assets' are to be followed.
- See ***Table B Matrix*** **page 4 below.** When excavating in vicinity of our underground electrical assets.
- All workers must be advised of the existence of the underground cables and easement restrictions.
- For cable or pipe locations and their depths, contact an accredited underground asset locator before works commence.
- The exact location of underground electrical assets likely to be affected shall be confirmed by use of an electronic cable locator followed by careful non-mechanical excavation to the level of conduits. Non-mechanical excavation (potholing using hydrovac or hand tools) must be used in advance of mechanical excavation to expose and locate all known conductors whilst adhering to the distances shown in Table B of the 'Work Near Underground Assets Guide'.
- An Accredited Service Provider ASP Level 3 ***SURVEY*** of the existing underground easement must be obtained, indicating the route, length and depth of the underground cables and must be displayed. This must also include the existing depth prior to work, and the proposed depth of the cabling after the works are performed. All works must comply with Endeavour Energy's Standards. See *EE's ASP Portal:* https://www.endeavourenergy.com.au/aspPortal/webengine/au/com/ee/asp/login/Login

Any cutting or filling of the land is a safety concern and requires an assessment. The required coverage above the cabling must be maintained throughout the easement. Any additional fill can compromise the maximum current cable rating capacity.

- Should the cable ducts or warning tape be exposed (damaged), all work is to ***STOP***. Notify Endeavour Energy ***131 003*** immediately. No work will recommence until a full inspection is conducted.
- No other service utilities are permitted within the underground easement, including stormwater, drainage, water & tap pipes or gas pipework, including temporary electrical supply etc.

- All conditional approvals granted, are subject to any encroachment being removed or relocated at the Owners expense should Endeavour Energy require this for cable maintenance, construction or emergency service works.
- Unimpeded 24hour / 7day a week access must be available to our electricity assets.
- Concreting over the cable easement is acceptable providing the ground cover is not reduced.
- If excavation is required due to an unsuitable sub-base, then details of a safe work method statement (SWMS) is required to be submitted and agreed to by Endeavour Energy prior to the excavation taking place.
- The planting of trees or the cultivation of shrubs with extensive root systems will not be permitted within the easement area. However, the planting of small shrubs and tilling of soil with a maximum root system 400mm deep may be considered in underground easements, except within 2 metres of joint bays, surface installations, cable marker plates and posts.
- The placing of garbage, timber or debris is not permitted within the easement area.
- The parking of vehicles within the easement area will normally be permitted provided that an adequate surface exists capable of supporting the vehicles weight likely to be parked, thus preventing the crushing of the cables or affecting the current cable rating.
- Approval will normally be given for the operation of mobile plant and equipment within the easement area. This is provided if an adequate surface exists capable of supporting the plant or equipment thus preventing the crushing of the cables. If a suitable surface does not exist, approval may be given subject to the activity being supervised by Endeavour Energy at either the developer or operator's expense.
- Any driveway where it crosses the easement for underground cables is to be constructed with reinforced concrete of not less than 200mm thick and sustain a 30tonne truck.
- All digging / excavation work is to be carried out by hand or toothless bucket and will be considered on an individual basis.
- No mechanical compaction of the concrete over the easement is to be conducted. Any compaction should only be carried out using static rollers.
- The erection of structures spanning the easement is not permitted. Consideration will be given if no other practicable alternative site is available, the cables will be required to be installed in ducts and if deemed necessary, concrete encased. Spare ducts may also be required to meet future cable requirements. The above works would be at the applicant's expense.
- The placing of 'fill' within underground easements is not usually permitted. However, consideration will be given on an individual basis after an investigation by Endeavour Energy.
- Approval for reduction in ground cover over underground cable easements will only be considered if the depth of the cable / ducts exceeds minimum design requirements.

- Approval for concrete driveways is subject to the driveway being capable of supporting the heaviest vehicle likely to traverse it and the cables are to be installed in ducts and, if deemed necessary, concrete encased. Spare ducts may be required to be installed to meet future cable requirements with installation being at the owner's expense.
- All conductive fencing must not encroach within the underground easement and must be earthed in accordance with AS3000. If the fence bisects the easement, the fence posts are to be placed outside the easement area. This also includes metallic bollards, Armco railing, star posts, sign posts, flag poles, fixed ground clothes hoists, pipe work or RIO – reinforcement, metallic tap components etc.
- Pools & Spas including pumps, skimmer boxes, coping or the like, are not permitted in easements.
- Domestic recreation activities are usually permitted within the vicinity of the easement.
- The storage of non-flammable materials may be considered provided that the land owner can demonstrate that removal of such material can be achieved in a reasonable time frame.
- The construction of buildings over the underground easement area is prohibited.
- Retaining walls are not permitted within the easement area.
- The storage of flammable, combustible, explosive or corrosive materials within the easement area is not permitted.
- It should be noted that these are guidelines only and **written permission** must be sought for any activity within the easement area.
- Endeavour Energy maintains the rights of the easement to have any structure or thing removed at cost to the Owner, for electrical maintenance, upgrades, emergency purposes or for any WH&S work health and safety concerns.
- The concreting requirements for the hardstand and the driveway crossing over Endeavour Energy's Easements are:

  Residential: 30mm sand base, one layer of F72 mesh on bar chairs, and 100mmm of 20MPA concrete.

  Commercial: 100mm road base, two layers F72 mesh on bar chairs, and 200mm of 32MPA concrete. *The base can be rolled but must not be compacted by mechanical devices, such as small plate compactors.*

  NOTE: *Any concreting over Endeavour Energy's Underground Easement's must also contain a concrete cut (expansion joint) along the easement line for future removal, if required.*

  Furthermore, the information above is not exhaustive and subject to change. It must be read in conjunction with Endeavour Energy's Easements and Property Tenure standard **MDI 0044.**

  Please review the above conditions and include those relevant to your proposal with the requested *SURVEY.* Send to easements@endeavourenergy.com.au for assessment.
  Thank you

Assets	Clearances	No Go Zone For Powered Excavation	Controls	Typical Depths
High Pressure services, mains and pipelines	**300 mm** with hand tools and supervision from Network Authority	**1000 mm**	Powered excavation within 300 – 1000 mm is only permitted under supervision and with a Permit to Work from Asset Owner Also see **Controls** for medium pressure mains immediately above	**750 – 1200 mm**
Low Voltage Electricity cables – voltages less than or equal to 1000V (1kV)	Close proximity with use of hand tools	**300 mm**	Must contact asset owner for specific conditions	**450 – 750 mm**
Electricity conductors from 11,000V (11kV) up to 33,000V (33kV)	Close proximity with use of hand tools	**600 mm**	Must contact asset owner for specific conditions	**900 mm**
Underground sub-transmission cables 33,000V up to 132,000V (132kV)	Must contact asset owner	Must contact asset owner	Must be carried out under the supervision of the asset owner	**900 mm**
High Voltage Electricity cables – voltages from 1000V (1kV) up to 33kV	Close proximity with use of hand tools	Must contact asset owner	Must contact asset owner for specific conditions	**600 – 1000 mm**
Extra High Voltage Electricity Transmission cables – voltages above (132kV) and 330,000V (330kV)	Must contact asset owner	Must contact asset owner	Work must be carried out under the supervision of the asset owner	**800 – 1200 mm**
Telecommunications cables	Contact asset owner for specific conditions	Contact asset owner for specific conditions	Must contact the asset owner for specific conditions	Typically **450 – 600 mm**, other assets to **1200 mm**
Water pipelines	N/A	**300 mm** (if pipeline is **200 mm** or greater in diameter)	Pot-hole to confirm location of asset	Min **450 mm**
Sewerage pipelines	N/A	**300 mm** (if pipeline is **200 mm** or greater in diameter)	Pot-hole to confirm location of asset	Between **600 mm** to **10 (ten) metres**

Last updated 7/4/2020

General Restrictions for Overhead Power Lines

Endeavour Energy wishes to provide the following list of 'General Restrictions' applicable to the **'Easement Area'**. It should be noted that these are indicative guidelines only and that this information should be administered in conjunction with the requirements of the Work Health and Safety (WH&S) Act and WorkSafe NSW (formerly WorkCover) legislation.

Endeavour Energy recommends a policy of **'prudent avoidance'** be adopted in relation to the use of the easement area for ongoing staff activities or work areas. Additionally, WH&S and WorkSafe legislation should be consulted in relation to this matter.

As existing ground levels throughout the easement are unknown, it is assumed that minimum design clearances exist within the easement area. As such, references to permissible heights on any activity may alter from that stated within this document. **Written approval** must be sought for any activity within the easement area. For such approval, detailed plans drawn to scale, and fully dimensioned showing property boundaries and other relevant information should be forwarded to Endeavour Energy.

Approval to encroach into the easement area will not be granted where an alternate site clear of the easement area exists. All approvals granted are subject to the encroachments being removed or relocated; at the owner's expense should Endeavour Energy require this for cable maintenance, construction or emergency works.

Should any earthing be disturbed whilst work is being carried out, all work should immediately cease, and Endeavour Energy notified so that the earthing can be reinstated.

1. Construction of *habitable* buildings (permanent or temporary) e.g. Houses, site-sheds with sleeping quarters, shipping containers, other substantial structures or parts thereof, includes eaves, guttering and footings, *shall not be erected within the easement area.*

1a. *Non-habitable* buildings will be considered if no other sites available. They must be earthed as per Endeavour Energy's 069575.dwg. The building cannot have electrical power connected, or store corrosives, explosives, combustibles or flammables. The building cannot exceed 2.5m height.

2. No encroachment into an overhead Transmission easement will be permitted within 10 metres of the closest steel structure and 5 metres of the closest pole.

2a. No encroachment into an overhead Distribution easement will be permitted within 5 metres of the closest pole.

3. Changes to ground levels within the easement area are not permitted without the prior written approval of Endeavour Energy. Applications are to be supported by a geo-technical report prepared by a civil engineer.

4. **Statutory clearances to the conductors must be kept always**.

   It should be noted that power lines are designed to allow for sag and swing sideways, consequently allowance for this needs to be considered always. The statutory clearance from 0 kV to 132 kV conductors is minimum 3 metres, in all directions, always. This clearance also applies but not limited to; persons, vehicles, hand tools, equipment, cranes, lifting gear, plant and load. Consideration needs to be given and the clearances increased where there is the likelihood of any inadvertent movement or swinging of the plant, crane, load or lifting gear towards the power lines.

5. Construction of roads, car and truck parking areas, and subdivisions will only be considered for approval if access to the structures is maintained and the layout is such that; sufficient building area is left clear of the easement, it will not create numerous utility crossings or later requests for encroachments.

6. If required, for Endeavour Energy to carry out the necessary calculations, the applicant must submit a Centre Line Profile, a recent survey, showing the following information:

REQUIREMENTS FOR PROFILE CLEARANCE TO TRANSMISSION LINES

Note: Clearances cannot be determined and will not be processed unless all the required information is submitted i.e. *Current levels **and** Proposed levels.*

THE INFORMATION TO BE SUPPLIED:

- In AutoCAD Format.
- Have a vertical exaggerated scale of 10:1. E.g. Horizontal Scales 1:1000 Vertical Scale 1:100 or Horizontal Scale 1:500 Vertical Scale 1:50.
- Information on the paper size that the drawing needs to be printed at for the scale to be correct e.g. Horizontal Scale 1:1000 Vertical Scale 1:100 when printed on A2.

THE CENTRE LINE PROFILE SURVEY IS TO INCLUDE ALL OF THE FOLLOWING INFORMATION:

- Lot and DP number of property.
- Clearly marked easement width.
- Total length of the conductor span affected.
- Conductor attachment height reading at each structure.
- Existing RL (Natural Ground Surface) and Final readings at the base of each structure.
- Indicate pole or structure identification numbers.
- Date, Time and Temperature at the time of each height reading taken.
- A height reading is required every 10 metres on the conductor closest to the ground of the Existing RL or as the terrain dictates for the entire span.

Note:

- The amount of distance required for each reading may be reduced on poles with smaller spans.

- Other information may be required where the structures are strained, or changes of direction occur on pole lines.

7. A second survey may be required upon completion of work.

8. Vehicles with elevating or extending components such as earth moving vehicles, concrete pumping vehicles, loaders, fork lift trucks, tip trucks, cranes, including Derrick style cranes and hoists, Hiabs, Palfingers including others, and are not to proceed under the conductors until such components are returned to the travelling position.
Note: Concrete pumping vehicles are not permitted to operate within an easement for electricity purposes.

9. Vehicles, plant or equipment having a height when fully extended that exceeds 4 metres shall not be brought onto an easement area without the prior written approval of Endeavour Energy.

10. The area within the easement is not to be used for the loading or unloading of trucks.

11. No soil or other material is to be stored, loaded or unloaded within the easement area.

12. The area within the easement is not to be used for storage or stacking of goods or materials, especially flammable or explosive material.

13. Application for approval for the erection of non-climbable flagpoles, CTV cameras, security lighting, weather vanes, signs and the like might be granted, subject to a height limitation of 4 metres and the earthing of all metallic parts.

MINIMUM APPROACH DISTANCES OF PLANT AND LOADS TO LIVE ELECTRICAL APPARATUS (FOR NON-AUTHORISED PERSONS)

NOMINAL VOLTAGE	MINIMUM APPROACH DISTANCE
Not exceeding 132,000V	3 metres
Above 132,000V but not exceeding 330,000V	6 metres
Above 330,000V	8 metres

Caution: *The operator of the plant must be able to identify the voltage level of the apparatus that they are approaching with the plant or assume 8 metres as a minimum.*

14. Extreme caution is to be observed when working within easements and around any structures, poles or wires including overhead or underground.

15. Dial Before You Dig service plans are required to check for underground utilities prior to any excavations works. Contact 1100 for assistance.

16. All personnel are to be advised of the hazards of working near high voltage overhead or underground wires.

17. All machinery or plant within an electricity easement is to be operated by adequately trained and accredited persons.

18. Endeavour Energy recommends the use of a suitably trained safety observer when work is being carried out within the easement area.

19. A hazard identification and risk assessment should be carried out within the easement area. A safe work method statement should be provided for any work carried out within the easement area. All staff should be briefed regularly, or when there are any changes, as to the contents of the risk assessment and safe work method statement.

20. For the attention of staff and visitors to the site and to ensure constant vigilance, Endeavour Energy recommends that clearly visible safety signs be erected, in accordance with the relevant safety standards, alerting attention to the transmission lines and associated hazards.

21. Flammable, combustible, corrosive or explosive materials, including gas bottles, are not permitted within the easement area. Flammable liquid carriers shall not be placed within the easement area.

22. Garbage, refuse or fallen timber is not permitted within the easement area. Burning off is not permitted within the easement area without the prior written approval of Endeavour Energy.

23. Any metallic fencing within the easement shall require earthing and isolating in accordance with the Australian Standards as per AS3000.

24. Structures such as detached garages, sheds, stables, carports, unroofed veranda's, shipping containers, water tanks, fixed plant and equipment, will only be considered for approval if no other practicable alternative site is available clear of the easement area.

24a. No approvals will be granted for any of the above where they are proposed within the minimum clearances.

24b. No access is to be restricted whilst maintaining safety clearances always.

24c. Furthermore, any proposed structures must not exceed 2.5 metres in height if climbable and 4.3m if not climbable.

***Please Note**: - Due to effects of induction and possible lightning/line fault step and touch potential, requests for pools, spas, open water features and some water tanks inside the easement will not be approved.*

25. Installation of utility services, such as power, telephone, gas, water and sewerage (overhead, underground, or on the surface) may be considered for approval by Endeavour Energy's Overhead and Underground Mains Manager. Proposed site dimensions in relation to assets are required.

26. Trees, plants or shrubs with a *mature height* that do not exceed 3 metres may be planted within the easement area provided they are no closer than 5 metres from the nearest structure (i.e. pole or tower). Mature trees must be a minimum 3 metres from the vertical projection of the nearest conductor (i.e. overhead power line). No plants are permitted in an area where they may obstruct access.

27. Dogs and livestock shall not be kept within the easement area if they are likely to create a dangerous situation for Endeavour Energy staff and thus restrict access.

28. Normal agricultural pursuits are permitted however, care should be taken when ploughing or operating mobile machinery near structures or supporting guys. Earthing systems are particularly prone to damage from such activities. It is imperative that access to the easement area and structures be available always. Whilst reasonable care will be taken, Endeavour Energy will not be responsible for any damage to crops caused whilst accessing and working within the easement area. The restrictions applying to the heights of mobile plant and equipment must be observed.

29. 24-hour 7 day a week access is required to the easement for emergency and maintenance purposes. Any locked gates are to have an Endeavour Energy lock incorporated in the locking system. Please contact Integrity Locking 1300 366 488 for details.

In addition to the above, details of some fencing restrictions are provided for your information. Written approval must be sought prior to the commencement of any work.

A. Brick, masonry walls or other substantial structures or parts thereof shall not be erected within the easement area.

B. All other types of fencing erected within the easement area are subject to a height limitation of 2.5 metres.

C. Fences must not encroach 5m of any asset without written permission.

D. The erection of any fencing is not permitted in a location that could create an unsafe working area for Endeavour Energy staff.

E. All metallic fences are required to be earthed and isolated in accordance with Endeavour Energy's specifications or Australian Standards AS3000.

F. Gates (4.2m wide) are required in boundary fences to facilitate longitudinal access to the easement area and associated structures by truck. All access gates are to include Endeavour Energy locks in the locking system. Please refer to the above point 29.

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:

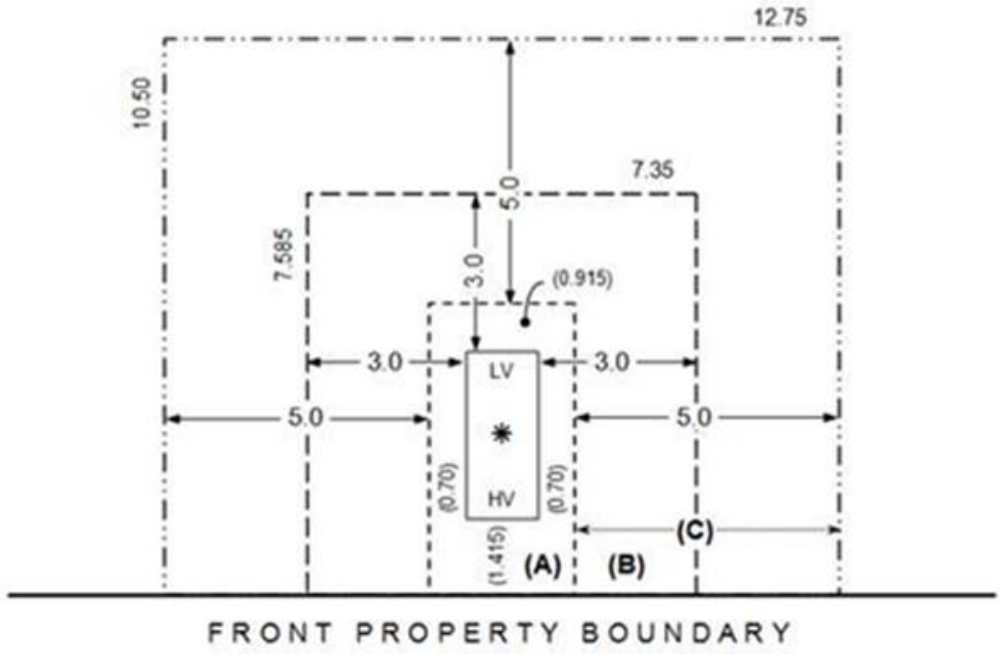
- Remove or spray all vegetation with a non-toxic grass and weed deterrent;
- Remove all foreign objects leaving the easement in an approved and level state;
- Form up the easement perimeter with treated timber minimum 75-100mm deep;
- Followed with the laying of a suitable porous weed mat; and
- Then 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.

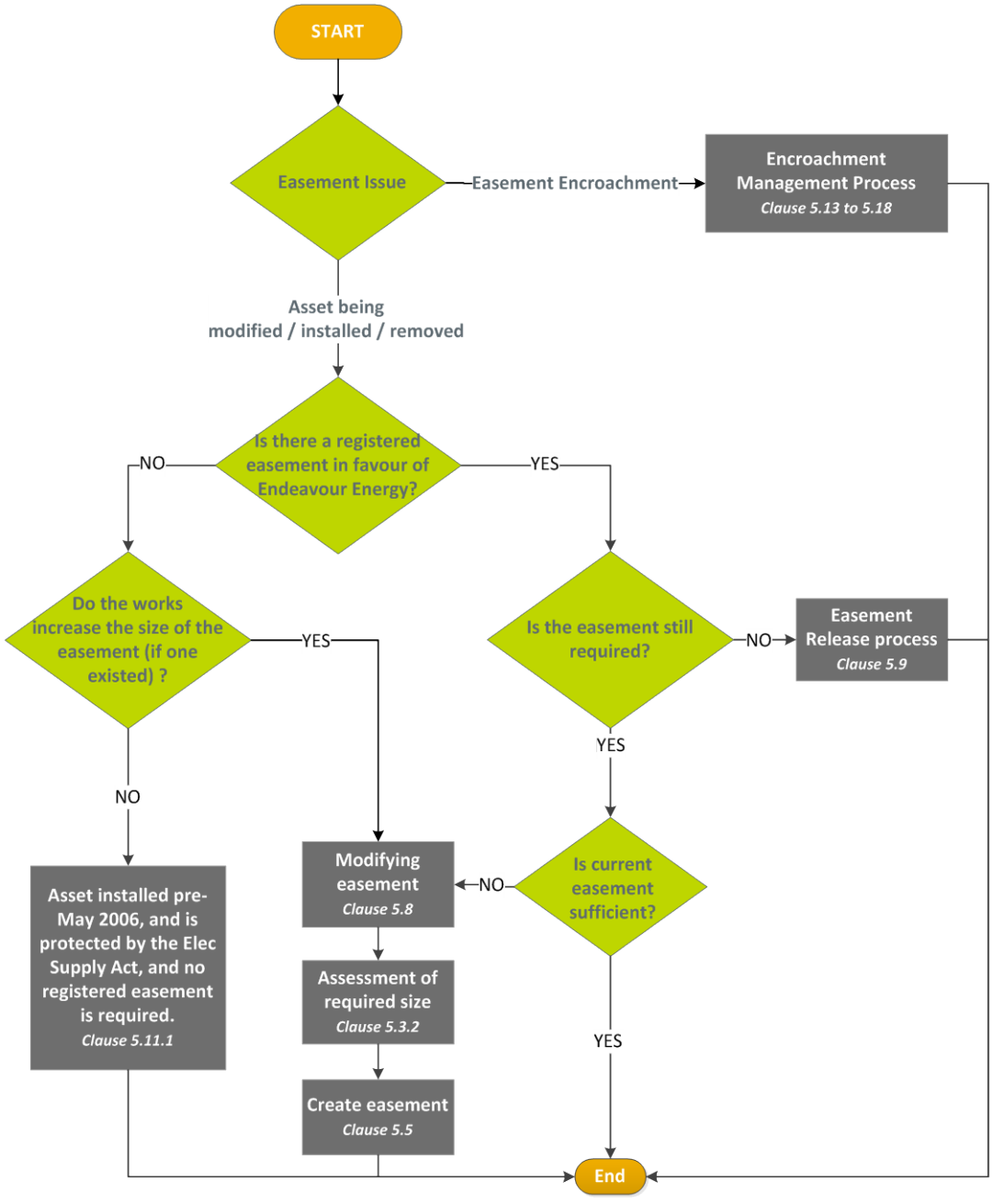


Figure 1 - Easement Management Flowchart

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.

