22 May 2026

Mr Kweku Aikins
Senior Planning Officer Assessments
Housing Delivery Assessments

Email – kweku.aikins@dpie.nsw.gov.au

RE: Major Projects – SEARs Request – 176 Rickard Road & 225-231 Byron Road, Leppington (SSD-119567490)

Reference is made to the above-described Request for SEARs that is currently being considered by the Department of Planning, Housing and Infrastructure (Department) and the Planning Focus Meeting (PFM) that occurred on Friday 7 May 2026.

Below is a summary of the points discussed at the meeting and additional comments that form Camden Council's response to the request for SEARs:

Current and future planning controls applying to the land

- The subject site is currently zoned B7 Business Park and as part of the Leppington Town Centre State Assessed Rezoning Proposal (LTC SARP) the site is proposed to be rezoned MU1 Mixed Use, RE1 Public Recreation and R4 High Density Residential.
- While still being finalised, it is anticipated that the part of the site to be zoned MU1 will be subject to a maximum FSR of 4.5:1 and a maximum building height of 36m, while the part of the site to be zoned R4 will be subject to a maximum FSR of 2.5:1 and a maximum building height of 36m.

Concurrent rezoning

- As part of the Scoping Report submitted with the SEARs request the applicant proposes a concurrent rezoning to:
  - Amend the height of buildings development standard to provide a maximum HOB of 125m in the west of the site and 36m in the east; and
  - Amend the FSR development standard to provide a maximum FSR of between 4:1 and 5.5:1 applying to different parts of the site.
- It is submitted that the proposed rezoning should not be considered in isolation and should be considered as part of the finalisation of the LTC SARP (which is due to be completed by the end of next month).
- It is noted that when the Housing Delivery Authority considered the SSD EOI request for this site, the members recommended *"that the applicant be advised the proposal should address the Leppington Town Centre Review Planning Proposal (PP-2023-284), that a merit assessment may result in development lower than proposed in the EOI application and that additional affordable housing commensurate with the uplift sought is required".*

Cumulative impact

- The draft Leppington Town Centre Planning Proposal as exhibited, was justified by a Housing Demand Analysis, which projected demand for around 10,500 dwellings by 2041.
- To date the Minister has declared nine projects in the Leppington Town Centre as being State Significant Development. Based on the Scoping Reports, these developments seek to create a combined 7,625 dwellings. Furthermore, the Housing Delivery Authority is actively considering EOIs for further major residential developments in the Leppington Town Centre that, if supported, would significantly increase this number.
- The cumulative impact that the SSD declared projects may have on the development of the wider town centre must be considered as part of any future application(s) (i.e. provision of sufficient public open space, traffic modelling and operation of intersections, provision of social infrastructure, maintaining sufficient employment opportunities etc.).

Road network

- The road network in the Leppington Town Centre primarily consists of rural roads that do not have the capacity to cater for the level of development planned for the centre.
- At this stage the State Government has not committed any funds to the physical delivery of the major road projects in the town centre.
- The existing road network cannot cater for the level of development currently planned in the town centre.
- To alleviate the pressure these developments will have on existing roads (e.g. Rickard Road), it is essential that the local road network (as per the ILP) is delivered in a timely manner.
- Accordingly, should this development proceed, any local roads planned for the site under the ILP should be delivered as part of Stage 1.

Active transport

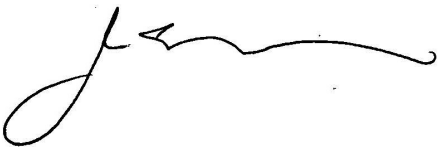
- A key part of the vision for Leppington Town Centre is that it develops as an active transport-focused precinct that prioritises public transport, cycleways and pedestrian pathways.
- Given the limited information submitted with the SEARs request it is not clear how the proposal will facilitate this.
- Any EIS should provide detailed analysis of how the proposal will facilitate, encourage and welcome pedestrian and cycling movements to Leppington Station.

Design Excellence

- The draft Leppington Town Centre Planning Proposal as exhibited includes detailed provisions for Design Excellence.
- Any EIS should include a detailed response to the design excellence provisions detailed in the draft LTC PP and should be considered by the SDRP or the DPHI's internal urban design team.
- It was noted from the Applicant's presentation that the intention is to go through the SDRP process which is encouraged.

For your consideration and please give me a call (02) 4653 3700 should you require clarification on any of the above-raised points.

Yours sincerely,



Jamie Erken
MANAGER STATUTORY PLANNING

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Oran Park NSW 2570

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English
If you need help understanding this information, please call the Translating and Interpreting Service on 131 450 and ask them to call Camden Council on 13 22 63 on your behalf.

Chinese (Simplified) | 简体中文
如果您需要帮助理解本资料内容，可首先致电 131 450，联系翻译和口译服务（TIS），然后要求为您转接 13 22 63 联系 Camden 市议会政府。

Chinese (Traditional) | 繁體中文
如果您需要幫助理解本資料內容，可首先致電 131 450，聯絡翻譯和傳譯服務（TIS），然後要求為您轉接 13 22 63 聯絡 Camden 市議會政府。

Arabic | العربية
إذا كنتم بحاجة للمساعدة في فهم هذه المعلومات، فيرجى الاتصال بخدمة الترجمة التحريرية والشفهية (TIS) على الرقم 131 450 والطلب منهم الاتصال بمجلس Camden على الرقم 13 22 63 بالنيابة عنكم.

Spanish | Español
Si necesita ayuda para comprender esta información llame al Servicio de Traducción e Interpretación (TIS) al 131 450 y pida que llamen a la Municipalidad de Camden al 13 22 63 en su nombre.

Vietnamese | Tiếng Việt
Nếu cần người trợ giúp mình hiểu thông tin này, xin quý vị gọi cho Dịch vụ Thông phiên dịch (TIS) qua số 131 450 và yêu cầu họ gọi cho Hội đồng Thành phố Camden số 13 22 63 giùm quý vị.

Punjabi | ਪੰਜਾਬੀ
ਜੇਕਰ ਤੁਹਾਨੂੰ ਇਸ ਜਾਣਕਾਰੀ ਨੂੰ ਸਮਝਣ ਵਿੱਚ ਮੱਦਦ ਦੀ ਲੋੜ ਹੈ, ਤਾਂ ਕਿਰਪਾ ਕਰਕੇ 131 450 'ਤੇ ਟ੍ਰਾਂਸਲੇਟਿੰਗ ਐਂਡ ਇੰਟਰਪ੍ਰੇਟਿੰਗ ਸਰਵਿਸ (TIS) ਨੂੰ ਫ਼ੋਨ ਕਰੋ ਅਤੇ ਉਹਨਾਂ ਨੂੰ ਤੁਹਾਡੀ ਤਰਫੋਂ 13 22 63 'ਤੇ Camden ਕੌਂਸਲ ਨੂੰ ਫ਼ੋਨ ਕਰਨ ਲਈ ਕਹੋ।

Italian | Italiano
Se ti serve aiuto per capire queste informazioni, telefona al Servizio traduzioni e interpreti (TIS) al numero 131 450 e chiedi di chiamare per tuo conto il Comune di Camden al numero 13 22 63.

Assyrian | ܐܣܘܪܝܐ
ܐܢ ܨܒܝܬ ܥܕܪܐ ܕܡܬܪܓܡܢܘܬܐ ܘܬܘܪܓܡܢܘܬܐ ܕܡܫܡܥ ܗܠܝܢ ܡܠܝܐ، ܒܥܝ ܛܠܦܘܢ ܠ 131 450 ܕܓܒ ܡܝܢܐ (TIS) ܕܬܘܪܓܡܢܘܬܐ ܘܬܘܪܓܡܢܘܬܐ ܕܡܫܬܡܫ ܒܗ ܫܠܝܚܘܬ ܕܬܫܐܠ ܠ Camden ܒ ܛܠܦܘܢ ܠ 13 22 63 ܓܒ ܡܝܢܐ.

Nepali | नेपाली
यदि तपाईंलाई यो जानकारी बुझ्न मद्दत चाहिन्छ भने कृपया 131 450 मा अनुवाद र दोभाषे सेवा (TIS) लाई फोन गर्नुहोस् र तपाईंको लागि Camden काउन्सिललाई 13 22 63 मा फोन गर्न लगाउनुहोस्।

Serbian | Српски
Ако вам је потребна помоћ да бисте разумели ове информације, позовите Службу за писмено и усмено превођење (TIS) на 131 450 и замолите да вам назову Општину Camden на 13 22 63.

Hindi | हिन्दी
यदि इस जानकारी को समझने में आपको सहायता की आवश्यकता है, तो कृपया अनुवाद एवं दुभाषिया सेवा (TIS) को 131 450 पर कॉल करें और उन्हें आपकी ओर से Camden काउंसिल को 13 22 63 पर कॉल करने के लिए कहें।

Croatian | Hrvatski
Ako trebate pomoć da biste razumjeli ove informacije, nazovite Službu za prevođenje i tumačenje (TIS) na 131 450 i zamolite da vam nazovu Općinu Camden na 13 22 63.

Greek | Ελληνικά
Εάν χρειάζεστε βοήθεια για να καταλάβετε αυτές τις πληροφορίες, τηλεφωνήστε στην Υπηρεσία Μετάφρασης και Διερμηνείας (TIS) στο 131 450 και ζητήστε τους να καλέσουν τον Δήμο Camden στον αριθμό 13 22 63 για λογαριασμό σας.

Maltese | Malti
Jekk għandek bżonn għajnuna tifhem dan it-tagħrif, jekk jogħġbok ċempel lis-Servizz tat-Traduzzjoni u l-Interpretar (TIS) fuq 131 450 u staqsihom iċemplu lill-Kunsill ta' Camden fuq 13 22 63 għan-nom tiegħek.

Filipino
Kung kailangan mo ng tulong sa pag-unawa ng impormasyong ito, mangyaring tumawag sa Translating and Interpreting Service (TIS) sa 131 450 at hilingin sa kanila na tumawag sa Camden Council sa 13 22 63 para sa iyo.

German | Deutsch
Wenn Sie zum Verständnis dieser Informationen Hilfe benötigen, wenden Sie sich bitte an den Übersetzungs- und Dolmetscherdienst (TIS) unter 131 450 und bitten Sie diesen, die Stadtverwaltung Camden unter der Nummer 13 22 63 für Sie anzurufen.

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NSW Department of Education

Ref: SSD-119567490
13 May 2026

Department of Planning, Housing and Infrastructure
NSW Planning Portal

Re: SSD-119567490 SEARs – 176 Rickard Road & 225-231 Byron Road, Leppington

Dear DPHI representative,

The Department of Education (the department) welcomes the opportunity to provide comments on the Secretary's Environmental Assessment Requirements (SEARs) request for SSD-119567490 and concurrent rezoning at 176 Rickard Road & 225-231 Byron Road, Leppington.

The department understands that the above SSD seeks development consent for the construction of a development for the purpose of shop top housing and residential flat building with provision of affordable housing. The proposed mixed-use development comprises:

- ~1,500 dwellings across the site include ~80 dwellings to be allocated for affordable housing,
- ~10,000sqm of commercial/retail/other floor space,
- New roads, community space and open space equating to ~6,000sqm.

The application also includes a concurrent rezoning of the site and amendment to planning controls.

The subject site is located in proximity to Leppington Public School and Public Preschool (~200m south) and the new high school for Leppington and Denham Court. Accordingly, the department has reviewed the SEARs request.

The successful operation of schools relies on safe pedestrian, cyclist and vehicle access, minimal noise and vibration interference and acceptable overshadowing and overlooking impacts. Accordingly, the department requests that the EIS comprehensively assesses the impacts of the proposal during construction and operation, including to the operation of nearby schools, including in relation to:

- Traffic and transport impacts, particularly to pedestrian and road safety and drop-off and pick-up operations
- Noise and vibration impacts
- Overshadowing and overlooking impacts.

The following comments are made for consideration early in the design and assessment phase:

General

- Being close to both the upgraded Leppington Public School and new Leppington/Denham Court High School, this development represents an opportunity to promote walking to school for students.

- Existing zoning of the land parcel shows RE1 Public Recreation space through the centre of the site, facilitating walkable permeability through this and neighbouring developments. The department supports development that enhances walkability of areas surrounding the school. Future transport impact assessments should evaluate pedestrian infrastructure in the vicinity and ensure adequate provision of pedestrian infrastructure given the likely concentrated demand around AM and PM peak school times. The provision of pedestrian crossing facilities on Byron Road to allow safe travel between the school sites and Leppington Station are also supported.
- It is anticipated that the expanded school population will generate new pedestrian and vehicle traffic demand on streets adjoining and connecting to the schools and request that school peak traffic demand be considered in the planning for these sites.
- It is understood that planning conditions have reserved width for future widening of Rickard Road. The department trusts that this development will be considerate of this provision and thus not jeopardise existing and future public transport services to the nearby schools.

Construction Traffic

- Construction vehicles should be prohibited from accessing and egressing the site during school drop-off and pick-up times (30 minutes before and after school start and finish times).
- Work zones should not be proposed in locations that will compromise pedestrian, cyclist and vehicular access to the school and associated drop-off and pick-up spaces.
- Pedestrian and cyclist safety should be closely considered and managed including where necessary, traffic controllers for construction vehicle entry and exit movements.
- If any impacts to school bus services are anticipated, these should be addressed and mitigated through a Construction Management Plan.

Noise and Vibration

- Noise and vibration assessments are to assess construction noise impacts and consider the schools as a sensitive receiver.
- If noise and vibration exceedances at the school are identified, mitigation measures should be developed consistent with NSW EPA construction noise guidelines. The mitigation measures should seek to maintain internal noise levels for classrooms required by the department's Educational Facilities Standards and Guidelines (EFSG).
- If necessary, mitigation measure(s) should also be included to provide periods of respite during the school day to limit impacts to student learning.

Air Quality

- Consideration should be given to air quality impacts arising from construction dust including appropriate mitigation measures as necessary.

Should you require further information, please contact the department's Statutory Planning team at StatutoryPlanning@det.nsw.edu.au.

Sincerely,



Jason Maslen
A/Director, Statutory Planning

Transport for NSW

14 May 2026

TfNSW Reference: SYD26/00447/01
DPHI Reference: SSD-119567490

Ms. Kiersten Fishburn
Secretary
Department of Planning, Housing, and Infrastructure
Locked Bag 5022
Parramatta NSW 2150

Attention: Anna Nowland

REQUEST FOR SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS (SEARS)
MIXED USE DEVELOPMENT WITH INFILL AFFORDABLE HOUSING
176 RICKARD ROAD AND 225-231 BYRON ROAD, LEPPINGTON

Dear Ms Fishburn,

Thank you for providing Transport for NSW (**TfNSW**) an opportunity to provide input to the Secretary's Environmental Assessment Requirements (**SEARs**) for the proposed State Significant Development Application (**SSDA**) at 176 Rickard Road and 225-231 Byron Road, Leppington.

TfNSW has reviewed the Scoping Report (prepared by Gyde Consultant on the 12 April 2026) and provides assessment requirements and comments in **TAB A** for the consideration of the Department of Planning, Housing and Infrastructure (**DPHI**).

If you have any further questions regarding the above matter, James Douglas, Land Use Planner, would be pleased to take your call on (02) 9983 3987 or via email at development.sydney@transport.nsw.gov.au.

Yours sincerely,

Brendan Pegg
Senior Manager Land Use Assessment Central and Western
Transport Planning Branch
Planning, Integration, and Passenger Division

TAB A – TfNSW assessment requirements and comments

1. *Transport Impact Assessment (**TIA**)*: A TIA shall be prepared in accordance with the *Guide to Transport Impact Assessment* (**GTIA**). GTIA replaces the Guide to Traffic Generating Developments and can be found at this link. The TIA will enable TfNSW to understand the impacts the development may have on the transport network, as well as the impacts to the state classified road network resulting from increased vehicular, bus and pedestrian/active transport movements. The TIA must include, but not be limited to, the following:

    - 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.
    - A review of the crash data along the identified transport route/s and key nearby intersections for the most recent 5-year reporting period and an assessment of the safety implications of the proposed development and required mitigation measures.
    - Details of the site access and pedestrian network and parking provision associated with the proposed development, in accordance with the relevant Australian Standards, Austroads Guide and Council's Development Control Plan (**DCP**).
    - Plans demonstrating how all vehicles likely to be generated during construction can be accommodated on the site to avoid impacts to the transport network. A preliminary Construction Transport Management Plan (**CTMP**) should be prepared as part of the TIA to mitigate any such impacts.
    - Given the sites proximity to the Bus Transit and Leppington Train Station TfNSW encourages the proposal to minimise the reliance on car usage through providing minimal parking spaces and the implementation of Travel Demand Management (**TDM**) measures.
    - Details of TDM measures to be utilised to minimise the development impact on general traffic and bus operations, including details of a location-specific sustainable travel plan (Green Travel Plan and/or specific Workplace Travel Plan) and the provision of facilities to increase the non-car mode share for travel to and from the site.
    - The TIA should consider the ultimate arrangement of Rickard Road including the design of the Byron Road/Rickard Road intersection and the ability of the existing network to function with the increased traffic volume especially during peak operating periods (school operating times).
    - TfNSW advises that Lot 37A DP8979 is, pursuant to *State Environmental Planning Policy Sydney Growth Centres* (***the SEPP***), partly zoned for a proposed road widening (**SP2 Classified Road**). The area required for road should be identified on any plan identified on the plans of development and addressed within the Environmental Impact Statement.

Planning and Assessments
Department of Planning, Housing, and Infrastructure
Locked Bag 5022
Parramatta NSW 2124

Attention: Kweku Aikins

14 May 2026

STATE SIGNIFICANT DEVELOPMENT APPLICATION
Secretary's Environmental Assessment Stage – SSD-119567490
176 Rickard Road & 225-234 Byron Road, Leppington

Dear Sir/Madam,

Transport for New South Wales (TfNSW) refers to the Department's Major Project Portals' notification for the above State Significant Development application.

The Department is advised that TfNSW, via Instrument of Delegation from the Secretary of Transport and from TAM (Transport Asset Manager of NSW), has been delegated to act as the rail authority for the heavy rail corridor, electrical supply authority, and Agent on behalf of the Land Owner; and to process the review of this proposal.

TfNSW (as Rail Authority) has reviewed the preliminary information associated with the draft SEARs, and advises that in order to protect rail land, assets, operations, and to ensure a safe and reliable rail service, it is requested the Department include the following item(s) into the SEARs where issued:

- An intersection design at Rickard Road and Byron Road taking into consideration the likely traffic generation of this development together with other nearby developments under the Leppington Town Centre Planning Proposal, in particular the development proposed at 173-183 Rickard Road, Leppington (SSD-69507469). The design must be accompanied by a Traffic Impact Assessment prepared by a suitably qualified engineer demonstrating safe traffic movement at the intersection and that any works to enable such movement will not impact the safety of vehicles and pedestrians utilising the existing commuter carpark including the vehicular entry/exit off Rickard Road. Any proposal, whether at initial or ultimate intersection design involving the re-location of the existing commuter carpark access road will require approval from Sydney Trains and land owners consent from Transport Asset Manager NSW (TAM) before being presented as an option in any EIS stage documentation.

7 Harvest Street, Macquarie Park NSW 2113
PO Box 459 Burwood NSW 1805
DA_sydneytrains@transport.nsw.gov.au
www.transport.nsw.gov.au/sydneytrains

Please contact the TfNSW Town Planning Management team via email to DA_sydneytrains@transport.nsw.gov.au should you wish to discuss this matter. Finally, it is requested that when the SEARs is issued, notification is provided by the Department.

Sincerely,

Miné Kocak

Principle Planner Dev Services Rail
Transport for NSW

Department of Climate Change, Energy, the Environment and Water

Our ref: HMS ID 14540

Kweku Aikins
Senior Planning Officer
Department of Planning, Housing and Infrastructure
kweku.aikins@dpie.nsw.gov.au
Letter uploaded to the Major Projects Planning Portal

Input to SEARs – State Significant Development

Proposal: Mixed Use at Rickard Road & Byron Road, Leppington

Major Project reference: SSD-119567490

Received: 1 May 2026

Dear Kweku,

Thank you for your referral inviting SEARS input from the Heritage Council of NSW on the above State Significant Development (SSD) proposal.

The subject site is not listed on the State Heritage Register (SHR), nor is it in the immediate vicinity of any SHR items. Further, the site does not contain any known historical archaeological relics. Therefore, no heritage comments are required.

As the site is in the vicinity of a local heritage item (Leppington Public School), you should seek advice from the relevant local council.

If you have any questions about this correspondence, please contact Alison Lamond at Heritage NSW on (02) 9873 8500 or heritagemailbox@environment.nsw.gov.au

Yours sincerely

Alison Lamond

Alison Lamond
Manger – Major Projects
Heritage NSW
Department of Climate Change, Energy, the Environment and Water
As Delegate of the Heritage Council of NSW
13 May 2026

5 May 2026

Jemena Gas Networks
(NSW) Ltd
ABN 87 003 004 322

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Industry Assessments
NSW Department of Planning and Environment
12 Darcy Street
Parramatta NSW 2150

Attention **Kweku Aikins**

Dear Kweku,

Property: 176 Rickard Road & 225-231 Byron Road, Leppington.

Proposal: Development for the purpose of shop top housing and residential flat building with provision of affordable housing.

Reference: SSD-119567490

Thank you for affording Jemena the opportunity to review the Planning Proposal for the development for the purpose of shop top housing and residential flat building with provision of affordable housing at 176 Rickard Road & 225-231 Byron Road, Leppington NSW 2179. I have reviewed the location of the Planning Proposal and undertaken a review of the documentation provided.

Jemena's nearest high pressure natural gas pipeline approx. 600m to the west of the site. Jemena does not anticipate that the proposed development will impact Jemena's high pressure natural gas pipeline, and vice versa. Consequently, Jemena does not wish to provide objections or further comments to the Planning Proposal.

Any works along Rickard Road & Byron Road, will need to follow the BYDA guidelines as applicable to working near underground assets.

If you have any questions or queries, please do not hesitate to contact the undersigned at robert.campbell@jemena.com.au or 0404 885 742.

Kind regards,

Robert Campbell
Senior Lands Management Officer
Jemena

14 May 2026 **Our reference: 227173**

Kweku Aikins
Department of Planning, Housing and Infrastructure
kweku.aikins@dpie.nsw.gov.au

RE: Sydney Water input to SEARs for SSD-119567490 at 176 Rickard Road & 225-231 Byron Road, Leppington (HDA Housing)

Thank you for seeking Sydney Water's input on the Secretary's Environmental Assessment Requirements for SSD-119567490 at 176 Rickard Road & 225-231 Byron Road, Leppington. The SSDA will seek consent for the following:

Concept Approval:

- Demolition of existing structures.
- Construction of a mixed-use development comprising a total 1500 dwellings, approximately 10,000m^2 of commercial GFA with basement parking.
- Provision of approximately 6,000m^2 of open space.

Stage 1:

- Construction of buildings comprising 400 dwellings.

To facilitate this development, the following concurrent amendments are proposed for the State Environmental Planning Policy (Precincts – Western Parkland City) 2021:

- Amend the existing 24m maximum Height of Building control across the site, ranging from 125m in the west and 36m in the east.
- Apply a maximum FSR control to range from 5.5:1 in the west and 4:1 in the east.

Servicing Information

It is understood that a Feasibility Application has been lodged with Sydney Water under CN227173 with servicing information provided in the developer's Notice of Requirements, dated 29th April 2026.

- Water servicing is dependant delivery of water mains expected by 2029.
- Wastewater capacity is available, reticulation sewer will need to be designed within the development site.

Water-related Infrastructure Requirements

1. The proponent of the development should determine service demands following servicing investigations and demonstrate that satisfactory arrangements for drinking water, wastewater, and recycled water (where required) services have been made.
2. The proponent must obtain endorsement and/or approval from Sydney Water to ensure that the proposed development does not adversely impact on any existing water, wastewater or stormwater main, or other Sydney Water asset, including any easement or property.
3. When determining landscaping options, the proponent should take into account that certain tree species can cause cracking or blockage of Sydney Water pipes and therefore should be avoided.
4. The proponent should consider taking measures to minimise or eliminate potential flooding, degradation of water quality, and avoid adverse impacts on any heritage items, and create pipeline easements where required.
5. Strict requirements for the protection of Sydney Water's stormwater assets may apply to this site. The proponent should ensure that satisfactory steps/measures been taken to protect existing stormwater assets, such as avoiding building over and/or adjacent to stormwater assets and building bridges over stormwater

Integrated Water Cycle Management (IWCM)

6. The proponent should outline any sustainability initiatives that will minimise/reduce the demand for drinking water, including any alternative water supply and end uses of drinking and non-drinking water that may be proposed, and demonstrate water sensitive urban design (principles are used), and any water conservation measures that are likely to be proposed. This will allow Sydney Water to determine the impact of the proposed development on our existing services and required system capacity to service the development.

Next steps

- Given the scale and complexity of the proposed development (further investigations may be required to determine the servicing requirements for this site. It is recommended that the proponent continues to engage directly with Sydney Water via their Feasibility under CN227173, ensuring to submit an updated Growth Data Form.
- The proponent should complete and return the enclosed Growth Data Form as part of their Feasibility application submission. The Growth Data Form should be updated promptly with Sydney Water in case of changes.
- The Department is advised to forward the enclosed *Sydney Water Development Application Information Sheet (for proponent)* to assist the proponent in progressing their development. This Info Sheet contains details on how to make further applications to Sydney Water and provides more information on Infrastructure Contributions.

If the proponent has any questions, they should contact their Sydney Water case manager associated with the lodged Feasibility application under CN227173. Should the Department require further information, please contact Joanne Chan from the Growth Analytics Team at urbangrowth@sydneywater.com.au.

Yours sincerely,

Growth Analytics Team
Growth and Development, Water and Environment Services
Sydney Water, 1 Smith Street, Parramatta NSW 2150

Enclosed:

- Sydney Water Development Application Information Sheet (for proponent)
- Sydney Water Growth Data Form

Development Application and Planning Proposal Review
NSW Planning Portal Concurrence and Referral

Endeavour Energy

Authority	Authority's Reference	Agency Concurrence and Referral	Authority Contact	Authority Notification	Submission Due	Submission Made
NSW Dept. of Planning, Housing & Infrastructure	SSD-119567490		Kweku Aikins	1/05/2026	14/05/2026	1/05/2026

Address	Land Title
176 Rickard Road & 225-231 Byron Road, Leppington	Lot 37A DP 8979, Lots 370 & 371 DP 1193738

Scope of Development Application or Planning Proposal

Request for Secretary's Environmental Assessment Requirements (SEARs) for Mixed Use Development at 176 Rickard Road & 225-231 Byron Road, Leppington.

Endeavour Energy's HxGN NetWorks Core NetViewer Master Facility Model indicates:

Within or adjacent to the property the electrical network used in the distribution / supply of electricity owned and operated by Endeavour Energy appear to be but may not be limited to:

Electricity Infrastructure / Apparatus	Statutory allocation (road verge / roadway*)	Easement (or other form of property tenure**)	Protected works***	Freehold (adjoining or nearby)
Overhead Power Lines				
Low voltage	☒	☐	☐	☐
High voltage	☒	☐	☐	☐
Transmission voltage	☐	☐	☐	☐
Pole / tower	☒	☐	☐	☐
Underground Cables				
Low voltage	☒	☐	☐	☐
High voltage	☒	☐	☐	☐
Transmission voltage	☐	☐	☐	☐
Streetlight / pillar	☒	☐	☐	☐
Substation				
Pole mounted/overhead	☒	☐	☐	☐
Padmount/underground	☐	☐	☐	☐
Indoor	☐	☐	☐	☐
Zone	☐	☐	☐	☐
Transmission	☐	☐	☐	☐
Switch	☐	☐	☐	☐
Other: Underground earth cables, stay pole	☒	☐	☐	☐

Low voltage extra low voltage up to 1,000 volts alternating current (a.c.).
High voltage above 1,000 volts a.c and less than 33,000 volts a.c. [33 kilovolts (kV)].
Transmission voltage 33 kV up to 132,000 volts a.c. (132 kV).
*Rights provided in a public road or reserve. The allocation depends on the classification and date of roadway dedication.
** Other form of property tenure includes but is not limited to restriction, covenant, lease, licence etc.
***Protected works under Section 53 'Protection of certain electricity works' of the *Electricity Supply Act 1995* (NSW).
Other: provide detail of electricity infrastructure / apparatus.