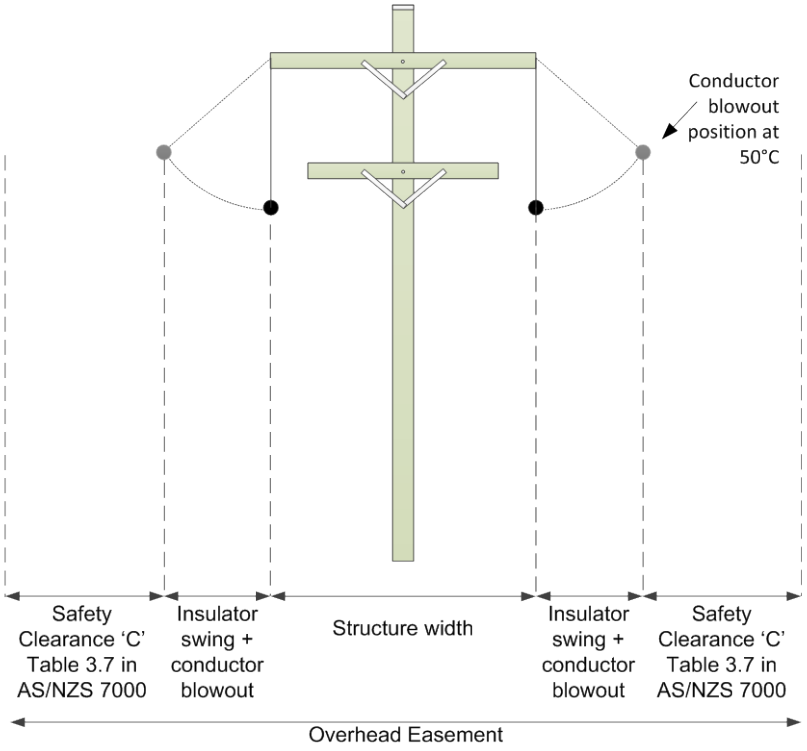


Figure 2 - Minimum overhead easement

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.

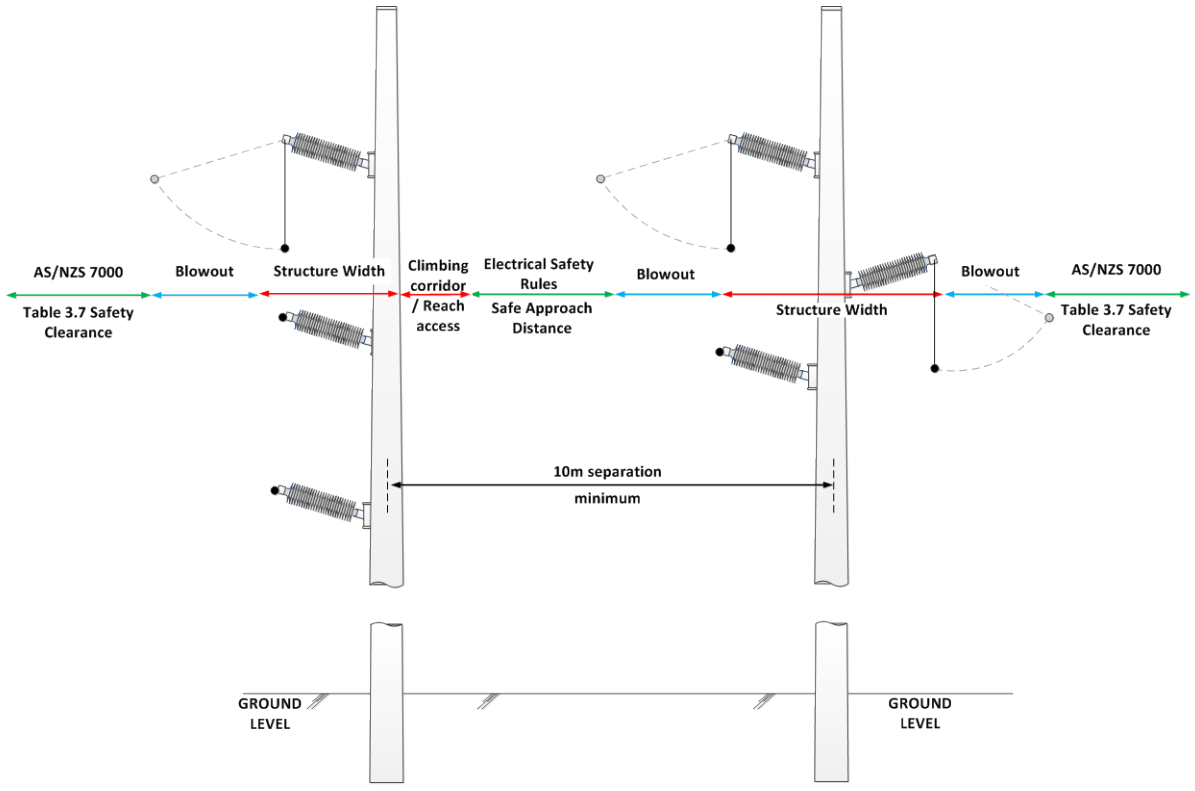


Figure 3 – Easement requirements for parallel feeders
(Structure on the right assumed to have the greatest conductor blowout)

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.

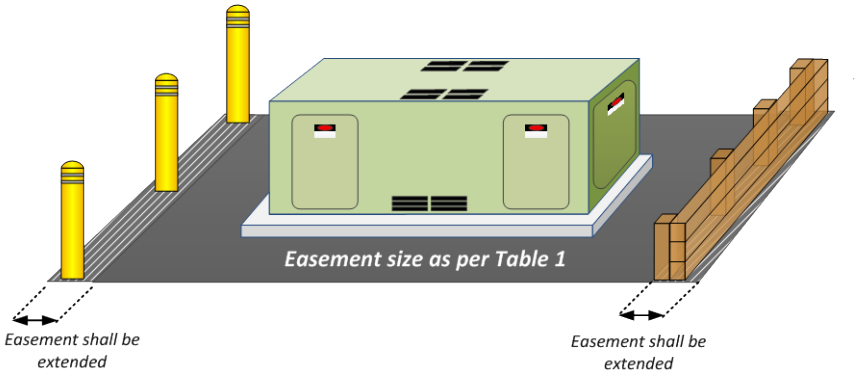


Figure 4 - Easements to include retaining wall or safety bollard

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.

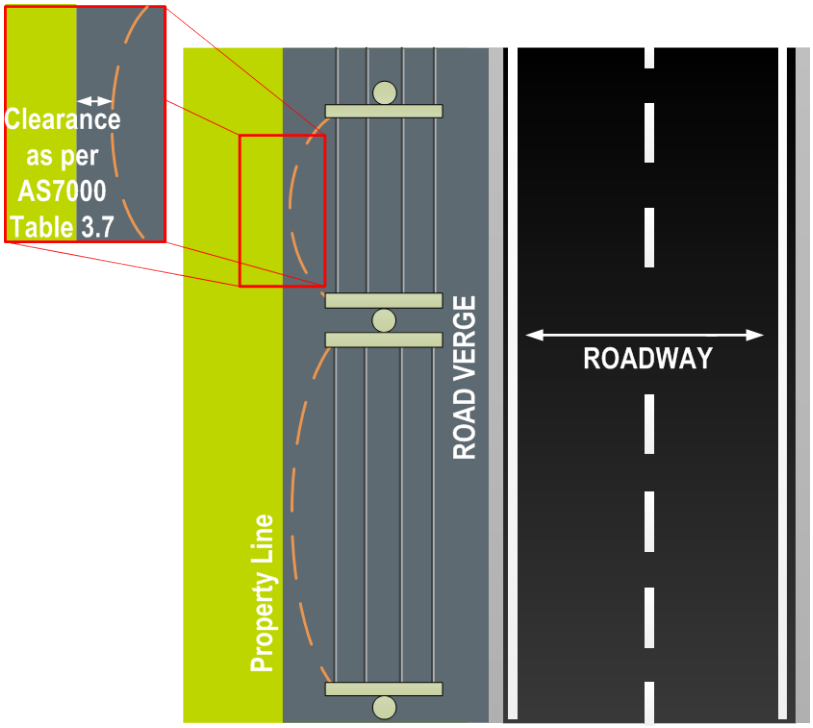


Figure 5 - Roadway requirements

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.

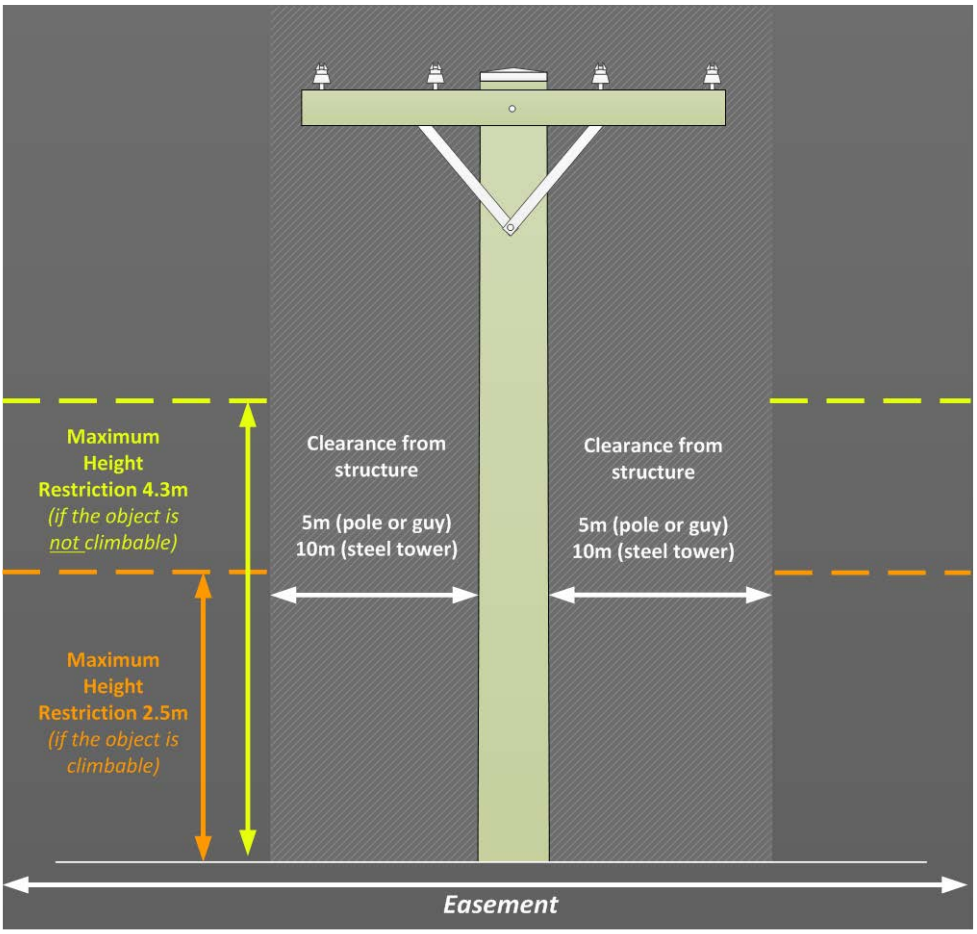


Figure 6 - Overhead line restriction within easement

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.

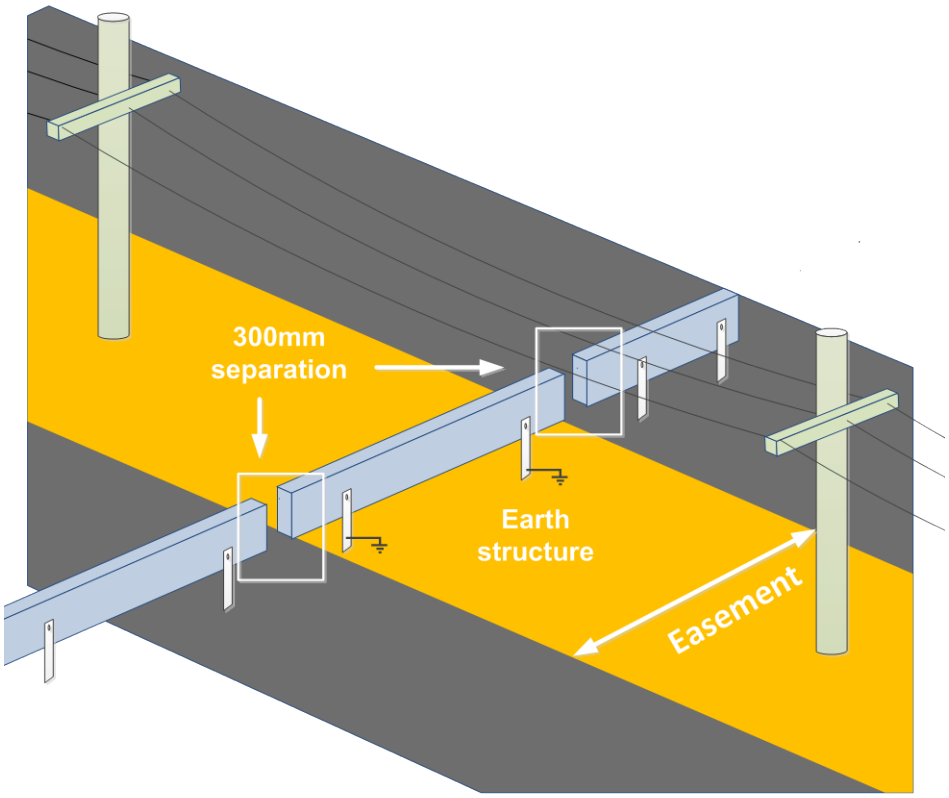


Figure 7 - Safety Barrier Requirement

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.

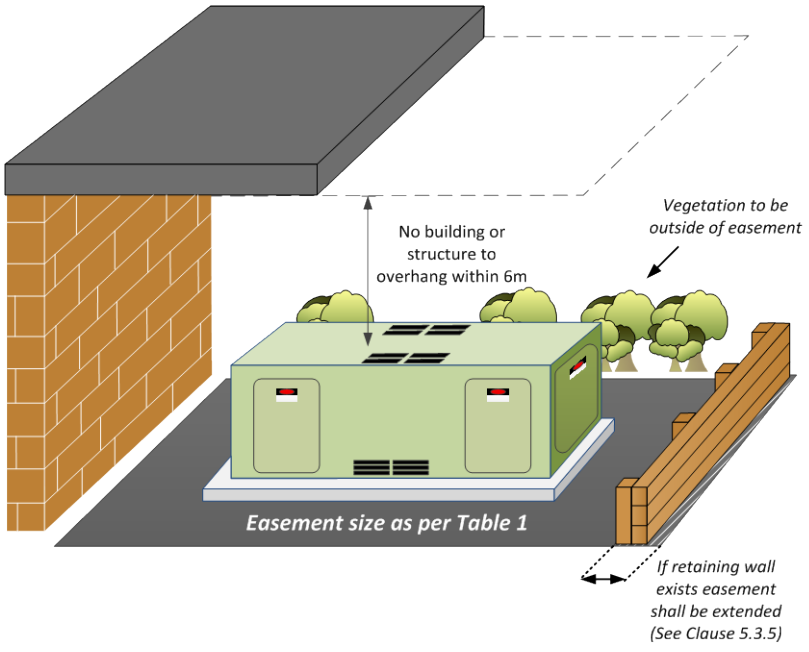


Figure 8 - Padmount Substation Easement Requirements

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

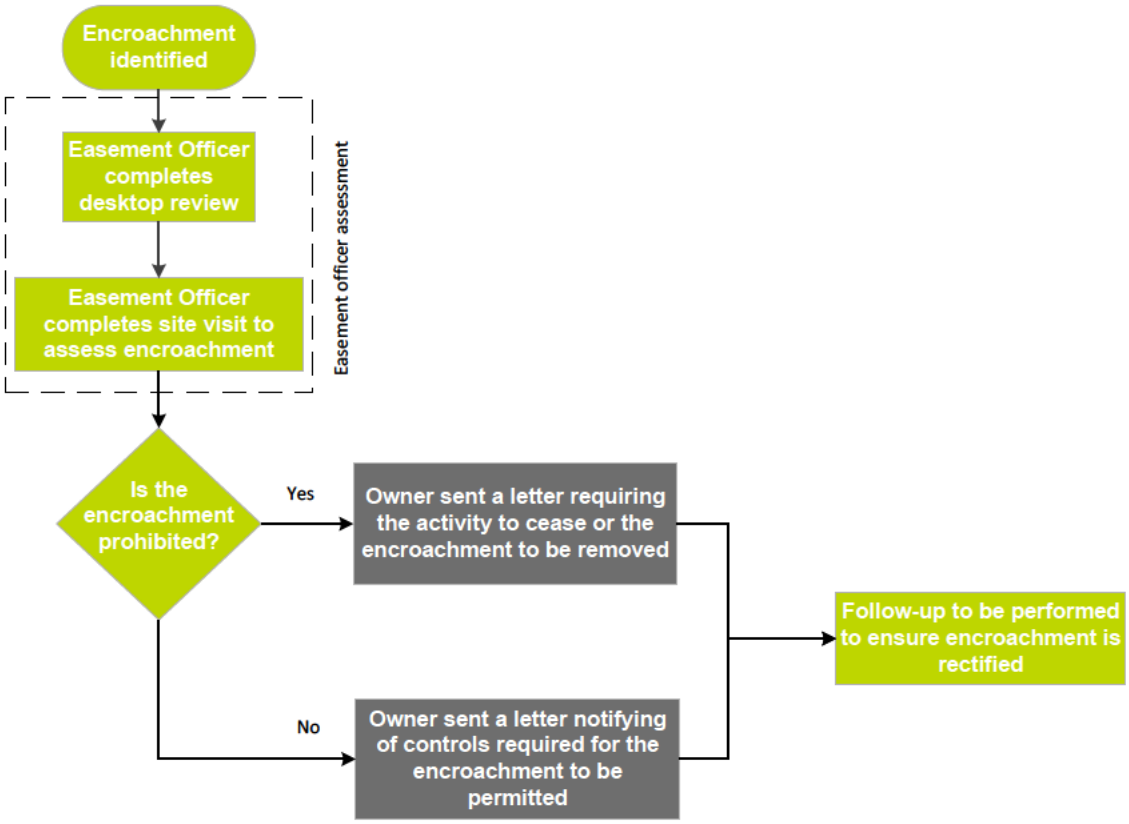
In addition to all requirements stipulated in this standard the risk of transfer earth hazards associated with Endeavour Energy's assets and/or equipment, structures or objects must be managed in accordance with SDI 100 "Distribution earthing design, construct and test".

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.

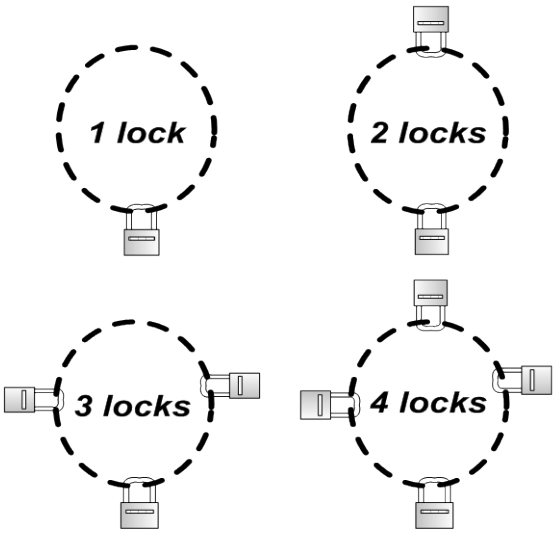


Figure 9 – Locking arrangements for shared access gates

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:

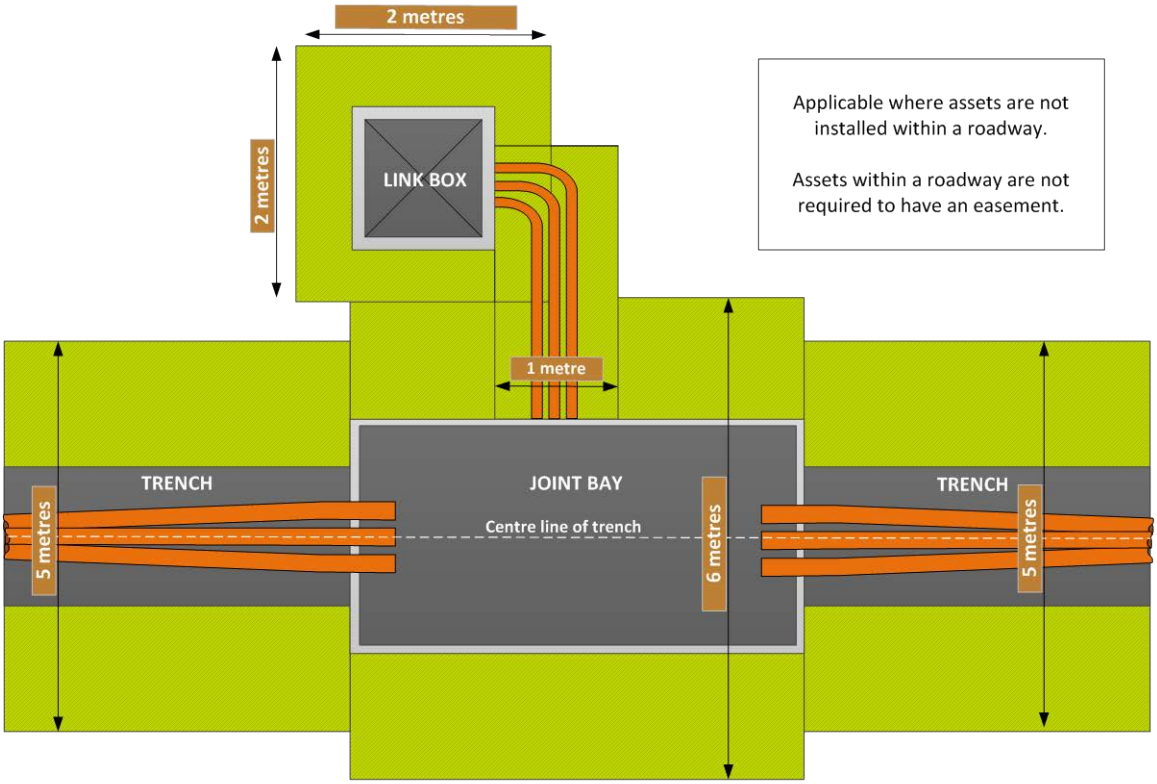
> **BY-LAW [X] ENDEAVOUR ENERGY – Access Ways**
>
> *The Association agrees that if the surface of the access ways does not support the heavy vehicles, machinery and materials necessary to maintain Endeavour Energy's electrical equipment, the Association will be responsible for repairing any damage caused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

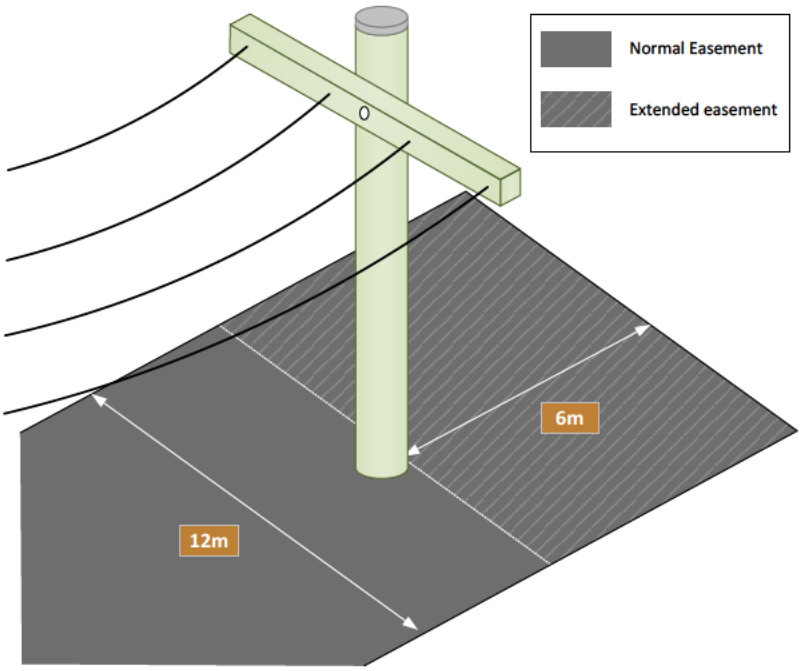


Figure 10 –UGOH pole easement

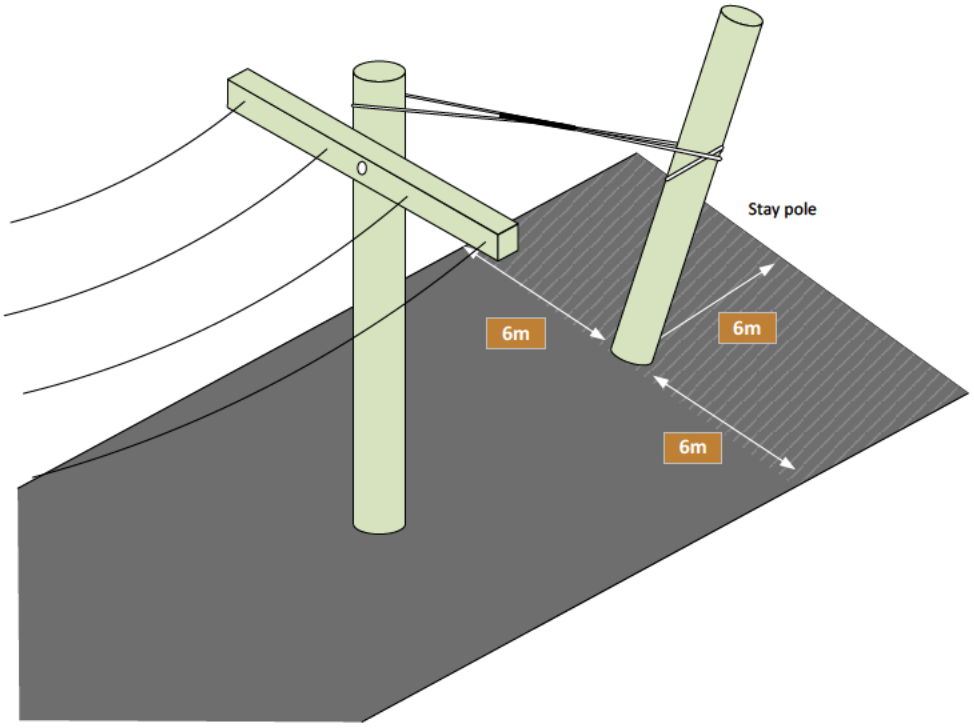


Figure 11 – Stay / Ground pole easement

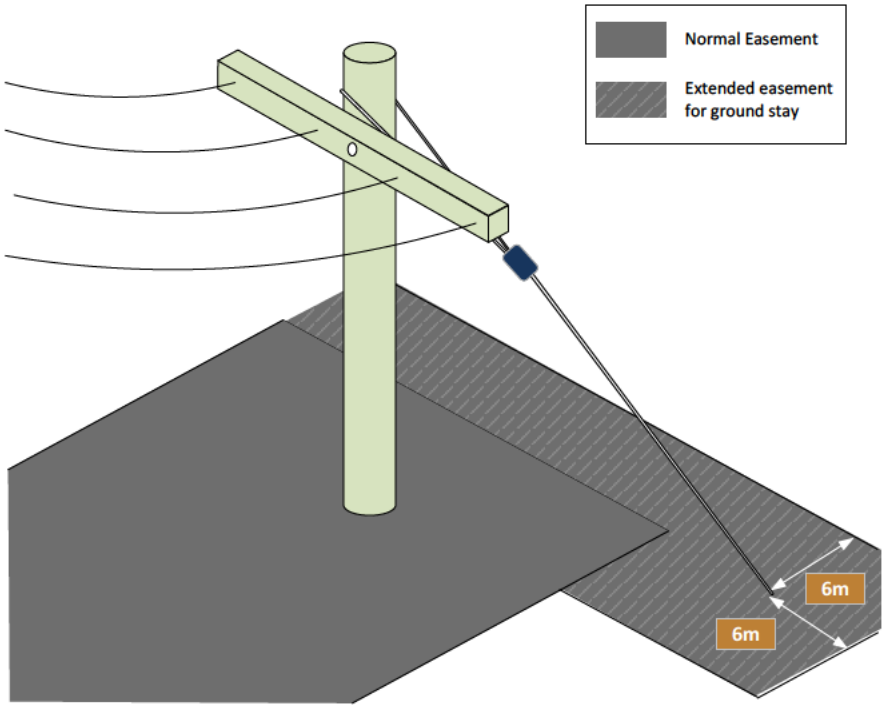
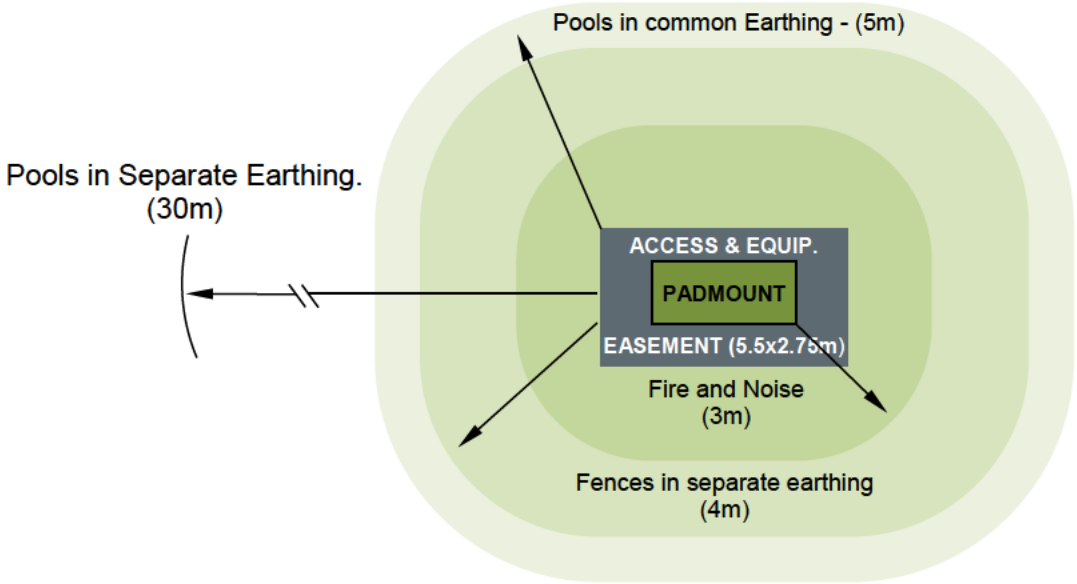


Figure 12 – Ground stay easement

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.

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-ENE23351-PLMB

DANGER IN THE PIPELINE

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

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.

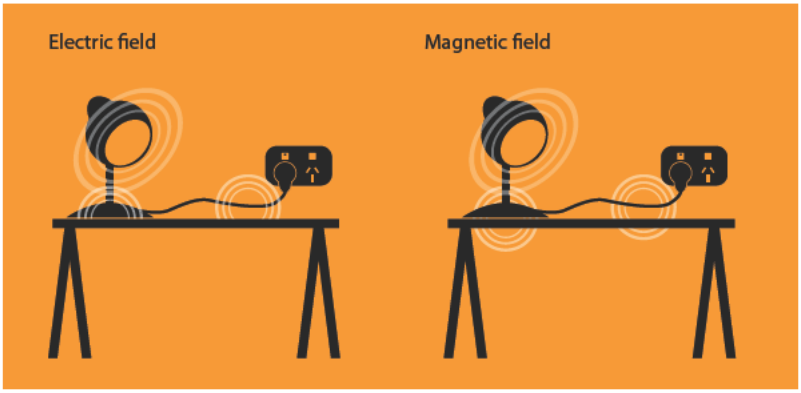
EMFS AND HEALTH

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:

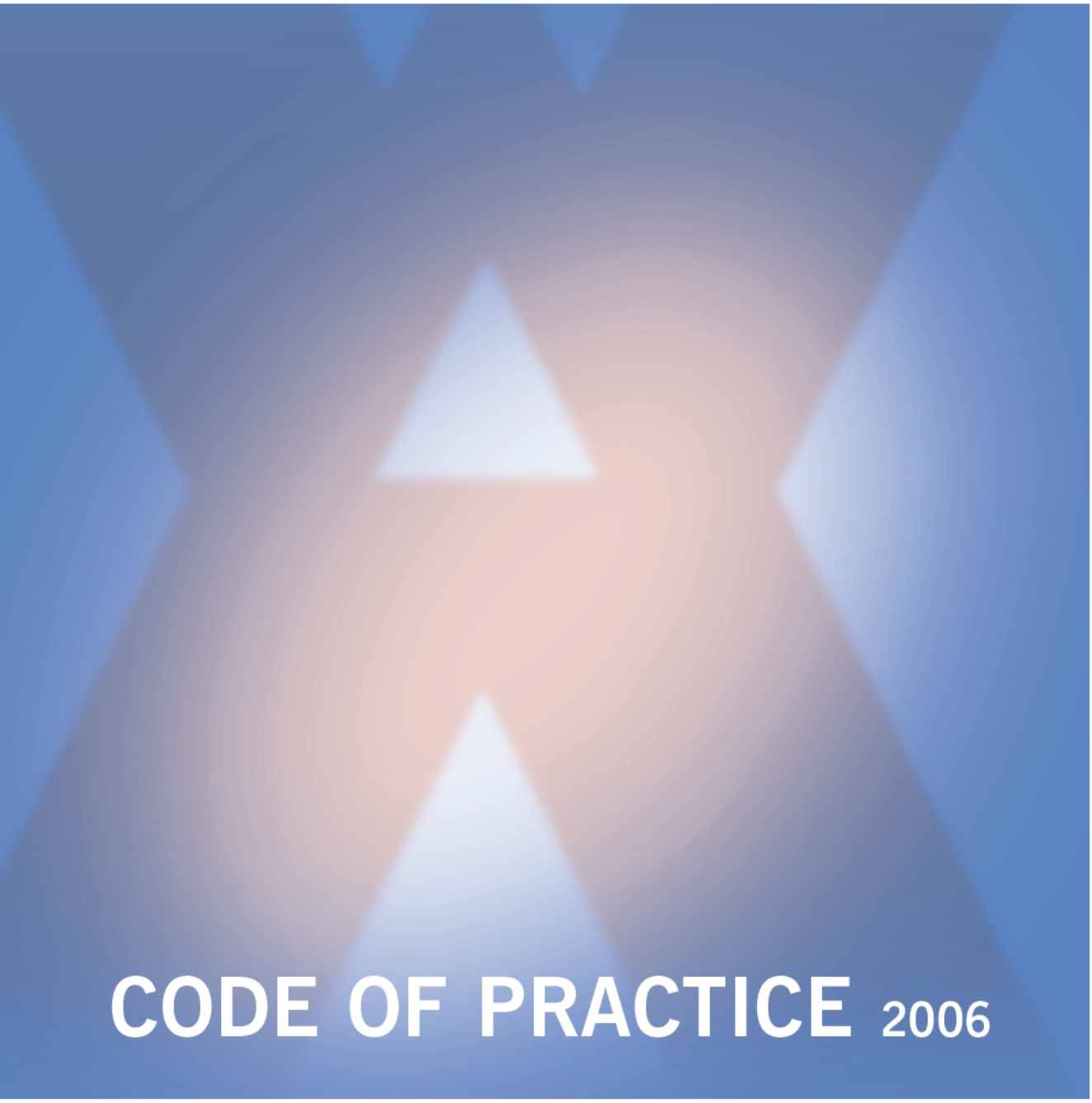
- your local electricity utility or the Energy Networks Association (ENA) www.ena.asn.au;
- the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) - www.arpansa.gov.au
- the World Health Organisation (WHO) – www.who.int

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

UPDATED DEC 2015 PUBLISHED FEB 2016

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.

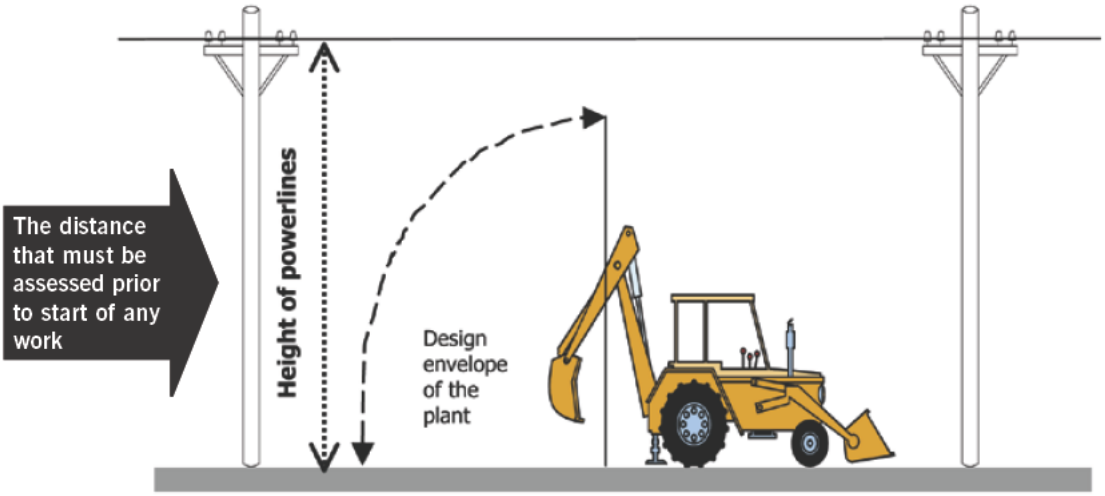


Figure 1: Distance that must be assessed for each worksite

- 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.

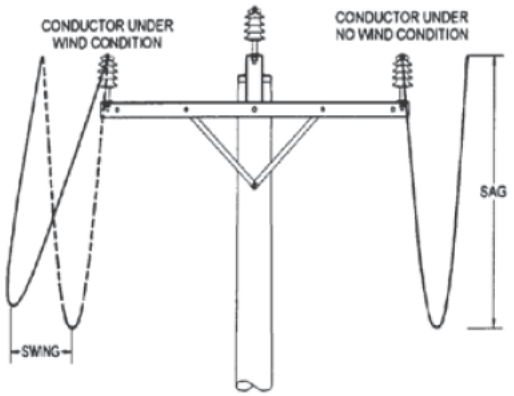


Figure 2: Illustration of overhead power line 'sag or swing'

- 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).

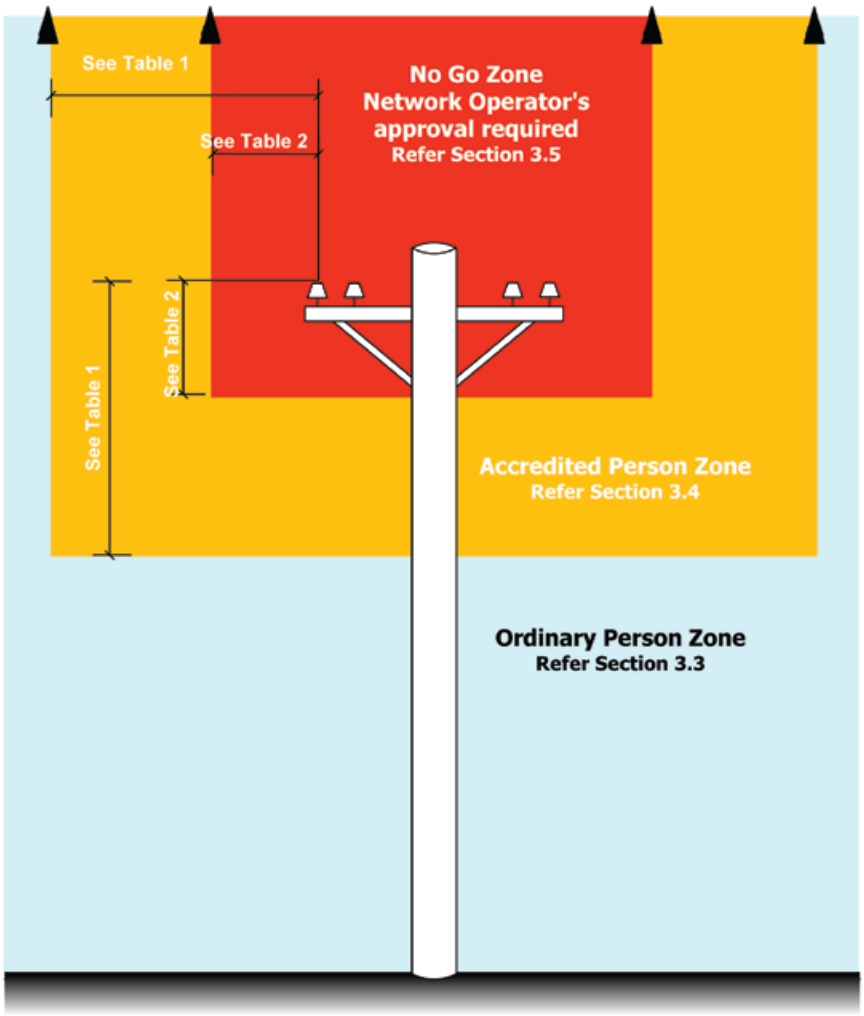


Figure 3 – Approach distances and work zones near overhead power lines

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.

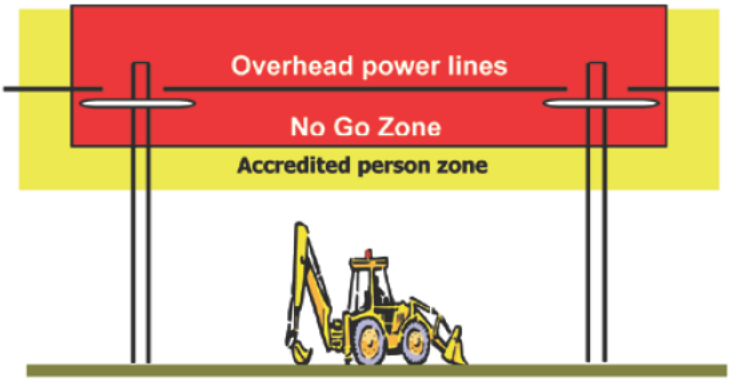
WARNING

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.

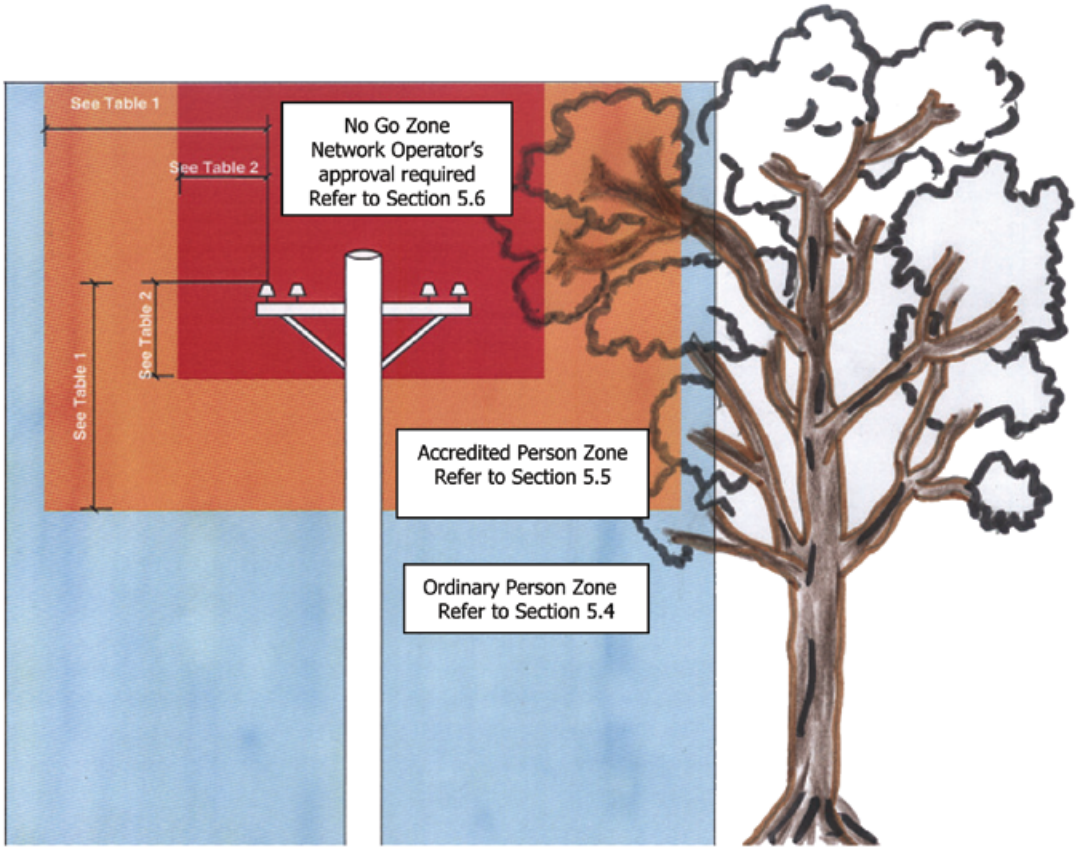


Figure 9 – Work zones for tree management near overhead power lines

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.

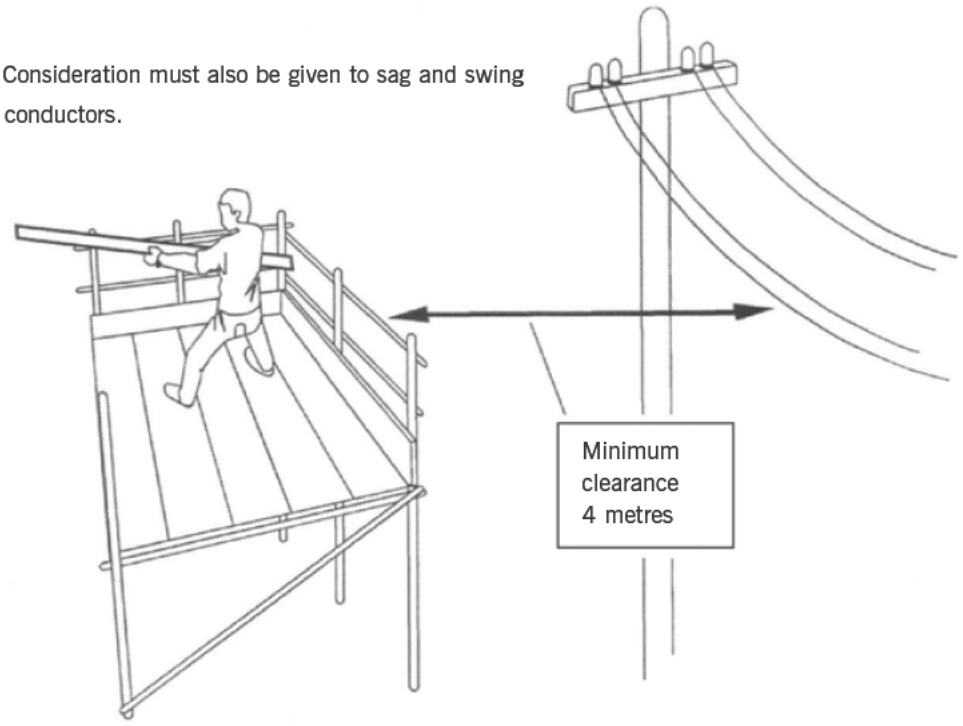
6.5 Control measures for the erection and dismantling of scaffolding near overhead power lines up to and including 33kV

(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.