POWER together

Endeavour Energy
ABN 11 247 365 823
T 133 718
Level 40-42, 8 Parramatta Square,
10 Darcy Street Parramatta NSW 2150
PO Box 811, Seven Hills NSW 1730
endeavourenergy.com.au

Relevant / applicable clause numbers from Endeavour Energy's Standard Conditions for Development Applications and Planning Proposals indicated by ☒ .

Objec-tion	Cond-ition	Advice	Clause No.	Issue	Detail
☐	☐	☐	1	Adjoining Sites	Adjoining or nearby development / use should be compatible with the use of Endeavour Energy's sites.
☐	☐	☐	2	Asbestos	Area identified or suspected of having asbestos or asbestos containing materials (ACM) present in the electricity network.
☐	☒	☐	3	Asset Planning	Applicants should not assume adequate supply is immediately available to facilitate their proposed development.
☐	☐	☒	4	Asset Relocation	Application must be made for an asset relocation / removal to determine possible solutions to the developer's requirements.
☐	☒	☐	5	Before You Dig	Before commencing any underground activity the applicant must obtain advice from the Before You Dig service.
☐	☐	☐	6	Bush Fire	Risk needs to be managed to maintain the safety of customers and the communities served by the network.
☐	☐	☐	7	Construction Management	Integrity of electricity infrastructure must be maintained and not impacted by vehicle / plant operation, excessive / high / unsecured loads, vibration, dust or moisture penetration.
☐	☐	☒	8	Contamination	Remediation may be required of soils or surfaces impacted by various forms of electricity infrastructure.
☐	☐	☒	9	Demolition	All electricity infrastructure shall be regarded as live and care must be taken to not interfere with any part of the electricity network.
☐	☐	☐	10	Dispensation	If a proposal is not compliant with Endeavour Energy's engineering documents or standards, the applicant must request a dispensation.
☐	☐	☒	11	Driveways	For public / road safety and to reduce the risk of vehicle impact, the distance of driveways from electricity infrastructure should be maximised.
☐	☐	☒	12	Earthing	The construction of any building or structure connected to or in close proximity to the electrical network must be properly earthed.
☐	☐	☐	13	Easement Management	Preference is for no activities to occur in easements and they must adhere to minimum safety requirements.
☐	☐	☐	14	Easement Release	No easement is redundant or obsolete until it is released having regard to risks to its network, commercial and community interests.
☐	☐	☐	15	Easement Subdivision	The incorporation of easements into to multiple / privately owned lots is generally not supported.
☐	☐	☒	16	Emergency Contact	Endeavour Energy's emergency contact number 131 003 should be included in any relevant risk and safety management plan.
☐	☐	☐	17	Excavation	The integrity of the nearby electricity infrastructure shall not be placed at risk by the carrying out of excavation work.
☐	☐	☐	18	Flooding	Electricity infrastructure should not be subject to flood inundation or stormwater runoff.

Objec-tion	Cond-ition	Advice	Clause No.	Issue	Detail
☐	☐	☐	19	Hazardous Environment	Electricity infrastructure can be susceptible to hazard sources or in some situations be regarded as a hazardous source.
☐	☒	☐	20	Look up and Live	Before commencing any activity near overhead power lines the applicant must obtain advice from the Look Up and Live service.
☐	☐	☐	21	Modifications	Amendments can impact on electricity load and the contestable works required to facilitate the proposed development.
☐	☐	☐	22	Network Access	Access to the electricity infrastructure may be required at any time particularly in the event of an emergency.
☐	☒	☐	23	Network Asset Design	Design electricity infrastructure for safety and environmental compliance consistent with safe design lifecycle principles.
☐	☒	☐	24	Network Connection	Applicants will need to submit an appropriate application based on the maximum demand for electricity for connection of load.
☐	☐	☐	25	Protected Works	Electricity infrastructure without an easement is deemed to be lawful for all purposes under Section 53 'Protection of certain electricity works' of the *Electricity Supply Act 1995* (NSW).
☐	☐	☒	26	Prudent Avoidance	Development should avert the possible risk to health from exposure to emissions form electricity infrastructure such as electric and magnetic fields (EMF) and noise.
☐	☐	☒	27	Public Safety	Public safety training resources are available to help general public / workers understand the risk and how to work safely near electricity infrastructure.
☐	☐	☒	28	Removal of Electricity	Permission is required to remove service / metering and must be performed by an Accredited Service Provider.
☐	☐	☐	29	Renewable Energy	The performance of solar, generation or battery systems and effects on the network and other connected customers needs to be assessed.
☐	☐	☒	30	Safety Clearances	Any building or structure must comply with the minimum safe distances / clearances for the applicable voltage/s of the overhead power lines. No works or loads must occur within the zone of influence of underground cables.
☐	☐	☐	31	Security / Climb Points	Minimum buffers appropriate to the electricity infrastructure being protected need to be provided to avoid the creation of climb points.
☐	☒	☐	32	Service Conductors	Low voltage service conductors and customer connection points must comply with the current 'Service and Installation Rules of NSW'.
☐	☐	☒	33	Street Infrastructure	Streetlighting should be reviewed and if necessary upgraded to suit any increase in both vehicular and pedestrian traffic. Existing electricity infrastructure must have adequate access and not be left stranded in public areas.
☐	☐	☒	34	Sustainability	Reducing greenhouse gas emissions and helping customers save on their energy consumption and costs through new initiatives and projects to adopt sustainable energy technologies.

Objec-tion	Cond-ition	Advice	Clause No.	Issue	Detail
☐	☐	☐	35	Swimming Pools	Whenever water and electricity are in close proximity, extra care and awareness is required.
☐	☐	☐	36	Tele - communications	Address the risks associated with poor communications services to support the vital electricity supply network Infrastructure.
☐	☒	☐	37	Vegetation Management	Landscaping that interferes with electricity infrastructure is a potential safety risk and may result in the interruption of supply.
Decision					Approve (with conditions)

Environmental Services Team

P 133 718
E Property.Development@endeavourenergy.com.au



Endeavour Energy respectfully acknowledges the Traditional Custodians on whose lands we live, work, and operate and their Elders past and present.

Reason(s) for Conditions or Objection (If applicable)

- To ensure an adequate connection, the applicant will need to engage an Accredited Service Provider (ASP) of an appropriate level and class of accreditation to assess the electricity load and the proposed method of supply for the development.

- An extension or augmentation of the existing electricity distribution network will be required. Whilst there are distribution substations in the area which are likely to have some spare capacity, it is not unlimited and will not be sufficient to provide for the additional load from the proposed development.

  Other factors such as the size and rating / load on the conductors and voltage drop (which can affect the quality of supply particularly with long conductor runs) etc. need to be assessed. However the extent of any works required will not be determined until the final load assessment is completed.

- Any required padmount substation/s will need to be located within the property (in a suitable and accessible location) and be protected (including any associated cabling not located within a public road / reserve) with an appropriate form of property tenure as detailed in the attached copy of Endeavour Energy's 'Land Interest Guidelines for Network Connection'.

  Generally it is the Level 3 Accredited Service Provider's (ASP) responsibility (engaged by the developer) to make sure substation location and design complies with Endeavour Energy's standards the suitability of access, safety clearances, fire ratings, flooding etc. If the substation does not comply with Endeavour Energy's standards, the applicant must request a dispensation.

  For further information please also refer to the attached copies of Endeavour Energy's:

  - Mains Design Instruction MDI 0044 'Easements and Property Tenure Rights'.
  - Guide to Fencing, Retaining Walls and Maintenance Around Padmount Substations.

- Endeavour Energy's network asset design policy is generally to progressively underground all new urban developments. All new cabling / reticulation infrastructure must be of an underground construction type. Where existing low voltage and high voltage overhead construction is present on or in proximity of the site, it may require undergrounding as the development proceeds.

- The low voltage service conductors and customer connection points must comply with the current 'Service and Installation Rules of NSW'.

- The electricity distribution network relies in part on the retention of appropriate building setbacks to the road frontages to allow for line route / network design options and to provide safety clearances to conductors. Particular regard needs to be had to secondary road frontages or where overhead power lines are located near side or rear boundaries where lesser building setbacks apply. The higher the voltage, the greater the safety clearance required. This is also in keeping with a policy of prudent avoidance.

  The encroachment of building setbacks (including by roof structures or projections from external walls constructed with conductive materials) may transfer fault currents to the main building / dwelling. It can also result in construction works being required within the minimum safe approach distance and may require the application to Endeavour Energy for appropriate network outages eg. when erecting and dismantling scaffold, and may also be an issue for the ongoing maintenance of the building or structure.

  Endeavour Energy's recommendation is that whenever reasonably possible buildings and structures be located and designed to avoid the need to work within the safe approach distances for ordinary persons eg. not having parts of the building normally accessible to persons in close proximity of the overhead power lines; the use of durable / low maintenance finishes. Alternatively, in some instances the adoption of an underground solution may be warranted ie. particularly for low voltage which can be more readily (in shorter distances) and comparatively economically be undergrounded.

  As a guide, Endeavour Energy's Mains Design Instruction MDI 0044 'Easements and Property Tenure Rights', Table 1 – 'Minimum easement widths', requires a minimum easement width of 9 metres for low voltage up to 22,000 volt / 22 kilovolt (kV) high voltage overhead power lines ie. 4.5 metres to both sides of the centreline of the poles / conductors. For higher voltages, the wider the required minimum easement width.

- The minimum required safety clearances and controls for buildings and structures (whether temporary or permanent) and working near overhead power lines must be maintained at all times. If there is any doubt whatsoever regarding the safety clearances to the overhead power lines, the applicant will need to have the safety clearances assessed by a suitably qualified electrical engineer / Accredited Service Provider (ASP).

  Even if there is no issue with the safety clearances to the building or structure, consideration must be given to WorkCover (now SafeWork NSW) 'Work Near Overhead Power Lines Code of Practice 2006' eg. ordinary persons must maintain a minimum safe approach distance of 3.0 metres to all voltages up to and including 132,000 volts / 132 kilovolt (kV). It also includes the following requirements for work near low voltage overhead power / service lines.

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

- Endeavour Energy Mains Design Instruction MDI 0031 'Overhead line design' includes the following clearance zone for pole mounted substations. Even with the provision of the clearance zone, the applicant may wish to consider the adoption of prudent avoidance principles.

8. Substations, auto-reclosers, sectionalisers, voltage regulators and enclosed switches

8.1 General requirements

8.1.2 Equipment hazard and fire zone

As part of the design, allowance is to be made for a three metre horizontal clearance zone around pole mounted substations, regulators, reclosers, sectionalisers and enclosed switches to minimise the effects of failure of any equipment and manage ongoing noise in accordance with Figure 13.

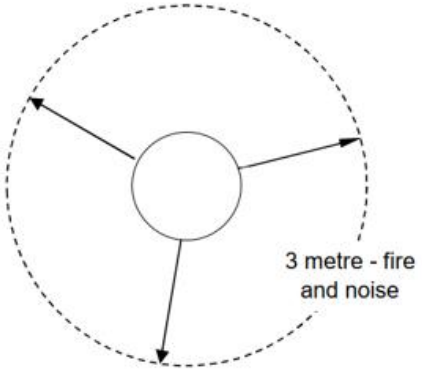


Figure 13 – Fire and noise separation

Pole mounted substations, regulators, reclosers, sectionalisers and enclosed switches may contain hazardous materials. Additional requirements apply to environments containing explosive gas atmospheres. Where applicable these provisions must comply with the requirements of AS/NZS 60079.

- The construction of any building or structure (including fencing, signage, flag poles, hoardings etc.) whether temporary or permanent that is connected to or in close proximity to Endeavour Energy's electrical network is required to comply with Australian/New Zealand Standard AS/NZS 3000:2018 'Electrical installations'.

- Driveways should be designed to increase the separation to the any electricity infrastructure on the road verge as much as reasonably possible and have regard to the intended use of the premises.

- The planting of large / deep rooted trees near electricity infrastructure is opposed by Endeavour Energy. Existing trees which are of low ecological significance in proximity of electricity infrastructure should be removed and if necessary replaced by an alternative smaller planting. The landscape designer will need to ensure any planting near electricity infrastructure achieves Endeavour Energy's vegetation management requirements.

  No planting of trees is allowed in the easement for a padmount substation. Screening vegetation around a padmount substation should be planted a minimum distance of 800mm plus half of the mature canopy width from the substation easement and have shallow / non-invasive roots. This is to avoid trees growing over the easement as falling branches may damage the cubicle and tree roots the underground cables. All vegetation is to be maintained in such a manner that it will allow unrestricted access by electrical workers to the substation easement all times.

Endeavour Energy's HxGN NetWorks Core Master Facility Model

The advice provided regarding the extent of the electricity network within or adjacent to the property is based on a desk top review of Endeavour Energy's HxGN NetWorks Core Master Facility Model. This is a computer based geospatial data system which holds the data on and is used to map the electricity network but is indicative only and based on the data available at the time. It only shows the Endeavour Energy electricity network.

Please note Endeavour Energy's responsibility / ownership of the network usually terminates at the connection point / point of supply but there may be unusual connections or situations with legacy assets as a result of alterations to legislation and codes. Other customer owned / private electricity distribution assets may be present on the site eg. from the connection point to the main service equipment enclosure, which are not owned or operated by Endeavour Energy (or shown on the Site Plan from Endeavour Energy's Endeavour Energy's HxGN NetWorks Core Master Facility Model and may include underground assets). These assets will need to be identified by the applicant and to which the relevant clauses / safety advice also applies.

Due to privacy and security requirements, certain aspects of Endeavour Energy's geospatial data are protected information. Additional plans and details of the electricity network within or adjacent to the property are available by the arrangements provided to the relevant referral services in accordance with the applicable legislation, licences, regulations and codes of practice etc.

Easement (or other form of property tenure)

Title searches will confirm the current owners of a property and shows any registered interests affecting the property such as an easement. Not all interests eg. short term leases and licences are registered on the title. Not all easements for electricity infrastructure will necessarily benefit Endeavour Energy eg. there may be interallotment / easements appurtenant to the land particularly for low voltage service conductors / customer connections. For further advice please refer to Endeavour Energy's:

- Land Interest Guidelines for Network Connection Works.
- Mains Design Instruction MDI 0044 'Easements and Property Tenure Rights'.

Standard Conditions

Due to the high number of notifications / referrals received by Endeavour Energy, the use of the 'Standard Conditions' is needed to enable responses / submissions to be made with the reasonably available resource allocation and within the statutory / requested time frames. The ability to provide more specific and detailed individual consideration to every notification / referral is limited.

Whilst all reasonable care and effort has been made to address the matters affecting the Development Application or Planning Proposal related to the electricity distribution network, the determining authority / applicant will need to consider their own specific knowledge, needs or circumstances, objectives and requirements in consideration of the response / submission to take appropriate corrective action.

This may require the determining authority / applicant to review the information provided for the application / proposal to verify the issue / risk included as either a 'Condition' or 'Advice' in the response / submission. For example, if Clause 37 'Vegetation Management' is marked as a 'Condition', the landscape plans / planting schedule should be referred to and reviewed to validate the risk associated with the matter as described in the 'Standard Conditions' eg. the mature height and /or spread of the proposed plantings may interfere with overhead power lines and require the use of smaller alternative planting.

Objection, Condition or Advice

With Endeavour Energy's Development Application and Planning Proposal Review process / system the intent of the 'Standard Conditions' being indicated as either, 'Objection', 'Condition' or 'Advice' depends on the risk associated with the matter and will be marked as:

- 'Objection' if it may substantially impact the proposed development or is a significant risk to the electricity distribution network that must be addressed by the applicant eg. significant encroachment of an easement, restriction or safety clearances.
- 'Condition' if it is likely or very likely to be an issue / needed to be addressed by the applicant and may require corrective action that can be reasonably rectified.
- 'Advice' if it requires consideration but is less likely to be an issue and the consequences of the applicant not addressing it are lower or can be readily rectified.

If the matter is not applicable / relevant then it is not marked.

For example, if the breaching of safety clearances to overhead power lines requires significant modifications to or redesign of the proposed building or structure or an asset removal / location it will be marked as 'Object'. If there no issue with the safety clearances to the building or structure, but ordinary persons need to maintain a minimum safe approach distance, it will be marked as 'Condition'. If there are any overhead power lines within or adjacent to the property but they are unlikely to be directly impacted, it will be marked as 'Advice'. If there are no overhead power lines, it is not marked.

If indicated as 'Object' or 'Condition', to resolve the matter/s the applicant will need to make direct contact with the relevant Endeavour Energy Contact (who do not have access to the NSW Planning Portal) via the contact details provided below. Re-referral via the NSW Planning Portal is not required and the matters can rest on the further correspondence.

In most instances even if the submission has been marked as 'Object', Endeavour Energy is not necessarily opposed to the Development Application. Whilst the determining authority may appropriately condition or defer these matters, Endeavour Energy recommends that whenever reasonably possible they be resolved before rather than as conditions of any development consent. This can assist in avoiding the need to later seek modification of an approved Development Application. Subject to the satisfactory resolution of the matter/s, Endeavour Energy will have no further objection to the Development Application.

Not all the matters may be directly or immediately relevant or significant to the Development Application or Planning Proposal. However, Endeavour Energy's preference is to alert proponents / applicants of the potential matters that may arise should development within closer proximity of the existing and/or required electricity infrastructure needed to facilitate the proposed development on or in the vicinity of the site occur. Even if a matter is not marked, applicants are encouraged to review all of the 'Standard Conditions' as some matters may not have been evident from the information provided with the Development Application and of which the applicant may have additional knowledge.

Submission Decision / Agency Response

The decision on the outcome of the assessment essentially correspond to the NSW Planning Portal 'Agency response', but as Endeavour Energy is not a concurring authority under the provision of the *Environmental Planning and Assessment Act 1979* (NSW), it does not 'Approve' or 'Refuse' a Development Application in the Portal ie. under the provisions of *State Environmental Planning Policy (Transport and Infrastructure) 2021* (NSW), Councils must take into consideration any response.

If any matter in the submission is marked as 'Objection', the outcome of the assessment will be 'Object' but in the NSW Planning Portal the 'Agency response' will be 'Approve (with conditions)'.

If any matter is marked as 'Condition', the outcome of the assessment and the 'Agency response' in the Portal will both be 'Approve (with conditions)'.

If all the matters in the submission are marked for 'Advice', the outcome of the assessment and the 'Agency response' in the Portal will both be 'Advice'.

Information Provided

Please note Endeavour Energy can only assess the Development Application or Planning Proposal based on the information provided by the applicant and determining authority. Due to time and resource constraints it is not possible to refer all development application notifications to the relevant internal stakeholders for review and advice or to request additional information from the applicant or determining authority. Applicants should be providing proper detailed plans of the electricity infrastructure / easements on or near the site (including current photographs) and address the potential impacts of the proposed development thereon in the Statement of Environmental Effects / Environmental Impact Statements. The provision of inadequate detail may result in Endeavour Energy objecting to the Development Application or Planning Proposal.

Applicants should also provide details of any early engagement or consultation undertaken with Endeavour Energy eg. Technical Review Requests, Connection of Load Applications, approval from Easements Officers etc. as this will assist in expediting the submission.

Accredited Service Providers

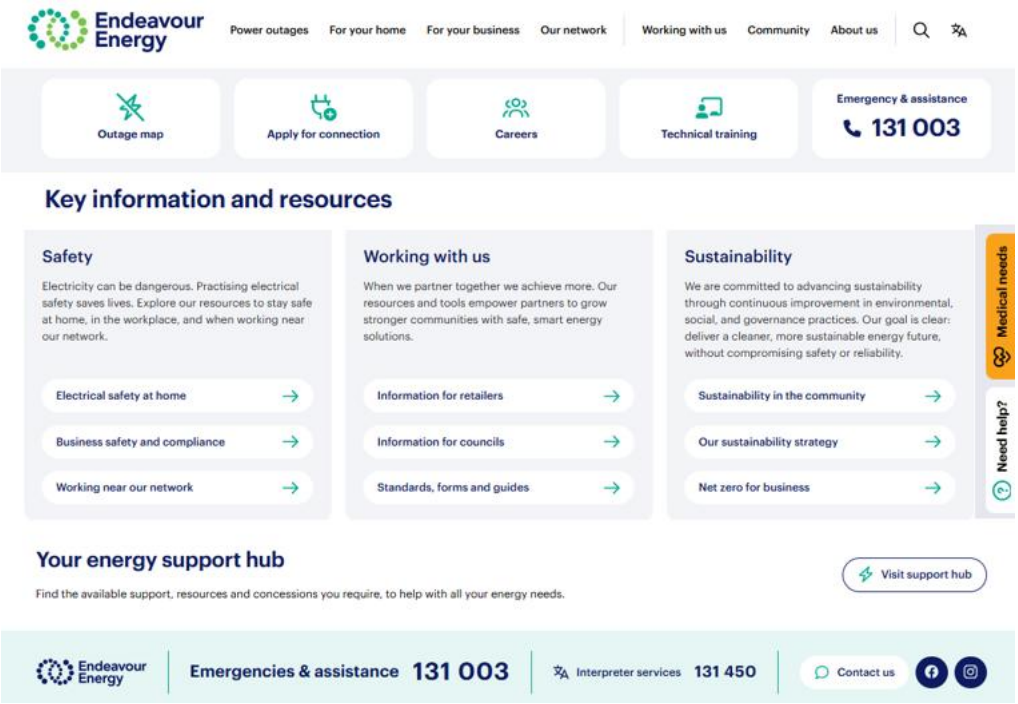
The Accredited Service Provider (ASP) scheme accredits organisations to perform contestable work on the NSW electricity distribution network. Contestable works are works that are required for the electricity distribution network provider to supply the load in the power lines where a new or altered connection is being requested.

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

Details of the ASP Scheme which accredits organisations to perform contestable work on the NSW electricity distribution network are available via the following link to the NSW Climate and Energy Action website at https://www.energy.nsw.gov.au/nsw-plans-and-progress/regulation-and-policy/asp-scheme-and-contestable-works .

Further Advice

The 'Standard Conditions' include additional advice and contact details and further information is also available on Endeavour Energy's website at https://www.endeavourenergy.com.au/ .



To resolve any objection or to seek further advice the following are the main contacts and can be reached by calling Endeavour Energy via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718. For other matters the contact details are included in Endeavour Energy's standard conditions for Development Application and Planning Proposal Review. Whilst the Environmental Services Team can provide the initial assessment and general advice or guidance, the resolution / approval of any matter/s rests with the relevant contact related to the matter/s and is not subject to the usual statutory notice requirements and response times.

Branch / Section	Matters	Email / Portal
Customer Network Solutions	Electricity supply or asset relocation who are responsible for managing the conditions of supply with the applicant and their Accredited Service Provider (ASP).	Connect Online
Easements Officers	Easement management or protected works / assets.	Easements@endeavourenergy.com.au
Property	Property tenure eg. the creation or release of easements.	network_property@endeavourenergy.com.au
Construction Works Team	Safety advice for building or working near the electricity network / street infrastructure in public areas (including zone and transmission substations).	Connect Online

Please note Endeavour Energy's above contacts do not have access to the NSW Planning Portal. To resolve any matters direct contact should be made with the responsible contact. This will avoid double handling and possible delays in responding to the applicant / Council.

In some circumstances further advice or guidance may need to be obtained by the applicant from an independent and appropriately qualified and / or experienced person / consultant before making any determination / decisions.

Connections Portal

Requests can be submitted to Endeavour Energy's Connections Portal Connections Portal through Connect Online which provides details on the application types and from which the Connections Portal can be launched. Once registered, you will have access to a range of connection services, including real time visibility of your application status through a dashboard. Applicants can sign in and submit requests by clicking on the relevant tile for the following matters:

- Connect supply or move assets.

  Connect load or generation to a new or existing supply. You can also apply to relocate electricity assets or attach third party assets on Endeavour Energy assets

- Work near infrastructure.

  Request support when working on or near our electricity network typically for building or construction sites.

- Electrical installation inspection.

  Request for a switchboard review, low voltage isolation and energise appointment, high voltage or hazardous inspection, or a dispensation request.

- Make an enquiry.

  Make a preliminary enquiry for a connection service or request technical information.

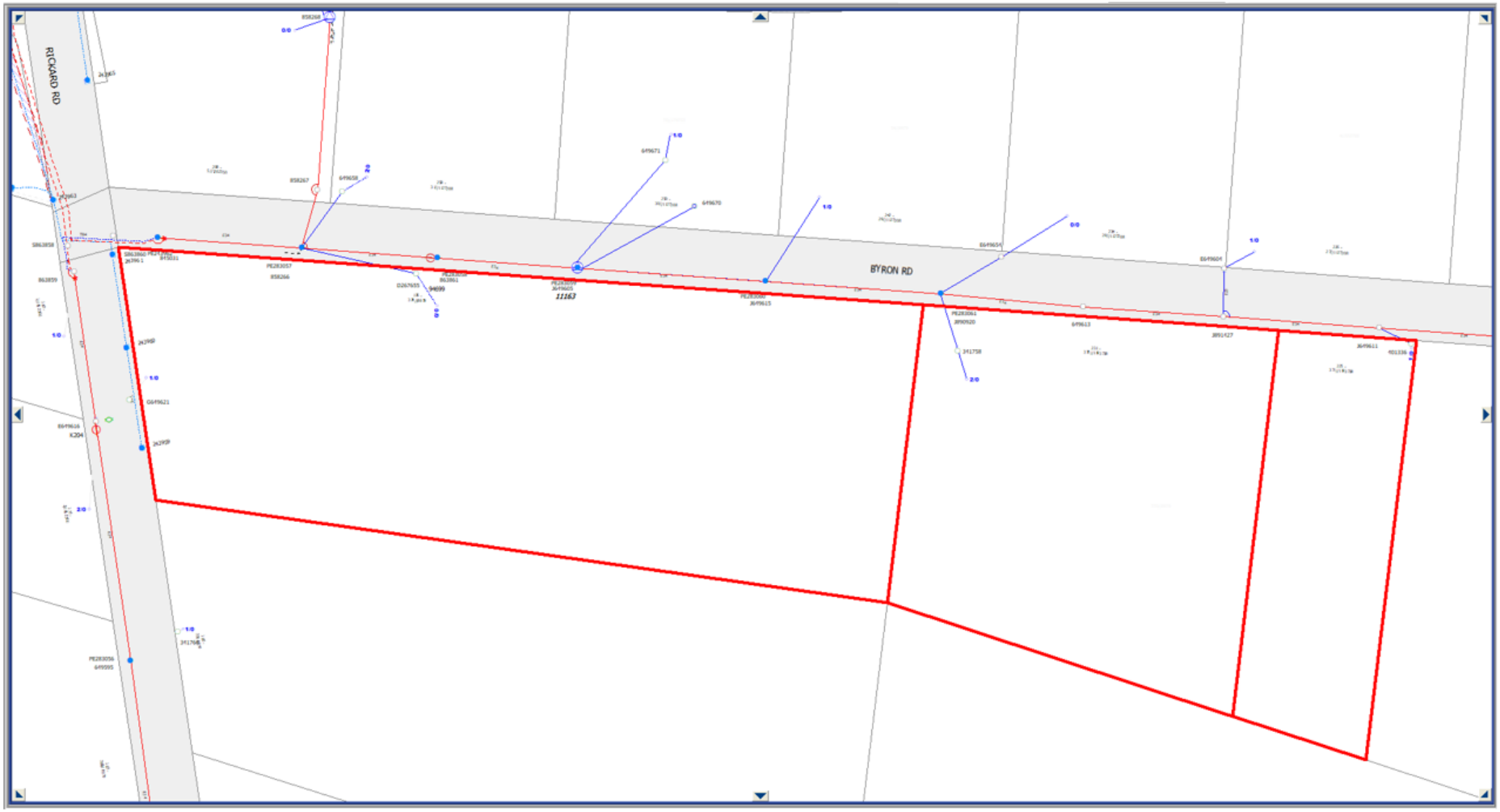
For further details of the services provided please refer to the quick reference guides available via the following link to Portal support .

Duty of Care

All individuals have a duty of care they must observe when working in the vicinity of electricity infrastructure. Before you do anything:

1) Contact Before You Dig and Look Up and Live to obtain the details of the electricity infrastructure on or near the site noting they are a guide only to what might be in the area and may not be entirely accurate.
2) Comply with the conditions and consider the advice provided above.
3) If needed contact Endeavour Energy General Enquiries on 133 718 or the contacts provided above for assistance. For Emergency Assistance call 131 003.
4) **DO NOT** attempt any work near electricity infrastructure until all required approvals and safety measures are in place.
5) Proceed only if you have satisfied yourself it is safe.
6) Always remember, even the briefest contact with electricity at any voltage can have serious consequences to a person's health and safety and can be fatal.

Site Plan from Endeavour Energy's HxGN NetWorks Core NetViewer Master Facility Model. WARNING: Electricity infrastructure shown is indicative only.



Please note the location, extent and type of any electricity infrastructure, boundaries etc. shown on the plan is indicative only. In addition it must be recognised that the electricity network is constantly extended, augmented and modified and there is a delay from the completion and commissioning of these works until their capture in the model. Easements benefitting Endeavour Energy are indicated by red hatching. Generally (depending on the scale and/or features selected), low voltage (normally not exceeding 1,000 volts) is indicated by blue lines and high voltage (normally exceeding 1,000 volts but for Endeavour Energy's network not exceeding 132,000 volts / 132 kV) by red lines (these lines can appear as solid or dashed and where there are multiple lines / cables only the higher voltage may be shown). This plan only shows the Endeavour Energy network and does not show electricity infrastructure belonging to other authorities or customers owned electrical equipment beyond the customer connection point / point of supply to the property. This plan does not constitute the provision of information on underground electricity power lines by network operators under Part 5E 'Protection of underground electricity power lines' of the *Electricity Supply Act 1995* (NSW).

LEGEND	
PS	Padmount substation
I	Indoor substation
G	Ground substation
K	Kiosk substation
COT	Cottage substation
PP	Padmount high voltage plugboard
	Pole mounted substation
	Overhead battery substation
	Underground battery substation
	Low voltage static compensator
HC	High voltage customer substation
MU	Metering unit
SS	Switch station
ISS	Indoor switch station
AT	Voltage regulator
	Customer connection point
	Low voltage pillar
	Streetlight column
	Life support customer
	Tower
	Pole
	Pole with streetlight
	Customer owned / private pole
	Cable pit
	Service pit
LB	Load break switch
AR	Recloser
	Proposed removed
	Easement active
	Statutory rights
	Easement proposed
	Licence active
	Subject site

Google Maps Street View



Google Maps Street View. Pole mounted substation no. 11163.



Standard Conditions for Development Applications and Planning Proposals

Version 11A – February 2026

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Endeavour Energy

POWER together

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Purpose

The following Standard Conditions are based on Endeavour Energy's experience dealing with numerous development applications and planning proposals. It provides an overview of what Endeavour Energy believes are the issues affecting the electricity distribution network that need to be considered by authorities in determining and conditioning consents.

These Standard Conditions should be referred to for advice about:

- Development Application Referral to Endeavour Energy required under *State Environmental Planning Policy (Transport and Infrastructure) 2021* (NSW), Division 5 'Electricity transmission or distribution', Subdivision 2 'Development likely to affect an electricity transmission or distribution network', Section 2.48 'Determination of development applications—other development'.

2.48 Determination of development applications—other development

(1) This section applies to a development application (or an application for modification of a consent) for development comprising or involving any of the following—

(a) the penetration of ground within 2m of an underground electricity power line or an electricity distribution pole or within 10m of any part of an electricity tower,

(b) development carried out—

(i) within or immediately adjacent to an easement for electricity purposes (whether or not the electricity infrastructure exists), or

(ii) immediately adjacent to an electricity substation, or

(iii) within 5m of an exposed overhead electricity power line,

(c) installation of a swimming pool any part of which is—

(i) within 30m of a structure supporting an overhead electricity transmission line, measured horizontally from the top of the pool to the bottom of the structure at ground level, or

(ii) within 5m of an overhead electricity power line, measured vertically upwards from the top of the pool,

(d) development involving or requiring the placement of power lines underground, unless an agreement with respect to the placement underground of power lines is in force between the electricity supply authority and the council for the land concerned.

(2) Before determining a development application (or an application for modification of a consent) for development to which this section applies, the consent authority must—

(a) give written notice to the electricity supply authority for the area in which the development is to be carried out, inviting comments about potential safety risks, and

(b) take into consideration any response to the notice that is received within 21 days after the notice is given.

(3) Subsection (2) does not apply to development specified in subsection (1)(b) if the development involves only one or more of the following—

(a) internal alternations to a building,

(b) a change of use of an existing building,

(c) a change to the hours of operation specified in the development consent,

(d) a subdivision that does not involve construction work.

- *Environmental Planning and Assessment Act 1979* (NSW) requires Councils:
    - in the Local Environmental Plan (LEP) making process (including LEP amendments through a planning proposal for rezoning) to consider the environmental, social and economic impact on the site and surrounds and ability to be accommodated within the capacity of the current and/or future infrastructure and services. When an LEP is made or amended through the planning proposal, it must demonstrate site-specific merit by having regard to this criteria;
    - in development control plan (DCP) to have regard to requirements or standards in respect of the provision of services, facilities and amenities demanded by development; and

- advise adjoining and nearby occupiers/owners of proposals lodged with Council, in the Council's opinion, the enjoyment of the adjoining or neighbouring land may be detrimentally affected.

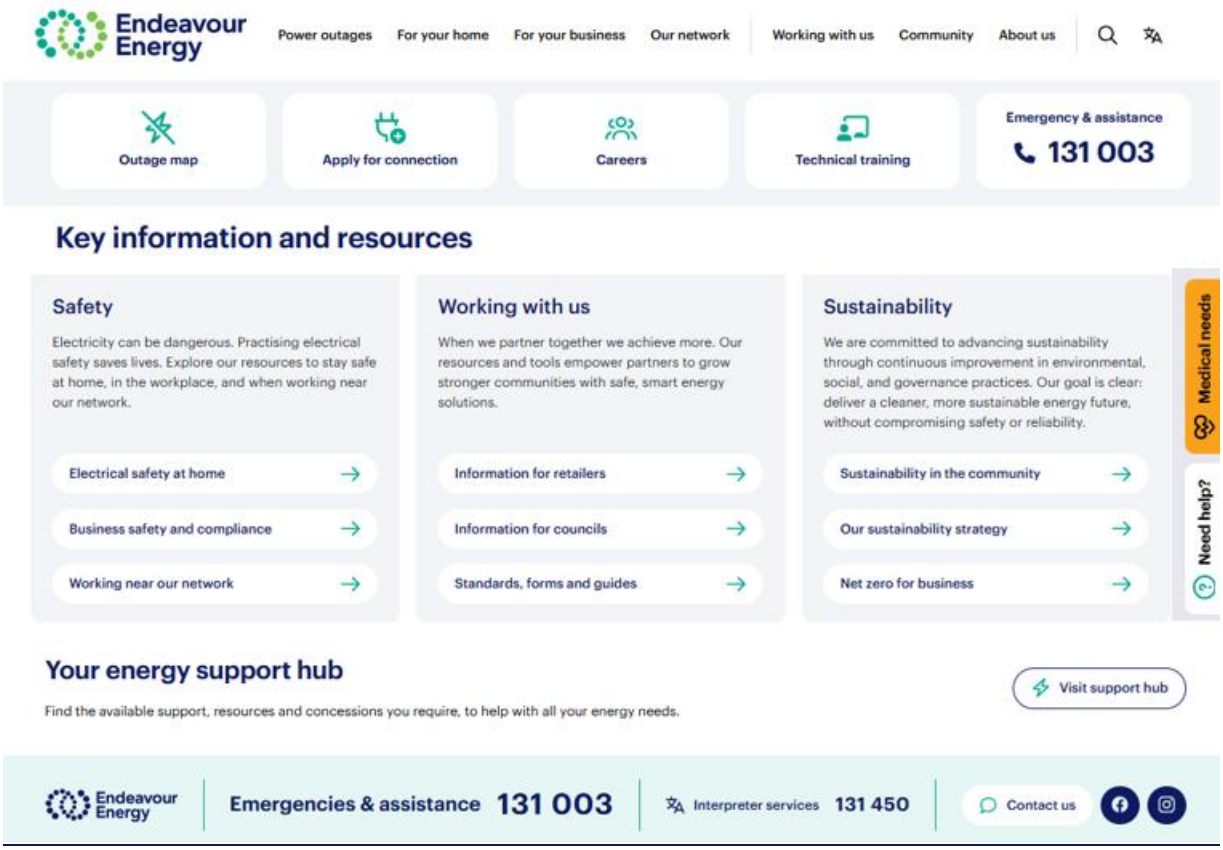
- Under the *Environmental Planning and Assessment Act 1979* (NSW), development may be declared State significant development (SSD). This declaration may be made by a State Environmental Planning Policy (SEPP) or by the Minister for Planning (the Minister) and is generally based on the scale, nature, location and strategic importance of the development to the State.

The Environmental Planning & Assessment Regulation 2021 (EP&A Regulation) requires certain SSD documents to be prepared having regard to the State Significant Development Guidelines and includes requirements for addressing infrastructure requirements and utilities. The following is an extract of a request for Secretary's Environmental Assessment Requirements (SEARs) for State Significant Development.

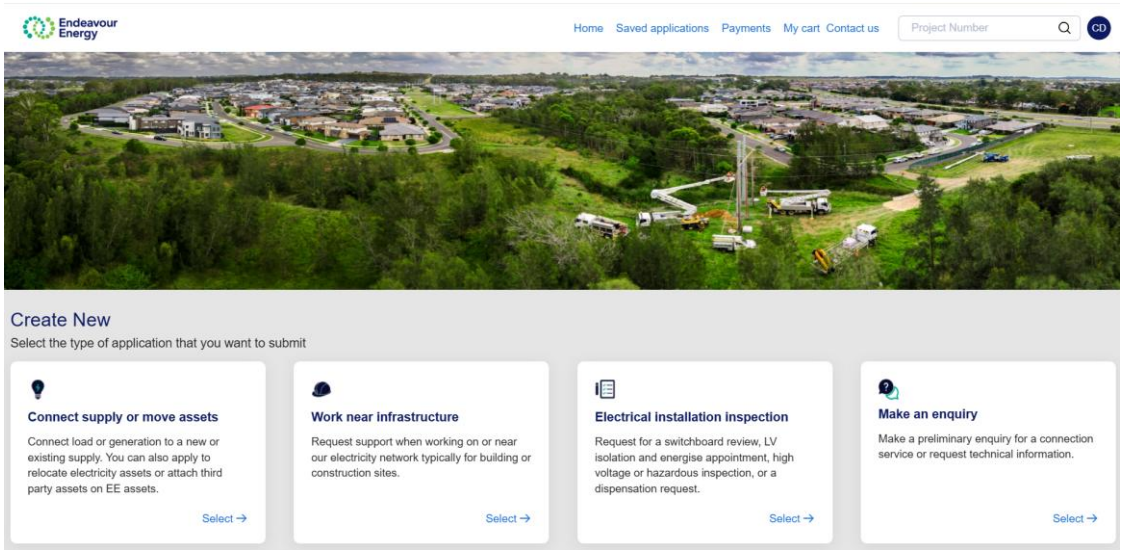
25. Infrastructure Requirements and Utilities • In consultation with relevant service providers: ○ assess the impacts of the development on existing utility infrastructure and service provider assets surrounding the site. ○ identify any infrastructure upgrades required on-site and off-site to facilitate 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. ○ identify potential impacts to existing utility infrastructure, as a result of the development.	• Infrastructure Delivery, Management and Staging Plan. • Evidence of consultation with providers

It is not intended as an exhaustive list of matters for consideration. Further advice is available via Endeavour Energy's:

- Website http://www.endeavourenergy.com.au which contains information for customers as well as in relation to the electricity distribution network and electrical safety.



Connect Online portal for new enquiries or work requests. After signing up, applicants can sign in and submit requests by clicking on the relevant tile for the service required shown below. Hovering over the tiles provides a preview of the services provided. For the essential documents and videos to help navigate the Portal please refer to the following link to Portal support .



1 Adjoining Sites

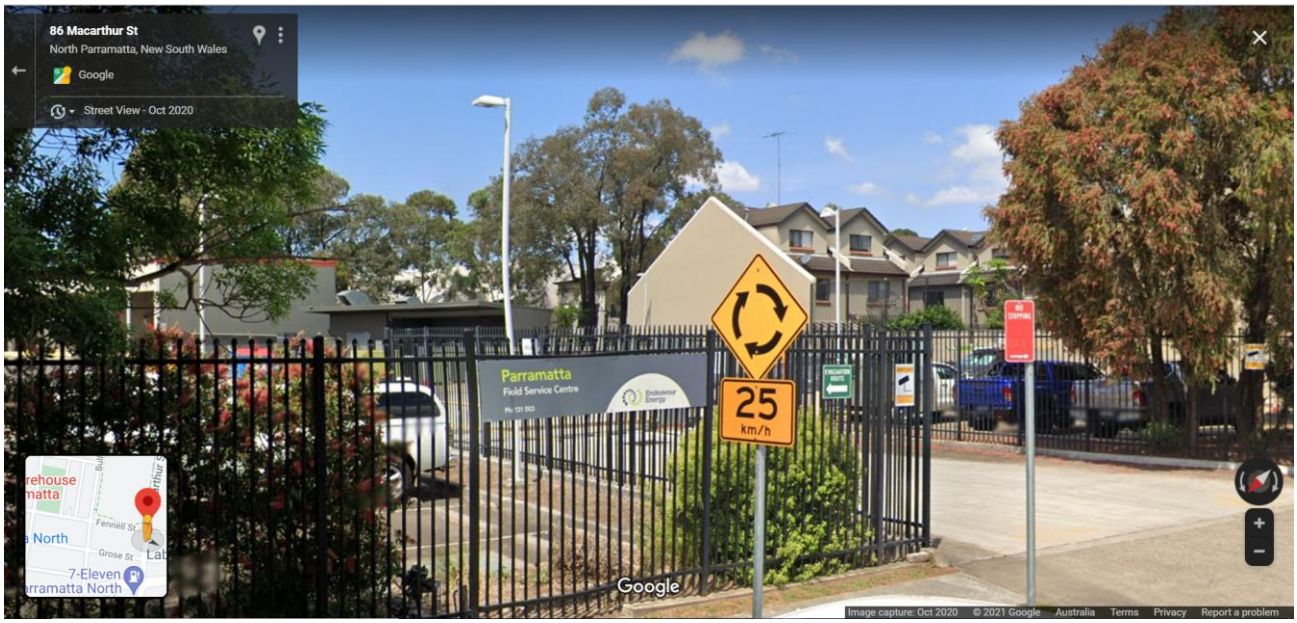
Endeavour Energy has a freehold property portfolio made up of network property required for the supply of electricity ie. for major assets such as transmission substations, zone substations and switching stations where security of tenure is paramount. It also holds non-network property which is not directly required for the supply of electricity but needed to provide accommodation for support services, ie. field service centres (FSC), pole yards and telecommunication sites.

Endeavour Energy's network properties being non-habitable buildings / sites are less sensitive and comparatively less impacted by development of adjoining or nearby properties. Accordingly, as an adjoining or nearby owners and occupiers, where compatible development is proposed Endeavour Energy generally leaves the determination regarding the environmental impact and the appropriate development controls to Council. The responses to Development Applications and Planning Proposals are therefore more focused on Endeavour Energy's role as an electricity supply authority.

Endeavour Energy's non-network sites are managed by the company in order to provide an environment that is liveable, sustainable and productive. In order to fully support the core objectives of the company, any development of adjoining or nearby properties which will have a detrimental effect on the foregoing objectives will be opposed by Endeavour Energy. The majority of the non-network sites are field service centres being essentially an industrial use are also comparatively less impacted but conversely may impact on the adjoining or nearby development.

Endeavour Energy is generally opposed to any sensitive development in close vicinity of its properties which could potentially limit its ongoing operations from the site. As the electricity network is operational 24/7/365 ie. all day, every day of the year (please refer to Section 26 Prudent Avoidance), likewise so potentially are the FSCs.

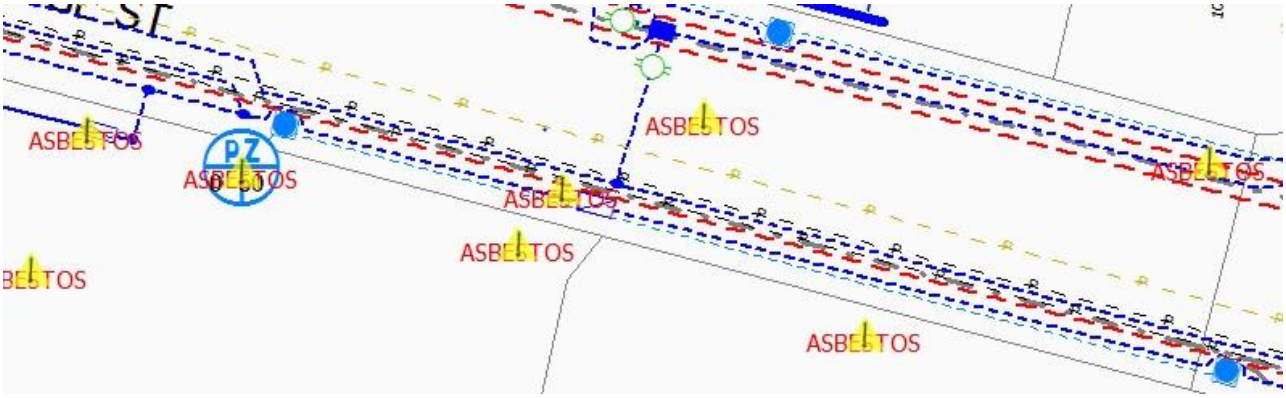
Accordingly there is noise, vehicle emissions, light glare etc. associated with the FSC operations which are not compatible to having nearby sensitive uses eg. traffic or persons accessing or working on the site during emergencies at night etc. Endeavour Energy's experience is that despite being a long standing existing use, when surrounding areas are subsequently redeveloped, the new occupants (sometimes supported by councils) seek to restrict the ongoing use of its sites. Given the essential nature of Endeavour Energy's operations such a situation arising is unacceptable. Endeavour Energy is not responsible for any amelioration measures for any emissions that may impact on the nearby proposed development.



Endeavour Energy's Parramatta Field Service Centre located at 84-86 Macarthur Street North Parramatta has had operational issues due to the later adjoining medium density residential development. Source: Google Maps Street View.

2 Asbestos

Endeavour Energy's HxGN NetWorks Core NetViewer master facility model shows locations identified or suspected of having asbestos or asbestos containing materials (ACM) present. This is usually in older parts of the electricity network where ACM was used for strengthening, insulation, lightness and cost saving.



Endeavour Energy's HxGN NetWorks Core NetViewer master facility model indicates that the site is a location identified or suspected of having asbestos or asbestos containing materials present.

The potential locations of asbestos to which construction / electricity workers could be exposed include:

- customer meter boards;
- conduits in ground;
- padmount substation culvert end panels; and
- joint connection boxes and connection pits.

Works on or in the vicinity of Endeavour Energy's electricity network which has the potential to impact asbestos or ACM must be carried out by the appropriately licenced Contractors in accordance involving with Safe Work NSW requirements and Endeavour Energy company procedures / requirements. Asbestos or ACM must be identified by a competent person employed by or contracted to the applicant and an asbestos management plan, including its proper disposal,.

Further details are available by contacting Endeavour Energy's Electrical and Public Safety Branch via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718.



This is an example of ACM cable ducts found in Endeavour Energy's electricity network during excavation for underground works.

3 Asset Planning

Power plants typically generate electricity a long way from homes and businesses. It is transported at high voltages to bulk supply points over the transmission system operated by Transgrid to Endeavour Energy's transmission substations at 132,000 volts / 132 kilovolts (kV).

From here Endeavour Energy transports electricity to our sub-transmission and zone substations, which usually service entire suburbs, transform electricity to mid voltage levels (11,000 / 11 kV or 22,000 volts / 22 kV). When electricity arrives at the location where it is required, distribution substations further transform the electricity to 400 or 230 volts. Underground cables and/or overhead power lines then carry this low voltage electricity to the customer connection points located on the customer's premises to service their electricity load.

Distribution substations are divided into:

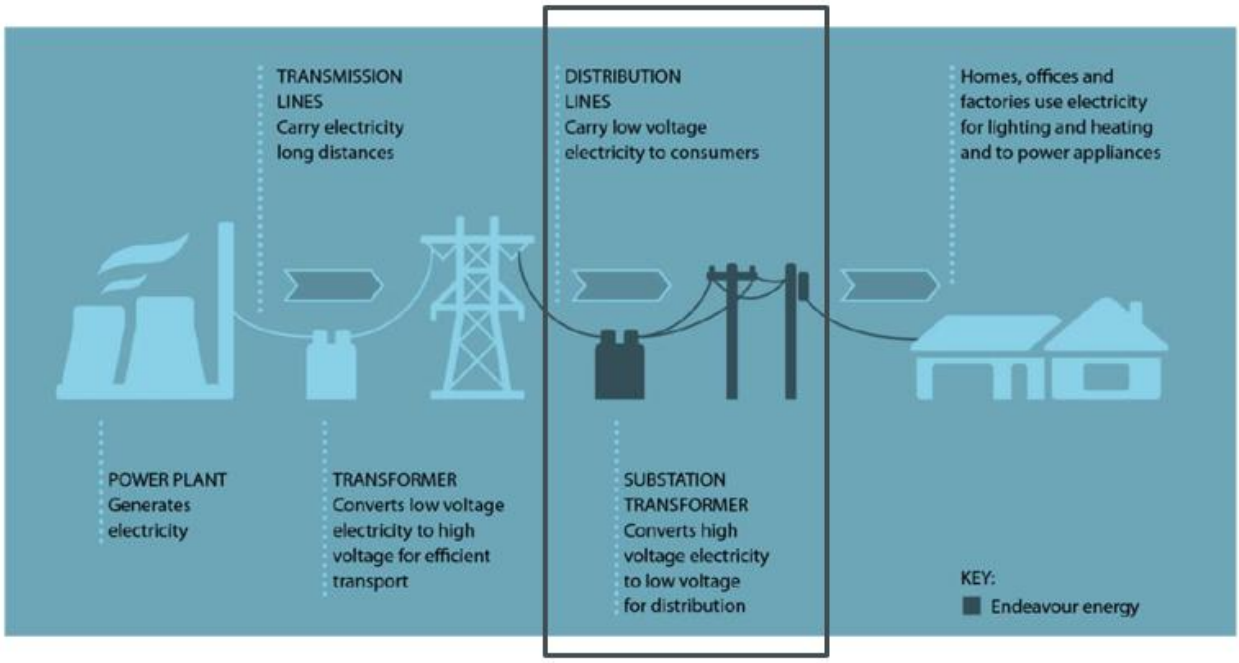
- ground mounted substations most commonly being a padmount substations installed a complete unit on a concrete foundation / plinth and usually associated with underground distribution (indicated by the symbol (PS) on the site plan from Endeavour Energy's HxGN NetWorks Core NetViewer master facility model) can accommodate loads from 315 kilovolt amperes (kVA) up to 1,500 kVA (typically 500 kVA).

- pole mounted substations where there is overhead distribution (indicated by the symbol on the site plan from Endeavour Energy's HxGN NetWorks Core NetViewer master facility model) and the substation equipment is outdoor type, mounted above ground level on a pole, have comparatively limited capacity of 16 kVA up to a maximum of 400 kVA.

Accordingly there is a significant variation in the number and type of premises able to be connected to a substation ie. a single distribution substation may serve one large building, or many homes.

As well as transforming voltage from high to low in a controlled manner, distribution substations also make it possible to perform the necessary switching operations in the grid (energizing and de-energizing of equipment and lines) and provide the necessary monitoring, protection and control of the network using the Supervisory Control and Data Acquisition (SCADA) system which is supported by an independent telecommunication network.

The following diagram from Endeavour Energy's Distribution Annual Planning Report December 2020 illustrates how the electricity distribution network operates in a traditional, 'one-way' service.



Source: Endeavour Energy Distribution Annual Planning Report December 2020

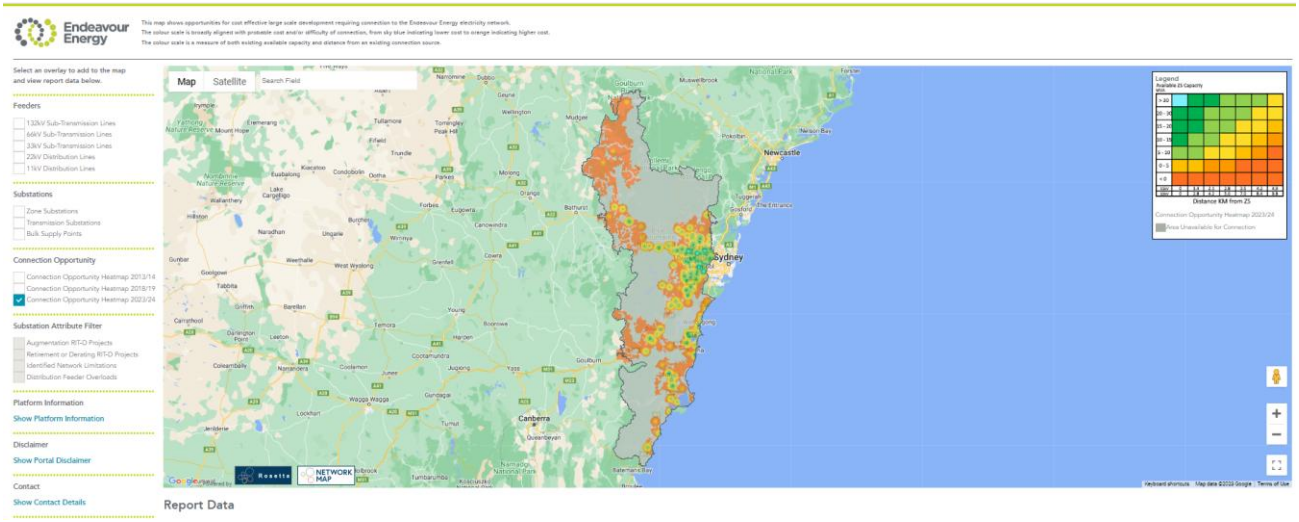
The electricity distribution network also provides a ‘two way’ service which enables customers with renewable energy resources such as solar photovoltaic panels to export electricity generated into Endeavour Energy’s network for supply to other customers for which the customer is credited / paid a solar feed-in tariff as determined by the Independent Pricing and Regulatory Tribunal (IPART).

3.1 Distribution Annual Planning Report Map

The DAPRM (Distribution Annual Planning Report Map) is an interactive geospatial map that has been developed to provide indicative information regarding Endeavour Energy’s high voltage electricity network topology, forecast loads and capacities, and network constraints. The DAPRM does not show details of the low voltage electricity distribution network. The DAPRM is an information service available to the public via the following link to Endeavour Energy’s website:

https://dapr.endeavourenergy.com.au/connections/# .

This map shows opportunities for cost effective large scale development requiring connection to the Endeavour Energy high voltage electricity network. By loading a marker of the proposed connection location, a line will be generated between the marker and the nearest zone substation. By selecting the Connection Opportunity Heatmap the colour scale shown is broadly aligned with probable cost and/or difficulty of connection, from sky blue indicating lower cost to orange indicating higher cost. The colour scale is a measure of both existing available capacity and distance from an existing connection source.



Endeavour Energy Distribution Annual Planning Report Map includes a Connection Opportunity Heatmap providing an indication of probable cost and/or difficulty of connection.

4 Asset Relocation

To facilitate development, some existing electricity infrastructure may need to be decommissioned / relocated or undergrounded. Planning Proposals often entail significant transport and pedestrian facilities involving the widening and upgrade of the roadways and installation of traffic signals. These works within the ‘Public Domain’ should similarly have regard to Endeavour Energy URD and asset relocation policies and a method of supply will need to be determined to service all other existing customers.

Enquiries for an asset relocation / removal should be made to Endeavour Energy’s Customer Network Solutions Branch who can be contacted via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718 or on Endeavour Energy’s website under ‘Home > For your business > Request a connection or upgrade >Relocating network assets’ or via the following link:

https://www.endeavourenergy.com.au/for-your-business/request-a-connection-or-upgrade/relocating-network-assets .

The developer is encouraged to approach a Level 3 Accredited Service Provider (ASP) to obtain preliminary details of the assets and discuss possible solutions to the developer's requirements. The developer must provide as much detail as possible concerning the Endeavour Energy assets that the developer wishes to relocate / remove' (including the addressing of alternative supply arrangements for any other customers supplied by the asset proposed to be removed). For details of the ASP scheme please refer to Section 24 Network Connection.

5 Before You Dig

Before commencing any underground activity the applicant is required to obtain advice from the ***Before You Dig*** service in accordance with the requirements of the *Electricity Supply Act 1995* (NSW) and associated Regulations.