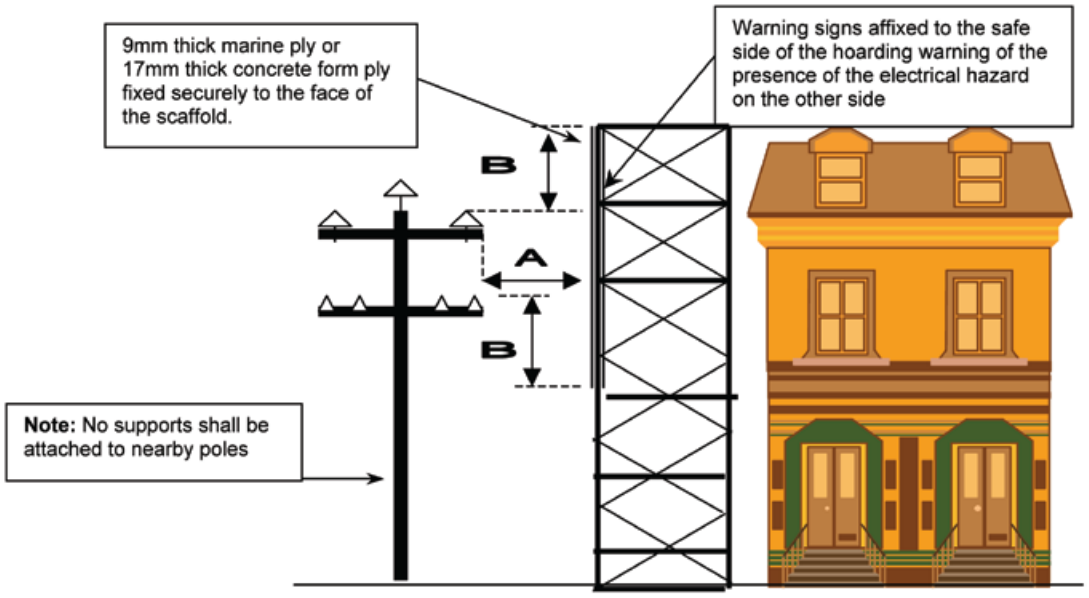


Figure 12 – Scaffolding with hoarding

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.

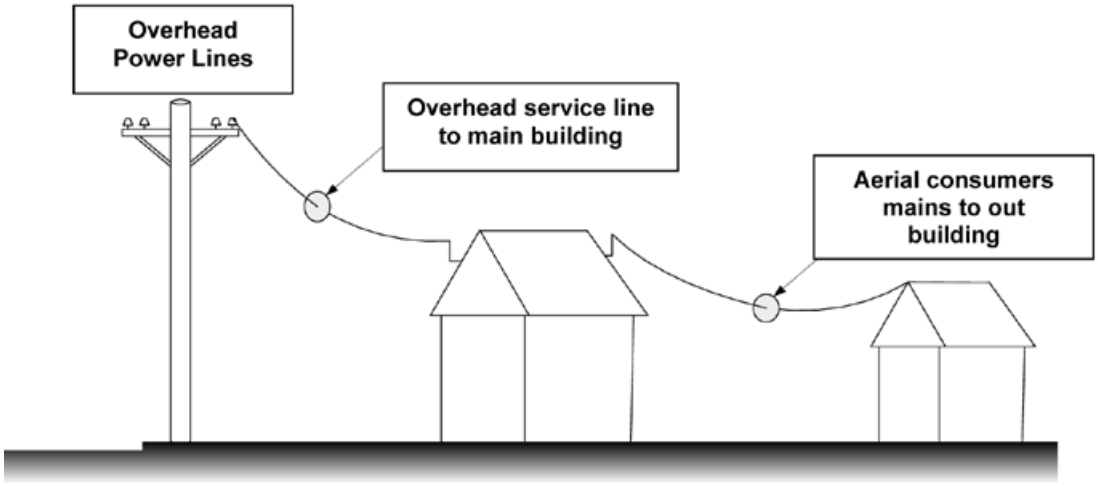


Figure 14 – Low Voltage Overhead Service Lines

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).

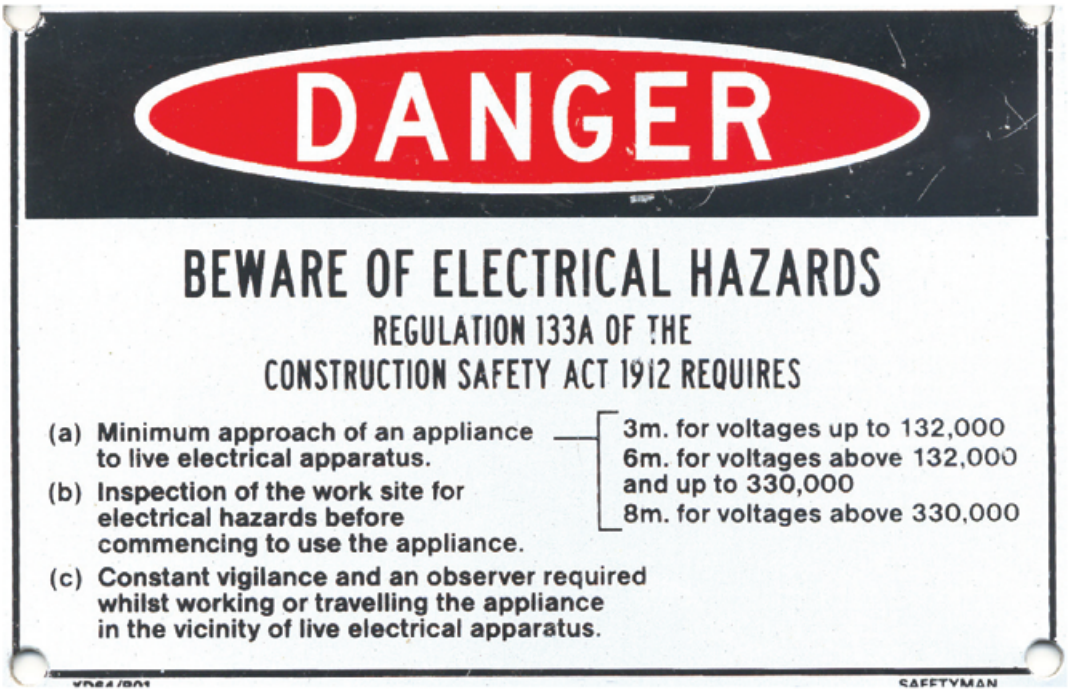
Working near overhead powerlines can be a high-risk activity and any contact with overhead power lines must be notified to WorkCover NSW and the relevant network operator in accordance with the requirements of the relevant legislation.

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.

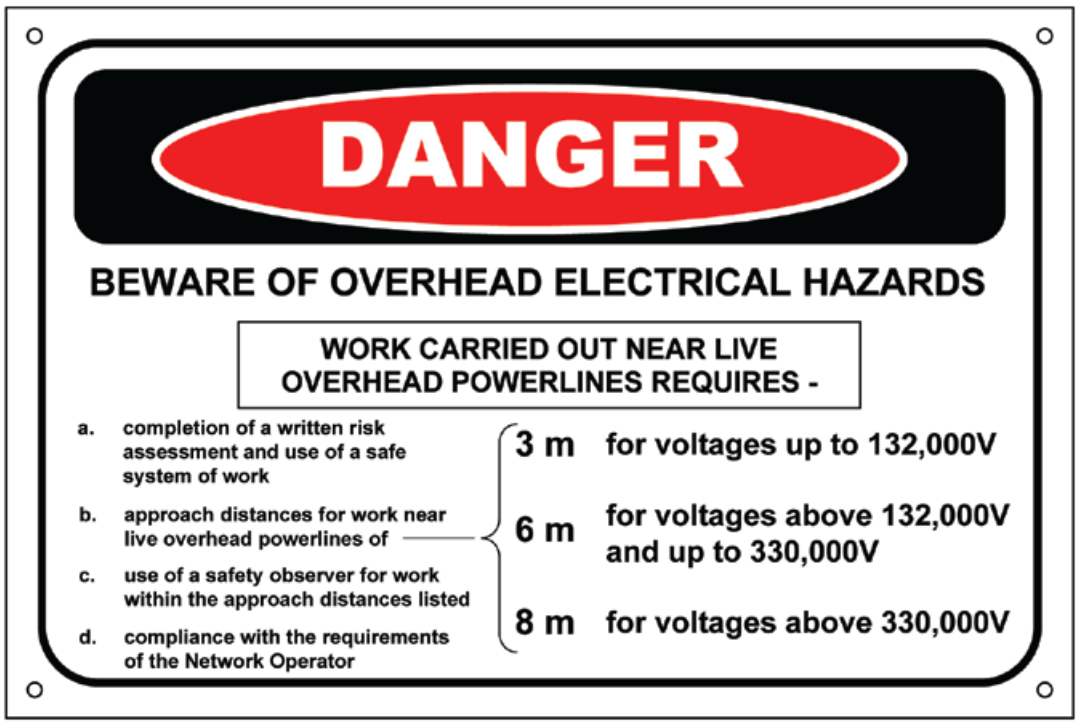
APPENDIX 1– WARNING NOTICE FOR OVERHEAD ELECTRICAL HAZARDS

(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.

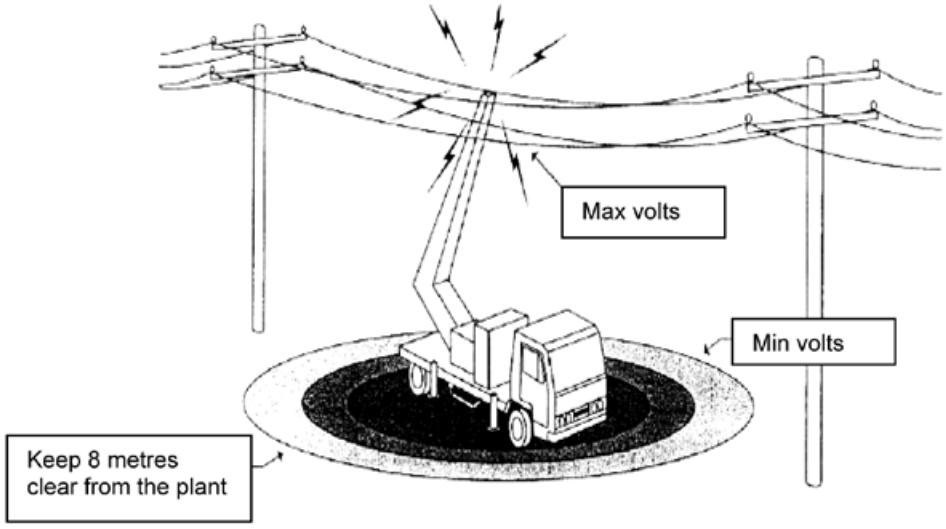


Figure 17: Affected area surrounding mobile plant when in contact with a live overhead power line

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**

NSW GOVERNMENT

WORK NEAR UNDERGROUND ASSETS – GUIDE

SAFEWORK NSW

2007

This is a Utilities Industry Reference Group (IRG) project in partnership with SafeWork NSW and Industry.
The Utilities IRG working party consisted of representatives from the following organisations:

- Alinta
- Australian Workers Union – Technical Administrative Professional Staff Branch
- Civil Contractors Federation
- Department Energy, Utilities and Sustainability
- EnergyAustralia
- Integral Energy
- Local Government Engineer's Association
- Local Government and Shires Association
- Roads and Traffic Authority
- Sydney Water
- Telstra
- SafeWork NSW.

Acknowledgement
The Working Party wishes to acknowledge that some references in this document are sourced from the *WorkSafe Victoria Guide for Undertaking Work Near Underground Assets, the Utility Providers Code of Practice for Western Australia* and the NSW Streets Opening Conference *Guide to Codes and Practices for Streets Opening.*

Catalogue No. SW08773
SafeWork NSW, 92–100 Donnison Street, Gosford, NSW 2250
Locked Bag 2906, Lisarow, NSW 2252 | Customer Experience 13 10 50
Website www.safework.nsw.gov.au

CONTENTS

PREFACE

This Guideline is for employers, employees, contractors, subcontractors and other parties involved in construction work near underground assets. Note: This Guideline is not designed to impact on mining legislation.

The aim of this Guideline is to assist employers in deciding appropriate measures to eliminate or control risks to workers and other people on construction sites. It provides practical advice on implementing the requirements of the *Occupational Health and Safety Act 2000* (OHS Act) and the *Occupational Health and Safety Regulation 2001* (OHS Regulation).

At times, construction work may be carried out near underground assets on greenfield construction sites as well as on or near public roads and pedestrians. Where construction and maintenance work is carried out on or near public roads, work should be carried out in accordance with the AS 1742 set of Standards – *Manual of uniform traffic control devices.* These Standards are supported by a set of field guides (HB 81) *Field guide for traffic control at works on roads.*

Use this Guideline to assess the effectiveness of your present arrangements for dealing with safety issues associated with working near underground assets, and to check that sources of risk have been identified and dealt with. If you are setting up a new business, this Guideline can serve as your step-by-step guide to establishing a program to manage the hazards arising from work near underground assets.

Work on, near or adjacent to gas and electricity services are deemed to be high risk construction work. Also water and sewerage assets may be deemed to be high risk construction work.

WHAT DO THE SYMBOLS IN THE GUIDELINE 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 undertake the activity.

Assess the risks in your workplace

Processes of finding things that cause harm, work out how serious the problems are and then to fix them

Legal obligations that must be followed

Questions you (or others) might ask to clarify issues

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

1. ESTABLISHMENT

1.1 TITLE

This is the Work Near Underground Assets Guideline.

1.2 PURPOSE

This Guideline provides practical guidance to prevent injury to people and damage to underground assets.

1.3 SCOPE

This Guideline informs asset owners, contractors, employers, workers and industry as to their obligations to:

- accurately install and record the location of the asset
- operate and maintain utility assets
- foster co-operation between underground utility owners and industry so as to eliminate or control the risk to individuals and the community, as well as damage to underground assets
- manage the risks involving underground assets at a workplace
- provide safe systems of work for individuals dealing with works near underground assets
- encourage the use of agreed practices for such work
- carry out JSA/Risk assessment and develop safe work method statements prior to commencing high risk construction work.

  Note: This Guideline relates to underground utility assets on public land, within easements and on private property. While the principles may be similar, this Guideline does not specifically relate to underground assets on private property.

1.3.1 Encouraging compliance

All worksite controllers within NSW have a duty of care to persons within their worksite or those who may be affected by actions or omissions arising from their work activities.

The adoption of this Guideline when dealing with underground assets should help ensure that this duty of care is met.

All persons working near underground assets are encouraged to adopt this Guideline.

All asset owners must promote and encourage the adoption of this Guideline, not only within their own workplaces but to sub-contractors and all persons performing work near underground assets.

1.4 COMMENCEMENT

This Guideline takes effect on 05/07.

1.5 INTERPRETATION

1.5.1 Recommended practices

Words such as ‘should’ indicate recommended courses of action. ‘Consider’ indicates a possible course of action that the Guideline is indicating the duty holder should think about. However, you may choose an alternative method of achieving a safe system of work.

1.5.2 Legal requirements

Words such as ‘must’, ‘requires’ or ‘mandatory’ indicate that legal requirements exist which must be complied with.

1.6 DEFINITIONS

access authority a written authorisation, issued by an asset owner, which allows persons to work within a specified proximity of the asset.

accredited person a person who has successfully completed a recognised training course relating to the specific job, the training having been conducted by a registered or accredited training organisation.

approach distance the minimum separation in air from an exposed conductor that shall be maintained by a person, or any object held by or in contact with that person.

approved having appropriate endorsement in writing for a specific activity.

asset owner the owner, controller or operator of an underground asset. For the purpose of this Guideline an underground asset includes electrical, water, sewage and drainage, gas, telecommunications, petrochemicals and hazardous substances.

authorised person a person with technical knowledge or sufficient experience who has been approved, or has the delegated authority to act on behalf of the organisation, to perform the duty concerned.

cable an insulated conductor or two or more such conductors laid together, whether with or without fillings, reinforcements or protective coverings.

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

confined space confined space as defined in Australian Standard AS 2865 *Safe working in a confined space.*

construction work means any of the following:

- excavation, including the excavation or filling of trenches, ditches, shafts, wells, tunnels and pier holes, and the use of caissons and cofferdams
- building, 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
- civil engineering, including the construction, structural alteration, repair, maintenance and demolition of – for example, airports, docks, harbours, inland waterways, dams, rivers, 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.

consumer services the supply to individual houses or premises, as opposed to "mains" which form part of the utility's distribution system.

- **water** the cold water supply pipework from the water main up to and including the outlet valves at fixtures and appliances. The water service is owned by the consumer.
- **electricity** consumer services means the conductors from the supply authorities' distribution mains (overhead or underground) to the customers' premises.
- **gas** the pipe used to supply gas to the property, which runs from the distribution main to the meter position.

  the Network Operator, also known as the Asset Owner, owns the section of the pipe between the distribution main and the property. The property owner owns the section of pipe between the property line and the meter.
- **telecommunications** the conduit and cabling controlled by the Carrier from the Network Point of Presence to the Network Boundary Point (NBP). Cabling beyond the NBP is customer owned cabling.

contaminated ground a contaminated site that poses a significant risk of harm to human health or the environment and is regulated by the EPA (NSW) under *Contaminated Land Management Act 1997.* Refer to http://www.epa.nsw.gov.au/clm/searchregister.aspx

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

crane an appliance intended for raising or lowering a load and moving it horizontally. 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.

earthed direct electrical connection to the general mass of earth so as to ensure and maintain the effective dissipation of electrical energy.

earth moving machinery 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 any electrical equipment, including overhead power lines and underground cables, the conductors of which are live or can be made live.

electricity network 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.

emergency work work to rectify or prevent imminent danger to human life or physical injury.

work to rectify or prevent imminent or continuing damage to, or destruction of, property or the environment.

work to rectify or prevent an unscheduled outage which has or is likely to have a significant impact on the Distribution Network or the Carrier's network.

employee an individual who works under a contract of employment or apprenticeship.

employer a person who employs persons under contracts of employment or apprenticeship.

energised connected to any source of energy.

excavating the movement or placement of soil or other surface materials by removing, boring or forcing objects into the ground or surface of the earth.

exposed conductor an electrical conductor, approach to which is not prevented by a barrier of rigid material or by insulation that is adequate under a relevant Australian Standard specification for the voltage concerned.

extra high voltage (EHV) in NSW, means a transmission system cable with a nominal voltage of 132,000V a.c. (132kV) or above.

hazard anything (including work practices and procedures) that has the potential to harm the health and safety of a person.

high pressure gas (HP) 210kPa – 1050kPa.

Note: Transmission Pressure gas is equal to or greater than 1050kPa.

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) a nominal voltage exceeding 1000V a.c. or exceeding 1500V d.c.

insulated 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.

instructed person a person adequately advised or supervised by an Authorised Person to enable them to avoid the dangers which electricity may create.

isolated disconnected from all possible sources of energy by means that prevent unintentional energisation of the apparatus.

lancing using water or air aided by vacuum extraction to achieve non-destructive excavation.

live energised.

low pressure gas (LP) pressure less than or equal to 7kPa.

low voltage (LV) a nominal voltage exceeding 50V a.c. or 120V d.c. but not exceeding 1000V a.c. or 1500V d.c.

mains part of the utility's distribution system as opposed to "services" which are the take-offs for individual properties.

- **water/sewerage** a conduit or pipeline controlled and maintained by a network utility operator or water authority.

- **electricity** aerial or underground wires or cables from 400/230V to 330kV a.c
- **gas** a pipe installed in a street to convey gas to individual services.
- **telecommunications** any facility owned by the carrier – typical underground plant consists of conduits, cables, pits and manholes linking exchanges, or exchanges to distribution points.

medium pressure gas (MP) pressures greater than 7kPa and up to 210kPa.

mobile plant includes plant that:

- moves either under its own power or is pulled or pushed by other mobile plant
- moves on or around the worksite, enters or leaves the site, or moves past the site
- includes road vehicles operating at a worksite.

Note: This definition has been adopted for the purposes of this Guideline. This includes items such as earthmoving machinery, concrete boom pumps and tipper trucks operating at a worksite.

network operator also known as the asset owner.

nominal voltage (U) the a.c. or d.c. voltage by which a system of supply is designated.

OHS act the Occupational Health and Safety Act 2000.

OHS regulation the Occupational Health and Safety Regulation 2001.

overhead power line 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.

other cable systems telecommunications cables, optic fibre cables, control cables, earth cables or electrolysis drainage cables.

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 premises where people work.

plant any machinery, equipment or appliance.

Note: For the purposes of this Guideline 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.

polymeric made from polymers otherwise known as plastics.

pot-holing excavating with hand tools to a pre-determined depth to establish if assets exist in the immediate location.

premises includes any place, and particularly includes:

- any land, building or part of a building
- any vehicle, vessel or aircraft
- any installation on land, on the bed of any waters or floating on any waters
- any tent or movable structure.

permit conditions permission conditions stipulated by asset owner.

pressurised a constrained flow of a substance in a pipeline which may be of varying diameters and thicknesses, the flow of which may or may not be directly controlled by an asset owner.

procedure the documentation of a systematic series of actions (or activities) directed to achieve a desired result.

property line the boundary line between the road reserve and the adjacent property.

railway assets electrical, signalling and communications infrastructure owned and maintained by the rail entity. Assets also included but are not limited to, drainage lines and compressed air line.

safety observer a competent person who has been specifically assigned the duty

of observing and warning against unsafe approach to the asset.

supervisor a representative of the principal for a worksite, who has the delegated responsibility for a task or range of tasks being undertaken at the worksite.

underground assets part of an underground network such as water/drainage/sewerage, electricity, gas or communications etc.

underground services the supply to individual houses or premises as opposed to underground assets which form part of the utility's distribution system.

works planned or programmed any work which has followed the normal planning process prior to work commencing ie where the worksite has been physically inspected and assessed in advance of the work crew arriving on site.

2. PLANNING AND PREPARATION

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

Under the OHS Act and the OHS Regulation, employers have an obligation to ensure the health, safety and welfare of employees at work and that other people are not exposed to risks to their health and safety. When contracting out work, employers must ensure that contractors are planning and carrying out work in a safe manner. The work should be conducted according to this Guideline.

To effectively implement this Guideline, employers need to be aware of these requirements and have procedures in place to apply them. Employees, self-employed persons, subcontractors and controllers of premises, plant and substances also have responsibilities under OHS legislation. Each individual should ensure that they work safely and that their work does not expose others to health and safety risks.

The way to systematically plan and manage health and safety in the workplace is to build risk management and consultation into all those activities that may have OHS implications. This will involve activities such as purchasing, work methods or procedures, using contractors, reporting OHS problems, investigating incidents and planning emergency procedures.

2.1 UNDERSTANDING RESPONSIBILITIES

2.1.1 Clients

The client's responsibilities under the OHS Act and OHS Regulation will depend on their role in the design and construction. They are usually a "controller of premises" at least to some extent and may also have other roles such as designer, principal contractor or an employer in relation to the project.

The client is also in the best position to influence others to consider that constructability and maintainability are included in the design and thus to reduce construction and ongoing maintenance risks at the design stage. Setting realistic timeframes for tendering, planning and project execution can also assist planning and execution of construction work.

However, the client is not always aware of all the complexities, such as the range of construction techniques, ground conditions and their effect on safety. It is therefore often appropriate for consultation between the client and other parties at an early stage to take advantage of the opportunity to identify the best concept design.

2.1.2 Controllers of work premises, plant or substances

Controllers of work premises, plant or substances also have health and safety legal responsibilities. They must make sure that the premises used as a place of work are safe and without risks to health and that the plant and substances used in the work process are safe and without risks to health when properly used. For persons who have only limited control of the premises, plant or substances, their responsibilities apply only to the matters over which they have control.

Designers should ensure that:

- to the extent that they have control over the design work, the structure (or plant) can be safely constructed, used, repaired, cleaned, maintained, and demolished, such that the health and safety of any person is not put at risk by the design
- information is provided to the client about the health and safety aspects of the design.

Designers should also ensure that, as far as practicable, hazards associated with the following are identified before commencement of the construction work:

- the design of the structure (whether permanent or temporary)
- systems of work required to construct, repair and maintain the structure
- the intended use of the structure

- materials required to be used in the construction of the structure
- the demolition (or abandonment) of the structure.

Note: In relation to the design of plant, the OHS Regulation contains more detailed risk control requirements on designers, manufacturers and suppliers.

Where there is more than one designer, critical aspects of the project should be documented and liaison should occur between the principal contractor and relevant designers so that the work can be coordinated to ensure the safe interaction of the different design aspects. When risks remain in the design work, information should be included with the design to alert others to the risks.

2.1.3 Principal contractors

The principal contractor, whether as an employer or as the person in control of the workplace, must provide and maintain in relation to those matters over which he or she has control, a workplace that is safe and without risks to health for their employees and other persons present at the workplace or affected by the work. To fulfil these obligations the principal contractor must plan for the work to be done safely.