The applicant must obtain plans not only to identify the location of any underground electrical or other utility infrastructure across the site, but also to identify them as a hazard and to properly assess the risk. Therefore, Duty of Care must be exercised when working around any infrastructure assets.

The plans DO NOT pinpoint the exact location of the infrastructure asset and only the presence. NEVER assume the depth or alignment of pipes and cables. Consider using cable location technologies, potholing and non-destructive digging techniques.

The expiry date of the plans can vary from each asset owner and therefore it is important to note the variations. If plans have expired, a new enquiry must be lodged to ensure current plans are always onsite.

The plans provided by the utility owners must be kept in a legible format either as a hard copy or an electronic copy so they can be easily read and understand.

If help is needed in reading plans and / or information provided, please contact the utility owners directly.

Further details are available on the Before You Dig website via the following link (lodging enquiries by phone is no longer available):

https://www.byda.com.au/ .

6 Bush Fire

Bush fire prone land (BFPL) is land that has been identified by local council which can support a bush fire or is subject to bush fire attack. BFPL maps are prepared by local council and certified by the Commissioner of the NSW Rural Fire Services (RFS). All development on BFPL must satisfy the aim and objectives of RFS Planning for Bush Fire Protection 2019 (PBP). Further information is available via the following link to the RFS website.

https://www.rfs.nsw.gov.au/plan-and-prepare/building-in-a-bush-fire-area/planning-for-bush-fire-protection/bush-fire-prone-land .

PBP contains development standards / specifications for bush fire protection measures for land use planning and designing and building of new development to ensure that is not exposed to high bush fire risk. Chapter 5 Residential and Rural Residential Subdivisions includes the following specific recommendations related to electricity services (with similar provisions also applying to Chapter 6 Special Fire Protection Purpose Developments (SFPP) and Chapter 7 Residential Infill Development).

5.3.3 Services – Water, electricity and gas

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

Table 5.3c

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

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	

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

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

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

1. Policy Statement

The company will apply prudent asset management strategies to:

- reduce the risk of bushfires caused by network assets and aerial consumer mains to as low as reasonably practicable (ALARP) level;
- mitigating the associated risk to network assets and customer supply reliability during times of bushfire whilst achieving practical safety, reliability, quality of supply, efficient investment and environmental outcomes; and
- ensure compliance with relevant acts, regulations and codes.

Accordingly the electricity network required to service the proposed development must be fit for purpose and meet the technical specifications, design, construction and commissioning standards based on Endeavour Energy's risk assessment associated with the implementation and use of the network connection / infrastructure for a bushfire prone site.

In assessing bushfire risk, Endeavour Energy has traditionally focused on the likelihood of its network starting a bushfire, which is a function of the condition of the network. Risk control has focused on reducing the likelihood of fire ignition by implementing good design and maintenance practices. However the potential impact of a bushfire on its electricity infrastructure and the safety risks associated with the loss of electricity supply are also considered.

Particular attention is given to the design of electrical assets in areas which are susceptible to bushfire to minimise the risk of both normal and foreseeable abnormal operation or failure of the assets initiating a bush fire.



Endeavour Energy crews replacing a burnt timber pole with a concrete pole after the September 2013 bush fire at Winmalee NSW.
Source: Everyday Endeavours, Staff Newspaper November 2013

Endeavour Energy's network is designed to minimise the risk of its assets initiating a bushfire. The asset management actions are focused on identifying and rectifying network defects that may result in faults that could cause fuel ignition. Endeavour Energy has well established processes for identifying such defects, for assessing the likelihood of such faults occurring and prioritising rectification. Endeavour Energy's vegetation management program and pre-summer bushfire inspection program are both examples of this commitment.

However, ultimately the vegetation management work done within easements is primarily to maintain the safe and reliable operation of the electrical network rather than providing a defendable space / Asset Protection Zone (APZ) for an adjoining development / dwelling the easement area is not owned by Endeavour Energy and the slashing and low cut grass would not necessarily be part of Endeavour Energy's vegetation management work.

It is every landholder's responsibility to manage the bush fire hazards on their property. It is also for this reason that any required bushfire protection measures should be contained within the overall development and not on adjoining lands. NSW Rural Fire Service 'Planning for Bush Fire Protection 2019' indicates that a fundamental premise for APZs is that they are provided within the property in such a way that the owner / occupant will be able to maintain the area in perpetuity.

Further details of Endeavour Energy's bushfire / vegetation management policies are available on Endeavour Energy's website under 'Home > Community > Vegetation management' or via the following link:

https://www.endeavourenergy.com.au/community/vegetation-management.

The following is an extract of Endeavour Energy Directions Paper for Consultation 1 July 2019 – 30 June 2024.

Bushfire Risk

Over 85 per cent of Endeavour Energy's franchise area is bushfire prone as identified by the NSW Rural Fire Service. Endeavour Energy's franchise area includes the Blue Mountains which has been identified as one of the highest areas of bushfire risk in NSW. As a result, vegetation management is a substantive and critical activity in providing a safe and reliable service.

If we fail to properly maintain safe clearances there is an increased risk of bushfire and outages from trees coming in to contact with, or falling on, powerlines. This can have catastrophic consequences for customers and increase the strain on essential government services like Fire and Rescue NSW and the NSW Rural Fire Service who have previously noted our important role in vegetation management.

"Vegetation management around electricity poles, wires and infrastructure is a critical bushfire mitigation measure. Historically the NSW Rural Fire Service (NSW RFS) has been satisfied that electricity distribution businesses have been appropriately addressing bush fire risks"

– Commissioner NSW Rural Fire Service – December 2014

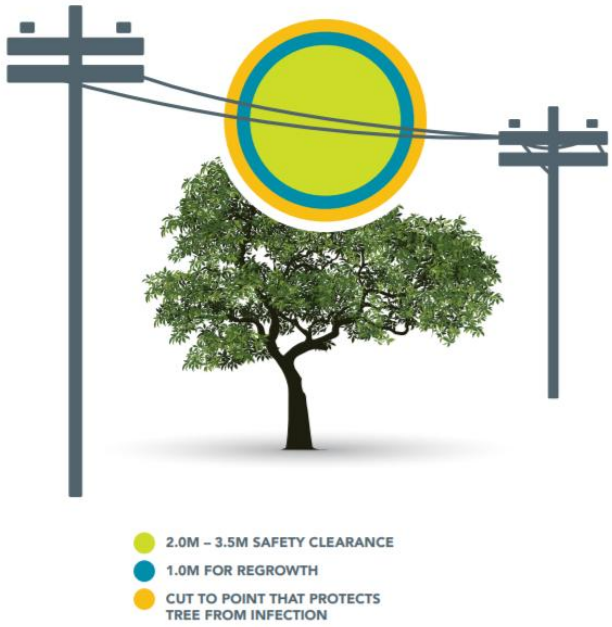
We have a comprehensive program of works to manage the risk of bushfires being initiated by the network. We employ leading edge radar based technology to accurately identify vegetation that is too close to the network. Our pre-summer program includes annual inspections of our assets in bushfire prone areas and associated maintenance work, vegetation management, and capital works to target specific high risk assets.

This program is one of Endeavour Energy's largest operating costs at approximately $60 million per year. To ensure we deliver value for money services we externally source this function.

Councils and customers may have different views about the frequency, the impact on streetscapes and the cost-benefit trade-off of tree-trimming. However, we are required to trim trees according to mandatory industry standards (Industry Safety Steering Committee Guideline 3 for managing vegetation near power lines). The ongoing use of the latest technology allows us to better target vegetation management programs in order to strike the right balance between the frequency, impact on streetscapes and compliance of tree-trimming.

14 Directions Paper for consultation

Tree-trimming clearance requirements



1 July 2019 – 30 June 2024

7 Construction Management

As part of the construction management plan the applicant must satisfactorily address any impacts of the proposed works on Endeavour Energy's electricity infrastructure located on the site as well as to the adjoining properties. In this regard the following issues should be considered and addressed by the applicant:

- Maintenance of the structural integrity / weather tightness of the substation building / chamber.
- Access to the substation must be available 24/7/365 ie. all day, every day of the year and must not be impeded by temporary fencing, hoardings, the storage of materials etc.
- The electricity infrastructure may be impacted by vehicle / plant operation, excessive loads, vibration, dust or moisture penetration.

Endeavour Energy expects the applicant will need to prepare a dilapidation report to assess of the current condition of any adjoining building before any construction is done around the area and after the new building's completion to determine if any damage was caused by the excavation, demolition, or construction work.

8 Contamination

Endeavour Energy has noted that Contamination Assessments generally do not appear to identify the electricity infrastructure on or in vicinity of the site which is likely to become redundant assets as a result of the proposed development (which is dealt with by Endeavour Energy's Customer Network Solutions Branch as part of the application for the connection of load for the new development – please refer to Section 24 Network Connection) as potential areas of environmental concern (AEC) and associated contaminants of potential concern (COPC).

Due to the potential variability in both the nature and extent of any contamination, it is difficult to define specific remedial strategies for potential contamination associated with electricity infrastructure. As a guide only, Endeavour Energy's Sustainability and Environment Branch have advised the remediation of soils or surfaces impacted by various forms of electricity infrastructure is not uncommon but is usually not significant eg. transformer oil associated with leaking substations, pole treatment chemicals at the base of timber poles etc. The method of remediation is generally the removal of the electricity infrastructure, removal of any stained surfaces or excavation of any contaminated soils and their disposal at a licensed land fill.

The overall Environmental Management System (EMS) for the project should include an unexpected finds protocol to deal with potential contaminated land or asbestos that was not previously identified in the Contamination Assessments. In most cases this should be able to deal with any contamination related to electricity infrastructure. Nonetheless Endeavour Energy's recommendation is for appropriate consideration to be given to electricity infrastructure in the Contamination Assessments.

If the applicant has any concerns over the remediation works related to redundant electricity infrastructure they should contact Sustainability and Environment Branch via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718.

8.1 Contamination from Endeavour Energy Sites

Endeavour Energy's management and / or remediation measures for its sites are implemented based on the presence of contaminants of potential concern that from a contamination perspective would make a site unsuitable for its required use as part of the electricity network. Based on current and historical use of a site, Endeavour Energy may undertake targeted intrusive site investigations to identify or assess concentrations of contaminants of potential concern.

Should the site require significant augmentation or redevelopment, investigations would be undertaken to determine whether environmental management or remediation is required on the site. If that occurs, the site would be assessed under the appropriate land use scenario, which based on the site's current and ongoing use for electricity distribution would be for a commercial or industrial type use. If the use of the site is proposed to change, it would be assessed under the then relevant scenario.

9 Demolition

Demolition work is to be carried out in accordance with Australian Standard AS 2601—2001: 'The demolition of structures'. All electric cables or apparatus which are liable to be a source of danger, other than a cable or apparatus used for the demolition works shall be disconnected ie. all electrical apparatus shall be regarded as live until isolated and proved de-energised by approved means.

Depending on the extent of the demolition works, the low voltage service conductor and customer connection may need to be isolated and/or removed during demolition. If required the applicant will need to engage an ASP of an appropriate level and class of accreditation to undertake the electrical works. For details of the ASP scheme please refer to Section 12 'Earthing'.

If the entire existing premises are planned for demolition, removal or relocation resulting in the permanent disconnection of a customer connection point, please refer to Section 28 'Removal of Electricity Supply' for further information.

Appropriate care must be taken to not otherwise interfere with any electrical infrastructure on or in the vicinity of the site eg. streetlight columns, power poles, overhead power lines and underground cables etc.

10 Dispensations

In instances where an applicant's proposal is not compliant with Endeavour Energy's engineering documents or standards, where all other options have been exhausted and compliance cannot be achieved, the applicant must request a dispensation in accordance with Endeavour Energy's Company Procedure GAM 0114 'Granting Dispensations for Engineering Documents' which states:

2.0 SCOPE

This procedure applies to all dispensation requests for proposed deviation from the company's engineering documents. This includes dispensations from, but is not limited to, Accredited Service Provider (ASP) designs, the company's designs, and failed acceptance testing results for new and existing equipment.

The dispensation request must outline the risk to the company's ability to provide a safe, reliable and sustainable electricity supply at an optimal whole of life cost when proposing to deviate from engineering documents. The validity of the risk will be assessed and the request will be approved only if the risk is deemed acceptable. The request will be rejected if the risk is deemed unacceptable or substantial evidence is not provided to justify deviating from the company's engineering documents.

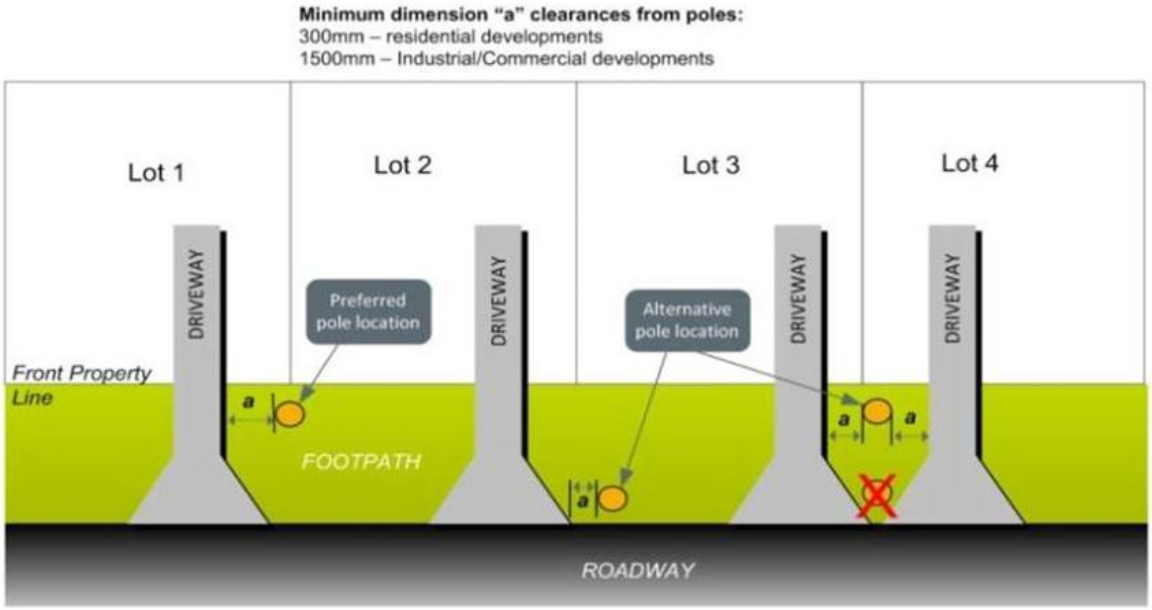
The request should be made to the relevant Endeavour Energy stakeholder eg. if it relates to an easement management matter to the Easement Officers, for an application for connection of load to Customer Network Solutions Branch etc.

11 Driveways

For public / road safety and to reduce the likelihood / protect electricity infrastructure from vehicle impact or loads, Endeavour Energy requires adequate separation distances of driveways that would be acceptable / safe for anyone properly using the driveway. Preference is to have the maximum reasonably possible separation distances from driveways and electricity infrastructure.

However with increased density achieved with smaller, narrower, battle-axe lots and where built to side boundary development is allowed this can sometimes be difficult to achieve. The widening of landscaping provided along the side boundary and the curving of the driveway away can provide additional clearance.

NSW Streets Opening Coordination Council 'Guide to Codes and Practices for Streets Opening' which is available via their website http://www.streetsopening.com.au/resources/ in Section 5.10. 'Vehicular Footpath Crossing' includes the following diagram.



The minimum separation to the skirting of the proposed driveway is regarded as the minimum that would be acceptable / safe for anyone properly using the driveway (and for which depending on the circumstances appropriate protective devices may be required) and failing the foregoing an asset relocation may be required.

Notwithstanding the 300 millimetre possible minimum, Endeavour Energy's preference is for a minimum of 1 metre separation. This is also in keeping with many Councils' development controls which requires driveways to be at least 1 metre from side boundaries ie. often poles are located in line with the boundaries.

The separation required depends on the type, extent and voltage of the electricity infrastructure (some poles may have multiple overhead power lines ranging from low voltage to 132,000 volt / 132 kilovolt (kV) high voltage); setback of the electricity infrastructure from the roadway / kerb and gutter; curve of the road; the traffic type, volume and speed etc. Essentially this requires the completion of a risk assessment.

For new underground subdivisions driveways should be located a minimum of:

- 500 millimetres from low voltage pillars.
- 1500 millimetres from streetlight columns.

In regard to the relevant parts of Australian Standard 2890 'Parking Facilities', whilst there is no direct reference in the Standard to power poles or streetlight columns as a 'permanent sight obstruction', provision needs to be made to allow for turning movements, reversing, safety aspects such as sight distances to both pedestrians and other vehicles should not be compromised. Also, as a 'fixed object', if adequate separation cannot be provided, protective devices to protect the power pole or streetlight column from vehicle impact may be required.

Under the provision of the *Electricity Supply Act 1995* (NSW), a driveway constructed too close to electricity infrastructure may under Section 49 'Obstruction of electricity works' be regarded as interfering with electricity works eg. in the event that a pole needs to be replaced and excavation of the surrounding ground is required part of the driveway would need to be removed.



Driveways need to be appropriately located in relation to poles. Poles with transformers (pole mounted substations) may have an additional earth mat surrounding the pole and should be provided with greater separation to driveways. Repairs and maintenance to poles can occur over extended periods of time blocking driveway access. Source: Google Maps Street View.

12 Earthing

Earth wires are a person's life-lines, conveying electricity from a faulty appliance or equipment through the wire to earth and back to the source through the neutral wires rather than through the person's body. If a fault occurs, power will flow to the earth by the shortest and easiest path. So, if appliances or equipment are not properly earthed, the power could flow through it and then through any person touching or using it, causing serious injury or even a fatality. All electrical infrastructure is therefore earthed.

Inadequate connection to the earth to allow a leaking / fault current to flow into the grounding system and be properly dissipated places persons, equipment connected to the network and the electricity network itself at risk from electric shock, fire and physical injury. The earthing system is usually in the form of an earth electrode consisting of earth rods or mats buried in the ground.

Endeavour Energy is committed to ensuring that its activities and assets conform to all relevant International and Australian Standards, Energy Networks Association (ENA) Standards and NSW legislation. Endeavour Energy's Company Policy, Network Asset Management, 9.2.5 'Network Asset Design' which states the following.

5.10 System earthing

The company's network must generally be effectively earthed. However, in order to improve safety for customers and the public (by reducing earth fault current and magnitude of earth fault potential rise in the distribution systems and zone substations) consideration must be given through the planning process to the limitation of the earth-fault levels on the distribution network.

Metal structures and equipment in some cases will be livened to dangerous voltage levels as a result of an earth fault. For this reason depending on access, location and exposure levels, metal structures and equipment must be bonded to earth by permanent connections to electrodes in contact with the general mass of the earth. The hazard to human beings of electric shock means all earthing systems must be designed so that acceptable levels of safety are maintained to electrical employees and the public.

Substations have an 'earth grid' specifically designed for the site considering such factors as ground resistance etc. Depending on the situation, Endeavour Energy may need to seek the imposition of restrictions on land adjoining its electrical infrastructure, particularly in areas of high risk to the public such as:

- aquatic centres, swimming pools (in the vicinity of a zone or transmission substation the required clearance distance is typically 15-30 metres);
- schools; pre-schools and day care centres;
- play grounds;
- conductive concrete or steel poles (near bus stops, pedestrian walkways, etc); and
- conductive boundary fencing.

For this reason, the construction of any building or structure (including fencing, signage, flag poles, hoardings etc.) whether temporary or permanent that is connected to or in close proximity to Endeavour Energy's electrical network is required to comply with AS/NZS 3000:2018 'Electrical installations'. This Standard sets out requirements for the design, construction and verification of electrical installations, including ensuring there is adequate connection to the earth. Inadequate connection to the earth to allow a leaking/fault current to flow into the grounding system and be properly dissipated places persons, equipment connected to the network and the electricity network itself at risk from electric shock, fire and physical injury.



Copper thieves cutting and taking earths from power poles means there is inadequate connection to the earth placing persons and the electricity network at risk. This example occurred in Prospect NSW part of Endeavour Energy's franchise / network area. Crime Stoppers is urging anyone with information about copper theft in their area to report it anonymously to Crime Stoppers on 1800 333 000.

Earthing systems should be designed by a suitably qualified electrical engineer / Accredited Service Provider (ASP) following a site-specific risk assessment having regard to the potential number of people could be simultaneously exposed, ground resistivity etc. For details of the ASP scheme please refer to Section 24 'Network Connection'.

In particular appropriate consideration should be provided to the conductivity of the fencing near electricity infrastructure or within the easement where there is a possibility it could act as a conductor of electricity and dangerous currents may be carried along the fence. Where conductive / metal fencing is used it must be appropriately earthed eg. the by the use of isolation panels where the fence enters or exits the easement created by the use of timber posts and/or earth electrode installed adjacent to the electricity infrastructure or easement.

12.1 Special Locations

Endeavour Energy's 'Design certification checklist for ASP L3' the design must comply with Endeavour Energy's 'Earthing Design Instruction EDI 001 – Earthing design risk assessment' in which schools, pre-schools, day care centres are regarded as a 'special location' – please see the following extract of EDI 001.

> The representative contact scenarios for any risk event are as follows:
>
> e) *Special*: implies an area within close proximity to or within a premise where there is a high likelihood that shoes will not be worn and/or the risks associated with the earthing system has the potential to be exposed to a number of people simultaneously through contact with affected metalwork. Examples include schools, pre-schools, day care centres, aquatic centres, recreational swimming areas and beaches. This classification must be assessed on a case-by-case basis and may not involve a societal assessment depending on the scenario.

Applicants should check with their ASP responsible for the network connection to the site that any existing or future padmount substations required to facilitate the proposed development that the earthing has been designed to comply with the 'special location' requirements under EDI 100.

13 Easement Management

Whilst the electricity distribution network is held under various forms of property tenure, the most common is an easement which 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.

Endeavour Energy's Mains Design Instruction MDI 0044 'Easements and Property Tenure Rights' deals with easements and covers:
This instruction covers:

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

The following is a summary of the usual / main terms of Endeavour Energy's electrical easements requiring that the landowner:

- Not install or permit to be installed any buildings, structures or services within the easement site.
- Not alter the surface level of the easement site.
- Not do or permit to be done anything that restricts access to the easement site without the prior written permission of Endeavour Energy and in accordance with such conditions as Endeavour Energy may reasonably impose.

Endeavour Energy's preference is for no activities or encroachments to occur within its easements. Most activities are prohibited within the padmount substation easement. However, if any proposed works or activities (other than those approved / certified by Endeavour Energy's Customer Network Solutions Branch as part of an enquiry / application for load or asset relocation project) will encroach / affect Endeavour Energy's easements, contact must first be made with the Endeavour Energy's Easements Officers, via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718 or email Easements@endeavourenergy.com.au .

Details of all the proposed works or activities within or affecting an easement, restriction or protected works (even if not part of the Development Application) must be referred to Endeavour Energy's Easements Officer for assessment and possible approval provided it meets the minimum safety requirements and controls. However please note that this does not constitute or imply the granting of approval by Endeavour Energy to any or all of the proposed encroachments and / or activities within the easement.

13.1 Padmount Substation Fire Rating Restriction

If part of a building encroaches the fire rating restriction for a padmount substation, the applicant will need to provide Endeavour Energy's Easements with an engineer's certificate identifying that all external surfaces of the building within the fire rating zone meet the appropriate fire rating as per Endeavour Energy's terms for the restriction and in accordance with Australian Standard AS 1530 'Fire Test to Building Material – Standard'. The engineer must also specify the materials to be utilised and the fixing instructions for those materials in order to meet the stated fire rating.

Alternatively, if it can be demonstrated that the entire building (including the fascia, down pipes and guttering) is a minimum of 3 metres away from the substation plinth, then Endeavour Energy would have no objection to the proposed development. Failing the foregoing, the location / design of the part of the building encroaching the restriction area would need to be amended to be outside of the restriction area or be protected by a fire screen / wall.

Figure 44 from Endeavour Energy's Mains Construction Instruction MCI0006 'Underground distribution: Construction standards manual' explains the fire restriction and the use of screen walls.

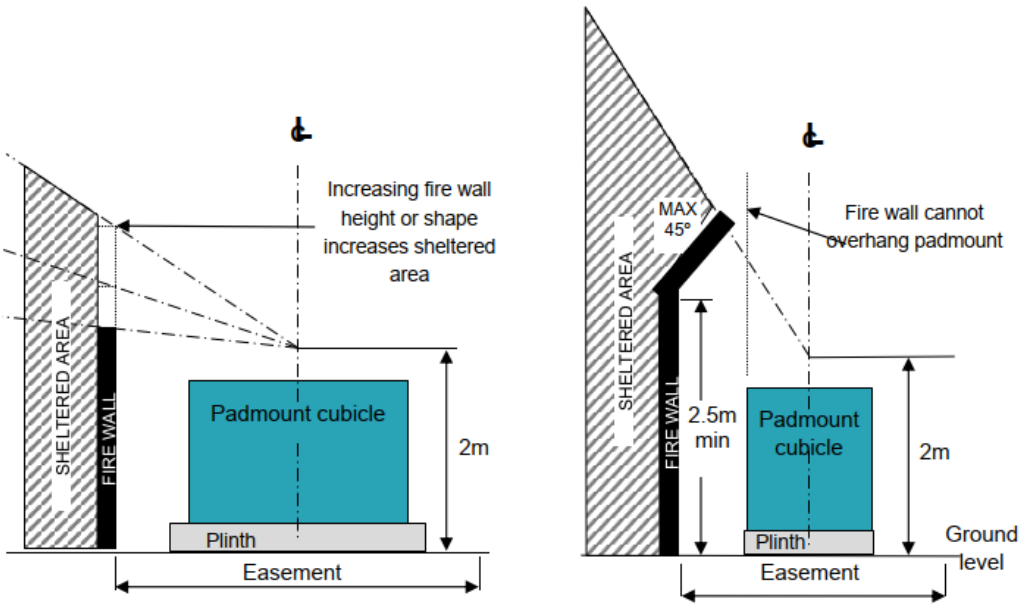
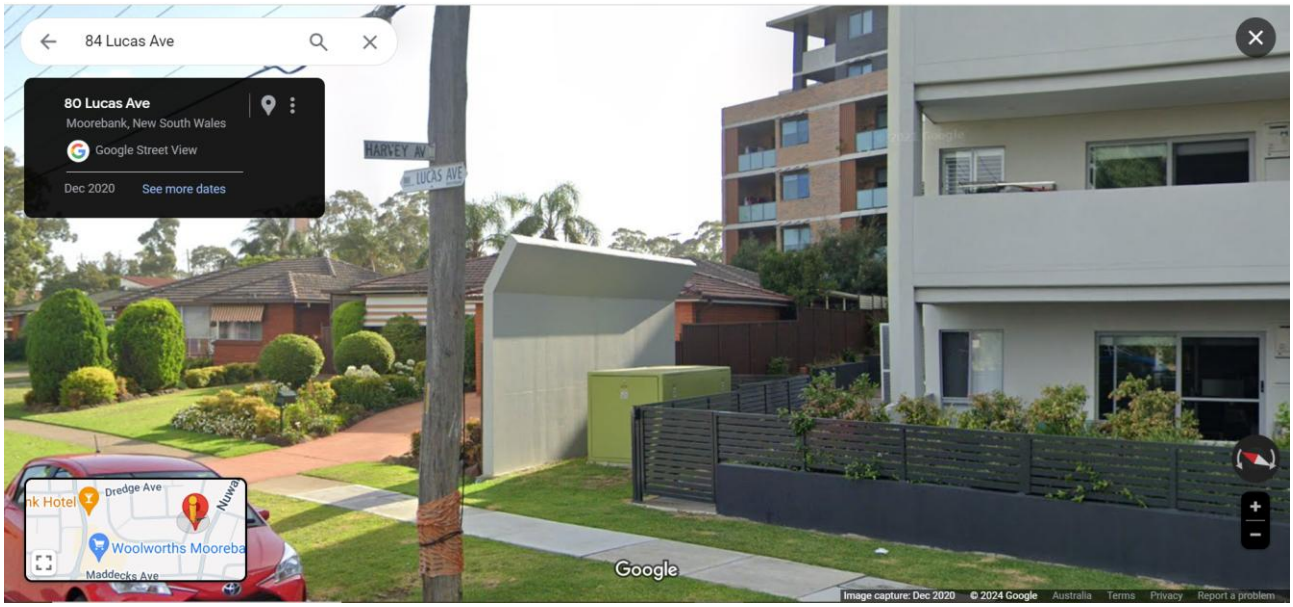


Figure 44: Screen wall examples

This is also outlined in Endeavour Energy's Mains Design Instructions MDI0028 'Underground distribution network design' and the Australian Standard AS2067: 2016 'Substations and high voltage installations exceeding 1 kV a.c.' which provides common rules for the design and the construction of electrical power installations and also addresses a range of issues including fire risk related to substations within or near buildings (which excludes any constructions with non-fire rated materials being allowed within the fire clearance zone) and recognises requirements of the National Construction Code.