The principal contractor must ensure that a site specific OHS management plan is prepared and documented for each place of work where construction work is to be carried out, before the work commences. This plan must be developed in consultation with the contractor/s and their employees or representatives. The plan must include safe work method statements (SWMS), provided by the contractors where they are used, for all work activities assessed as having risks. It must also include the following details:

- arrangements for OHS induction training
- arrangements for managing OHS incidents including response persons
- site safety rules and arrangements for informing persons affected
- details where persons have specific site OHS responsibilities.

The health and safety management plan must be monitored to ensure that work is carried out safely, according to that plan and that the plan is effective. The plan must be maintained and up to date during the course of the construction work and must be made available for inspection. The principal contractor must stop work immediately, or as soon as it is safe to do so, where there is a risk to the health or safety of a person.

2.1.4 Contractors

The contractor(s) doing the work, whether the principal contractor themselves or sub-contractors, must provide and maintain a workplace that is safe and without risks to health for their employees in relation to those matters over which they have control.

In addition to consultation with the principal contractor in the overall job planning, the contractor must develop written SWMS including an assessment of the risks and the controls used to carry out the work safely.

2.1.5 Employees

Employees must take reasonable care of the health and safety of themselves and others. Employees must cooperate with employers in their efforts to comply with OHS requirements. This means that employees must notify their employer of safety and security hazards, risks and incidents in line with the requirements of the OHS Act. These requirements should be outlined by the employer's OHS policy, procedures and safety related instructions.

Employees must not be required to pay for anything done or provided to meet specific requirements made under the OHS Act or OHS Regulation.

2.1.6 Self-employed persons

Self-employed persons must ensure that their undertakings do not expose others to health or safety risks.

2.2 COORDINATION OF RESPONSIBILITIES

There may be a number of parties involved in a project, such as:

- the client
- the principal contractor
- controllers of premises, plant or substances
- designers
- employers (contractor or subcontractors) who employ persons at the site, including labour hire agencies providing persons to the site
- self-employed persons
- suppliers of plant, materials or prefabricated components.

Where more than one party has responsibilities at a specific workplace, each party retains their legal responsibilities and must discharge their responsibilities in a coordinated manner.

3. 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 Guideline, 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.

3.1 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.

3.1.1 Consultation arrangements

The OHS Act provides three options for consultation arrangements:

Arrangement	Workplace	Requirement
OHS Committee	20 or more employees	requested by a majority of employees or direction by SafeWork NSW
OHS Representative	any size	at least one employee requests an election or directed by SafeWork NSW
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 Guideline, 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.

3.1.2 Consultation procedures

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

3.1.3 When should consultation be undertaken?

Under section 13 of the OHS Act, employers have the general duty to consult employees when decisions are being considered that may affect their employees' health and safety. 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 and safety include:

- planning for new premises or modifying existing premises
- purchasing new plant, equipment or substances
- planning, designing or changing work tasks or jobs
- using contractors in the workplace
- investigating incidents or accidents

- developing emergency procedures
- determining or reviewing workplace amenities
- 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 purchase decision or task change. However, the employers and committee or representative should agree on what process is needed to ensure that affected employees are consulted.

3.1.4 How should consultation be undertaken?

When engaged in consultation, 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 them 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 employees' concerns have been addressed.

3.2 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.

When addressing health and safety issues, besides consulting employees, employers must adopt the process of risk management. This process requires employers to:

3.2.1 Identify hazards

To ensure a safe and healthy workplace, employers must 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.

3.2.2 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.

3.2.3 Eliminate or control the risk

The first responsibility is to investigate how the risk can be eliminated. Before implementing the control measures described in this Guideline, an employer should investigate possible strategies for eliminating the hazard from the work system.

If it is not reasonably practicable to do so, the risks associated with the hazard must then be controlled. This Guideline has been developed to provide advice on the most effective control measures.

3.2.4 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.

3.2.5 When must employers undertake risk management?

The OHS Regulation requires employers to incorporate the process of risk management into procedures.

These are the same activities for which employers are required to consult with employees.

3.2.6 Strategies for developing effective risk management procedures

When risk management activities are undertaken the following strategies should be considered to inform the process:

- visual checks through workplace inspections
- analysing the types of work being performed and the way work is performed
- inspections of plant and equipment
- analysing workplace records on accidents, incidents or 'near misses'
- risk management information provided by suppliers or manufacturers of equipment or, in the case of hazardous substances, Material Safety Data Sheets (MSDS)
- industry codes of practice for particular hazards or work processes
- Australian Standards, which set safety standards for a range of equipment products and materials
- guidance material from SafeWork NSW or industry or professional organisations.

Further advice is provided in the *Code of Practice: Risk Assessment.*

3.2.7 Personal protective equipment (PPE)

The use of PPE to control risks is lowest on the hierarchy of control measures. The measures at the lower levels are less effective and they require more frequent reviews of the hazards and systems of work. They should only be used when other control measures are impracticable or when, after implementing other controls, a residual risk remains.

- PPE selection and suitability

  Where PPE is to be used it should be appropriate for the risk and comply with the relevant Australian Standard or SafeWork NSW approval. Employees should be competent in the proper selection, use and maintenance of the PPE. There should be sufficient supervision and monitoring conducted to ensure PPE is used and employees are competent in its use. PPE should be regularly inspected, maintained and replaced as necessary.

- Eye protection

  Dust, flying objects and sunlight are the most common sources of eye damage in excavation work.

  Where persons are carrying out cutting, grinding or chipping of concrete or metal, or welding they must be provided with eye protection complying with AS/NZS 1337:1992 – *Eye protectors for industrial applications.* Eye protection complying with AS/NZS 1337 should also be provided where persons carry out other work, such as carpentry or handling of chemicals, where there is a risk of eye injury. Selection, use and management systems should comply with AS/NZS 1336:1997 – *Recommended practices for occupational eye protection.*

- Hearing protection

  Where personal hearing protection is provided it should conform with AS 1270:1988 – *Acoustics – Hearing protectors.* Control measures including training should comply with AS/NZS 1269.3:1998 – *Occupational noise management – Hearing protector program.*

- High visibility garments/safety reflective vests

  Persons working underground or near traffic, mobile plant or equipment under operator control, should be provided with and use high visibility garments. Such garments should be selected, used and maintained in accordance with AS/NZS 4602:1999 – *High Visibility Safety Garments.* Other clothing not covered by the high visibility garment should be light coloured and all garments should be selected for best contrast with the surrounding background.

- Safety helmets

  The use of safety helmets may prevent or lessen a head injury from falling objects or a person hitting their head against something. Where there is a likelihood of persons being injured by falling objects and overhead protection is not provided, persons must be provided with and must use an appropriate safety helmet. Appropriate safety helmets should also be provided and used where a person may strike their head against a fixed or protruding object or where there is a risk of accidental head contact with electrical hazards.

  All persons on excavation sites should wear head protection that conforms to AS/NZS 1801:1997 – *Occupational protective helmets* and be used in accordance with AS/NZS 1800:1998 – *Occupational protective helmets – Selection, care and use.*

- Safety gloves

  Where there is a risk of hand injury, such as exposure to a harmful substance, excessive heat or cold, or to a mechanical device, hand protection appropriate to the risk and that complies with AS/NZS 2161:1998 – *Occupational protective gloves* should be provided and used.

- Waterproof clothing

  Waterproof clothing provided as a system of work relating to weather or site conditions should be effective and suitable for the task. Waterproof clothing should also incorporate light reflective features in accordance with the requirements of the section above.

3.2.8 Incident reporting

Hazards and OHS problems should be reported as soon as they are noticed so that the risks can be assessed and addressed as quickly as possible. Records of reported hazards should be kept and should include details of the action taken to remove the hazard or control the risk arising from the hazard.

The OHS Regulation also prescribes a number of workers compensation and OHS legal requirements concerning incident and injury reporting.

3.2.9 First aid

The OHS Regulation requires that employers must provide first aid facilities that are adequate for the immediate treatment of injuries and illnesses that may arise at the place of work and, if more than 25 people are employed, trained first aid personnel.

To ensure adequate first aid provisions, employers must identify their potential problems, assess their requirements and consult with employees in the process.

When determining the nature, number and location of first aid facilities and the number of trained first aid personnel, employers must take into account the location and type of work being undertaken. The type of work performed will influence the hazards and the possible harmful consequences for employees. For example, office workers will have different first aid requirements from construction workers. Workplaces using hazardous substances may require specialised first aid facilities, such as eyewash stations and emergency showers. The risk assessment process will assist in identifying the particular needs of the workplace.

Further information regarding such matters as contents of first aid kits, who qualifies as 'trained first aid personnel', and other requirements relating to first aid rooms, consult the OHS Regulation or the *First Aid in the Workplace Guide.*

3.2.10 Emergency response

The OHS Regulation specifies that an employer must ensure that, in the event of an emergency at the workplace, arrangements have been made for:

- the safe and rapid evacuation of persons from the place of work
- emergency communications
- appropriate medical treatment of injured persons
- appointment of appropriately trained persons to oversee any such evacuation and, if appropriate, the use of on-site fire fighting equipment.

3.2.11 Record keeping

The OHS Regulation requires records to be kept in the following areas:

- induction training
- hazardous substances
- confined spaces
- plant
- electricity
- asbestos
- atmospheric monitoring
- notification of accidents.

Refer to the relevant chapters of the OHS Regulation for further information.

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4. ACCURATE INSTALLATION AND INFORMATION

4.1 INTRODUCTION

Asset owners are required to capture and maintain accurate and up-to-date (as built) records of their underground assets.

When planning a job requiring excavation, a complete record search must be undertaken by lodging an enquiry with the central call service 'Dial Before You Dig'. Asset owners who are not members of this service must also be contacted. When an asset location is requested, asset owners may provide information on the recommended practices for work near that location or asset.

Lodging an enquiry with 'Dial Before You Dig' is as simple as visiting www.dialbeforeyoudig.com.au, phoning 1100 or faxing an enquiry to 1300 652 077. Once the records are obtained, they should remain in the work area and be accessible to all. When carrying out emergency work, every effort should be made to obtain records as soon as possible. If work must commence prior to the records being obtained, it should be carried out on the basis that underground assets are present even if an Electronic Service Detector gives the 'all clear'.

It should be also remembered that as technologies and work practices change over time, features such as the presence of warning tape may not be where you expect (see Table A). For example, the majority of telecommunication assets at joint locations are now housed in pits or manholes. However, the line between these may not be straight if obstructions were encountered during installation. Direct buried cable in rural areas may be identified by pits/manholes and marker posts. However, it cannot be assumed that a cable follows a direct path between these items.

WARNING: Asset owners' plans may not show the presence of all cables, pipes and plant. They may only show their position relative to road boundaries, property fences etc at the time of installation and the asset owners do not guarantee that such plans are accurate thereafter due to changes that may occur over time.

Do not assume depth or alignment of cables as these vary significantly. For example, road and building alignments and levels may change.

4.2 ENSURING ACCURACY OF PLANS AND RECORDS

Asset owners shall have a system of work which ensures the accuracy of plans. The system of work should be included in the asset owners' audit processes.

Improving the accuracy of existing asset plans relies on cooperation between asset owners and contractors. If during work activities, underground assets are found to be not on the plans or are in a different location, contact should be made with the source of the plans to notify of the missing information.

4.3 UNDERGROUND ASSET OWNERS INCLUDE:

- electricity generation, transmission and distribution
- rail
- Roads and Traffic Authority
- local authorities
- telecommunications
- private (eg privately owned water pipelines)
- gas transmission and distribution
- petrochemical (oil, petrol, LPG etc)
- oil
- water
- drainage
- sewerage.

(See Table A).

4.4 ELECTRICITY CABLES

4.4.1 Cable records

Cable records are in the form of plans drawn to scale or on computer based Geographic Information Systems (GIS).

The detail of the records will vary with the type of installation. For cable installed in a standard allocation, the records may provide only general cross sectional arrangements of cable and conduits together with road crossing and street lighting information.

It is common practice to negotiate a special alignment on the roadway for high voltage transmission cables. For this type of installation, the records are more detailed with reduced level and offset information provided. The details of local area distribution and of transmission cables are typically shown on separate plans.

Older installations may not be accurately recorded or reference details may have changed.

4.4.2 Cable installation

The cover for underground electricity cables and underground control cables may vary in depth. Always assume a cable may be present. See Table B.

Note: Underground electrical cables are not necessarily covered with slabs, marker tapes or other indicators of their presence and are frequently not enclosed in conduits. Some underground electrical cables may have been encased in bitumen. Hence a full risk assessment must be undertaken prior to carrying out any excavation work so as to accurately establish the exact locations of underground electrical cables.

4.4.3 Cable ancillary equipment

Associated with many cable installations are ancillary assets and pits. These may include cable joint pits, cable link pits, oil or gas pits, inspection pits and other ancillary pits. These pits will have cables or pipes that connect them to the main cables and care should be exercised when excavating between the cables and the ancillary pits. The presence of ancillary pits shall be confirmed with the electricity asset owner prior to any work.

4.5 GAS PIPES

4.5.1 Gas reticulation systems

Several methods of gas reticulation are used, from low-pressure services through to transmission systems. These systems have been constructed from materials including coated welded steel, cast iron, and a variety of plastics. In most areas, the systems are buried directly in a suitable stone-free backfill. The systems are not designed to resist the impact of tools or mechanical plant or to be left unsupported over any great distance. The operating pressures range from as low as 2kPa up to as high as 15MPa for a transmission pipeline system.

4.5.2 Pipe records

The records for all high and low pressure gas distribution mains are maintained in the form of plans drawn using Computer Aided Design system (CAD). The detail of the records will show the size of pipe and the type of material, changes in direction. Please note gas consumer services are generally not shown on plans. High-pressure transmission pipelines are generally located within a pipeline easement, therefore records of these pipelines are in the form of alignment sheets specific to the individual pipeline.

The location of high and low-pressure distribution mains on the plans are shown at a nominal distance from the building line. The actual pipe alignment will be shown in text as an offset distance in metres from the Building Line (MBL) – also could be known as the ‘property boundary’. When locating gas distribution pipes always reference the offset distance from the building line as minor changes in alignment will not be shown graphically.

4.5.3 Pipe installation

Most pipes laid in recent years may have a marking tape or polymeric plastic slab laid above the pipes for identification when excavating. However, these tapes or slabs may have been damaged by other excavations in the area since the initial construction and not replaced. For location purposes, plastic pipe may have been laid with a trace wire to enable the main to be located using a cable locator. Again, it is

important these tracer wires are not interfered with or broken, as it makes future location of these pipes very difficult. If you do break the trace wire, please ensure that the wire is rejoined and coated with electrical tape. Steel mains and pipelines will not have a trace wire as they are metallic and can be detected. Other structures, such as siphon points, valve pits, regulator pits and other varied components may be installed in the pipeline. Care needs to be taken to locate these before excavation.

While the plans may show the expected location of underground distribution mains, consumer services are not shown. Properties should be checked to ascertain whether gas meters are present. If so, the services normally run at right angles to the distribution main to the service connection at the meter. However, it cannot be assumed that a pipe follows a direct path between these items. Be aware the consumer service may receive its supply from a distribution main on the opposite side of the road. The installed depth of consumer services varies – refer to Table B. In circumstances where the correct depth of cover has not been achievable, mains and services may be encased in concrete or laid in copper pipe.

All high-pressure steel distribution mains and transmission pipelines have corrosion protection systems. These systems form part of the pipeline and incorporate the protective coating, test points and galvanic anodes at various points along its length. If these are broken or damaged, it should be reported to the gas utility immediately. They are easily rectified but can be extremely difficult to locate if the damage is not reported.

4.6 WATER AND SEWER PIPES

4.6.1 Pipeline types

Cast iron and steel pipes are often joined with lead. These and asbestos pipes are easily disturbed and brittle. Mild steel and ductile cast iron pipes have external protective coatings which, when damaged, significantly reduce the life of the pipes. Copper pipes are very soft and easily compressed or bent without necessarily breaking, but their flow capacity can be significantly reduced. Recycled water areas have dual pipe and service systems.

The water supply system in residential areas has traditionally formed part of the multiple earth neutral (MEN) system of the electricity distribution network. More recent use of PVC and polypropylene materials may adversely impact the MEN system. Refer to Section 5 for more information.

4.6.2 Depth and location

Water authorities, developers and local councils maintain records of pipeline locations.

As with other assets, there can be great variations in pipeline depths, depending on their age and the amount of surface reconstruction over the years. More recently, some water assets have been co-located with other assets in shared trenches. This raises the potential problem of simultaneous damage to several assets.

Some pipes may be encased in concrete to provide added support and protection.

4.7 TELECOMMUNICATION CABLES

Telecommunications cables developed for underground installations have changed in line with technology requirements.

Plans provided by Telstra are circuit diagrams only and indicate the presence of telecommunications plant in the general vicinity of the area shown. Due to the nature of the Telstra plant and the age of some cables and records, it is impossible to ascertain the location of all Telstra plant from plans. Telecommunications plant seldom follow straight lines and careful on site investigation is essential to uncover and reveal its exact position.

4.8 ABANDONED AND RETIRED UNDERGROUND ASSETS LEFT IN-SITU

In cases where assets are no longer to be utilised and are to be left in-situ, they are to be disconnected and/or filled, capped, plugged or otherwise rendered safe to avoid any future problems.

All such assets shall be consistent with the following points:

- treated as in-service unless otherwise positively proven out of service
- marked accordingly on the appropriate asset record
- if out of service retired or abandoned assets etc are to be interfered with, the owner of the asset should be contacted and arrangements made to locate the asset
- an asset shall not be used by others without prior agreement with the asset owner. This is so that both organisations' records can be updated
- where an asset is inserted inside an out of service, retired or abandoned conduit, pipe or duct, the records shall show this information
- if assets are sold or disposed of to another owner, then both organisations records should show such information.

4.9 TABLE A: THE INSTALLATION OF VARIOUS TYPES OF UNDERGROUND ASSETS

Assets have been installed underground over the last 150 years. Therefore you may come across a large range of pipe and cable materials, their installation technologies and protection barrier methods. The table below gives an overview of these different techniques. It is not a complete list and it should be remembered that you may come across underground assets that have no barrier protection or other indication of their presence, for example underbores.

Utility/Industry	Asset	Traditional Techniques	Current Techniques	New Technologies
Electrical cables (power, rail and tram)	Transmission: Extra High Voltage (EHV) Distribution: High Voltage (HV) and Low Voltage (LV) Supervisory and signalling cables	Buried direct, conduits (orange PVC), ductlines, concrete encased, fibro asbestos cement, steel, earthenware or encased in bitumen Protective covers bricks/tiles, terracotta, concrete, polymeric Marker tapes – polymeric	Direct burial in trench, ducts Some thrust boring across roads Marker tape – polymeric Protective covers – polymeric and concrete Surface markers	Trench-less technology including directional drilling Conduits installed by directional drilling. Variations in alignment and depth may occur. Multiple conduits can be installed using this method
	Cathodic protection	May be direct buried	Nil	
	Earthing rods and conductors	Direct buried	Direct buried	
	Conduits and ducts	Orange PVC	Orange PVC	
	Power poles and lattice towers	Risk assess to ensure that 1) structure will not be undermined and 2) cable is not coiled around base of pole		
Gas pipelines	Transmission	Coal tar enamel (warning contains asbestos) coated steel pipe Blue polyethylene coated steel pipe	Yellow polyethylene coated steel pipe Red fusion bonded epoxy coated steel pipe Construction techniques included trenching, cased boring, horizontal directional drilling	

Utility/Industry	Asset	Traditional Techniques	Current Techniques	New Technologies
Gas pipelines (continued)	Distribution High Pressure	Blue polyethylene coated steel pipe Yellow polyethylene coated steel pipe	Yellow polyethylene coated steel pipe Construction techniques included trenching, cased boring, horizontal directional drilling	High density polyethylene yellow stripe/black pipe
	Distribution Low Pressure	Tar coated wooden pipe Cast iron pipe Blue PVC pipe	Yellow nylon pipe Medium density yellow polyethylene pipe High density polyethylene black and yellow stripe pipe Insertion of disused cast iron pipe with nylon or polyethylene pipe Construction techniques included trenching, cased boring, horizontal directional drilling	
	Consumer services	Cast iron pipe Galvanised steel pipe	Yellow nylon pipe Medium density yellow polyethylene pipe High density polyethylene yellow stripe/black pipe Insertion of disused cast iron or galvernised pipe with nylon or polyethylene pipe Construction techniques included trenching, grundamat boring, horizontal directional drilling	
Water mains and services	Pipes 15 mm to 3000 mm, valves, hydrants, chambers	Cast iron, steel, cement coated steel, asbestos cement, copper, glass reinforced plastic ductile iron, polyethylene, PVC or concrete encased steel or ductile iron	Pipes usually installed by trenching Pipe cracking and slip lining renewal technique also used Some directional drilling Some thrust boring across roads Surface fittings for access and operation Chambers for valve access	Dual supply mains and services in recycled water areas

Utility/Industry	Asset	Traditional Techniques	Current Techniques	New Technologies
Water mains and services (continued)	Property connections	Service connections to properties are usually copper in smaller sizes and iron or steel in larger sizes (fire services and industrial)		Dual supply mains and services in recycled water areas
Sewerage mains and services (continued)	Pits pipes 15 mm to 1800 mm, tunnels, valves, connections	Cast iron, mild steel, cement lined steel, asbestos cement, copper, glass reinforced plastic, ductile cast iron or PVC, vitreous clay	Pipes installed by trenching Sewer re-lining or replacement using trenchless technologies (eg pipe cracking and slip lining)	On site treatment and reuse systems Jointless systems
Stormwater, grey water and drainage pipelines and services	Pits pipes 15 mm to 1800 mm, tunnels, shafts	Cast iron, mild steel, cement lined steel, asbestos cement, copper, ductile cast iron or PVC reinforced concrete	Installation generally by trenching	
Communications cables	Phone lines	Fibro asbestos cement (FAC) pipes and ducting. Galvanised iron (GI) pipe – various diameters Rocla concrete pipes Earthenware pipe Tunnels – Sydney CBD and servicing some other major telephone exchanges White PVC pipe 10 mm to 100 mm internal diameter Black PVC Directly buried cables PVC or armored steel sheath Polyethylene	Because of the long operational life of conduits, cables providing new technology services are often hauled into existing conduits All new standard conduit installations are white PVC of internal diameter 20 mm – 100 mm. Galvanised iron (GI) conduits are used for special purpose applications Conduits installed by directional drilling. Variations in alignment and depth may occur. Multiple conduits can be installed using this method Direct drilling technologies	Conduits installed by directional drilling. Variations in alignment and depth may occur. Multiple ducts can be installed using this method
	Co-axial, data and signalling cables	As above	As above	

Utility/Industry	Asset	Traditional Techniques	Current Techniques	New Technologies
Water mains and services	Broadband, copper and fibre optic cables	As above	As above Directly buried fibre optic cables will generally have been installed with marker tape above the cable containing a metallic wire Fibre Optic cables in conduits are installed by directional drilling technologies. They do not have marking tapes installed above the cable. In this case there may be no metal marking tapes installed	
	Conduits and ducts	As above	As above	
Oil transmission pipelines and valves	High Pressure (above 1050 kPa) Regularly signposted	Coal tar enamel (warning contains asbestos) coated steel pipe AS 2885-1997. *Pipelines for Gas & Liquefied Petroleum*	Yellow polyethylene coated steel pipe	
Privately owned pipelines	Chemical	Mostly similar to oil and gas transmission pipelines above (SafeWork NSW Dangerous goods pipelines) Regularly signposted.		

Note: It is essential to treat a cable or pipe as high voltage or high pressure until it has been positively identified as being otherwise.

5. HAZARD IDENTIFICATION

5.1 SAFETY INFORMATION

Consideration must be given to the safety of individuals and the community, especially to provide adequate safety barriers and safe pedestrian access around the worksite. Additionally, PPE applicable to the particular operation must be used.

Excavation within the zone of influence may destabilise the underground asset or supporting structures resulting in damage to the asset.

5.1.1 Some of the dangers when working near underground assets

- Gas

  Damage to gas assets can cause gas escapes which may lead to fires or explosions if an ignition source is present. There are two types of leaks following damage to the asset:

  - damage which causes an immediate escape. In this case, there is a risk to those working at the site
  - damage which causes an escape some time after the incident. This may be through damage which weakens the asset casing or the result of poor reinstatement practice. In this instance, the public is mainly at risk.
- Electricity
  - an injury resulting from damage to live electricity cables is usually caused by electric shock or the explosive effects of arcing current and by the fire or flames which may follow when the sheath of a cable is penetrated by an object. Damage and injury may also occur if the cable is crushed or contact is made between the individual phases of a cable. The presence of gas or a mixture of gases in a trench could be ignited by an electrical charge or an electrical arc resulting in a fire or explosion, the severity of which depends on the gaseous mixture
  - gas can be present in the ground due to gas pipe damage or leakage, sewage pits, chemical reactions or leaching and the accumulation of airborne gases in low lying areas. Gas can also be introduced by the nature of the work being undertaken such as oxy-acetylene cutting or chemical grouting
  - consideration should be given to conducting a risk assessment to determine if a trench or the work constitutes a confined space.
- Petroleum or oil pipelines
  - the result of damaging these assets is similar to that of gas assets. However, there is the additional risk of significant environmental issues such as contamination of waterways.
- Water pipes and sewers
  - some pipelines transport water under high pressure. Some older water pipes are also made from asbestos cement. Damaged water pipes have great potential to affect other assets and structures, either directly or by washing away their supports ie thrust blocks
  - the main danger from sewer damage is the contamination of a broken water main or asset, damage to the environment or disease from exposure to sewage. Some sewer lines are high pressure. Toxic and explosive gases may also be present in both sewer lines and stormwater drains
  - persons working on metallic water pipes are at risk of electric shock due to an electrical fault near a customer's premises or a mains neutral fault in the street. Metallic water pipes are usually bonded to the electrical earthing system and are a path of low resistance. Stray electrical current will often flow through the bonded metallic water pipe. When the pipe is cut or disconnected, either side of the pipe could become live causing a person to receive a serious or fatal electric shock. The consumer is also at risk of an electric shock under the same circumstances.

- Telecommunications
  - consequences could be the isolation of whole communities, disruption of interstate and international telecommunications, inability to contact emergency services, loss of telephone, mobile phone, data and television services
  - cables containing optical fibres carry light signals generated by Class 3B lasers that can cause injury to the eye. This infra-red beam is invisible to the naked eye and exposure to it should be avoided. Small optic fibre particles are capable of entering the bloodstream causing injury or death.
- Pipelines containing hazardous substances and dangerous goods

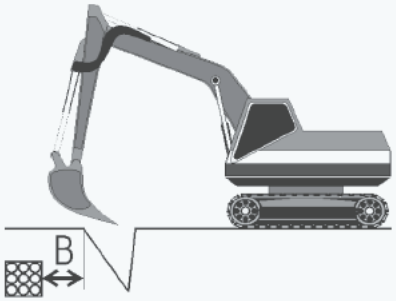
5.1.2 Safety considerations for Low, High or Extra High Voltage electrical cables

- High voltage (HV): same as for low voltage except the approach distances are variable. For more information refer to Table B.
- Extra high voltage cables (EHV): all work in the vicinity of extra high voltage cables must be undertaken with the consent and under the supervision of the asset owner. Contact with extra high voltage electric current will result in serious burns and/or death. For more information refer to Table B.
- Notwithstanding any guidance on the use of blasting as a means of excavation, where blasting is to take place within 200 m of an underground asset, the asset owner should be contacted for any special requirements.

5.1.3 Electrical earthing of metallic pipes

Prior to the removal or the repair/replacement of metallic piping, workers must ensure that an effective electrical bond across the break is maintained at all times.

5.2 TABLE B: TYPES OF ASSETS AND LIMITS OF UNDERGROUND APPROACH

Assets	Clearances	No Go Zone For Powered Excavation	Controls	Typical Depths
Types of underground assets (**Note:** The owners of assets registered with the Dial Before You Dig service and covered by this Guideline require an enquiry through this free service and the compliance with any directive issued with information regarding the asset)	The minimum approach distance for individuals carrying out work near underground assets	Distance 'B' is the minimum approach distance for powered excavating machines  For directional boring across the line of an asset a minimum clearance of 300 mm from the asset shall be maintained For directional boring parallel to the asset and at the level of the asset, a clearance of 500 mm shall be maintained from the edge of the nearest asset. It may be necessary to dig trial holes to prove the location of the nearest asset at points along the route. See Section 6.10	If the risk assessment identifies a potential risk of making contact with both underground and overhead assets, two safety observers would be required. One observer to ensure that the machinery maintains a safe distance from underground assets, the other observer to ensure a safe distance from the overhead powerlines In the case of gas or electricity assets, an appropriate fire extinguishing system must be at the worksite If the width and/or depth of the excavation will expose the asset, the asset owner must be contacted prior to commencing work	
Low and Medium Pressure services and Low pressure mains	N/A	300 mm	Pot-hole to confirm location of service The position of the asset will not appear on the maps	300 – 450 mm

Assets	Clearances	No Go Zone For Powered Excavation	Controls	Typical Depths
Medium Pressure mains	N/A	300 mm	Pot-hole to confirm location of asset The code of practice for shafts, tunnels and trenches, and the guide to dangers of poorly ventilated workplaces Only one individual at a time should be excavating if hand excavation is being undertaken in a confined space. Another should act as an observer and be able to operate any breathing, escape or fire equipment required The elimination of an ignition source in the event of an escape Excavation below underground assets should not be undertaken within a distance of 300 mm below the asset located at the lowest level **Note:** All transmission pipelines involving gas, oil and petrochemical have separate requirements and the asset owners should be contacted.	450 – 750 mm
High Pressure services, mains and pipelines	**300 mm** with hand tools and supervision from Network Authority	1000 mm	Powered excavation within 300 – 1000 mm is only permitted under supervision and with a Permit to Work from Asset Owner Also see **Controls** for medium pressure mains immediately above	750 – 1200 mm
Low Voltage Electricity cables – voltages less than or equal to 1000V (1kV)	Close proximity with use of hand tools	300 mm	Must contact asset owner for specific conditions	450 – 750 mm
Electricity conductors from 11,000V (11kV) up to 33,000V (33kV)	Close proximity with use of hand tools	600 mm	Must contact asset owner for specific conditions	900 mm

Assets	Clearances	No Go Zone For Powered Excavation	Controls	Typical Depths
Underground sub-transmission cables 33,000V up to 132,000V (132kV)	Must contact asset owner	Must contact asset owner	Must be carried out under the supervision of the asset owner	900 mm
High Voltage Electricity cables – voltages from 1000V (1kV) up to 33kV	Close proximity with use of hand tools	Must contact asset owner	Must contact asset owner for specific conditions	600 – 1000 mm
Extra High Voltage Electricity Transmission cables – voltages above (132kV) and 330,000V (330kV)	Must contact asset owner	Must contact asset owner	Work must be carried out under the supervision of the asset owner	800 – 1200 mm
Telecommunications cables	Contact asset owner for specific conditions	Contact asset owner for specific conditions	Must contact the asset owner for specific conditions	Typically 450 – 600 mm, other assets to 1200 mm
Water pipelines	N/A	300 mm (if pipeline is 200 mm or greater in diameter)	Pot-hole to confirm location of asset	Min 450 mm
Sewerage pipelines	N/A	300 mm (if pipeline is 200 mm or greater in diameter)	Pot-hole to confirm location of asset	Between 600 mm to 10 (ten) metres

5.3 ON-SITE CHECKING

Prior to any excavation work, check at least 100 m along the footpath in each direction and around nearby corners for indications of existing assets. These include:

- indicators or markers for underground assets, drainage pits and manhole covers
- damaged footpaths, driveways or depressions which may indicate the presence of a trench
- cables running up a pole
- overhead cables near the worksite
- control cabinets
- no overhead wires to a building or premise
- above ground connection cabinets
- transformers for cathodic protection on power poles
- light poles without an overhead service
- service pits for gas, water, electricity, communications, sewerage and drainage connections
- down pipes or vent poles
- underground storage tank fill points and venting systems
- kerb markings
- water valves
- fire hydrants and plugs
- sprinkler systems
- road repairs
- trap doors or access-covers for:
  - access to underground electricity substations
  - access to cable jointing pits or tunnels
  - access to sewerage or stormwater trunks
  - access underground gas regulators, siphons and valve assemblies
  - access to shafts
  - link box pits, oil tank pits and other ancillary underground pits.
  - domestic service pits
- gas or water meters
- electricity pillars and meter boxes
- any other signs out of character with the surrounding area such as a clearing for an easement.
- If such indications exist, the asset must be located by hand or another approved method.

5.4 PLAN OR DRAWING READING

Although each asset owner may have their own type of plan, with special notations and legends, the basic principle of map reading can be applied.

Telecommunications plans, and in some cases electrical plans, may provide a detailed representation of the asset or network. When reviewing the information:

- identify the streets or buildings nearby and position yourself so the streets correspond with the plan/s
- use the scale and measurements indicated on the plan/s to pinpoint your exact location
- remember, drawings may NOT be to scale
- many plans reference the asset location from an adjacent property alignment
- determine if measurements are metric or imperial, or a combination of both
- identify nearby pipes or cables and mark their recorded location
- cross-reference any supplementary plans or details
- identify any of the items listed below and assess their relationship to each other to determine if a measurement has altered:
  - building lines
  - pits and poles
  - offsets
  - turning points.

Note: Inaccuracies can and do occur, both on plans and in the ground. If in doubt, check with the asset owner. Never guess or assume!

Asset owners' plans show only the presence of some cables, pipes and plant. They only show their position relative to road boundaries, property fences etc at the time of installation and the utilities do not warrant or hold out that such plans are accurate thereafter due to changes that may occur over time. DO NOT ASSUME DEPTH OR ALIGNMENT of cables or pipes as these vary significantly. For example, road and building alignments and levels may change.

6. MANAGING THE RISKS

6.1 MANAGING RISKS IN THE WORKPLACE

Employers and self-employed persons must identify any foreseeable hazards, assess their risks and take action to eliminate or control them.

A hazard identification and risk assessment process must be carried out at the planning and preparation stage by the employer/contractor doing the work 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. For tunnel construction work the safe system of work must also be documented in a Safe Work Method Statement (SWMS).

6.1.1 Monitor and review risk assessments and control measures

The OHS Regulation states that employers must review risk assessments and measures adopted to control risks whenever:

- there is evidence that the risk assessment is no longer valid
- an injury or illness results from exposure to a hazard to which the risk assessment relates
- a significant change is planned to the place of work, work practices or work procedures.

6.1.2 Safe work method statements (SWMS)

The OHS Regulation requires SWMS where the cost of the work undertaken exceeds $250,000 or for defined high risk construction work. Construction work in tunnels is defined as high risk construction work, so tunnelling work requires a SWMS.

The SWMS:

- describes how the work is to be carried out
- identifies the work activities assessed as having safety risks
- identifies the safety risks
- describes the control measures that will be applied to the work activities. It also 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.

A SWMS requires the work method to be presented in a logical sequence. The hazards associated with each process are to be identified and the measures for controlling these hazards specified.

Break down each job into a series of basic job steps to identify the hazards and potential accidents in each part of the job. The description of the process should not be so broad that it leaves out activities with the potential to cause accidents and prevents proper identification of the hazards.

Employees of the workforce should be involved/consulted in the development and implementation of any SWMS.

All persons involved in carrying out the work should understand the SWMS before commencing the work.

6.1.3 Consultation with relevant parties prior to commencing work

The planning before the start of work, which may affect a utility asset, must include but not limited to:

- consultation with local councils
- consultation with asset owners to obtain agreement on the use of out of service, retired or unused assets
- advising affected residents/occupants
- obtaining permit requirements and conditions for undertaking the works
- identifying and determining exact location of assets
- establishing methods to be adopted to protect existing assets

- further consultation as required by the scope of works
- consultation with 'Dial Before You Dig' and the asset registers of other infrastructure owners not registered with 'Dial Before You Dig'
- consultation with roads authority (eg RTA, local council or private body)
- consultation with local councils in terms of storm water assets and work in council owned roads.

Where underground assets exist, the precise location of the assets shall be established in conjunction with the asset owner by pot-holing (or equivalent non-destructive asset location techniques) prior to the principal excavation commencing.

Consideration must be given to the presence of private property assets eg telecommunications, gas, stormwater, sewerage and water assets. These private property assets are unlikely to be found on any plans and are best identified by a visual on-site inspection.

The use of an Electronic Service Detection Device to survey the ground for buried pipes and cables, before commencing excavation, should be considered.

The close out process of the project or scope of work may typically involve recording the 'as constructed' diagram of the asset and providing this record to the appropriate agency with details of:

- finished surface level
- depth of asset
- alignments from property boundary and/or kerb etc
- type of cover or warning device installed eg warning tape, concrete slab, mechanical polymeric protection strip etc
- new ownership details of the asset
- assets retired, removed, declared out of service etc
- type, size, location and installation method of assets
- surface and underground markings installed
- advice to any authorities, agencies etc on the completion of the project or scope of works
- cancellation of any permits, authorities etc
- the provision of a copy of the asset plans to the new owner.

For more information on how to safely dig near an asset, specific information is provided on the Telstra website via the following link www.telstra.com.au/dialb4udig/digging.htm Excavation with hand tools shall be carried out carefully up to but not closer than the minimum distances specified in Table B.

6.1.4 Planning and liaising with other authorities

When planning, it is important to discuss and consider the following areas:

- existing utility assets
- duration of the project and scope of works
- future planned assets
- opportunities for coordination of works
- shared trenching opportunities
- thermal impacts on EHV electricity assets
- changing ground surface levels
- installing heat sources (eg other electricity assets)
- creating underground voids (eg stormwater assets)
- changing backfill materials
- possible limitations in information available
- opportunities to improve information availability
- effect on traffic
- opportunities to isolate or relocate existing assets
- provision of visual identification devices
- asset owner and other authorities' concerns, conditions and expected working procedures
- any requirement/s for the worksite involving:
  - access to assets
  - permit conditions
  - recording of infrastructure, assets locations or relocations
  - financial costs
  - individual, asset or community safety
  - worksite and traffic management requirements and railway safety management requirements

- reinstatement requirements (this liaison is in addition to the statutory notification required by legislation).

Consideration must be given to the operation of heavy plant over potentially fragile underground assets.

6.2 RAILWAY ASSETS

Rail easements have numerous electrical power, signalling, communication cables, compressed air and drainage lines that are owned and maintained by the Rail Authority. These assets vary in type of construction and are documented to various degrees of accuracy.

Numerous utility service providers and other private parties also jointly use the rail easement. Access to the rail easement is strictly regulated by the requirements of AS 4292.1: 2006 and AS 4799: 2000.

Access to information relating to the location of the various rail assets is issued on application.

6.3 SERVICE TUNNELS

Many utilities own or share service tunnels. These will have shafts plus manholes at the surface or other surface infrastructure supporting the tunnel environment.

6.4 EXCAVATION AND TRENCHING

To maintain essential structural support and the protection of other existing assets, excavations in the vicinity must not disturb the embedment around each asset (see Table B for minimum approach distances and to identify if the asset owner must be contacted for specific approach conditions). This information should be supplied by the asset owner through a 'Dial Before You Dig' request. Where this is not possible, the relevant asset owners must be consulted and their permission first obtained.

- If a cable or pipe is exposed, the contractor must ensure that any angular material such as rock or gravel does not mix into the embedment material
- Excavations in any easement must be backfilled, compacted and re-sealed to the appropriate Authority's standard at the completion of excavation
- Temporary restorations in roads and footways must be of sufficient quality to ensure the safety of pedestrians and vehicles until the final restoration is undertaken. Temporary restorations must be regularly checked by the responsible party to confirm their integrity
- Refer to NSW Code of Practice, *Excavation*
- Refer to:
  - AUS-SPEC 306U *Road Openings and Restoration* (2004 and earlier additions)
  - AUS-SPEC 7200 C0219 *Construction – Roadways – Road openings and restorations for utilities* (2007).

6.5 ASSETS NEAR BRIDGE APPROACHES

Often underground assets will be congested at the approach to bridges. Assets' typical depths may vary substantially, rising and falling sharply and at much shallower depths than elsewhere as they are channelled into shared allocated spaces on the bridge. Road safety barriers are often very close to heavily congested services at the approaches to bridges. Construction staging and footing design for such barriers should consider impacts on assets and, where possible, construct barriers prior to constructing the assets.

6.6 ASSETS AROUND POLES

Unless otherwise agreed, underground assets and other obstructions around poles are to be kept a minimum distance of 300 mm from the periphery of the pole, to allow inspections by asset owner staff.

No excavation within 10 metres of a Single Wire Earth Return (SWER) transformer pole is to occur without the approval of the local electricity asset owner.

It should be noted that the NSW Service and Installation Rules require a sketch of the underground service/consumers mains to be marked inside the switchboard.

6.7 TRAFFIC CONTROLS

All work carried out on RTA NSW controlled roads must be done in accordance with the RTA's *Traffic Control at Work Sites Manual.* As this manual is considered to be the benchmark for traffic control in NSW, all works carried out within the road corridor or on adjacent pathways should be conducted in accordance with this manual.

6.8 EMERGENCY WORK

While there will be times when, due to pressing requirements, the timeframe for starting work will prevent some of the normal controls from being completed, this will not diminish the responsibility of worksite controllers to do everything that is reasonable and practical that is within their power to ensure the health, safety and welfare of persons affected by their actions.

6.9 VERTICAL BORING

For any boring within 500 mm of an underground asset, the location of the asset/s shall first be proved by careful hand digging (pot-holing) or equivalent asset location techniques and:

- a minimum clearance of 300 mm from the edge of the underground asset shall be maintained for pole hole boring
- lead in excavations shall be used.

Note: All transmission assets including EHV electricity cables, pipelines involving gas, oil and petrochemicals have separate requirements and the asset owners should be contacted.

6.10 DIRECTIONAL BORING

- When boring across the line of an underground asset, the location of the asset/s shall be positively proven by hand digging (pot-holing) or proven by another approved method.
- All transmission pipelines involving gas, oil and petrochemicals have separate requirements and the asset owners should be contacted.
- For boring under electricity cables, it is necessary to excavate a slit trench beside the cables to confirm the depth of the cables and ensure the drill is not within the minimum approach distance of the cable specified in Table B.
- Additional precautions and clearances are required for directional boring near or beneath sub-transmission cables, normally located in roadways. If the bore is to pass within 2 metres of any electrical cable or conduit the asset owner must be notified as the clearances for HV and EHV may be significantly greater.

  See Table B for further information on clearances.

6.11 MECHANICAL EXCAVATING PLANT

Reference should be made to SafeWork NSW's *Moving Plant on Construction* Sites code of practice.

Mechanical excavating plant may be used with care up to, but not closer than, the minimum distances as specified in Table B.

- Where the excavation is being carried out parallel to or across underground asset/s, location of the asset/s must be proven by careful hand tool excavation (pot-holing) or another endorsed method used to positively locate the asset prior to mechanical excavation.
- If an excavation must exceed the depth of the asset and will disturb the protective cover, slab, other asset/s or the bedding material around the asset/s, the asset owner/s must be contacted to determine if the asset/s is to be relocated.
- Excavations must be reinstated to comply with the asset owner's requirements.
- Where plant is required to operate over underground assets, such as in major road reconstruction, the clearances as specified in Table B must be maintained. Alternatively, if Table B cannot be complied with, the asset can be mechanically protected by an engineered structure agreed to by the asset owner.

Note: All transmission cables, pipelines and petrochemical networks may have separate requirements and the asset owners should be contacted before commencing work.

6.12 EXPLOSIVES

The use of explosives by licensed operators must only be used after a comprehensive risk assessment has been undertaken in consultation with all owners of assets in the vicinity and must be consistent with the requirements of the *Explosives Regulation 2005.*

6.13 PILE DRIVING

Pile driving adjacent to underground assets must not take place without authority from the owner of the assets. The exact location and depth of all adjacent assets shall be physically proved by hand digging (pot-holing) or equivalent asset location techniques prior to commencement of work.

The effects of vibration on the asset must be considered when planning the work.

6.14 IDENTIFICATION OF ASSETS NOT ON PLANS

Where an asset that is not identified on any plans etc is located in the field, work should be suspended until the asset is positively identified and any remedial controls put in place. Depending on the nature of the risk, it may be necessary to notify the asset owner and obtain a revised plan.

6.15 ASSET SEPARATION DISTANCES

To avoid safety and operational conflicts resulting from space infringement issues, refer to the Street Allocation Diagrams in Section 13.

7. SAFE SYSTEMS OF WORK

A critical part of planning safe systems of work is making sure that the plans are accurate. With some assets installed over 60 years ago, it is likely that changes would have been made to the surface of the land at some stage. Road widening and regrading of surfaces are common causes for inaccuracies in records. For this reason, when working from old records, pot-holing and/or pipe and cable locating devices should be used. The relevant authority or asset owner should be told of any inaccuracies in records.

Asset owners typically require notification of a major project or where the project may require supply of a service or product outside normal residential demand.

A safe system of work should be sufficiently robust to include site controls that will ensure assets on construction sites are not damaged. All those who dig the ground should be aware of the assets in the area before they dig and have appropriate controls in place. Particular attention needs to be given to relocated assets and persons new to the site to ensure they are aware of the assets and their locations.

At the project planning stage it is important to consider minimising damage to surface infrastructure and disruption of services to residents, pedestrians and traffic. Any construction or maintenance technique should ensure adequate clearances are maintained between assets and that other assets crossings are identified.

Access to assets must be maintained at all times to ensure emergency and scheduled maintenance activities can be carried out by the asset owner. Contractors should also give consideration at the planning stage for site storage of material and traffic areas associated with construction activities so these do not impede access to or damage assets.

Consideration should also be given to the appropriate level of supervision and training, including specific industry awareness training, for an individual undertaking work near any gas or electrical assets.

7.1 EXCAVATION USING NON-POWERED HAND TOOLS

For more information on how to safely dig near an asset, specific information is provided on the Telstra website via the following link www.telstra.com.au/dialb4udig/digging.htm Excavation with hand tools shall be carried out carefully up to, but not closer than, the minimum distances specified in Table B.

There is a duty of care when excavating near cables, pipes and plant. Before using machines to excavate, **underground assets must first be exposed by pot-holing** with **non-conductive** tools to identify its location. Damage can also result in serious injury or death to workers and widespread disruption to services and traffic.

7.1.1 Work on top of or below an underground asset

No disturbance of the underground assets, including any mechanical cover (eg concrete or polymeric cover slab), should occur without prior notification to the asset owner.

Excavation must not be carried out below an underground asset unless steps are taken to ensure that:

- the asset/s or the integrity of the asset and support material is not damaged
- under-crossing shall be at right angles whenever possible
- such excavation below the asset/s should not come within the distance specified in Table B.

  Note: all transmission cables, pipelines and petrochemical networks may have separate requirements and the asset owners should be contacted before commencing work
- steps must be taken in consultation with the asset owners to ensure the asset is adequately supported.

  Note: Also see Section 6.10 Directional Boring.

7.1.2 Work beside an underground asset

If any excavation beside underground assets comes within the clearances specified in Table B, then the asset owner must be notified prior to work commencing. Measures should be agreed upon to ensure the stability of the surrounding soil or material.

7.2 ACCIDENTAL CONTACT WITH UNDERGROUND ASSETS

In the event of an inadvertent contact with an underground asset, it is essential to notify the asset owner and comply with the reporting requirements under the OHS Regulation (Chapter 12).

7.2.1 Electrical assets

Should contact be made with a live overhead power line or a flash-over occur 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

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 power lines 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 8 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.