Fire screen wall to padmount substation no. 36553 in Lucas Avenue, Moorebank used to avoid the fire rating restriction encroaching the adjoining property. Source: Google Maps Street View.

It is Endeavour Energy's experience in dealing with the fire restriction areas for padmount substations that any form of glazing (in particular opening windows) cannot achieve the required rating. In regard to the Building Code of Australia (BCA) is the grading period in minutes is for three criteria: structural adequacy, integrity and insulation. For glazing the structural stability of the product and the capacity it has to resist fire, while still acting as a support for its structure (since windows are generally not structural elements) is difficult to achieve. The issue with any openings is that if they are left open, the internal surfaces are also exposed to fire. For this reason both openings and glazing within the fire restriction site is best avoided.

Partly for this reason the Terms of Restriction on the Use of Land for Fire Rating of Buildings was amended in 2022 to include the following additional requirement.

> *No doors or opening windows are permitted to be erected within the restriction site on the external surface of a building within 3 metres from the substation footing.*

Although this additional requirement is not included in the restriction registered on title to all properties, given the problem in achieving the required fire rating, it essentially will apply.

In addition the following matters also need to be considered in regard to the fire rating restriction:

- Personnel access doors and fire exit doors to a building are not permitted within the fire restriction area.
- Gas mains/pipes shall not pass through the fire restriction area.
- A 10 metre clearance distance shall be maintained between substation and fire hydrants, booster valves, and the like in accordance with Australian Standard AS2419.1:2021 'Fire hydrant installations, Part 1: System design, installation and commissioning'.
- Any landscaping that potentially could transfer / provide connectivity for flame or radiant heat from a fire in the substation to a dwelling or building should be avoided.
- The storage of and / or use of flammable, combustible, corrosive or explosive material within the fire restriction should be avoided.



An electrical transformer caught alight in Sydney's south-west today. (9News)



At least 18 people were evacuated from nearby units. (9News)

Whilst fires in padmount substations are relatively rare they do occur and can represent a risk to the nearby buildings and occupants. The required fire clearances / ratings must be complied with. Above are photographs from 9 News coverage of 'Fire erupts between two apartment blocks in Sydney's south-wests' regarding a padmount substation fire at Guildford which occurred on 25 October 2021. Source: https://www.9news.com.au/national/guildford-fire-apartment-block-electrical-new-south-wales-sydney-south-west/46ff15ed-84f7-4442-9884-dc206cb6e7d0

13.2 Site Specific Conditions

Land interests benefitting Endeavour Energy must be provided where any part of the distribution system is or will be located on land that is not a dedicated public road or reserve. Depending on the type of development and the location of electricity assets being installed, there are different pathways to providing land interests for contestable works. All land interest requirements are outlined in Endeavour Energy's 'Land Interest Guidelines for Network Connection Works'.

Although land interests are still created by registration of the approved Endeavour Energy, there are also unregistered land interests in the form of Site Specific Conditions, which may be appropriate for certain types of distribution network assets, where the connection assets are positioned on the public road frontage within the land parcel being supplied and with direct access from the public road. Endeavour Energy's Customer Network Solutions Branch maintain a register of the Site Specific Conditions and will apply for the life of the 'Premises Connection Assets'.

These Site Specific Conditions are imposed in lieu of the customer creating a registered Land Interest in the form of an easement. Essentially the Conditions are the same as that for the easement for the type of distribution network asset and the assets are managed on the same basis as if an easement is in place.

Further details of the land interest requirements are available by contacting Endeavour Energy's Customer Network Solutions Branch via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718 or on Endeavour Energy's website under 'Home > For your home > Connecting your home > Subdivision of land > Land interest for contestable works' or via the following link:

https://www.endeavourenergy.com.au/for-your-home/connecting-your-home/subdivision-of-land/land-interests-for-contestable-works .

14 Easement Release

Under Endeavour Energy's Company Policy 9.2.3 (Network) 'Property Tenure for Network Assets', the company will assess all applications for the release of easements to identify and manage risks to its network, commercial and community interests. The company may seek compensation for the extinguishment of property tenure. No easement is considered to be redundant or obsolete until it is released under this policy.
Applications for the release / extinguishment of an easement can only be made by the registered landowners of the encumbered property and are usually done either:

- As part of an application for connection of load or capital works project for a development project eg. where alternative / new network arrangements are to be put in place, which is managed by Endeavour Energy's Customer Network Solutions Branch. Endeavour Energy's Customer Network Solutions Branch will make the applicant or their ASP aware of Endeavour Energy's requirements for the release of easement. Please refer to Section 24 'Network Connection'..

- At the request of landowners where the electrical assets within the easement have been removed or it has become apparent that the easement has possibly become redundant to Endeavour Energy's future network requirements eg. no electrical assets have ever been installed in the easement. Further details are available by contacting Endeavour Energy's Property Branch via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718 or email network_property@endeavourenergy.com.au (underscore between 'network' and 'property'). The greater amount of detail provided will assist in the assessment of the application.

In some circumstances the release of easement may be for nil compensation eg. the affected land is subject to dedication as public road or as part of an asset relocation / capital works project where the alternative network arrangements occur at the same voltage and level of easement affectation. Otherwise the release will be subject to monetary compensation paid by the applicant having regard to the potential increase in value of the land as a result of the easement release / reduction in the extent of easement affectation (with appropriate consideration given to the applicant's alternative network arrangements).

15 Easement Subdivision

Endeavour Energy's preference is to have continuity of all easement types over the most direct and practicable route affecting the least number of lots as possible. Therefore, Endeavour Energy generally does not support the subdivision of easements and their incorporation into multiple / privately owned lots.

The incorporation of electricity easements into privately owned lots is generally problematic for both Endeavour Energy and the future landowners and requires additional easement management to ensure no uncontrolled activities / encroachments occur within the easement area.

Accordingly, Endeavour Energy's recommendation is that whenever reasonably possible, easements be entirely incorporated into public reserves and not burden private lots (except where they are remnant lots or not subject to development). In some Council areas this is a requirement for subdivisions as shown in the following extract of Camden Council's development control plan.

C7.2 Neighbourhood and Subdivision Design		
Electricity easements are to be incorporated in public road reserves and shall not burden private lots.	The proposed electricity easements are located within the public road reserve. No electricity easements burden the private lots.	✓

Endeavour Energy's experience is that regardless of the easement, inevitably some property owners will seek to maximise the utilisation of their land and will encroach or undertake prohibited activities within the easement. The following aerial photograph shows part of easement within the public reserve being clear but that within the private lots having prohibited buildings and swimming pools.



Overlay of approximate location of easement for 132,000 volt / 132 kilovolt Feeders No. s 930 & 931 Baulkham Hills to Carlingford from Endeavour Energy's HxGN NetWorks Core NetViewer master facility model onto aerial photograph from SIX Maps of properties located on the southern side of McGiff Avenue, North Rocks NSW. The part of the easement to the west within Hunts Creek Reserve show no encroachments. To the east within privately owned lots there are encroachments of the easement by buildings / structures and swimming pools.

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

- Subdivision of the easement parallel to overhead power lines or underground cables which effectively reduce the easement width must be avoided.
- The number of crossings of easements must be minimised and crossings should be or close to perpendicular to the overhead power lines or underground cables and must be at least half the easement width beyond any pole or structure. Contiguous / ready access along the easement can be difficult not only due to fencing but also retaining walls and changes in levels which may preclude physical access.
- Unrestricted access to structures such as poles and towers or cable pits must be retained. Where subdivisions incorporate easements to the rear of the lots, if buildings are constructed from side boundary to side boundary, access to the easement is extremely restricted.
- Easements for other types of electricity infrastructure such as padmount substations or switching stations shall not be subdivided but any associated restriction or right of access etc. may encumber and adjoining lot.





Poor subdivision of easements restricts access and working area around the structures. Source: Google Maps Street View.

If a subdivision results in the incorporation of Endeavour Energy's easement into new or multiple lots, the easements, rights and restrictions, covenants etc. must be retained over the affected lots and in accordance with the requirements of NSW Land Registry Services (LRS).

Depending on the age of the existing easement terms and the intended use of the site, Endeavour Energy may need to include additional requirements / restrictions to be registered on titles to each of the lots to ensure it can reasonably access and manage its existing electricity infrastructure within the easement. This may apply in situations where the terms of easements reflected the use at the time of large lot non-urban changing to a multiple lot urban use. For example, old terms of easement may only provide access to the site via the easement itself compared to being able to enter the (entire) lot burdened using the most practical route to the easement.

16 Emergency Contact

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

If someone seriously injured or in need of urgent medical help call the Triple Zero (000) service which is the quickest way to get the right emergency service to help you. It should be used to contact Police, Fire or Ambulance service in life threatening or emergency situations.

17 Excavation

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

Electricity Supply Act 1995 No 94

Current version for 1 August 2018 to date (accessed 4 September 2018 at 08:54)

Part 5 › Division 2 › Section 49A

49A Excavation work affecting electricity works

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

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

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

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

(a) to modify the excavation work, or

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

If any excavation work affects Endeavour Energy's electricity infrastructure, reasonable prior contact must be made with Endeavour Energy's Construction Works Team via Endeavour Energy's Connections Portal through Connect Online . Enquiries related to electricity infrastructure located within an easement should be directed to Endeavour Energy's Easements Officers by email Easements@endeavourenergy.com.au . Contact can also be made via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718.

With the increased number of developments incorporating basements often being constructed to the property boundaries or immediately adjacent to easements, the integrity of the nearby electricity infrastructure can be placed at risk.



This excavation for a basement at 6 Sorrell Street Parramatta NSW for a mixed use 8 storey development in 2015 was identified by Endeavour Energy's Regional Services North as being unsafe due to the integrity of padmount substation 7858 located on the adjoining lot being compromised and access not being available. This resulted in the 'switching out' of the substation from the network until the site conditions were again deemed to be safe.

However even relatively minor excavation works may affect the integrity of the nearby electricity infrastructure.



Crews from Endeavour Energy's Moss Vale Field Service Centre in March 2024 had to attend site as this excavation by a drainage contractor resulted in the striking of the earthing system for a pole mounted substation and compromised the support of the poles.

18 Flooding

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

Endeavour Energy's System Control Branch Procedure NCB 0615 'Flood Response Plan' is based on electricity supply being maintained as long as practicable consistent with the safety of employees' general public and emergency services personnel. It involves rearranging the network having regard to a substation prioritisation ranking, comprised of flood risk and damage potential, to focus the flood response efforts toward areas and resources in order of highest importance.

In regard to the flood susceptibility of electricity infrastructure, overhead power lines which can be damaged by flying or floating debris, falling trees and branches, inundation by floodwater and in colder parts of the network, collected ice and snow. The main guide to the construction of overhead power lines is Australian/New Zealand Standard AS/NZS 7000:2016 'Overhead line design' which has specific as well as general guidance in regard to design of overhead power lines in flood prone land.

Underground cables are less likely to be damaged from storm events but are still susceptible to flooding and tidal surges. Saltwater, which is a very good conductor and causes electrolysis reactions with the metal conductors and can result in accelerated corrosion to the underground cables and associated infrastructure. With appropriate design electrical cables are commonly run underwater and in other hostile environments and likewise can also take into consideration potential flood events.

The main guide to the construction of overhead power lines used by Endeavour Energy is its:

- Mains Design Instruction MDI 0028 'Underground distribution network design'.
- Mains Construction Instruction MCI 0006 'Underground distribution construction standards manual'.

These documents have specific as well as general guidance applicable to the design and construction of underground cables in flood prone land.

Distribution substations should not be subject to flood inundation or stormwater runoff ie. the padmount substation cubicles are weatherproof not flood proof and the cable pits whilst designed to be self-draining should not be subject to excessive ingress of water. Section 7 'Substation and switching stations' of Endeavour Energy's Mains Construction Instruction MCI 0006 'Underground distribution construction standards manual' provides the following details of the requirements for flooding and drainage in new distribution substation locations.

> *7.1.6 Flooding and drainage*
>
> Substations are to be located such that the risk of flooding or stormwater damage is minimal.
>
> As a minimum the level at the top of the transformer footing, HV and LV switchgear, shall not be lower than the 1:100 year flood level.
>
> All drains within the substation site area or in the vicinity shall be properly maintained to avoid the possibility of water damage to Endeavour Energy's equipment.
>
> In areas where, as determined by the Network Substation Manager, there is a high water table or a heightened risk of flooding, indoor substations will not be permitted.
>
> All materials used in the construction below the substation (ground level) shall be capable of withstanding prolonged immersion in water without swelling or deterioration.



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

18.1 Building in flood hazard areas

The Australian Building Codes Board (ABCB) National Construction Code Standard 2012.3 'Construction of buildings in flood hazard areas' includes the following requirements.

2.9 Requirements for utilities

2.9.1 General

(a) Utilities and related equipment, other than an electrical meter for the building, must not be placed below the *FHL* unless they have been designed specifically to cope with flood water inundation.

Note: The location of electrical meters is regulated by the electrical authority.

(b) Buried systems must be placed at a depth sufficient to prevent damage due to scour and erosion during the *DFE*.

(c) Exposed systems must be designed to withstand the flood related actions (buoyancy, flow, debris and wave).

2.9.2 Electrical

Unless the electrical supply authority determines otherwise:

(a) Electrical switches must be placed above the *FHL*.

(b) Electrical conduits and cables installed below the *FHL* must be waterproofed or placed in waterproofed enclosures.

(DFE: Defined Flood Event; FHL: Flood Hazard Level)

19 Hazardous Environment

Endeavour Energy is aware that the provisions of State Environmental Planning Policy Resilience and Hazards (Resilience and Hazards SEPP) Chapter 3 'Hazardous and offensive development' in the preparation of a preliminary hazard assessment electricity infrastructure is not defined / regarded as sensitive land use. However, in these situations Endeavour Energy has sought further advice from the consultants preparing the preliminary hazard assessment on the basis that, although not a sensitive land use in the traditional / environmental sense, if the electricity infrastructure on or in proximity of the site (which also may be a potential ignition source) is damaged, the resulting outage could leave many properties / customers without power.

In these situations the applicant's consultants have been requested to specifically address the risks associated with the proximity of the electricity infrastructure ie. detail design considerations, technical or operational controls etc. to demonstrate as required by the Resilience and Hazards SEPP that the proposed business / development is suitably located and can be built and operated with an adequate level of safety and pollution control.

Irrespective of the class / division and the quantities, any dangerous goods whether combustible and / or flammable should not be stored near electricity infrastructure and increasing the separation distance as far as reasonably possible is recommended.



Figure 4: Service Station Facility Following Fire

Extract of Statement of Environmental Effects for a Development Application notification received by Endeavour Energy in July 2023 for the rebuilding of a service station at Campbelltown following a fire in February 2023 which was near low voltage and 11,000 volt / 11 kilovolt high voltage overhead power lines. Note the fire damage to the pole.

In similar situations the consultants have been requested to specifically address the risks associated with the proximity of the electricity infrastructure ie. detail design considerations, technical or operational controls such as equipotential bonding between the earth, concrete driveway and fuel tanks etc. to demonstrate as required by the Resilience and Hazards SEPP that the proposed business / development is suitably located and can be built and operated with an adequate level of safety and pollution control.

Endeavour Energy's Mains Design Instruction MDI 0028 'Underground distribution network design' includes the following advice regarding substations near hazards.

> *6.3.7 Substation near hazards*
>
> Substations contain HV and LV electricity, oil, plastics, concrete and other materials. In some situations, a substation can be regarded as a hazardous source, or be susceptible to hazardous sources.
>
> Therefore, substations in or near hazardous areas will be dealt with strictly in accordance with Australian Standards and statutory requirements. The minimum distances to be maintained from hazardous locations are set out in AS 60079.10:2009. Reference will be made to AS 60079.10:2009 and any relevant statutory authority, in determining the siting of a substation when in hazardous locations. Padmount substations in or near hazardous areas, will have stainless steel cubicles as long as they comply with EDI 100 for earthing.

19.1 Fire Risk

Endeavour Energy's electricity infrastructure is potentially a source of ignition for fires. Endeavour Energy's risk control has focused on reducing the likelihood of fire ignition by implementing good design and maintenance practices. However there is still the potential for fires to occur as a result of fault currents, flashovers, fallen conductors, vehicle impacts etc.

With oil-filled equipment used in the substations there is the possibility of fires occurring eg. with padmount substations this is the reason for the inclusion of a fire restriction area. The appropriate selection, installation, maintenance and condition monitoring of the equipment used in substations is undertaken to reduce the possibility of fires and their containment.

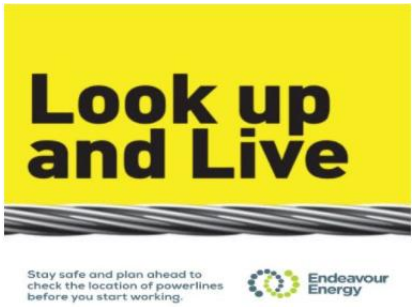
Although the risk cannot be eliminated entirely, Endeavour Energy's aim is to reduce the residual risk of these potential hazardous events to 'As Low As Reasonably Practicable'.

Whilst, Endeavour Energy has traditionally focused on the likelihood of its network starting a fire, conversely Endeavour Energy believes that Councils (and applicants) should consider the safety risks associated with inappropriate development in proximity of electricity infrastructure that may result in damage to the network and the loss of electricity supply.

19.2 Air Quality / Dust

Although Endeavour Energy's electricity infrastructure is not a 'sensitive receptor' in the traditional sense of being a habitable / residential use, the electrical equipment / operation of the site would be affected by excessive / cumulative dust emissions. Although unlikely in normal circumstances and the risk is considered low, it could cause a flashover to occur on the insulators on the overhead power lines or start a fire in the substation. From Endeavour Energy's perspective it is imperative that the appropriate air quality management measures are implemented and adhered to in order to minimise any impact on the electricity infrastructure on or in the vicinity of the site.

20 Look Up and Live



Before undertaking work on a site with overhead power lines, the location of powerlines can be checked with the free Look up and Live app which is available via the following link:

www.lookupandlive.com.au .

The Look up and Live map is an interactive geospatial map that has been developed to display the electricity networks of various distributors including Endeavour Energy. It is a simple worksite planning tool which provides information on powerline safety and allows specific information to be obtained from Endeavour Energy concerning how to minimize the risk of contact while working in proximity to the electricity network.

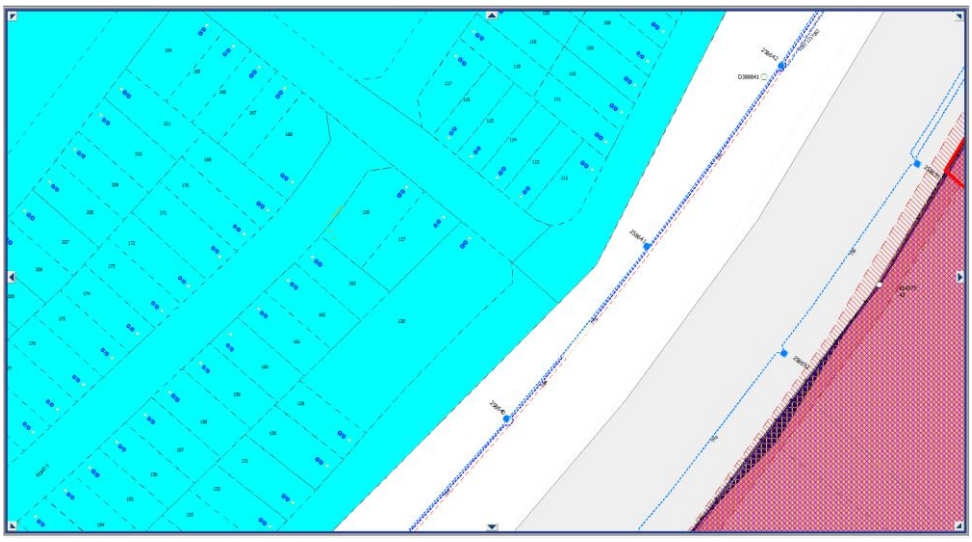


In December 2022 a concrete boom truck in Western Sydney came into contact with 33,000 volt / 33 kilovolt high voltage overhead powerlines causing an electrical explosion that energised the immediate area with potentially fatal consequences. Thankfully no one was killed or seriously hurt. Source: Too often Endeavour Energy (NSW) is... - Endeavour Energy | Facebook

21 Modifications

Endeavour Energy's HxGN NetWorks Core NetViewer master facility model shows enquiries and applications for contestable works projects with Endeavour Energy's Customer Network Solutions Branch for electricity supply by either:

- 'Work Polygon' indicated by the coloured highlighting and/or hatching of the lot.
- 'Developer Area' indicated by a proposed road / lot layout for a proposed subdivision.



Extract of Endeavour Energy's HxGN NetWorks Core NetViewer master facility model showing 'Work Polygon' and 'Developer Area'.

As such, Endeavour Energy's Customer Network Solutions Branch are managing the conditions of supply with the proponent and their Accredited Service Provider (ASP). However the applicant will need to contact Endeavour Energy's Customer Network Solutions Branch via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718 if the Development Application:

- Includes any contestable works projects that are outside of any existing approved / certified works.

- Results in an electricity load that is outside of any existing Supply / Connection Offer requiring the incorporation of the additional load for consideration. This is due to load often being based on a desktop assessment using an After Diversity Maximum Demand (ADMD) where demand is aggregated over a large number of customers providing an ADMD for the site / per lot. Depending on the actual development proposed for the site, the ADMD provided may not be sufficient ie. the increase in the number of premises or in the developable area may result in the creation of additional load; requirement for another separate customer connection point etc.

22 Network Access

It is imperative that the access to electrical infrastructure be maintained at all times. To ensure that the supply electricity is available to the community, access to the electricity infrastructure may be required at any time. Restricted access to electricity infrastructure by electricity workers causes delays in power restoration and may have severe consequences in the event of an emergency.

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. To ensure suitable access is available to electricity infrastructure the *Electricity Supply Act 1995* (NSW) includes the following Section 49 'Obstruction of electricity works'.

Electricity Supply Act 1995 No 94

Current version for 1 July 2019 to date (accessed 7 April 2020 at 10:49)

Part 5 › Division 2 › Section 49

49 Obstruction of electricity works

(1) This section applies if a network operator has reasonable cause to believe that any structure or thing situated in, on or near its electricity works:

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

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

(2) In those circumstances, a network operator:

(a) may serve a written notice on the person having control of the structure or thing requiring that person to modify or remove it, or

(b) in an emergency, may, at its own expense, modify or remove the structure or thing itself.

This is particularly important where there are poles or structures and changes in direction to a line route. In the event of fallen conductors or faults in underground cables, access to the poles or cable pits to restring or pull cables will be required by electricity workers with heavy vehicles, machinery and materials and is essential for restoring electricity supply.



The equipment required for pole replacements can include up to a 60 ton crane, franna crane, large elevating work platform and lifter borer.

23 Network Asset Design

Endeavour Energy's Company Policy, Network Asset Management, 9.2.5 'Network Asset Design' as one of its purposes is to establish the design principles and standards to be applied consistently across the network. The Company Policy includes the following:

5.11 Reticulation policy

5.11.1 Distribution reticulation

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

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

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

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

For urban areas it provides the following additional detail.

5.11.1.1 Urban areas

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

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

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

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



Overhead power lines are progressively undergrounded as subdivisions progress. Source: Google Maps Street View.

For non-urban areas it includes the following.

5.11.1.2 Non-urban areas

Extensions to the existing overhead 11kV and 22kV network and conductor replacements / augmentations must be underground. Where underground reticulation is not practical overhead construction can be used. The choice of overhead construction must be bare wire for the following circumstances:

- areas that are not substantial treed;
- long gully crossings;
- SWER lines;
- joint use 132, 66 or 33kV lines; and
- distribution lines with transmission construction and located in an easement.

All other overhead constructions must be CCT or NMSHVABC.

Extensions to the existing overhead LV network and augmentations must either be underground or utilise ABC. Conductor replacements greater than 100m route length must utilise ABC.

5.11.2 Transmission and sub-transmission

Transmission and sub-transmission lines will be must overhead construction unless environment, community and/or planning instrument considerations require an underground solution.

The Company Policy also indicates that 'Customers may elect or may be required by local council to install underground reticulation'. Councils may seek the enforcement of underground cables policy as part of their detailed planning and design guidelines in their Development Control Plans to support the planning controls in the Local Environmental Plan.

As well as improving the reliability of supply, and improved aesthetics a major consideration for increasing the proportion of underground power is the reduction of traffic hazards with poles traditionally placed in close to the kerb lines which increases the risk of vehicular impacts and potential road fatalities.

24 Network Connection

Applicants should not automatically assume that the presence of electricity infrastructure in the locality and / or nearby similar development means that adequate supply is immediately available to facilitate their proposed development.

Generally, customers wishing to connect a typical low voltage load up to 100 amps single phase or 63 amps three phase in an existing urban area will be offered to connect under a low voltage (LV) basic connection service even though out minimal extensions or augmentation works may need to be carried out to the network in order to facilitate the connection.

Many other types of LV connections, such as loads in non-urban locations or loads above 100 amps single phase or 63 amps three phase, may also be offered a LV basic connection service if it is assessed that the connection can be supported by the network without the need to extend or enhance the network.

In cases where the non-urban or larger LV loads are deemed to be requiring enhancement or extension works to the network, the offer will be in the form of a standard connection service.

When considering applications, Endeavour Energy will determine which areas are urban and rural based on the criteria specified within the definition of rural and urban below and the local government planning instruments.

Applications for new connection services need to be completed online. Further details of the entire range of connection services including high voltage installations; temporary builder's supply; asset relocation and removal; multi occupant developments; subdivisions; meeting the requirements of development approval etc; are available by contacting Endeavour Energy's Customer Network Solutions Branch via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718 or on Endeavour Energy's website under 'Home > Our network > Start a connection' or via the following link:

https://www.endeavourenergy.com.au/our-network/start-a-connection .

To ensure an adequate connection, the applicant may need to engage an Accredited Service Provider (ASP) of an appropriate level and class of accreditation to assess the electricity load and the proposed method of supply for the development. The ASP scheme is administered by Energy NSW and details are available on their website via the following link or telephone 13 77 88:

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

There are currently 3 levels of accreditation:

- Level 1: Construction of electricity distribution network assets ('poles and wires' or underground)
- Level 2: Construction or change of service lines between the electricity distribution network and the point of connection of the property/premises and for energising new or altered connections
- Level 3: Design of electricity distribution network assets underground or overhead.

The availability of additional electricity supply to a development is based on a wide range of factors eg. the age and design of the network; the number and type of distribution substations required to transform high to low voltage to supply customers / developments; other development in the locality utilising previously spare capacity within the local network; the progress of nearby / surrounding sites including electricity infrastructure works; the size and rating / load on the conductors and voltage drop (which can affect the quality of supply particularly with long conductor runs) etc.

Depending on these factors, in some circumstances the electrical infrastructure may need to be extended or upgraded to accommodate additional electrical load resulting from a development. However the extent of any works required will not be determined until the final load assessment is completed. Any work required to enable supply of the load in line with the requirements of the *Electricity Supply Act 1995* (NSW) is deemed to be 'contestable works' and should be undertaken by an ASP of an appropriate level and class of accreditation.

As part of the application for connection of load Endeavour Energy's Customer Network Solutions Branch as well as determining the method of supply requirements will also determine the funding arrangements. Depending on the circumstances not all the works may be customer funded or constructed and Endeavour Energy may supply materials, fund or construct works, make a capital contribution or seek reimbursements from the customer eg. for the use of spare ducts which Endeavour Energy has made a capital contribution as part of other nearby works.

For more complex connections, advice on the electricity infrastructure required to facilitate the proposed development can also be obtained by submitting a Technical Review Request to Endeavour Energy's Customer Network Solutions Branch who can be contacted via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718 or by completing an online application on Endeavour Energy's website under 'Home > For your business > Request a connection or upgrade' or via the following link

https://www.endeavourenergy.com.au/for-your-business/request-a-connection-or-upgrade .