7.2.2 Gas assets

Should an incident involving gas assets occur, the following actions should be taken:

- all work should cease immediately
- operator is to shut down the plant or equipment UNLESS this process may provide an ignition source for any escaping gas
- it is essential to leave the cab or operator station, trench or enclosure and maintain an exclusion perimeter due to the risk of explosion or fire. Do not attempt to use any instrument which may provide an ignition source near the gas escape. This may include mobile phones, two way radios, etc
- warn all other personnel and/or public to keep clear from the worksite and equipment. DO NOT attempt to approach, re-enter or

start the vehicle until the relevant authorities have determined the site is safe
- contact the fire brigade on 000 if life and/or property are threatened
- facilitate First Aid treatment and seek medical aid as required
- advise your organisation's emergency contact and request they immediately notify the relevant authorities, including the relevant asset owner
- initiate the emergency management plan and incident investigation process.

7.2.3 Sewerage assets

Should an incident involving sewerage assets occur, the following actions should be taken:

- cease work, make the site safe and contact the sewerage asset owner as soon as possible. Local circumstances and/or ownership should be considered
- if contaminated, shower or wash down with copious amounts of water. Remove any contaminated clothing as soon as practical
- there is a risk of infection from ingestion or eye contact. If eyes are contaminated, flush with copious amounts fresh potable water. If ingested, seek medical advice
- for skin contact, wash with soap and water. For broken skin and abrasions, also seek medical advice
- protect the public and watercourses from exposure to raw or untreated sewage
- if damage to a sewer pipe occurs during construction works, take appropriate steps to prevent surrounding material entering the pipe.

7.2.4 Water assets

- Cease work, make the site safe and contact the asset owner.

7.2.5 Telecommunications assets

- Report any damage to Telstra assets by phoning 13 22 03.
- Contact specific asset owner if not owned by Telstra.

7.3 COOPERATION WITH AUTHORITIES

Constructing authorities and others operating in a public road reserve, rail reserve or private property have a duty of care to protect the existing assets of utility providers. It is essential to determine the location of existing assets by obtaining plans and proving the exact location before excavating.

Asset owners may have formal agreements in place describing how work shall be undertaken near each other's assets and these shall be complied with.

7.3.1 Obligations of asset owners and contractors

There is an obligation for all asset owners, contractors and service providers to observe the specifications and separation distances indicated in the Streets Opening Conference diagrams (see Section 13) or those agreed through consultation between asset owners.

All contractors should notify the relevant asset owners if they locate any asset that is not shown accurately on the plans. At no time may an asset be relocated or moved without the prior authority of the asset owner.

7.4 DOCUMENTED SYSTEMS OF WORK

A documented **risk assessment** developed in consultation with those supervising and undertaking the activity is necessary for all activities where excavation and inadvertent contact with underground assets may occur.

A **SWMS** is to be developed in accordance with the OHS Regulation which captures details of the risk assessment and the required training/qualification. All those workers undertaking the activities identified in the SWMS should be made aware prior to commencement of work (eg toolbox talk).

An **excavation permit** is an excellent method of managing the investigation and approval process leading up to the commencement of the excavation. A properly constructed permit will produce a rigorous process that must be

followed and completed prior to excavation activities and includes the positive identification of underground assets.

Verification activities such as audit and inspection are an excellent means of ensuring that the process has been correctly implemented at a systems level and on the ground before and during the excavation activity.

7.5 TRAINING OF MANAGERS AND EMPLOYEES

Training is an integral component of reducing the risk of inadvertent contact with underground assets.

Managers and supervisors need to be made aware of the hazards and overarching requirements regarding inadvertent contact with underground assets such that they are able to implement safe systems of work and properly plan for and oversee the activities.

Both managers/supervisors and employees will benefit from information and training regarding the use of electronic detection devices, how to use the 'Dial Before You Dig' service and how to read plans supplied by the asset owners and/or 'Dial Before You Dig'.

Employees need to be made aware of the systems in place to minimise the risk of inadvertent contact with underground assets and also the hazards facing them if these systems are not employed.

Site-specific induction systems should include details such as the known location of assets, the site safety rules in relation to excavations (eg no excavations without a permit) and provide inductees access to, or a copy of, the utilities location plan for the work zone.

7.6 ASSET OWNER PLANS AND 'DIAL BEFORE YOU DIG'

A site meeting with the asset owners may be required to determine location/s and procedures for dealing with assets within the scope of work. This issue should be addressed during initial project development to provide time to establish a regime to manage any risks.

Before commencing any excavation work, reference shall be made to the details or plans of the utility or private assets in the proposed excavation area as well as a site inspection to identify any unmarked assets. Plans illustrating the location of known underground assets can be obtained from individual asset owners or the 'Dial Before You Dig' service.

As mentioned, the location of underground assets provided by a service or utility provider may not be accurate for many reasons. As complete accuracy cannot be guaranteed, the position of underground assets must be proven by hand excavation, pot-holing or other approved techniques.

For work in the vicinity of EHV electricity transmission cables it is mandatory to have a meeting with the asset owner prior to any work commencing.

7.7 CABLE/PIPE IDENTIFICATION DEVICES

An electronic pipe or cable locator should be used to more accurately identify the location of the underground asset – as asset owners' plans will not provide exact locations.

Once identified using such electronic device, care should be taken to mark the location of the underground asset on the ground's surface.

7.8 GROUND PENETRATING RADAR (GPR)

Ground penetrating radar (GPR) is emerging within the civil construction industry as an excellent tool for identifying underground assets and mapping assets on a wider scale.

GPR is a non destructive and non invasive technique for rapidly imaging the shallow surface (up to 10 m) and produces high resolution colour section in real time. Parallel images can be used to create a 3D image.

7.9 POT-HOLING

Pot-holing is the use of hand tools to excavate to a pre-determined depth to establish if assets exist in the immediate location. Pot-holing is a proven method of identifying assets.

Never assume that underground assets are positioned in the location as depicted on the plans or in the depth suggested. All underground assets should be positively identified prior to commencing excavation.

Pot-holing should be undertaken along the length of the proposed excavation to identify the path of underground assets and their depth. The information contained on the asset owner's plans and gathered during electronic identification methods helps in this process.

- careful digging (ie pot-holing) is the only sure way to identify the depth and alignment of underground pipes and cables
- pot-holing must be undertaken with reference to plans and other information provided by pipe and cable owners.

The amount of pot-holing should be determined with reference to the risk assessment for the site. Excavators should also pay attention to pot-holing requirements included in work practices provided with the network plans and onsite by a representative of the pipe and cable owner.

7.10 AIR AND WATER LANCING

Air/water lancing techniques may be used in some circumstances, but the advantage of these needs to be assessed against any inherent safety and environmental risks, eg dust generation, contaminated water runoff and possible damage to underground assets.

7.11 TRENCHLESS TECHNIQUES

Pot-holing must be used to locate existing underground assets to ensure adequate clearances are maintained between assets and to locate other asset crossings. Pot-holing at each asset crossing and at regular spacing along assets is recommended.

Where high risk assets are identified, consultation with the asset owner is required. Consultation is also required when using directional boring across existing utility lines. Where clearances required by other assets cannot be achieved at the proposed depth of asset installation, alternative solutions should be sought in consultation with the relevant parties.

It is crucial to provide the "as constructed" details on this type of installation for future reference because:

- the ground above the bore is typically undisturbed, not offering any indication of previous works
- of the inability of directionally-bored installations to provide warning tape or mechanical protection above the asset
- the bore may not follow a direct route.

7.12 SAFETY OBSERVERS

Excavation work around underground assets should only be undertaken with the assistance of a competent safety observer.

The safety observer/s should be given sufficient control of the activity to call for a cessation of work in the event of system failure or observation of unsafe practice which may give rise to an inadvertent contact with an underground or overhead asset.

When excavating near or adjacent to underground assets it is important to be aware of overhead hazards such as overhead powerlines. Risk assessment may dictate a requirement for more than one safety observer for such activity, eg one observer to mitigate inadvertent contact with underground hazards and the other to mitigate inadvertent contact with overhead hazards.

7.13 CONFINED SPACES

Excavations are generally not confined spaces. However, confined space provisions may apply to certain excavations where the excavation enters foul or contaminated ground or opens a live sewer. Also, where the atmosphere can be altered by exhaust gases or other contaminants, the excavation is to be treated as a confined space. Further information is given in SafeWork NSW's *Code of Practice: Excavation,* Section 4.

7.14 GLOBAL POSITIONING SYSTEM (GPS)

GPS technology provides an excellent opportunity to plot the location of underground assets and maintain that information for the duration of the project. This is especially important in maintenance and long term projects.

GPS locations, when captured, should be noted on relevant plans. This information should also be provided to asset owners for any as built/ modified infrastructure or previously unidentified underground assets.

7.15 ABOVE GROUND IDENTIFICATION DEVICES

Previously in this document, many above ground identification devices have been discussed that may assist identifying underground assets.

The Western Sydney Orbital Project (M7) successfully implemented a process where different coloured conduits (according to the nature of the asset) were temporarily inserted into the pot-hole directly onto the underground asset. These conduits, when back filled, extended approximately 1-1.5 metres above the ground and were plugged on top to prevent dirt and debris entering the conduit. These above ground locators enabled easy visual identification of the path of known underground assets and, when a measuring tape was inserted into the conduit, provided the exact depth of the asset.

8. TRAINING, INSTRUCTION AND INFORMATION

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.

In addition, some activities are restricted to persons holding the relevant certificate of competency, for example scaffolding and operation of cranes and some load shifting equipment. See the OHS Regulation or the *Industrial Certification Manual* for a full list of such activities.

8.1 TRAINING REQUIREMENTS

In addition to the requirements of construction training, all persons undertaking work involving underground assets must be instructed, trained and assessed as competent for the tasks they are undertaking.

Training includes but is not limited to:

- induction
- general health and safety induction training
- work activity health and safety induction training
- site specific health and safety induction training (Clause 216 OHS Regulation)
- risk assessment methodology
- training in the use of SWMS
- plan/map reading
- utility specific statutory training.

8.2 INDUCTION TRAINING

The OHS Regulation requires that employees receive OHS induction training, including general health and safety induction training, work activity based induction training and site specific induction training, and that this training covers the topics set out in the *Code of Practice: Occupational Health and Safety Induction Training for Construction Work 1998.* The training must cover the following points:

- arrangements for the management of OHS, including arrangements for reporting hazards to management
- health and safety procedures relevant to the work of the employee, including the use and maintenance of risk control measures
- how to access any health and safety information that the employer is required to make available to each employee
- any other induction training relevant to the place of work (eg confined spaces entry training), having regard to the competence, experience and age of the new employee.

8.3 TRAINING TOPICS

Training should draw on knowledge of the known hazards and risks in your operations, including matters described in this Guideline. The source of risks should be pointed out and the adverse outcomes that have been experienced by others should be used to stress the importance of safety.

The training provided and the instruction given should at least include all safe work methods to be used on the job and matters described in this Guideline, that is, all hazards, risks and control measures for control of hazards.

8.4 WHO SHOULD RECEIVE TRAINING?

The target groups for training at a workplace include but are not limited to:

- managers and supervisors of employees and/or other persons undertaking work considered at risk of injury and/or who have responsibility for implementing safe operating procedures
- OHS committees and OHS representative/s
- staff responsible for the purchasing and maintenance of plant, PPE and for designing, scheduling and organisation of work activities
- persons undertaking risk assessments or preparing SWMS

- employees and subcontractors undertaking the work, including employees of labour hire organisations.

As the needs of each target group are different, the content and methods of presenting training material should be tailored to meet the specific needs of each group.

8.5 PROVISION OF INFORMATION AND INSTRUCTION

Information may include:

- the results of any applicable risk assessment
- SWMS
- a review of such a risk assessment and/or SWMS or operating procedure
- any other relevant OHS information.

Employers should brief each employee as to the contents of risk assessments and SWMS when each employee and/or other person first begins to perform tunnelling work, at regular intervals thereafter, and whenever there are changes to risk assessments or new information about health and safety risks becomes available.

Employees and other workers should have, on request, ready access to risk assessments and SWMS.

9. CASE STUDIES AND CHECK LISTS

9.1 REPAIRING SEWERAGE PIPES

A reactive dig and repair job was commenced by a work crew of a sewage and drainage authority following the internal surcharge of a sewer line at a preschool adjacent to the worksite. CCTV was used to identify the repair location of the sewer. Damage to the sewer pipes apparently occurred during the laying of electrical conduits approximately 20 years ago and a contractor had carried out a repair of that damage. The repairs appear not to have been referred back to the responsible sewerage authority and eventually resulted in the internal surcharge at the preschool.

The work crew did not find indicator plates or markers identifying underground power in the immediate area, and, because locating equipment was not readily available, made a decision not to delay the work and to commence excavating with a mechanical excavator. The excavator uncovered bricks marking an electricity asset directly over a conduit. Marker tape was found but was not immediately obvious.

An incident was declared by the work crew and work stopped when the conduits were uncovered. The asset owner was called to the site and supervised the remainder of the repairs. An insulated spud bar was used to break up concrete that was placed around the pipe in the original repair. The pipe was replaced, work completed and the excavation backfilled. The incident was reported as a near miss.

The hazards shown here include a broken sewer pipe and high voltage cables.

The risks were electric shock, contaminated and hazardous atmosphere (from sewer gases) and possible infection.

Failure to identify the presence of these cables before work commenced exposed the workers to the risk to health and safety.

Once the risk was identified, the controls included the use of insulated tools to excavate under the supervision of an authorised person from the asset owner.

9.2 COUNTRY TELECOMMUNICATIONS CABLE DAMAGE CASE STUDY

At this location, a contractor working for a telecommunication carrier performing combined pre-ripping and plough operation to install new optic fibre cable, damaged the Telstra major interstate fibre cables.

The new route was being installed through rural paddocks and properties by D7 dozer and trenching machinery. The route was being installed parallel to the existing Telstra major fibre route.

At the manhole, approx 20 metres from the damage location, a 30 fibre cable, 16 fibre cable and a 30 pair copper cable left the manhole at right angles following the fence line. The contractor failed to identify the break off from the manhole shown on the plans. These cables were subsequently damaged during the pre-ripping procedure near the fence line.

The contractor believed the main cables where in another location, the one they had been following, and they had not noticed the manhole (located approximately 20-30 metres from the pre-ripping process) until after the damage had occurred. Two markers on either side of the manhole were clearly visible from a distance.

Site observations

- The Telstra fibre cable route was clearly marked with Telstra yellow concrete markers, which was easily visible.
- The manhole was marked with a yellow concrete marker post at either end of the manhole.
- The cable route was clearly shown on Telstra plans that the contractor obtained from the 'Dial Before You Dig' service.
- There was no visible sign of asset location (pot-holing) on the ground such as markers, paint, peg lines, markings on the ground etc.
- There were deficiencies with the safe system of work used on the project.

9.3 CITY TELECOMMUNICATIONS CABLE DAMAGE CASE STUDY

A contractor in the west of Sydney drilling pier holes for the construction of townhouses caused significant damage to telecommunication cables resulting in severe disruption to telecommunication services in country NSW.

An auger operated by an excavation contractor made a direct hit on a telecommunications cable route. Thousands of telephone lines, mobile phone towers, EFTPOS terminals and data lines went dead all over NSW instantly.

The auger, a giant drill, severed six fibre optic cables running between 12 and 60 fibres each and a 2400 copper pair cable, about seven kilometres from the Parramatta exchange.

Physical cable damage was not confined to the one hole in the ground – it wrenched and ripped cables clean out of manholes for hundreds of metres on either side.

One of the cables was the main feed to the Bathurst and Orange area, others carried mobile phone traffic. Almost all the copper lines were in use by local households and businesses and, not least of all, the main ATM (asynchronous transfer mode) internet backbone running to the south and west out of Sydney. At one ISP alone, more than 100,000 customers across four states were unable to log on to the internet for hours. Also 250,000 Foxtel service subscribers were disconnected, some for nearly 12 hours.

It was not just the phone services that went down. EFTPOS services died, and staff from a Bathurst supermarket were reduced to hunting around other businesses for manual transfer forms for more than a day so customers could buy groceries and debit their bank accounts. E-mail access in Bathurst was out too.

Had the 'Dial Before You Dig' service been contacted on 1100 and the appropriate plans used, the damage could have been avoided.

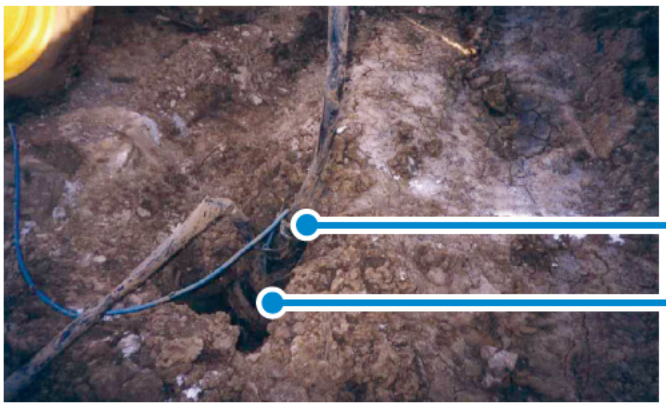
If there is any doubt at all about cable location, Telstra will send staff to show contractors and property owners how to check for stray lines. However, there was no call placed to the 1100 service for this damage.

When people in west Sydney picked up their phones and found no signal, they might have expected their mobiles or other carrier services to fill the gap. But Telstra, Optus, AAPT, Vodafone and Primus were all affected to some extent.

This incident was the cable cut of all cable cuts, but cut and flooded cables take down parts of the telephone and data network every day.

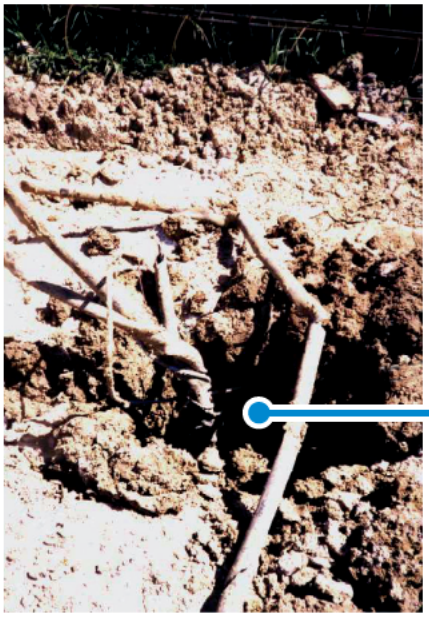
It took 50 technicians until 11.00 that night just to restore all the services, and two-and-a half days to finish all the work.

Sub-ducts and cables laying on the construction site, pulled out by an auger.



Twisted sub-ducts and optical fibre.

One of the bored holes where the cables and conduits had been pulled out.



Twisted sub-ducts and optical fibre.

Through these bored holes large amounts of cables and sub-ducts had been pulled out. Thus, causing major damage to cables and joints in the Telstra Network.

9.4 EXAMPLE OF AN INCIDENT REPORT USED BY AN ELECTRICITY ASSET OWNER

'Excavator operator injured when hitting 11,000 volt underground cable'

Date	07/10/05
Incident occurred at a place of work (refer OHS Act 2000)	(Construction site)
System voltage involved	11,000 kV
Address	Northumberland Road
Work being done for	Contestable work done for customer
Category	General public (workers – non networks worker)
Category type	Electric shock
Treatment	Medical treatment given (Hospital)
Description of injuries	Excavating for ASP to relocate 11,000 volt UG cables, excavator hit cable causing explosion and feeder trip. Victim received shock from excavator and was taken to hospital for check up. No permanent injuries
Network element involved in incident	Underground mains
Object involved in incident	Excavator
Location of incident	Urban
Location type	Public Roadway (including footpaths to property boundary)
	Accident area exposed to weather (ie outdoors)
Possible causes of incident	Failure to follow written procedures
Briefly describe possible causes of incident in more detail	Workers had located cable via searches but proceeded to dig with excavator beyond marker tape and hit cable
Initial corrective action	ASP and excavator operator advised of the dangers associated with excavation near cables. Advised that any work beyond covers or marker tapes can only be done using hand tools
Corrective action taken	excavator operator advised of his responsibilities when working near underground assets ASP reminded of his responsibilities in regard to site supervision and the need to consult plans before commencing any excavation work
Follow up	Cable isolated and repaired by IE. 50 customers interrupted for 5.2 hours

9.5 CASE STUDY: CONSTRUCTION OF THE M7 MOTORWAY

The Abi Leighton Joint Venture (ALJV) conducted an extensive risk assessment before commencing on the project and services both above and below the ground were identified as a major risk.

The ALJV consulted with the asset owners who identified an extensive number of assets in the M7 corridor and local road upgrades.

Plans were obtained from 'Dial Before You Dig' and from the asset owner. Electronic services detection was also conducted. These assets were then surveyed and non-destructive digging conducted to positively identify each asset. Colour coded conduits were then placed on top of the assets.

The ALJV still recorded hits to the assets as not all assets were identified on the plans or by 'Dial Before You Dig'.

Meetings were arranged by the ALJV with management and field staff, asset owners, subcontractors and 'Dial Before You Dig'. From these meetings the ALJV developed the following procedures through consultation to reduce the possibility of impacting on these assets:

- a request to de-energize high risk electrical assets where possible was made to the asset owner. A training course was developed and delivered by the ALJV and Integral Energy to approximately 500 ALJV and subcontractor employees on the project
- permits to excavate and work around assets were reviewed and developed with input from all stakeholders. The mandatory exclusion zones for underground assets were doubled
- colour coded conduits were used to identify the type of asset, location and depth
- when working in the asset zones, only toothless buckets were permitted to be used on plant
- banners, posters, stickers and signage were extensively used to remind all personnel of the procedures.

The ALJV, in consultation with a manufacturer, developed a GPS backpack to identify a known asset by comparing it to the ALJV survey database. This allows the ALJV to mark out existing assets and make this information more accessible and easier to understand.

By consulting and training all stakeholders, the ALJV was able to implement safe work methods and dramatically reduce the number of incidents impacting on assets.

Colour Coded Conduits used to identify assets

Manufacturer's backpack being used by ALJV survey staff

The manufacturer's pocket PC allows quick recognition of underground assets by touch screen technology. This identifies the type of asset and its approximate location.

10. FURTHER INFORMATION

10.1 AUSTRALIAN STANDARDS

- AS 2648.1 *Underground marking tape*
- AS 4026 *Electrical cables for underground residential systems*
- AS 1345 *Identification of the contents of pipes, conduits and ducts*
- AS 2566.2 *Buried flexible pipelines*
- AS 4271 *Interim – Geographic information data dictionary*
- AS 1742.3 *Traffic control devices for works on roads*
- AS/NZS 4360 *Risk management*
- AS 4799 *Installation of underground utility services and pipelines within railway boundaries*
- AS 4292.1 *Railway safety management*
- AS 2865:2001 *Safe working in a confined space*
- AS 1165 *Traffic hazard warning lamps*
- AS 1345:1995 *Identification of the contents of pipes, conduits and ducts*
- AS 1742.3 *Traffic control devices for works on roads*
- AS 1743 *Road signs – specifications*
- AS 1744 *Forms of letters and numerals for road signs*
- AS 1906 *Retroreflective materials and devices for road traffic control purposes*
- AS HB81 *Field guide for traffic control at works on roads:*
  (HB81.1 Short term urban works – daytime only
  HB81.2 Short term rural works – daytime only
  HB81.3 Mobile works
  HB81.4 Short term night works
  HB81.5 Works on unsealed roads
  HB81.6 Bituminous surfacing)

Australian Standards are available from SAI Global www.saiglobal.com/shop
email sales@sai-global.com or phone 13 12 42.

10.2 SAFEWORK NSW CODES OF PRACTICE

- *Code of Practice: Work Near Overhead Power Lines*
- *Code of Practice: Excavation*
- *Code of Practice: Moving Plant on Construction Sites.*

10.3 OTHER STANDARDS AND REFERENCES

- Streets Opening Conference (2007) *Guide To Codes and Practices for Streets Opening*
- Streets Opening Conference (1999) *Model Agreement for Local Councils and Utility Service Providers*
- *Service and Installation Rules of New South Wales* (2006)
- AUS-SPEC 306U AUS-SPEC *Road Openings and Restoration* (2004 and earlier additions)

- AUS – SPEC 7200 C0219 *Construction – Roadways – Road openings and restorations for utilities* (2007).

  For Streets Opening Conference enquiries, contact The Secretariat, Institute of Public Works, Engineering Australia (NSW Division)
  Phone 02 9267 6677 Fax 02 9283 5255 email ipwea@ipwea.org.au

  For AUS–SPEC enquiries contact: Manager Specifications, Standards Australia, 286 Sussex Street Sydney NSW 2000. GPO Box 476 Sydney NSW 2001
  Phone 02 8206 6713 Fax 02 8206 6021 email aus-spec@standards.org.au

10.4 LEGISLATION

- *Electricity Supply Act 1995*
- *Electricity (Consumer Safety) Act 2004*
- *Gas Supply Act 1996*
- *Occupational Health and Safety Act 2000*
- *Pipelines Act 1967*
- *Sydney Water Act 1994*
- *Hunter Water Act 1991*
- *Roads Act 1993 and Road Regulations 1994 (as amended)*
- *Local Government Act 1993*
- *Contaminated Land Management Act 1997*
- *Telecommunications Act 1997.*

11. APPENDIX A – UNDERGROUND ASSET LOCATION CHECKLIST

Worksite location:

(street name, cross street, landmarks)

Plans provided by: Dial Before You Dig ☐ Yes ☐ No Contractor ☐ Yes ☐ No
Asset owner ☐ Yes ☐ No

Underground assets located:

Utility (Note Utility from which plans were obtained)	Plans received as per dial before you dig information	Plans current Check dates	Plans indicate assets in vicinity	Assets checked	Pot-holing req'd	Pot-holing done	Stand-by req'd	Site marking completed	(sketch on rear of sheet)
	✓	✓	✓	Y/N	Y/N	Y/N	✓	Y/N	Y/N
Communications									
Electrical									
Water									
Sewerage									
Gas									
Other									
Other									

Sketch worksite and Utility locations on reverse side of page

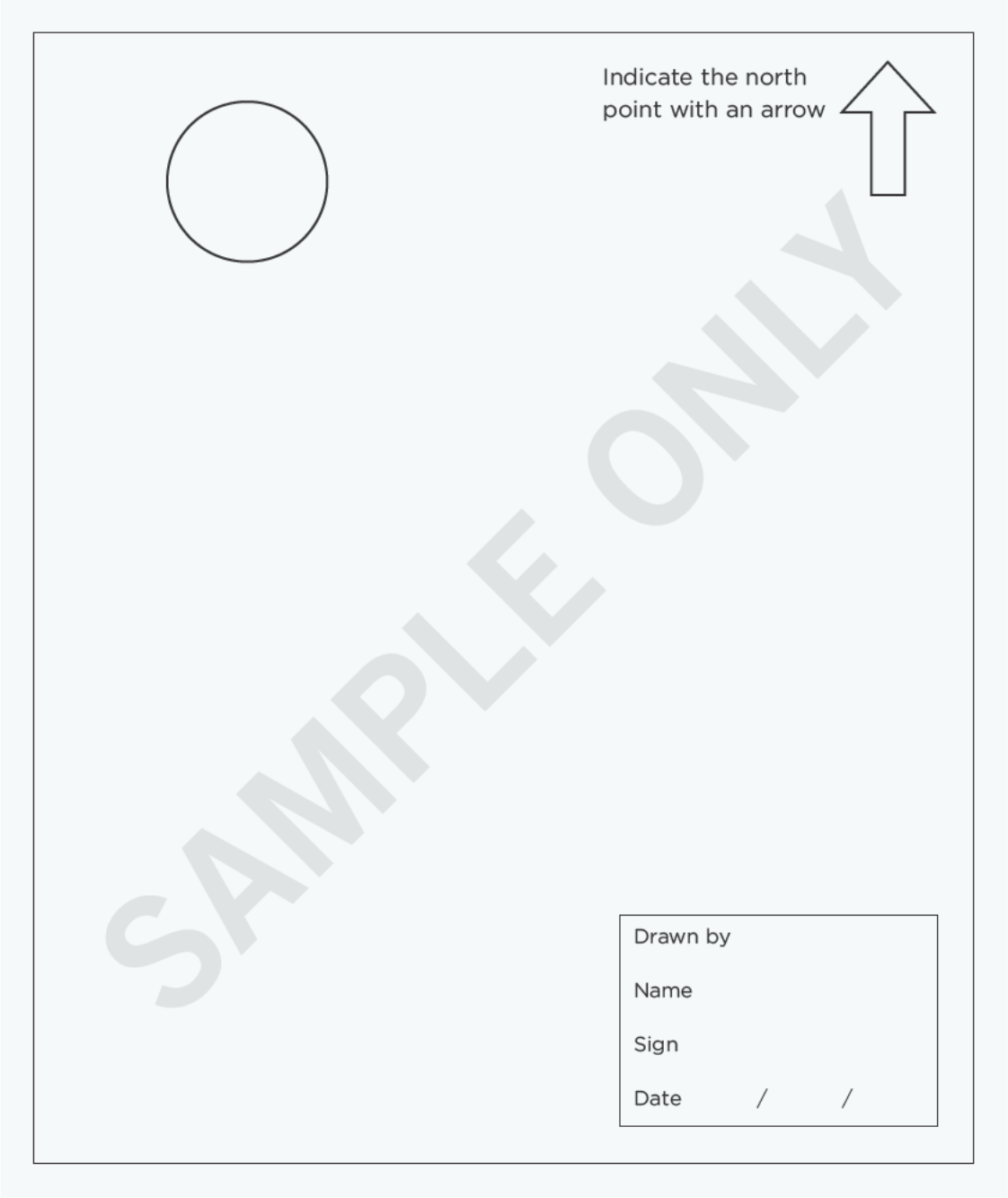
Additional Comments:

Plans verified and confirm all assets as located? ☐ Yes ☐ No

Person locating asset	Person carrying out work
Signed	Signed
Name (Print) ..... Business Name.....	Name (Print) .....
Date completed checks ...../...../.....	Date received checked results ...../...../..... Completed Checklist and Utility Plans included in job-pack. ☐ Yes ☐ No

UNDERGROUND ASSET LOCATION CHECKLIST – SAMPLE ONLY

Diagram of UG assets as located on site



The above sketch should contain the following details:

- street alignments (where applicable)
- lot boundaries (where applicable)
- name of street and suburb
- north point
- nearest cross street
- distances from relevant assets/boundaries
- depth of cover (only if available)
- signature and name (drawn by).

12. APPENDIX B – WORKERS COMPENSATION INSURANCE

Anyone who employs workers, and in some cases engages contractors, must maintain a current workers compensation insurance policy. Penalties apply for failing to have a current policy in place.

All employers have a legal liability to pay workers compensation to workers who are injured in the course of their work, and employers are required by law to hold a workers compensation insurance policy from a licensed SafeWork NSW insurer to cover that liability.

For workers compensation insurance purposes the *Workplace Injury Management and Workers Compensation Act 1998* (the Act) defines a worker, subject to certain specified exceptions, to mean:

A person who has entered into or works under a contract of service or a training contract with an employer (whether by way of manual labour, clerical work or otherwise, and whether the contract is expressed or implied, and whether the contract is oral or in writing).

In addition, the Act deems certain other persons to be workers for workers compensation purposes, eg some types of contractors.

For assistance in clarifying your obligation, contact your insurer or the SafeWork NSW Customer Experience on 13 10 50.

13. APPENDIX C – TYPICAL FOOTWAY ALLOCATIONS FOR UTILITY SERVICES AND DEPTH OF COVER IN ROAD RESERVES

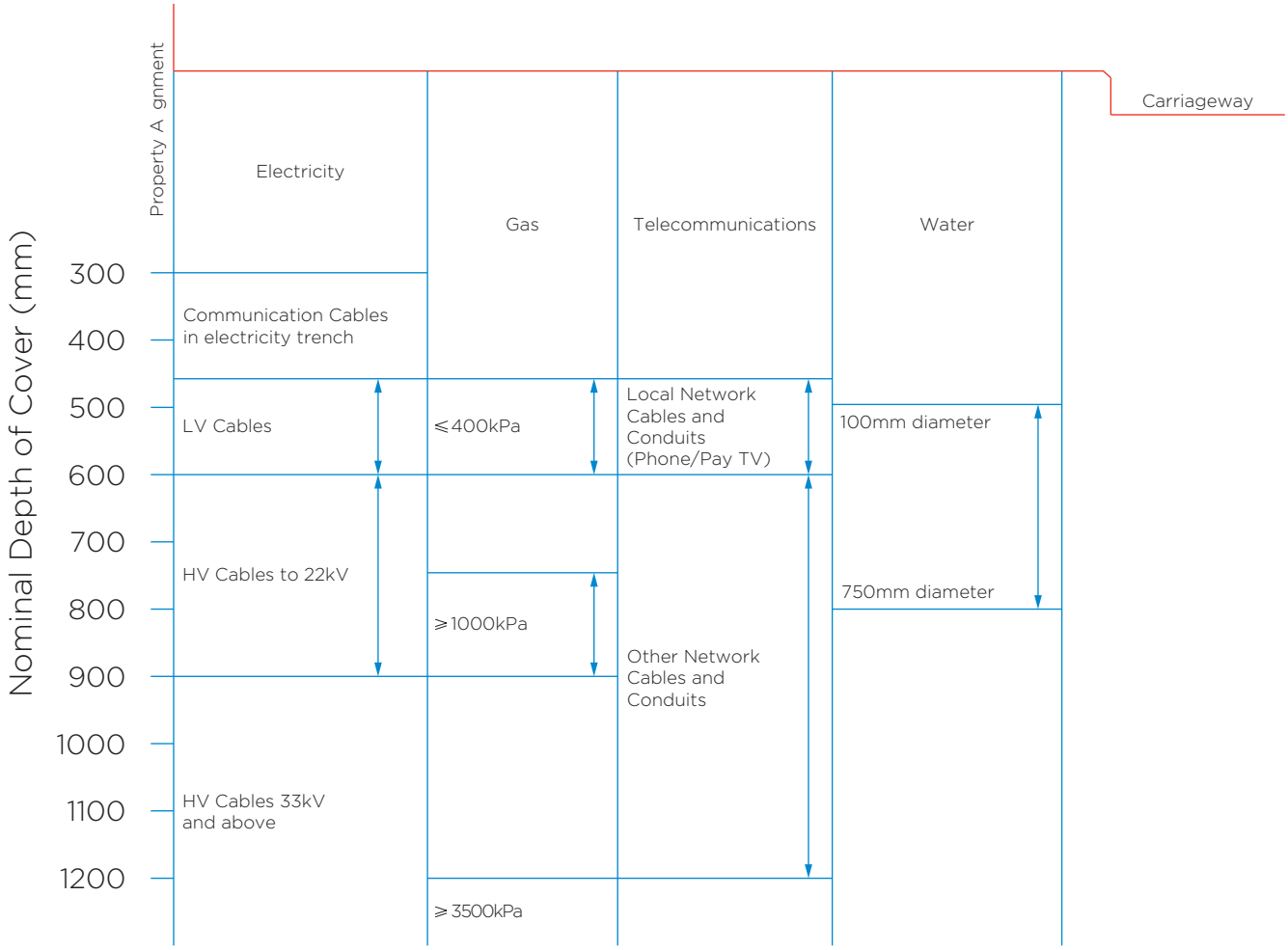
The diagrams in this section have been sourced from the publication entitled *Guide to Codes and Practices for Streets Opening 2007* published by the NSW Streets Opening Conference (SOC). These diagrams are typical examples only, and may not be up-to-date. The current edition of the SOC document should always be consulted prior to undertaking work that impacts on underground services to ensure that the information used is up-to-date.

Source: NSW Streets Opening Conference: Guide to Codes and Practices for Streets Opening 2007

For the purpose of this section, note that sewer lines have not been specifically identified.

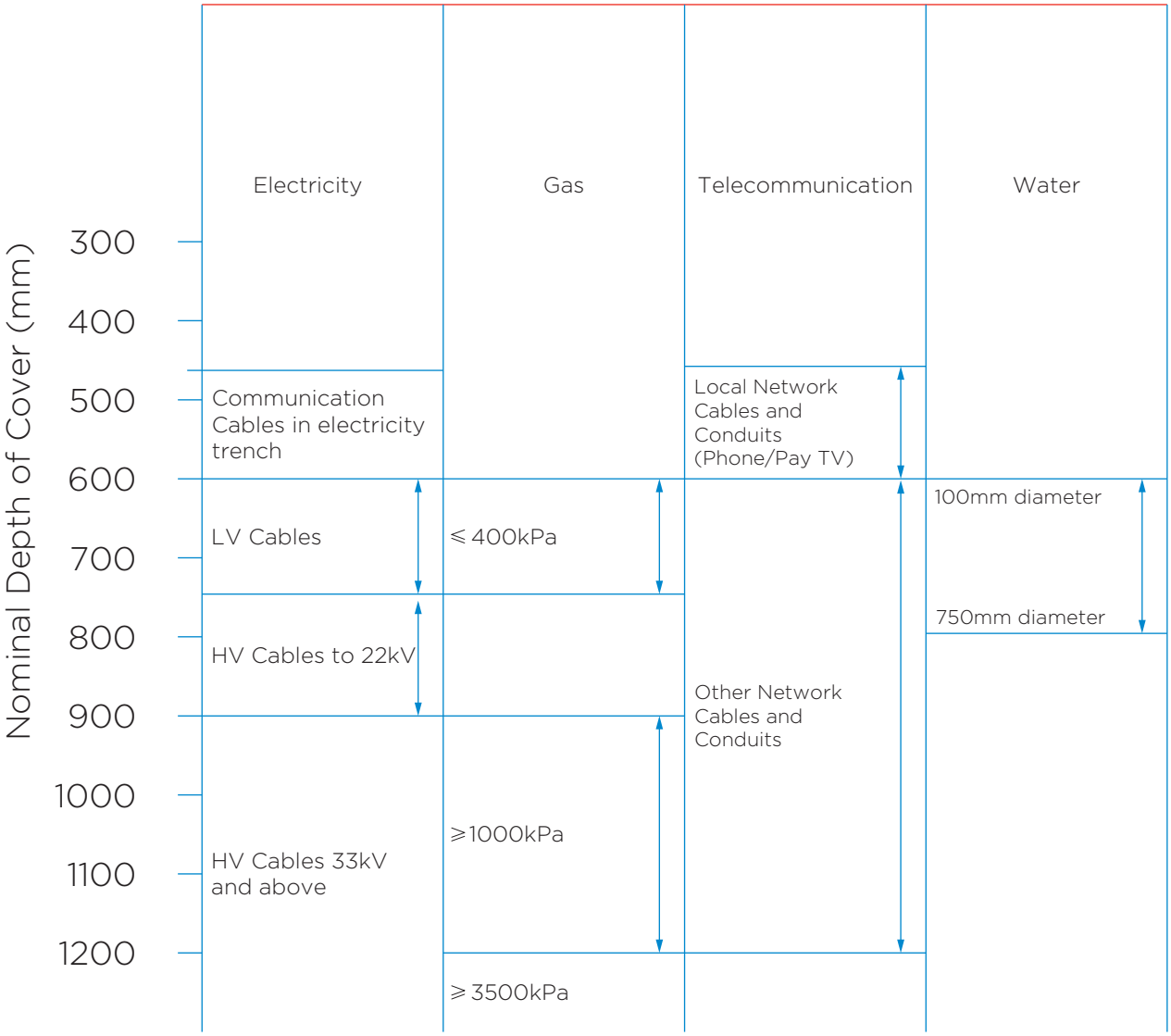
13.1 NOMINAL DEPTH OF COVER OF UTILITY SERVICES IN ROAD RESERVES

13.1.1 In footways



Source: NSW Streets Opening Conference: Guide to Codes and Practices for Streets Opening 2007

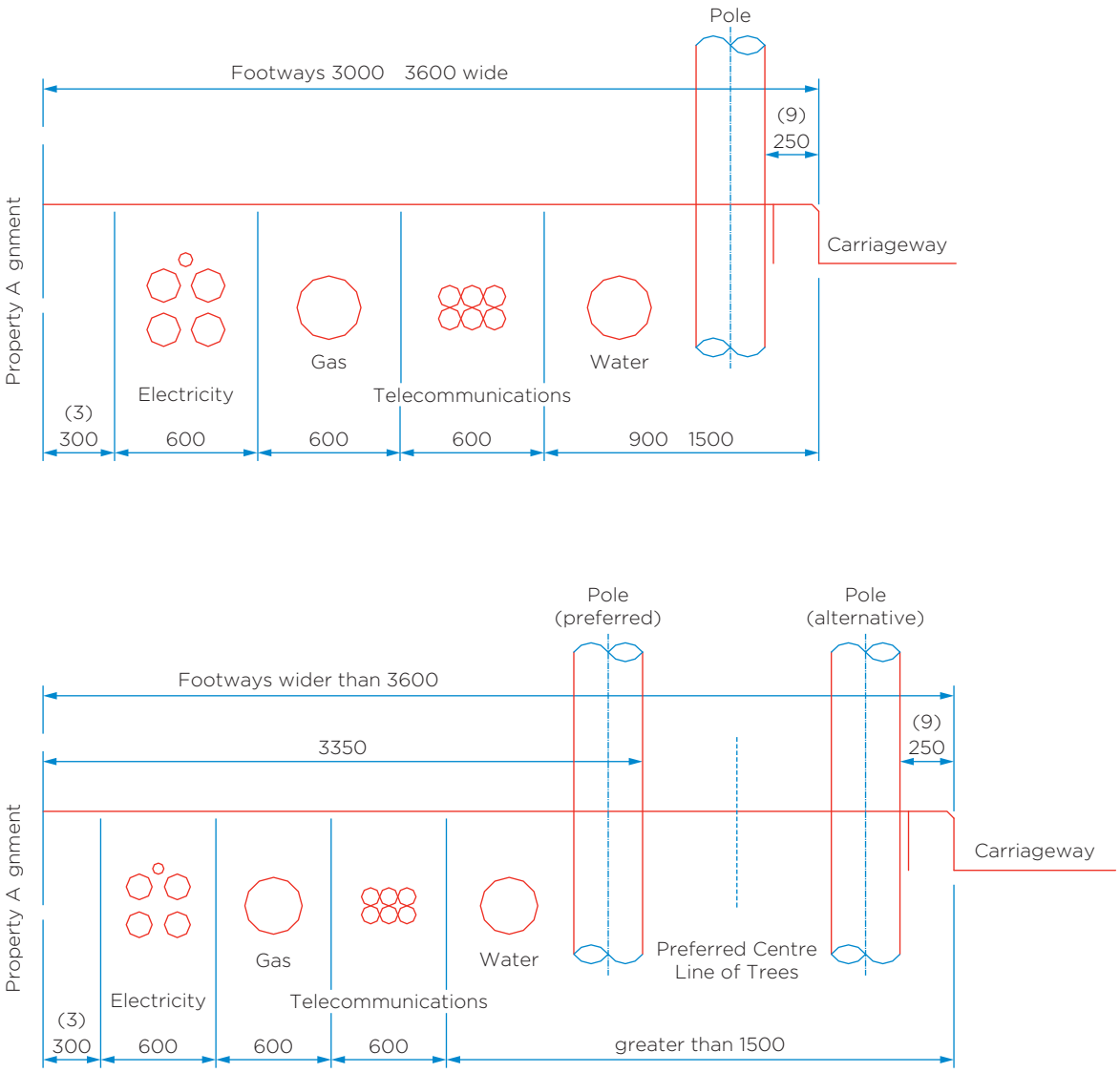
13.1.2 In carriageways



Source: NSW Streets Opening Conference: Guide to Codes and Practices for Streets Opening 2007

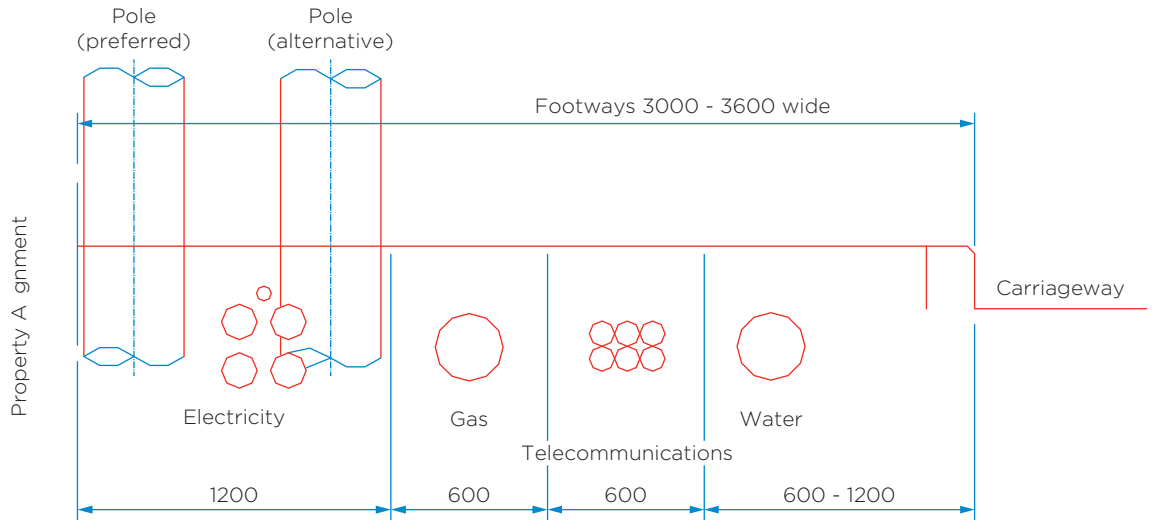
13.2 UTILITY/SERVICE PROVIDER ALLOCATION OF SPACE IN FOOTWAYS

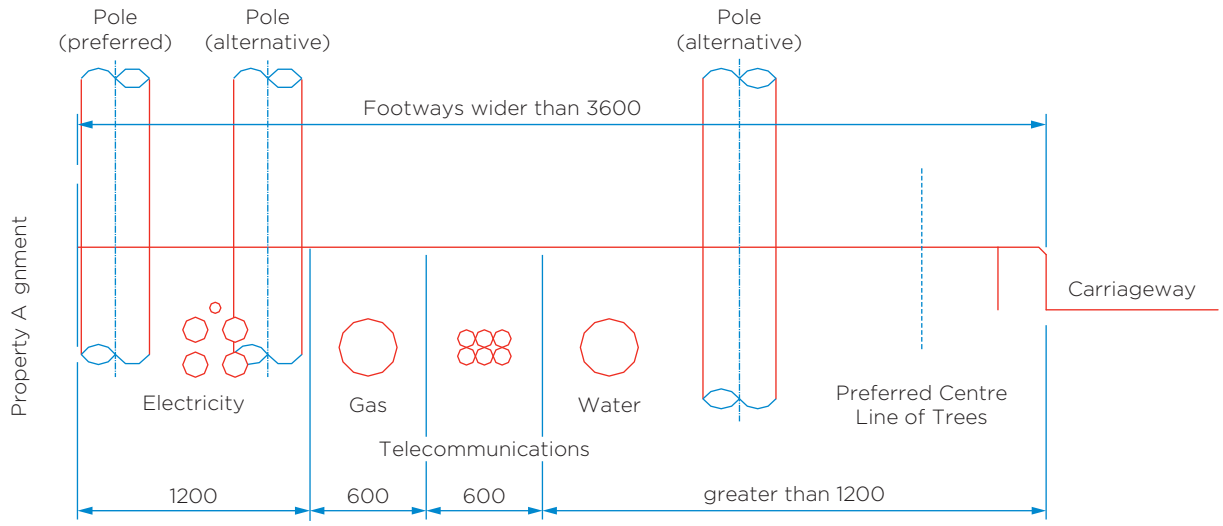
13.2.1 Streets dedicated prior to 1 January 1991



Source: NSW Streets Opening Conference: Guide to Codes and Practices for Streets Opening 2007

13.2.2 Streets dedicated after 1 January 1991





Source: NSW Streets Opening Conference: Guide to Codes and Practices for Streets Opening 2007

Catalogue No. SW08773 0118