The response to these enquiries is based upon a desktop review of corporate information systems, and as such does not involve the engagement of various internal stakeholders in order to develop a 'Connection Offer'. It does provide details of preliminary connection requirements which can be considered by the applicant prior to lodging a formal application for connection of load.

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

Questions about connections services can be made to Endeavour Energy's Customer Network Solutions Branch via Endeavour Energy's Connections Portal through Connect Online . Contact can also be made via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718.

24.1 Facilitating Subdivision

As a facilitating subdivision for the orderly subdivision and development of land the usual requirement to provide a separate customer connection point for each lot within the subdivision may be waived with the resulting lots to be identified / released as residue lots.

Accordingly the notification of arrangement letter issued by Endeavour Energy's Customer Network Solutions Branch will identify the lots as residues and are being released unsupplied.

The further proposed subdivision to create developable lots will be subject to Endeavour Energy's normal customer connection procedure and policies.

24.2 High Voltage Customer

As a high voltage customer the 'High Voltage Operational and Maintenance Protocol' between Endeavour Energy and the customer regarding the provision of high voltage supply to the site will specify a 'Load of Customers Installation' which is adequate for the then / Customer's current requirements. The Protocol generally also states the following:

> *'Should any further increase in loads be required, contact should be made with Endeavour Energy's Customer Network Solutions Branch, who will inform you of the requirements in this regard'.*

The Protocol also identifies where Endeavour Energy's responsibility terminates (normally at the pole or pillar on the road verge from which supply is taken) in respect of:

- ownership of high voltage equipment;
- switching operations; and
- maintenance of equipment.

However, high voltage customer connections must be a single customer site. Multiple occupant developments such as subdivisions, shopping centres, factory units, distribution centres, etc. are not entitled to high voltage connections. Accordingly, should this change, the site will no longer be eligible for a High Voltage Connection Service.

24.3 Distribution Substations

As distribution substations require incoming supply at 11,000 volts / 11 kilovolts (kV), in areas with only low voltage supply the 11 kV high voltage supply will need to be extended from the closest existing feeder to the site. However, feeders are also limited in capacity and in some instances a new dedicated feeder/s from the closest zone substation to the site will be required.

Although there are numerous diversity factors applicable for any given type of connection, installation (ie. residential, commercial, industrial) and other factors, for typical installations and usual equipment loads are provided in the Australian / New Zealand Standard AS / NZS 3000:2018 Electrical Installations (known as the Electrical Wiring Rules).

Any required distribution substation will need to be located within the property (in a suitable and accessible location) and be protected (including any associated cabling not located within a public road / reserve) with an appropriate form of property tenure as detailed in the attached copy of Endeavour Energy's 'Land Interest Guidelines for Network Connection'.

Endeavour Energy's general requirements is for distribution substation to be at ground level and have direct ready access from a public street (unless provided with appropriate easements for the associated underground cables and right of access) and must not be located within 6 metres of road intersections or bends to reduce the risk of possible vehicle impact damage.

Generally it is the Level 3 Accredited Service Provider's (ASP) responsibility (engaged by the developer) to make sure that the substation location and design complies with Endeavour Energy's standards the suitability of access, safety clearances, fire ratings, flooding etc. As a condition of the Development Application consent Council should request the submission of documentary evidence from Endeavour Energy confirming that satisfactory arrangements have been made for the connection of electricity and the design requirements for the substation, prior to the release of the Construction or Subdivision Certificate / commencement of works.

Endeavour Energy's distribution substations in newer / urban / underground areas consist mostly of padmount substations (also known as kiosk substations). Typically, they are a green or brown coloured box to blend into their surroundings, these structures are connected by underground cables. They can accommodate loads from 315 kVA up to 1,500 kVA (typically 500 kVA) ie. there is a significant variation in the number and type of premises able to be connected to a substation.



Padmount substations are converters of electricity, reducing the high voltages for street lighting and to the end user whilst low voltage pillar boxes are distribution junction points. These structures also mean underground cables are nearby. Digging activities and planting of trees or shrubs should not occur near them.

As an example of the type of development that may require the provision of a padmount substation, Endeavour Energy's Mains Design Instruction MDI 0028 'Underground distribution network design' includes the following requirement for substations in urban residential development.

> **4.4 SUBSTATIONS FOR URD**
>
> Substations in URD's must be padmounts, 500 kVA must be the standard size for transformers. 315 kVA transformers must be installed where the capacity of a 500 kVA transformer cannot be adequately utilised by this and adjacent developments and the deferment of expenditure is economical.

From Endeavour Energy's Mains Design Instruction MDI 0030 'Method of calculating voltage drop in low voltage mains', the After Diversity Maximum Demand (ADMD) Schedule for new URD development areas in Western Sydney in a gas area 6.5 KVA with 90 % of the transformer capacity allows for a maximum of 69 small dwellings for a 500 kVA padmount substation (or 43 for a 315 kVA).

Older / non-urban / above ground areas of the network utilising pole mounted substations have comparatively limited capacity of 16 kilovolt amperes (kVA) up to a maximum of 400 kVA. Pole mounted substations need to be located in an area that is clear of overhead obstructions and the immediate area surrounding the pole should provide a firm, level base with sufficient space to safely erect an extension ladder.



Pole mounted substation no. 914 in Blaxcell Street, Guildford NSW has 79 customer connection points servicing 119 premises in an urban context which is at the upper end of the number of premises able to be serviced. In contrast pole mounted substation no. 26132 in Baaners Lane Little Hartley NSW in a non-urban context only services a single rural property. Source: Google Maps Street View.

24.4 Indoor Substations

Traditionally Endeavour Energy's preference has been for the utilisation of padmount substations. The reasons for this included ready access and no reliance on the building owners to provide / maintain the building required to house an indoor substation. Padmount substations are regarded as a 'plug and play' system without the need for a physical building which allows for easier reconfiguration and less involvement with a building owner to resolve any issues / conflicts.

Developers have consistently opposed the imposition that such indoor substations place on their developments, but indoor substations have usually taken up development space equivalent to a few car parking spaces and in comparison to padmount substations, being integrated into the building they are an aesthetic improvement and also address issues related to fire rated construction and avoiding the need for the use of fire / screen walls.

For new developments particularly within central business districts where zero and minimal building setbacks are allowed (and which given their size makes the provision of the easements and restrictions for a padmount substation difficult to achieve on site), Endeavour Energy's recommendation is for the distribution substation to be an indoor substation (also known as a chamber substation).

Whilst indoor substations are predominantly utilised for commercial / office type development, in May 2017 Endeavour Energy's Mains Design Instruction MDI 0028 'Underground distribution network design' was amended to allow certain types of urban multi residential load (UML) developments to utilise indoor substations where a padmount substation is not practicably possible.

As with the installation of underground reticulation, Councils may seek the enforcement of an indoor substations policy as part of their detailed planning and design guidelines in their Development Control Plans to support the planning controls in the Local Environmental Plan.

As shown in the following extract of Google Maps Street View this site at 32 Castlereagh Street Liverpool utilises an indoor substation due to the zero building setback with the low voltage overhead power lines also having been undergrounded to provide the required safety clearances to the building.



Indoor substation at 32 Castlereagh Street Liverpool. Source: Google Maps Street View.

In comparison, as shown in the following extract of Google Maps Street View is of a site at 18 Copeland Street Liverpool required the installation of a fire wall next to the padmount substation to avoid the creation of restrictions on the adjoining site the development. Whilst meeting the fire rating requirements etc. from an aesthetics perspective this is not an attractive outcome.



Fire wall constructed for padmount substation at 18 Copeland Street Liverpool. Source: Google Maps Street View.

25 Protected Works

In cases where Endeavour Energy does not have an easement over electricity infrastructure on a site, they are usually protected assets and deemed to be lawful for all purposes under Section 53 'Protection of certain electricity works' of the *Electricity Supply Act 1995* (NSW). Essentially this means the owner or occupier of the land cannot take any action in relation to the presence in, on or over the land of electricity works ie. the electricity infrastructure cannot be removed to rectify the encroachment.

These protected assets are managed as if an easement is in place (please refer to Section 13 Easement Management) and in accordance with the minimum easement widths specified in Endeavour Energy's Mains Design Instruction MDI 0044 'Easements and Property Tenure Rights',

For overhead power lines, this easement width in some circumstances may not be warranted ie. depending on the span (the longer the span the greater the sag and blowout of the overhead power lines), type of conductor, access, property type and use etc. However if the easement width cannot be reasonably provided, as a minimum any building or structure (including fencing, signage, flag poles etc.) whether temporary or permanent must comply with the minimum required safe distances / clearances (please refer to Section 30 Safety Clearances).

Protected works often occur in non-urban / rural areas (where in the past the policy was not to obtain easements due to the lower number of customers and the associated network risks)

The applicant should note the following requirements of Endeavour Energy's 'Land Interest Guidelines for Network Connection Works, Provision of Network Connection Services'.

5.0 REGISTERED LAND INTERESTS REQUIRED WHEN SUBDIVIDING LAND

5.1 Urban Requirements

Endeavour Energy will require the registration of Land Interests for:

a) all new transmission, high voltage and low voltage Network Assets; and
b) all existing transmission, high voltage and low voltage Network Assets located within the Customer's land.

5.2 Non-urban Requirements

Endeavour Energy will require the registration of Land Interests for:

a) all new transmission, high voltage and low voltage Network Assets;
b) all existing transmission Network Assets located within the Customer's land;
c) all existing high voltage Network Assets located within the Customer's land; and
d) all existing low voltage Network Assets that will be used to supply any adjoining land outside the subdivision.

6.0 REGISTERED LAND INTERESTS REQUIRED WHEN NOT SUBDIVIDING LAND

6.1 Urban Requirements

Endeavour Energy will require the registration of Land Interests for:

e) all existing Network Assets that will be used to supply a new Network Asset.

26 Prudent Avoidance

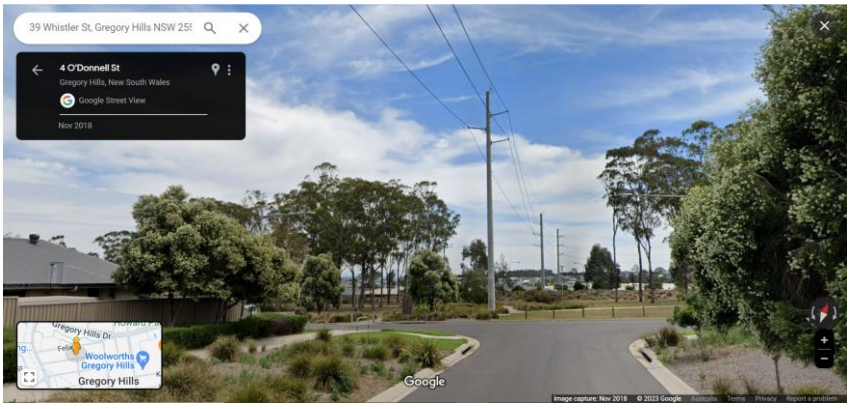
The electricity industry has adopted a policy of prudent avoidance by doing what can be done without undue inconvenience and at modest expense to avert the possible risk to health from exposure to emissions form electricity infrastructure such as electric and magnetic fields (EMF) and noise which generally increase the higher the voltage ie. Endeavour Energy's network ranges from low voltage (normally not exceeding 1,000 volts) to high voltage (normally exceeding 1,000 volts but not exceeding 132,000 volts / 132 kV).

In practical terms this means that when designing new transmission and distribution facilities, consideration is given to reducing exposure and increasing separation distances to more sensitive uses such as residential or schools, pre-schools, day care centres or where potentially a greater number of people are regularly exposed for extended periods of time.

These emissions are usually not an issue but with Council's permitting or encouraging development with higher density, reduced setbacks and increased building heights, but as the electricity network operates 24/7/365 (all day, every day of the year), the level of exposure can increase.

Endeavour Energy believes that irrespective of the zoning or land use, applicants (and Council) should also adopt a policy of prudent avoidance by the siting of more sensitive uses eg. the office component of an industrial building, away from and less susceptible uses such as garages, non-habitable or rooms not regularly occupied eg. storage areas in a commercial building, towards any electricity infrastructure – including any possible future electricity infrastructure required to facilitate the proposed development.

Where development is proposed near electricity infrastructure, Endeavour Energy is not responsible for any amelioration measures for such emissions that may impact on the nearby proposed development.



Incorporating the easement for 132 kilovolt (kV) overhead transmission lines at Gregory Hills into the public road reserve and parks is in keeping with a policy of prudent avoidance and also assists with easement management associated with the subdivision of easements.

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

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

Typical magnetic field measurements associated with Endeavour Energy's activities and assets given the required easement widths, safety clearances etc. and having a maximum voltage of 132,000 volt / 132 kV, will with the observance of these separation distances not exceed the recommended magnetic field public exposure limits. As a guide, reference should be had to Endeavour Energy's Mains Design Instruction MDI 0044 'Easements and Property Tenure Rights' Table 1 – 'Minimum easement widths'.

26.1 Special / Sensitive Uses

Regarding the proximity of sensitive / special uses such as schools, pre-schools, day care centres etc. near electricity infrastructure, Endeavour Energy's Sustainability & Environment Branch has provided the following advice.

> *As far as Network Environment Assessment Section is aware there are no restrictions in legislation that stop schools, pre-schools, day care centres being placed next to electricity infrastructure.*
>
> *In regard to the NSW Planning & Environment 'Child Care Planning Guideline' August 2017, besides Part 3.6 'Noise and air pollution' referring to substations as a 'noisy environment', there is no specific requirement under the site selection and location criteria to consider proximity to electricity infrastructure, although arguably a child care centre and electricity infrastructure are not a compatible use.*
>
> *Prudent avoidance measures must however be implemented. Prudent avoidance was a policy recommended by former Chief Justice of the High Court of Australia, Sir Harry Gibbs, as a result of an inquiry he conducted into community needs and high voltage transmission lines including issues in relation to EMF back in 1991. The findings in the Gibbs report are consistent with subsequent inquiries and are still relevant today.*
>
> *Prudent avoidance is defined as doing what can be done without undue inconvenience and at modest expense to avert the possible risk to health from exposure to new high voltage transmission facilities. In practical terms, this means designing new transmission and distribution facilities having regard to their capacity to produce EMFs, and siting them having regard to the proximity of houses, schools and the like.*
>
> *Although the Gibbs report was particularly aimed at electricity distributers to consider when placing their infrastructure, and bearing in mind that there are schools, pre-schools, day care centres adjacent to our infrastructure in various locations right across our franchise area, it is nonetheless Endeavour Energy's recommendation it that such 'sensitive uses' are not built adjacent to major electricity infrastructure.*
>
> *Should such a development proceed, the design of the schools, pre-schools, day care centres should also consider prudent avoidance measures such as any rooms which the children will occupy (class rooms, play areas, sleeping rooms, eating areas) be arranged such that they are on the side of the site/building which is furthest away from the electricity infrastructure.*
>
> *There is scientific consensus that health effects have not been established but that the possibility cannot be ruled out. Accordingly, if there are any concerns regarding the location of the schools, pre-schools, day care centres in proximity to the electricity infrastructure, in order to make an informed conclusion, the applicant may need to commission an independent review to provide an overall assessment including electric and magnetic field measurement and advice. Applying a precautionary approach early on in the design process will hopefully result in the adoption of prudent avoidance principles benefitting the eventual development of the site.*

Endeavour Energy is able to provide estimated EMF levels from comparable electricity infrastructure and having regard to concept designs which can then be used to model the possible impact. Further details are available by contacting Endeavour Energy's Substation Primary Design Section via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718 or email earthingenquiry@endeavourenergy.com.au.

Although not part of Endeavour Energy's electricity network, the applicant should consider wiring the new building and locating high electricity consuming devices away from areas occupied by children.

26.2 Noise

The transformers in substations may emit a hum – especially when under heavy load say in the summer peak when use of air conditioning is at its highest. Overhead power lines can produce an audible sound or buzz as a side effect of carrying electricity. The sound can be louder if there is increased moisture (during rain, fog, frost etc.) or pollutants in the air. The sound usually occurs at the poles at the insulators supporting the power lines and increase at higher voltages.

Endeavour Energy's substations are not a 'scheduled premises' under the *Protection of the Environment Operations Act 1997* (NSW) and the holding of a licence under that Act for operations at the site is not required ie. a substation is generally located and designed to not result in the emission of offensive noise. As guide / target Endeavour Energy's substations nominally meet the Environmental Protection Authority 'NSW Industrial Noise Policy' with the overall aim to allow the need for its network operations to be balanced with the desire for quiet in the community.

The Environment Protection Authority EPA 2013/0127 Noise Guide for Local Government, in Part 3 Noise management principles, includes a reference to *State Environmental Planning Policy (Infrastructure) 2007* (NSW). Whilst not directly applicable to 'Division 5 Electricity transmission or distribution', the similar standard as that required for rail corridors and roads and traffic should be imposed on any new development.

> *If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:*
>
> *(a) in any bedroom in the building—35 dB(A) at any time between 10 pm and 7 am,*
>
> *(b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway)—40 dB(A) at any time.*

Acoustic assessments should consider substations required to facilitate the proposed development as a potential mechanical / plant noise source.

26.3 Electronic and Magnetic Fields (EMF)

Endeavour Energy recognises that a causal link between EMF exposure and demonstrated health effects has not been established, even after much scientific investigation throughout the world. There are no state or federal exposure standards for 50/60- hertz (Hz) EMF based on demonstrated health effects. Nor are there any such standards world-wide. Among those international agencies that provide guidelines for acceptable EMF exposure to the general public, the International Commission on Non-Ionizing Radiation Protection in 2010 established a level of 2,000 milligauss (mG). Endeavour Energy recognises that timely additional research is unlikely to prove the safety of power-line EMF to the satisfaction of all.

Endeavour Energy is committed to ensuring that its activities and assets conform to all relevant International and Australian Standards, National Health and Medical Research Council (NH&MRC) Standards, Energy Networks Association (ENA) Standards and NSW legislation. As mentioned above, this includes a commitment to a policy of prudent avoidance as endorsed by the ENA with regard to the location of assets and electric and magnetic fields.

27 Public Safety

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

https://www.endeavourenergy.com.au/for-your-home/safety .

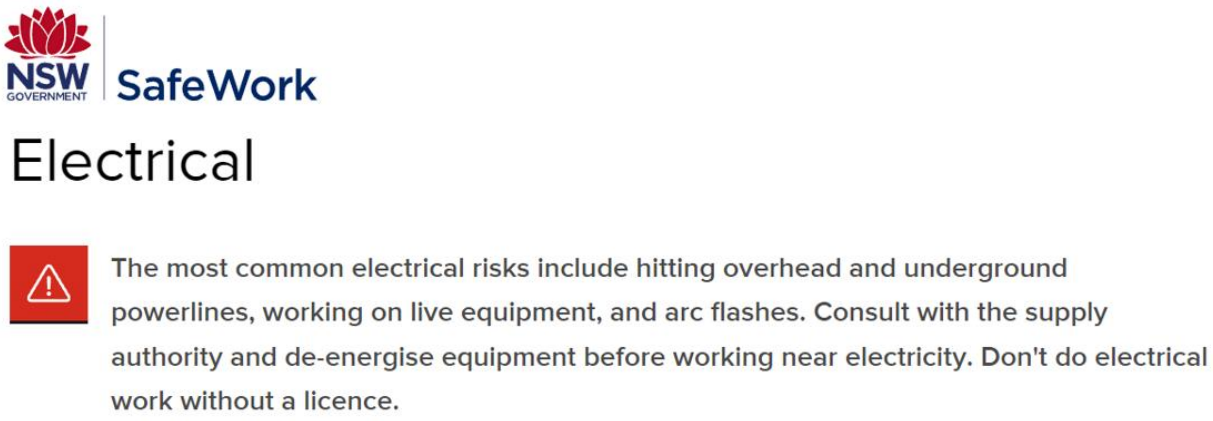
Endeavour Energy provides safety advice to the building industry, councils or any other organisation or individuals working near our overhead or underground network. Enquiries for parts of the network which are not subject to easements can be made by submitting a request to Endeavour Energy's Construction Works Team via Endeavour Energy's Connections Portal through Connect Online. Enquiries related to electricity infrastructure located within an easement should be directed to Endeavour Energy's Easements Officers by email Easements@endeavourenergy.com.au . Contact can also be made via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718.

SafeWork NSW provides key safety information on how to protect persons from the risks arising when working or undertaking activities near overhead power lines and underground cables including:

- SafeWork NSW 'Work Near Underground Assets – Guide 2007'; and
- WorkCover (now SafeWork NSW) 'Work Near Overhead Power Lines Code of Practice 2006'.

These documents as well as other useful resources are available via the following link to the SafeWork NSW website.

https://www.safework.nsw.gov.au/your-industry/construction/safety-topics/electrical .



28 Removal of Electricity

Approval for the permanent disconnection and removal of supply and meters eg. when premises are planned for demolition, removal or relocation, or the replacement of a temporary builder's supply with a permanent connection, must be obtained from Endeavour Energy's Customer Network Solutions Branch (contact via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718) and the works completed by Accredited Service Providers (ASP) with the relevant class of Authorisation for the type of work being carried out. For details of the ASP scheme please refer to Section 24 Network Connection.

The work could involve:

- The disconnection and removal of an underground service cable or overhead service line,
- Removal of metering equipment.

The Authorised Level 2 ASP will complete an online application on Endeavour Energy's website for Removal of All Gear Notification of Service Works (NOSW) for approval to undertake the works. The ASP must also follow the Retailer / Meter Providers' process for the permanent removal of supply.

29 Renewable Energy

Renewable energy is energy derived from natural sources that are able to be replenished when they are consumed. The electricity distribution sector is undergoing a profound and complex transformation as the shift to renewable energy gathers momentum and with it there are new technologies and different ways of operating. The key renewable resource for Endeavour Energy is solar generation with coupling to batteries.

29.1 Solar Photovoltaic Cells

Solar photovoltaic (also known as solar PV) converts sunlight directly into electricity using a technology known as a semiconductor cell or solar PV cell. The most common form of solar PV cell is typically encased in glass and an aluminium frame to form a solar panel. One or more panels can be installed to power a single light, cover the roof of a house for residential use, or be assembled into a large-scale solar farm generating hundreds of megawatts of electricity.

Endeavour Energy allows connection of up to 8 kilowatts (kW) total panels to a 5 kW inverter or up to 40 kW total panels to a 30 kW inverter. If the applicant's connection requirements are other than these, an application for a micro embedded generator connection service will be required.

The connection of small and medium embedded generators with a capacity of between 30 kilowatts (kW) and 5 megawatts (MW) may affect other Endeavour Energy customers connected to the electricity network. A detailed technical review of endeavour Energy's network's capacity to transfer the generation energy along with analysis of the generator's protection schemes and quality of supply considerations must therefore be undertaken prior to a permission to connect to Endeavour Energy's network being issued. Further details are available by contacting Endeavour Energy's Customer Network Solutions Branch via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718 or on Endeavour Energy's website under 'Home > For your home > Connecting your home > Embedded networks' via the following link:

https://www.endeavourenergy.com.au/for-your-home/connecting-your-home/embedded-networks .



The roof at Bankwest (now CommBank) stadium in Parramatta supports a 100 kilowatt hour (kWh) solar panel system 309 individual solar panels generating renewable energy for the stadium. Source: Bankwest Stadium Sustainability Case Study May 2020.

29.2 Distribution Network Service Provider-owned Battery Energy Storage System (BESS)

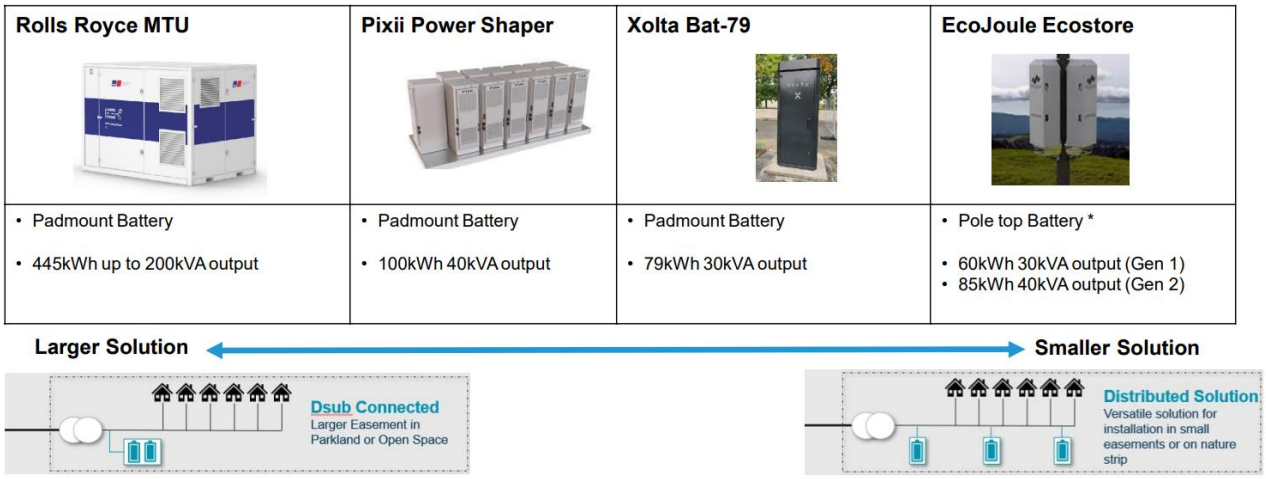
Endeavour Energy is developing a low voltage grid connected battery energy storage system. They serve two main purposes:

- Network Support: by reducing peak demand (forecast overloading), improving solar hosting capacity, or solving quality of supply issues eg. by charging off excess solar generation and export this energy back into the network in periods of high demand.

- ‘Community Batteries’: a metered battery used for both, network support, and market services ie. to charge at times of low spot market price and dispatched at high spot market price, allowing both benefits to be achieved.

This improves network utilisation, reliability, and quality of supply for customers.

Similar to distribution substations, the batteries can be either a ground battery with the unit and a low voltage switchboard mounted onto plinth placed on the ground or a pole mounted unit. The choice of unit depends on the required capacity / supply and the construction / design of the surrounding existing electricity distribution network. The following diagram shows the units typically used.



* Pole mounted Tesla Powerwalls also under exploration

Source: Endeavour Energy Low Voltage Network Battery Document Roadmap February 2024 Version 1

29.3 Privately-owned Battery Energy Storage System (BESS)

BESS that are privately owned / located on private land can range in scale, from small residential units to large utility-scale projects and their installation requires careful planning, accreditation with local authorities, and consideration of factors like network impact and local regulations.

Endeavour Energy would expect that a private BESS would similarly comply with the National Guidelines for Distribution Network Service Provider-owned Battery Energy Storage System ENA DOC 054-2025 which under Section 2.5.12 ‘Network study’ for a large BESS [more than 600 kilowatt-hour (kWh), high voltage / low voltage connected and ground mounted) requires a detailed network study detailing the major steps and associated processes to be applied during the preparation and construction of the network and the BESS models to be used for the protection investigations.

For fire and safety protocols Fire and Rescue NSW Safety of Alternative and Renewable Energy Technologies (SARET) Research Program addressing lithium-ion battery safety with a project theme for:

Project 4: Fire propagation in stationary energy storage systems

Project 4 aims to characterise fires involving BESS in buildings, including assessing fire propagation under different scenarios, and assessing building systems responses and fire service intervention procedures and tactics to minimise risk to occupants, property, the environment, and emergency responders.

In the interim to address the potential impact of a private BESS on Endeavour Energy's electricity distribution network, the segregation requirement is the greater of either:

- Australian/New Zealand Standard AS/NZS 5139:2019 'Electrical installations - Safety of battery systems for use with power conversion equipment' which provides guidelines for the installation, operation, and maintenance of these systems to protect people and property; or

- The BESS manufacturer's recommended installation space to not encroach the easement, restriction etc. requirements for the network assets as per Endeavour Energy's Mains Design Instruction MDI 0044 'Easements and Property Tenure', Table 1 'Minimum easement widths' eg. even if there is not an easement for network assets in the public / road reserve, the notional easement width would apply.

This applies to all privately owned BESS regardless of the battery type / category / size etc. This should help to ensure the BESS is in a low risk location with sufficient distance so the radiant heat flux from the BESS enclosure (when fully involved in fire) does not create the potential for ignition or damage of the adjacent electricity distribution infrastructure.

Notwithstanding the foregoing guidelines, for any BESS installation the engineering report, fire safety / suppression strategy, fire thermal design etc. should specifically address the risks associated with the proximity to Endeavour Energy's electricity distribution network. Irrespective of the design of the BESS, increasing the separation distance as far as reasonably possible is recommended. Please also refer to Section 19 Hazardous Environment .

30 Safety Clearances

30.1 Overhead Power Lines

For overhead power lines, as a minimum any building or structure (including fencing, signage, flag poles etc.) whether temporary or permanent must comply with the minimum safe distances / clearances for voltages up to and including 132,000 volts (132 kV) as specified in:

- Australian/New Zealand Standard AS/NZS 7000 – 2016: 'Overhead line design'.

- 'Service and Installation Rules of NSW' which can be accessed via the following link to the NSW Climate and Energy Action website:

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

These distances must be maintained at all times and regardless of the Council's allowable building setbacks etc. under its development controls. As a guide only please find attached a copy of Endeavour Energy Drawing 86232 'Overhead Lines Minimum Clearances Near Structures'. Factors such as the span (the longer the span the greater the sag and blowout of the overhead power lines), type of conductor, access, property type and use etc. will impact on the minimum clearances.

Different voltages are kept at different heights, the higher the voltage, the higher the wires are positioned on the pole. Similarly, the higher the voltage, the greater the required building setback. In addition to the overhead power lines, there may also be overhead earth cables (refer to Section 12 Earthing) installed above the power lines for lightning protection as well as overhead pilot / telecommunications cables (refer to Section 36 Telecommunications).

Whilst power poles primarily carry overhead power lines, in some instances separate from the power lines that supply electricity there can be telecommunication cables for telephone and internet services and other attachments for traffic lights, cellular antennas etc. These are usually installed below the electrical lines to ensure worker safety. Any work or activities in proximity of these assets are the responsibility of and must also comply with the asset owner / operators requirements.



Overhead powerlines with high voltage, low voltage and service connections at different levels on the poles. This example is in Marayong NSW part of Endeavour Energy's franchise / network area. Source: Google Maps Street View.

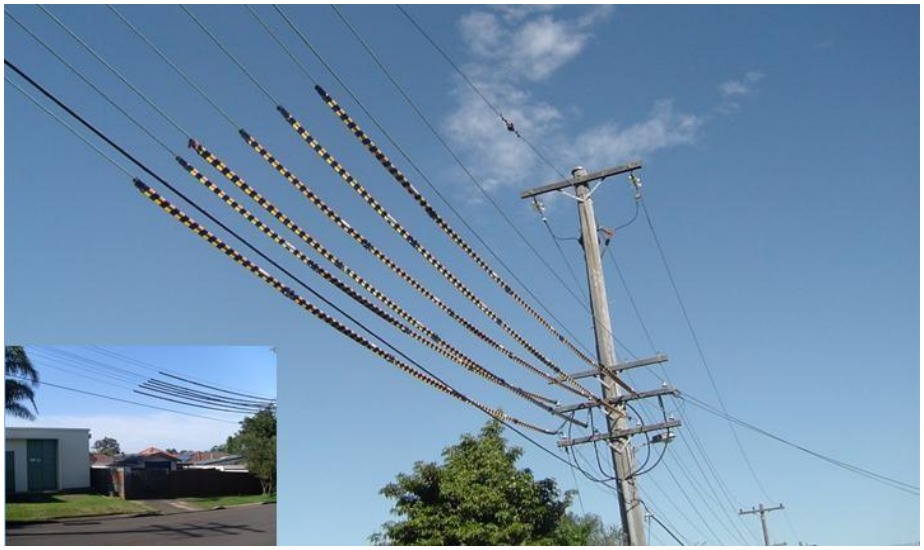
Consideration must be given to WorkCover (now SafeWork NSW) 'Work Near Overhead Power Lines Code of Practice 2006' which includes the following requirements for work near low voltage overhead power / service lines.

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

In addition the developer / builder should consider 'tiger tailing'/matting the low voltage overhead service lines to provide a distinct visual of the location of overhead construction ie. these are still not regarded as insulated conductors and safe approach distances need to be maintained. as shown in the following photograph.



'Tiger Tails' are used primarily as a visual indicator or for mechanical protection from electrical wires. They are not to be used as insulating material and will not provide full protection from live electricity. This example is of tiger tails installed by Endeavour Energy on overhead power lines at Ermington NSW as part of a risk management for work on a nearby Distribution Substation No. 20981. Source: Google Maps Street View.

30.1.1 Building Setbacks

As the electricity distribution network partially relies on the retention of appropriate building setbacks relative to the use / zoning of the land to the road frontages to provide safety clearances to overhead power lines on the road verge / roadway, the encroachment of building setbacks is generally not supported by Endeavour Energy.

Particular regard needs to be had to secondary road frontages or where overhead power lines are located near side or rear boundaries where lesser building setbacks apply. Multi-dwelling development with subsequent subdivision should assess building setbacks based on the proposed subdivision layout. Consideration must be given in rezonings reducing building setbacks and subdivisions changing the primary road frontage to secondary road / side or rear boundaries to which reduced building setbacks usually apply under the councils' Development Control Plans. Even if there is no existing electricity infrastructure, the encroachment of building setbacks may affect future required line routes. This may also apply to underground cables.

As a guide, the minimum easement widths in Endeavour Energy's Mains Design Instruction MDI 0044 'Easements and Property Tenure Rights', Table 1 – 'Minimum easement widths', should be considered. Although the safety clearances to a building or structure are less than the minimum easement width, the greater separation will assist in addressing issues for ordinary persons maintaining a minimum safe approach distance; prudent avoidance etc.





The encroachment of building setbacks by dwellings, structures etc. may also result in the encroachment of safety clearances to overhead power lines on the road verge / roadway or on the site itself. In this example located in The Hills Shire Local Government Area (LGA), there are both low voltage and 11,000 volt / 11 kilovolt high voltage overhead power lines. Source: Google Maps Street View.

In areas where the electricity network is designed on the basis of low density residential development with typically minimum front building setbacks ranging from 4.5 to 10 metres, a rezoning to increases density / dwellings per hectare is often achieved by allowing for reduced and sometimes zero setbacks, as well as then encroachments / projections of balconies and awnings into the front building setback (or in some mixed-use developments the awnings extent over the footpath), the required clearances cannot be maintained and causes issues with the network.

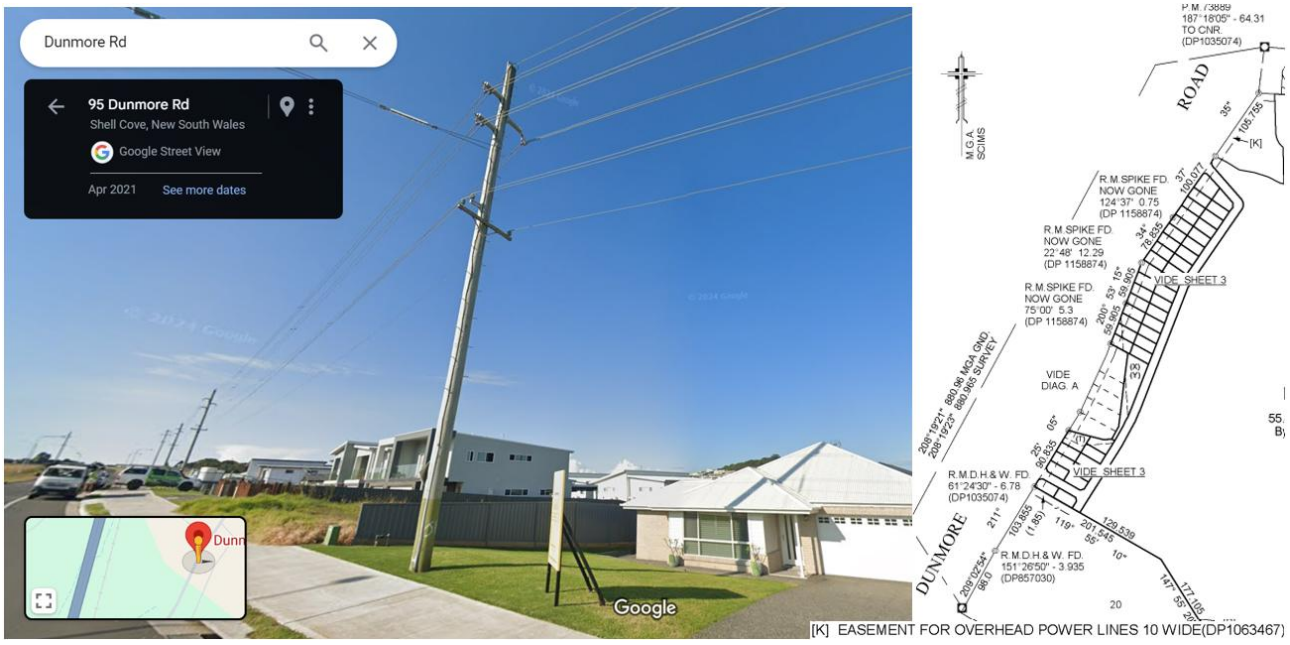
The following shows two examples of rezonings of rural land with 33,000 volt / 33 kilovolt (kV) overhead transmission lines to the road frontages which under Endeavour Energy's Mains Design Instruction MDI 0044 'Easements and Property Tenure Rights' require a minimum 18 metre wide easement.

At Fifteenth Avenue, Austral which is to become a major road with restricted vehicle access, as part of the Indicative Layout Plan the local roads run parallel to the major road and are located within the notional easement fully incorporated into the public road reserve and not impacting the developable lots.



33,000 volt / 33 kilovolt (kV) overhead power lines at Fifteenth Avenue, Austral Source: Google Maps Street View. Inset Austral & Leppington North Precincts Indicative Layout Plan.

At Dunmore Road, Shell Cove where the fronts of the low density residential lots are subject to an easement for overhead power lines 10 metres wide ie. Although there was no existing easement over the land, as part of the application for connection of load for the new urban residential subdivision the easements were required to be created to ensure the future dwellings did not encroach the minimum required safety clearances etc.



Easement for 11,000 volt / 11 kilovolt (kV) and 33,000 volt / 33 kV overhead power lines at Dunmore Road, Shell Cove. Source: Google Maps Street View. Extract of Deposited Plan DP 1113813.

30.1.2 Scaffolding

For any scaffolding, depending on the width of the working platform and the distance of the conductors from the boundary, consideration may need to be given to the 'Work Near Overhead Power Lines Code of Practice 2006', Section 6.5 'Control measures for erection and dismantling of scaffolding near overhead power lines up to and including 33kV' an extract of which follows.

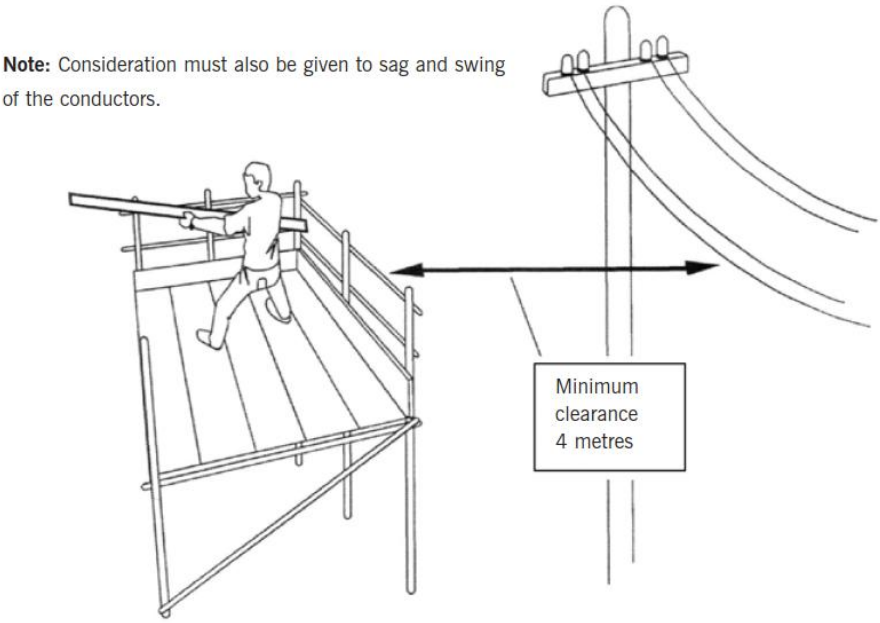
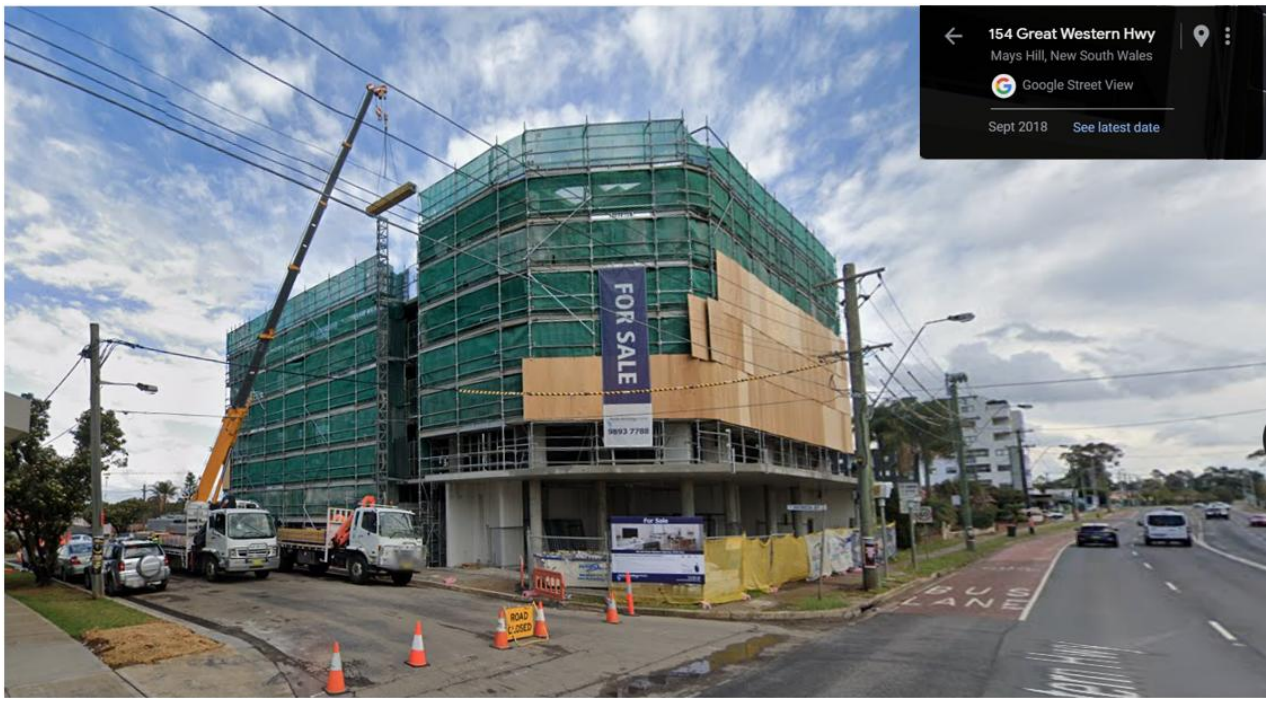


Figure 10 – A 4 metre approach distance applies in any direction where metallic scaffold is erected, used or dismantled near overhead power lines.

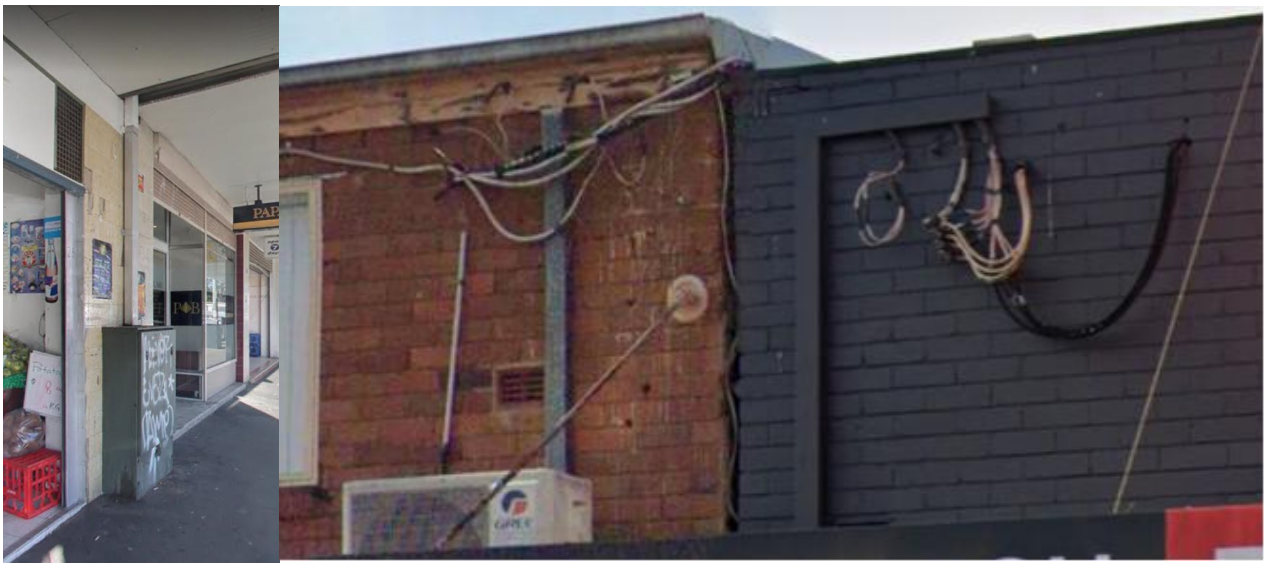
The use of scaffolding near overhead power lines may require the isolation of the network and the use of a hoarding which can be a significant cost and time to organise.



Hoarding erected on scaffolding near overhead powerlines for construction of a mixed use development at the Great Western Highway, Westmead. Source: Google Maps Street View.

30.1.3 'Awning' Overhead Power Lines

In some older urban areas of the electricity distribution network may have low voltage overhead 'awning' power lines where the conductors are in troughs / ducts fixed to the awnings / shop fronts.



Example of ‘awning’ overhead power lines coming from a low voltage pillar on the road verge rising to through a duct and then through or above the awnings to the customer connection points for the premises. Source: Google Maps Street View.

With the low voltage overhead ‘awning’ power lines, before commencing any activity their exact location must be identified. If any of the foregoing external works involves the exposing of the power lines within the awning and the undertaking of works within the safe approach distances, it requires an electrically authorised (500 mm) or instructed person (1,000 mm) with technical knowledge or sufficient experience to perform the work required. The applicant may need to seek advice from an Accredited Service Provider (ASP) of an appropriate level and class of accreditation for the undertaking of any such works. For details of the ASP scheme please refer to Section 24 Network Connection.

Whilst more an issue for overhead power lines, consideration of safety clearances is also relevant to underground cables. SafeWork NSW ‘Work Near Underground Assets – Guide 2007’ provides practical guidance to prevent injury to people and damage to underground assets. Work on, near or adjacent to gas and electricity services are deemed to be high risk construction work.

The previous advice for overhead power lines, similarly apply to with minimum approach distance for individuals carrying out work near underground electricity distribution assets and works or loads within the zone of influence of the cables can impact the integrity of the network. As a guide, Endeavour Energy’s Mains Design Instruction MDI 0044 ‘Easements and Property Tenure Rights’, Table 1 – ‘Minimum easement widths’, requires a minimum easement width of 3 metres (assumed to have no concrete protection unless proven otherwise) for low voltage up to 22,000 volt / 22 kilovolt (kV) high voltage underground cable ie. 1.5 metres to both sides of the centre line of the conductor / cable ducts.

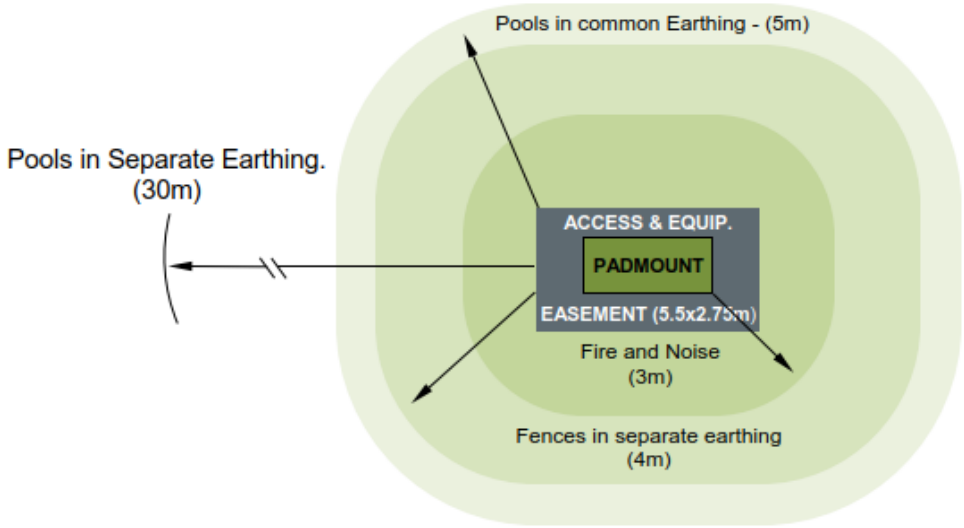
Again if there is any doubt whatsoever regarding the safety clearances or any potential impact on the integrity of the underground cables, the applicant will need to have the safety clearances and impacts assessed by a suitably qualified electrical and or civil engineer / Accredited Service Provider.

30.3 Padmount Substations

The majority of Endeavour Energy’s padmount substations are held under easement. As shown in the following extract of Endeavour Energy’s Mains Design Instruction MDI 0044 ‘Easements and Property Tenure Rights’, Figure A4.3 ‘Padmount easements and clearances’, padmount substations require:

- Easement with a minimum size of 2.75 x 5.5 metres (single transformer).
- Restriction for fire rating which usually extends 3 metres horizontally from the base of the substation footing / plinth.
- Restriction for swimming pools which extends 5 metres from the easement (which may not be required for non-residential development).

A4.3 - Padmount easements and clearances



The easement should not cross property boundaries but the restriction/s may affect any adjoining property provided they are able to be registered on the title to that property.

The restrictions for padmount substations were introduced on a case for case basis from 2003 before becoming standard in 2009. Whilst some existing padmount substations may not have these restrictions, in the redevelopment of any site with an existing padmount substation, for safety reasons the new restrictions should also be applied.

30.4 Low Voltage Ground Batteries

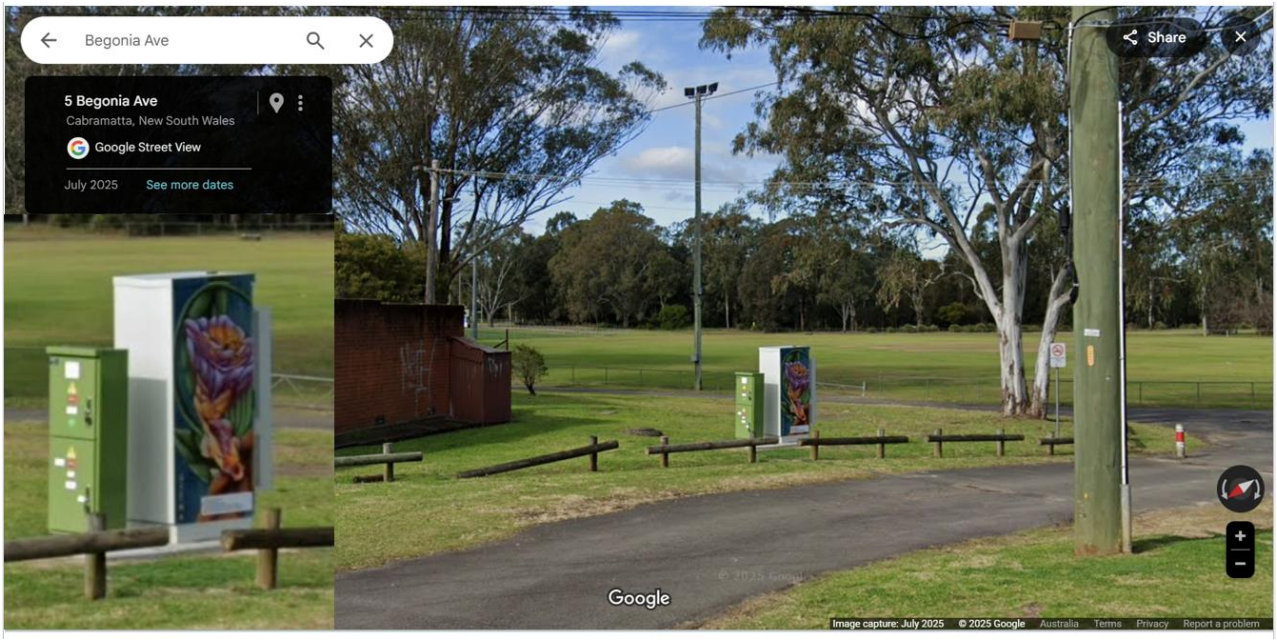
The lithium ion batteries used are classified as dangerous goods due to their chemical, fire and electrical hazards. Low voltage ground batteries have been designed and manufactured to self-contain a fire if thermal runaway is encountered. As a precautionary measure, NSW Fire & Rescue have recommended a 3.0 metre exclusion zone to other assets ie. similar to the restriction for fire rating for a padmount substation. This exclusion zone can be reduced if a fire rated barrier is introduced and detailed designs considered.

The National Guidelines for Distribution Network Service Provider-owned Battery Energy Storage System ENA DOC 054-2025 includes the following ‘Segregation Requirements’.

1.6.1 LV Ground-mounted BESS

1.6.1.1 *Segregation Requirements*

- BESS units require separation from neighbouring areas and buildings that are subject to fire risk. Separation may be by means of adequate clearances or building components having minimum fire resistance levels (FRL). This requirement would be aligned with state fire response processes.
- BESS unit sites should comply with the state EPA Noise Policy applicable for Industry and may require a noise assessment to be undertaken for several factors e.g., a house with a window facing the battery would result in a higher spacing requirement than one with just a wall.
- The separation distance could be reduced with the use of additional noise attenuation, and an independent noise assessment determines the installation to be below EPA Guidelines.
- Segregation of the BESS from the neighbourhood will be assessed using both noise and fire factors assessed according to the jurisdictional guidelines/regulations.



Battery unit and distribution board installation at Begonia Avenue, Cabramatta at the entrance to Don Dawson Oval (Cabramatta Sports ground). Source: Google Maps Street View.

30.5 Pole Mounted Substations

Endeavour Energy Mains Design Instruction MDI 0031 ‘Overhead line design’ includes the following clearance zone for pole mounted substations.

8. Substations, auto-reclosers, sectionalisers, voltage regulators and enclosed switches

8.1 General requirements

8.1.2 Equipment hazard and fire zone

As part of the design, allowance is to be made for a three metre horizontal clearance zone around pole mounted substations, regulators, reclosers, sectionalisers and enclosed switches to minimise the effects of failure of any equipment and manage ongoing noise in accordance with Figure 13.

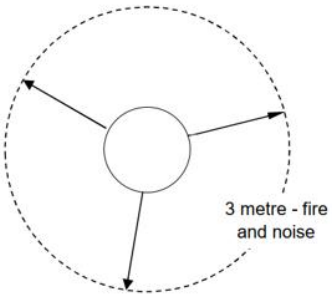


Figure 13 – Fire and noise separation

Pole mounted substations, regulators, reclosers, sectionalisers and enclosed switches may contain hazardous materials. Additional requirements apply to environments containing explosive gas atmospheres. Where applicable these provisions must comply with the requirements of AS/NZS 60079.

30.6 Low Voltage Pole Mounted Batteries

As with ground batteries, the lithium ion batteries used are classified as dangerous goods due to their chemical, fire and electrical hazards. The National Guidelines for Distribution Network Service Provider-owned Battery Energy Storage System ENA DOC 054-2025 includes the following ‘Segregation Requirements’.

1.6.2 LV Pole-mounted BESS

1.6.2.1 *Segregation Requirements*

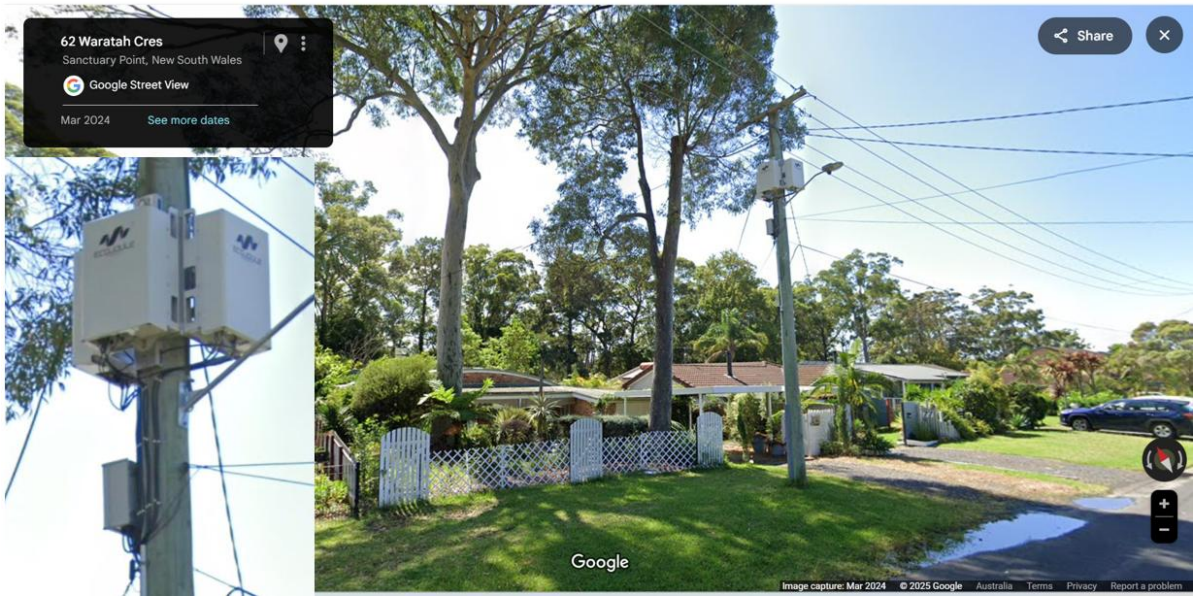
- Pole-mounted BESS units should allow for a 3-metre horizontal clearance zone around the pole to minimise the effects of failure of equipment.
- BESS units should comply with state EPA Industrial Noise requirements and may require a noise assessment to be undertaken.
- Maintain a recommended evacuation distance of 25 meters for LV pole and ground-mounted batteries to maintain safety, noise, and smoke mitigation. General separation guidelines for Pole-mounted BESS units are minimum (subject to noise mitigation requirement) 4 meters in urban areas and 8 meters in rural areas from residences.
- Segregation of the BESS from the neighbourhood will be assessed using both noise and fire factors assessed according to the jurisdictional guidelines/regulations.
- These separations can be reduced with the use of additional noise attenuation, and an independent noise assessment determines the installation to be below state EPA guidelines.
- The design process should consider the potential impacts arising from the BESS installation and how these impacts may be mitigated. These may include, for example, visual impact, noise, vegetation, water quality management, waste, heritage issues, erosion and sediment control and bushfire management.



Battery unit, control box and distribution board on pole at Booyong Street, Cabramatta at Bolivia Park. Source: Google Maps Street View.

30.7 Low Voltage Static Compensator (STATCOM)

A low voltage (STATCOM) is a type of low voltage regulator installed in locations to provide network support benefits gained from low voltage regulation and other power quality improvements particularly on longer overhead low voltage circuits that have significant voltage variation, and in the presence of solar photovoltaic cells. They are connected in shunt / parallel to overhead low voltage networks by absorbing or injecting reactive power autonomously improving steady state and transient voltages. They can be configured with three separate units or a single unit with a separate low voltage circuit breaker. The units can pose a fire risk, have electromagnetic emissions and audible noise and the adoption of prudent avoidance principles should be considered.



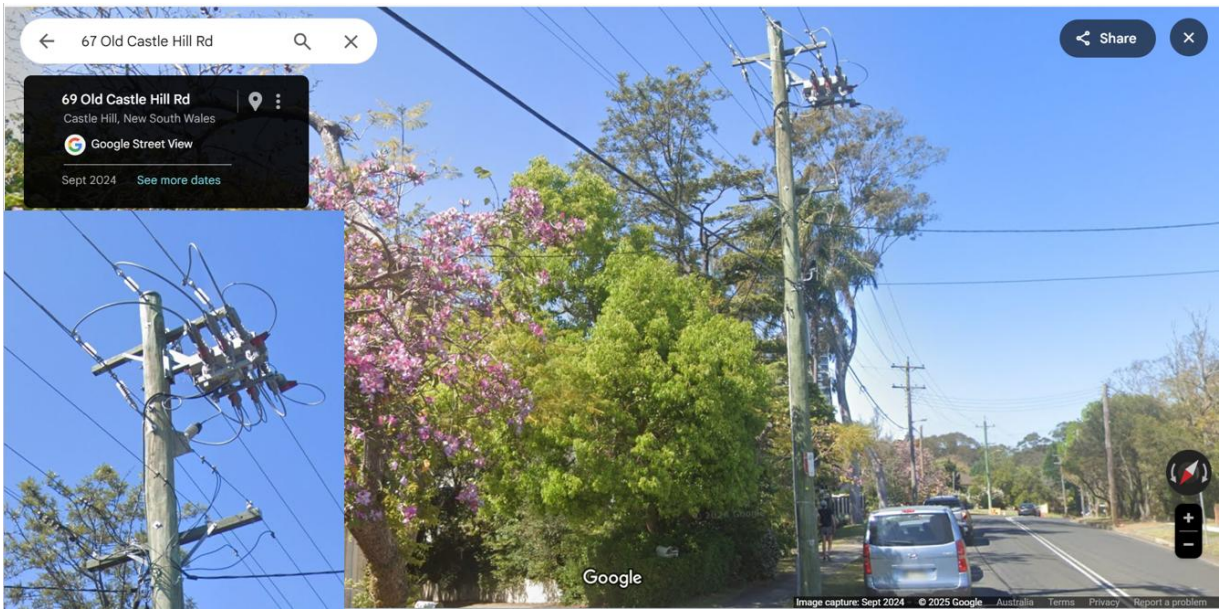
STATCOM unit and circuit breaker on a pole at Waratah Crescent, Sanctuary Point Source: Google Maps Street View.

30.8 Electrical Switches

Electrical switches such as air break switches, load break switches, isolators, earth switches etc. are used in distribution and transmission networks to allow for isolation of assets or feeders for maintenance work, repairs or inspection purposes. Switches also have the function of providing the ability to reconfigure the network to enable alternative sources of supply either permanently or temporarily by changing open points between feeders.

These switches are located across the network and there are significant variations to the types and design of the units. The switches vary according to the voltage / application, their arc quenching medium such as compressed air, gas or oil ie. a small electrical arc, appearing as a spark or flash, is normal and expected when a load break switch operates, and can also be operated manually or automated / motorised.

The units can pose a fire risk, have electromagnetic emissions and audible noise ie. during the normal distribution of electricity as well as the operation of the switches, and the adoption of prudent avoidance principles should be considered.



Load Break Supervisory Control Switch at Old Castle Hill Road, Castle Hill. Source: Google Maps Street View.

30.9 Ground or Pole Stays

The turning / angle of overhead power lines or at a termination pole / structure creates an 'unbalanced load' and means it is necessary for the pole to be stayed to stop it from leaning or tipping over from the forces of the conductors turning or terminating. This is done with tensioned wires going to a bollard pole, concrete block or embedded into ground with an anchor rod and plate or concrete footing. Stay poles are generally best avoided ie. the use of an un-stayed higher strength pole is preferable to a lower strength pole that is stayed.

Endeavour Energy Mains Design Instruction MDI 0031 'Overhead line design' includes the following

3.12 Stays

Where it is necessary to stay a pole in an urban area, a bollard pole must be used. Ground stays are permitted in non-urban areas where a trip hazard is deemed unlikely, otherwise a bollard pole must be used.



Stay poles at Riverstone Source: Google Maps Street View. Ground stay at Menangle which with the urban residential subdivision may need to be replaced with a bollard pole.

When previously non-urban / rural areas become urban area, existing ground stays may not only become a trip hazard due to the increase in pedestrian traffic but may also impact on the location of driveways and the clearances to the stay wires which could be damaged by vehicle impacts.

30 Security / Climb Points

Endeavour Energy's Substation Design Instruction SDI524 'Fencing and Perimeter Security at Zone and Transmission Substations, and Switching Stations' states the following requirement in relation to the prevention of unauthorised access by any person to a substation by the creation of 'climb points'.

5.11 Perimeter management

Consideration shall be given to the balance between screening with manufactured objects or plants, and the security benefits of uninhibited visibility to staff and the general public.

To prevent people from concealing themselves or aiding their activities, vegetation shall not screen the entire length of the substation perimeter.

Vegetation that could provide a climbing point, and all objects, including equipment and stores, shall not be located within 2000mm of either side of the intruder resistant perimeter fence or intruder resistant barrier.

Accordingly, Endeavour Energy's usual requirement is to have a minimum clear area / buffer of 2 metres from the fence with 3 metres preferred, and then depending on what the climb point is, it could increase to 4 metres. Where a permanent structures / object is constructed within these clearances, Endeavour Energy may raise the height of the substation fence.

Zone substations typically have a security weldmesh fence, the height and finish eg. may be topped with razor wire, depending upon the nearby existence of climb points and the clearance of vegetation within 3m of the fence. Whilst Endeavour Energy has no control over the development on the adjacent land, the construction of a structure that constitutes a 'climb point' would require an increase in the height of the substation fence.



Endeavour Energy's Seven Hills Zone Substation is an 'outdoor' design. Note height of fencing due to adjacent 'climb point' created by the seating and awning. Source: Google Maps Street View.

31 Service Conductors

A component of Endeavour Energy's electricity distribution system are the service lines from the street to the customer's connection point / electrical installation dedicated to the supply of electricity to the site. In older / above ground areas of the network this is typically an overhead service line coming from a pole on the road verge going to a point of attachment where the mains are terminated on a customer's building, pole or structure.

Low voltage overhead service conductors encroaching adjoining properties in older / above ground parts of the network can be an issue for the redevelopment of 'brownfield' areas. These service mains are generally 'legacy assets' but are also 'Protected Works' and cannot be removed to rectify the encroachment – unless it is done so with the agreement of the benefited property owner and an alternative low voltage customer service is provided at the applicant's cost. Conversely, if the adjoining site were to be redeveloped, the encroachment would need to be rectified by and at the cost of the adjoining owner.

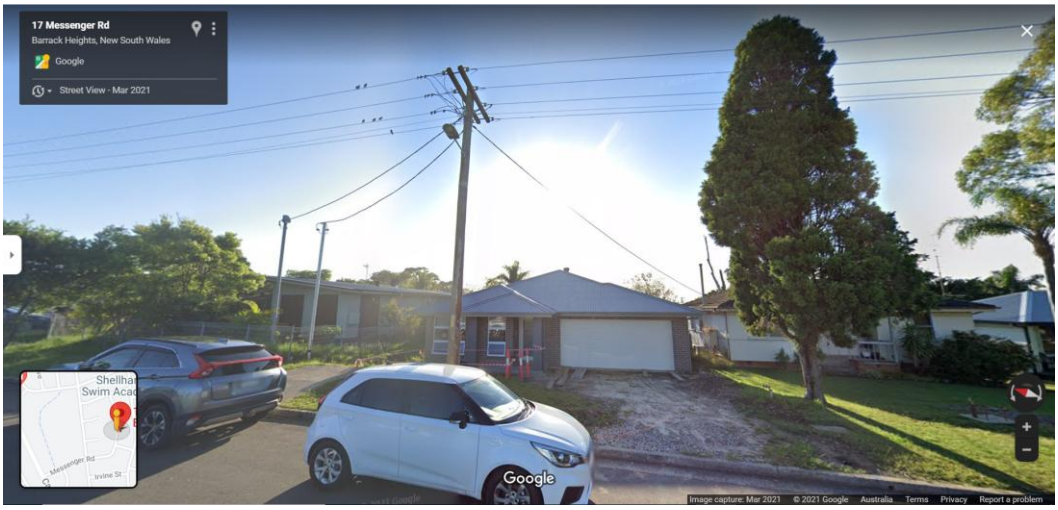
Clauses 2.2.2 'Service Route' and 3.2.4 'Crossing of Adjoining Property' of the Service and Installation Rules of NSW state that service mains or consumer's mains crossing an adjoining property must have a suitable easement. Endeavour Energy generally requires this easement to adopt the standard terms in Schedule 8 of the *Conveyancing Act 1919* (NSW) and benefit the lot being serviced (an inter-allotment easement appurtenant to the land). As Endeavour Energy's HxGN NetWorks Core NetViewer master facility model only shows easements benefiting Endeavour Energy, these are not shown on the site plan from Endeavour Energy's HxGN NetWorks Core NetViewer master facility model. To verify the existence of such an easement a title search would be required.

Whilst Endeavour Energy's Mains Design Instruction MDI 0044 'Easements and Property Tenure' requires a minimum easement width of 9 metres for low voltage overhead power lines ie. 4.5 metres to both sides of the centreline of the conductors, for certain types of conductors and in some circumstances a lesser easement width may be allowed – usually 6 metres.

Given the difficulty in obtaining easements, the solution to the encroachment is usually the adoption of an alternative network design involving either an underground solution or a customer owned / private pole. In accordance with the Service and Installation Rules of NSW, Clause 3.7.2.1 'Private Posts/Poles' a private post/pole must be installed within 1 metre of the front property street alignment.

The Service and Installation Rules of NSW can be accessed via the following link to the NSW Climate and Energy Action website:

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



The low voltage overhead service conductor to the older dwelling on the right encroaches the adjoining property. The newer dwelling to the left utilises a private pole to avid encroaching the adjoining property. The newly constructed dwelling also utilises a private pole possibly also utilised for temporary builder's supply and as cables will not impede the front building setback and also avoid the need for a point of attachment bracket usually required to be fixed to a rafter or fascia. Source: Google Maps Street View.

31.1 Mid Span - Suspended Service Conductors

The 'Service and Installation Rules of NSW' under Clause 3.2.4 'Crossing of Adjoining Property' indicates 'A private pole should be installed to avoid a suspended service. A mid span / suspended service is only permitted as a last resort'. Mid span / suspended services are also generally 'legacy assets' and not permitted for new development.



Mid span / suspended low voltage overhead service conductor for a dwelling at Rydalmere. Source: Google Maps Street View.

33 Street Infrastructure

33.1 Streetlighting

Endeavour Energy recognise that lighting roads, pedestrian crossings and pathways helps to keep pedestrians and motorists safe during times of inadequate natural light.

With the increase in both vehicular and pedestrian traffic resulting from the overall development occurring in the area, even if the existing streetlighting is already designed for an urban environment, the streetlighting may need to be reviewed and if necessary upgraded to comply with the series of standards applying to the lighting of roads and public spaces set out in with Australian / New Zealand Standard AS/NZS 1158: 2010 'Lighting for roads and public spaces'.

Whilst the determination of the appropriate lighting rests with the road controlling authority, Endeavour Energy as a Public Lighting Service Provider is responsible for operating and maintaining the streetlights on behalf of local councils, Roads and Maritime Services and other utilities in accordance with the NSW Public Lighting Code 2019 (Code). Endeavour Energy recognises that well designed, maintained and managed Public Lighting offers a safe, secure and attractive visual environment for pedestrians and drivers during times of inadequate natural light.

For any Code implementation and administration / technical matters please contact Endeavour Energy's Substation Mains Assets Section via General Enquiries on business days from 9am - 4:30pm on telephone: 133 718 or email mainsenquiry@endeavourenergy.com.au .



Green light for Net Zero Strategy

Kiama Council has given the green light to switch all remaining local street lights to LED, a key element of their Net Zero Strategy. Council has endorsed a proposal by Endeavour Energy to upgrade the remaining 951 non-LED street lights in the municipality.

The completion of light-emitting diode (LED) street lighting upgrade by Kiama Municipal Council will reduce emissions by 310 tonnes of carbon emissions a year [382,225 kilowatt-hours (kWh)].Source: https://www.nationaltribune.com.au/green-light-for-net-zero-strategy/ .

33.2 Street Awnings

With zero building setbacks and street awnings extending over the footpath, consideration must be provided to the possible impacts on the existing streetlights. This may result in the reduction of light levels by having a shadowing effect. To rectify this additional under awning lighting may be required to ensure the visual requirements of pedestrians and motorists are maintained.

The design of the awning must take into consideration the positioning of the existing lighting infrastructure and must facilitate the safe working environment. Streetlight columns and poles must not pass through awnings. As a guide:

- Endeavour Energy's Mains Design Instruction MDI 0044 'Easements and Property Tenure Rights' includes the following requirements.

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.

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

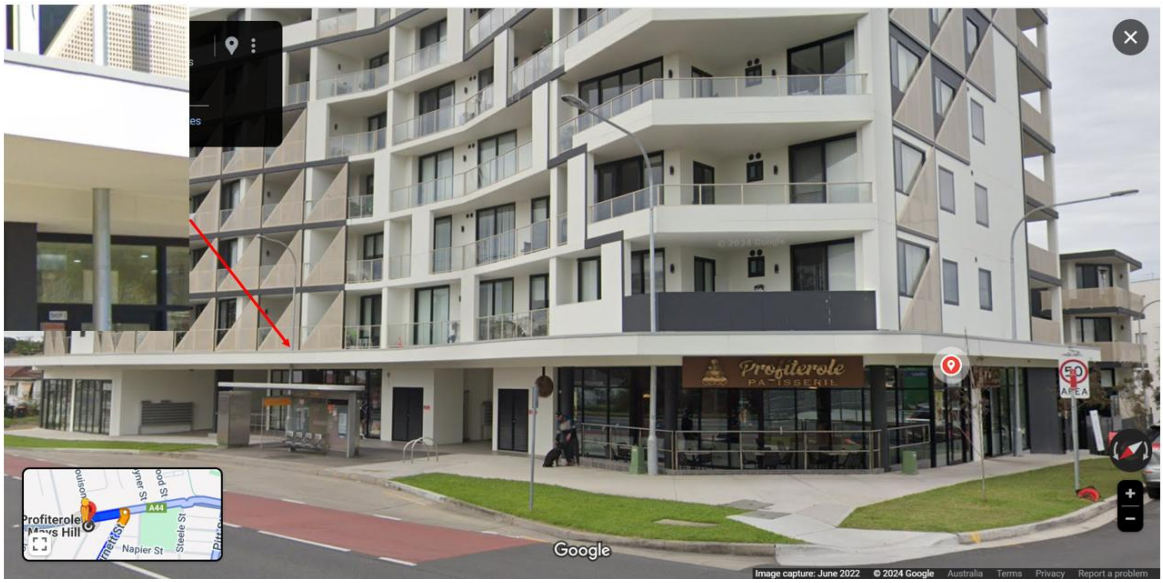
	Voltage	Asset Type	Construction	Minimum Easement (m)
Other		Streetlight Column / Service Pillar		1.0 x 1.0

(The network asset must be positioned in the centre of the easement).

- NSW Streets Opening Coordination Council 'Guide to Codes and Practices for Streets Opening' includes the following:

5.8. SERVICES AROUND POLES

Underground services and other obstructions around poles are to be kept a minimum distance of 300mm from the periphery of the pole to allow inspections by utility/service provider staff and the safe replacement of the pole.



The street awning is inappropriately constructed around three streetlight columns. Source: Google Maps Street View.

The awning may restrict access for the installation and removal of the streetlight column, fixing of streetlight faults for which access will be required for all lighting infrastructure including lamps, columns, supply cabling, pillars and pits. Maintenance staff will require safe access both for themselves and their vehicles and equipment purposes eg. from an elevated work platform (EWP) vehicle to change the lamps. Failing the foregoing, an asset redesign / relocation may be required.

33.3 Public / Pedestrian Obstruction

For public / pedestrian safety and to protect electricity infrastructure from becoming a public obstruction, Endeavour Energy requires adequate consideration to walkway and thoroughfare design where a new or existing electrical asset is likely to pose a hazard. Preference is to ensure electrical infrastructure is not placed or left stranded in public areas.

This may occur with public domain upgrades with footpaths and pavements being redesigned and particularly impact on the low voltage network pillars which provide the connection point to supply residences and businesses is underground distribution areas. Alternatively, assets may need to be relocated where design alternatives are not suitable - please refer to Section 4 'Asset Relocation'. Wall mounted designs are available where building facades are in close proximity to pedestrian footpath areas.





Low voltage pillars should be appropriate to the role and context of the street / footpath. Source: Google Maps Street View.

Conversely it is also important that when designing a new street making changes to an existing street or undergoing maintenance to the public domain (including lighting; landscaping and street furniture etc.) do not interfere with, restrict access for maintenance and repairs or replacements (which may require excavation and result in difficulties in restoration of the finished surfaces) or create a hazard such as climb point, to the electricity distribution infrastructure.



Street furniture such as bus shelters etc. need to be appropriately located. Source: Google Maps Street View.

The foregoing is also in keeping with the processes and design principles set out the NSW Government Movement and Place framework for planning, designing and managing transport networks to maximise benefits for the people and places and which can be accessed via the following link to their website.

https://www.movementandplace.nsw.gov.au/

34 Sustainability

Greenhouse gas emissions from Australia's energy sector continue to decline due to gradual decarbonisation of the grid. Endeavour Energy is also committed to reducing greenhouse gas emissions and helping customers save on their energy consumption and costs through new initiatives and projects to adopt sustainable energy technologies.

This commitment involves network demand management solutions (also known as a non-network option) being investigated and implemented where cost to either permanently defer network investment or temporarily defer investment to achieve the optimal timing and utilisation of network investments whilst meeting regulatory, statutory obligations, stakeholder and customer expectations. This will include consideration and potential adoption of new technologies and innovative approaches that can provide those solutions.

Demand management solutions generally involve a specific or linked network element, such as a zone substation, or broad based targeted solution – where a network area, such as a broader distribution area, has been forecast to exceed network capacity limitations within the area.

Notwithstanding the solutions such as the use of controllable loads, embedded generation and network tariff options that promote the efficient utilisation of network assets by signalling the economic cost of network congestion can also apply to individual customers eg. by saving energy around the home when and how heating or cooling, cooking, lighting etc. that involves the use of smart meters, batteries and solar panels to enable customers to generate, store and sell electricity into the grid as well as integrating electric vehicles into the network.

Accordingly Endeavour Energy encourages all development to adopt sustainable energy initiatives. For details of Endeavour Energy's sustainable energy initiatives or on Endeavour Energy's website under 'Home > About us > Sustainability' via the following link:

https://www.endeavourenergy.com.au/about-us/sustainability .



In particular:

- Endeavour Energy supports the uptake of electric vehicles (EV), the installation of EV charging stations and offer businesses the opportunity to participate in innovative EV trials. For further information refer to the following links on Endeavour Energy's website:
    - https://www.endeavourenergy.com.au/for-your-business/net-zero-for-business/ev-charging-for-business ; and
    - https://www.endeavourenergy.com.au/for-your-home/ev-charging .
- Endeavour Energy's "Flexible Exports" program enables efficient energy usage and supports renewable energy integration (from solar) into the grid. For further information refer to the following links on Endeavour Energy's website: https://www.endeavourenergy.com.au/for-your-home/solar-and-battery-options/flexible-exports .

For those working in Western Sydney, the following section of Endeavour Energy's website provides resources for establishing sustainable growth in the region: https://www.endeavourenergy.com.au/community/our-projects/greater-western-sydney .

Endeavour Energy is supporting nature, improving biodiversity and working towards a circular economy that recovers resources and protects the planet. This includes aiming to be nature positive by 2030 in operations and construction and zero waste to landfill in our operations by 2030 (excluding hazardous and contaminated waste). As such, the consideration of circular economy practices and habitat protection in development is encouraged. For further information, refer to the following link on Endeavour Energy's website: https://www.endeavourenergy.com.au/about-us/sustainability/regenerative-economy .

35 Swimming Pools

Electricity and water are a potentially dangerous combination and needs to be treated with caution. This is due to parts of the swimming pool having the potential to be a conductor of electricity that can function as a path for stray current which as it seeks to complete the circuit, it could travel through to the water in the swimming pool. This includes but is not limited to coping / paving, rail / decks, steps, diving boards, pumps, filters etc.

Swimming pools potential could occur in any land zone and in addition to private pools on residential lots can be for various other uses eg. as part of an apartment complex / common area, recreation centres, hotels, sales and display etc.

Special consideration needs to be provided to the positioning of swimming pools in:

- Front yards.
- Corner lots with reduced building setbacks to the secondary road frontage.
- Adjoining zone and transmission substations.

The potential risk is reflected in swimming pools being prohibited in all types of easements. The separation / restrictions for swimming pools near padmount substations is detailed in Section 30.3 Padmount Substations . For Endeavour Energy's purposes the separation required from electricity infrastructure to a swimming pool includes the 'pool zone' being 'arms reach' or 1.25 metres from the water edge, as referred / defined in Australian/New Zealand Standard AS/NZS 3000:2018 'Electrical installations'.

As a guide, for electricity distribution infrastructure that is protected works or adjacent to the site in public roadways and other adjoining properties ie. without an easement, the 'pool zone' should be outside of the notional easement provided in Endeavour Energy's Mains Design Instruction MDI 0044 'Easements and Property Tenure Rights' Table 1 – 'Minimum easement widths'.

If there is any doubt whatsoever regarding the safety clearances to any electricity distribution infrastructure, the applicant will need to have the safety clearances assessed by a suitably qualified electrical engineer / Accredited Service Provider (please refer to Section 24 Network Connection).

Australian/New Zealand Standard AS/NZS 3000:2018 'Electrical installations' in clause 6.3.4.8 'Electricity Distributor's electrical equipment' states:

- Pools and spas shall not be located in areas containing electrical equipment, including connection pits and cabinets, owned by the electricity distributor, that results in such equipment being incorporated into any classified zone. See diagrams 6.15 and 6.16 of the Standard. (Please refer to the Appendices for a copy of the diagrams).

With the 'classified zones' this means no pool or spa can be installed within 3.5 metres of any of Endeavour Energy's electrical equipment and ever further if a 5 metre restriction zone is registered on the title to the property.

The Standard also requires the construction of a bonded earthing system to meet the requirements of equipotential bonding all the metal / conductive components to create substantially the same electrical potential, so that, under fault conditions, the difference in potential between simultaneously accessible exposed and extraneous conductive parts will not cause electric shock.



Before and After. This swimming pool in Endeavour Energy's network area at Middleton Grange NSW had to be modified to comply with the restriction for the padmount substation on the use of land in relation to swimming pools.

36 Telecommunications

Endeavour Energy has significant telecommunications infrastructure between their control centres, substations and other key electricity network infrastructure for Supervisory Control and Data Acquisition (SCADA) applications, communications to our Field Service Centres asset monitoring systems and high-speed protection packages can also be affected. In some cases the infrastructure is shared with telecommunications carriers.

Factors including environmental factors (topography, direct signal strength, radio frequency interference, proposed transmitter type, receiver type etc) affect the operation of the telecommunications systems. Accordingly telecommunications facilities need to be clear of surrounding obstructions such as buildings to reduce 'dead spots' and allow the radio base station to effectively cover its intended range / path (typically a direct line of sight between two radio base stations located on towers or elevated topographical features).

Telecommunications are likely to be affected if a building or development is in the line of sight between sending and receiving antennae or within a zone of the line of sight of these antennae. Where a potential exists for interference to line of sight links, an obstruction analysis will need to be undertaken to ensure that there is no impact on Endeavour Energy's telecommunications facilities.

Mitigation measures may require an establishment of an exclusion zone or relocation or redesign of the development causing the interference. Failure to do so would require Endeavour Energy to modify or relocated its existing telecommunications infrastructure eg. by installation of a directional antennae to reroute the existing signal; installation of an amplifier to boost the signal, and / or utilisation of onsite optical cable to reroute the original signal. All of these will involve a significant impact on Endeavour Energy's telecommunication facilities, cost and potential safety risk until the matter is rectified.

36.1 Telecommunications Carriers

In addition to electricity distribution, telecommunications carriers can apply for a Facilities Access Agreement (FAA) to install their assets on parts of the network, being mostly poles in overhead distribution areas but also on streetlight columns, including:

- cable television (CATV); fibre coaxial, public switched telephone network (PSTN) cables;
- associated telecommunication equipment including antennas, micro cells etc. (and which may have a power supply / electrical connection); and

are the responsibility of the carrier owning the telecommunications system.

Telecommunications cables are typically the lowest wires and located below the overhead power lines. If a telecommunication cable or equipment is encountered, advice should be obtained from the telecommunications network operator and never assume that the operating voltage is harmless.



Telecommunications equipment on the road verge and streetlight column in Bedford Street and Northcliffe Drive, Berkeley. Source: Google Maps Street View.

37 Vegetation Management

Endeavour Energy recognises the importance of plants and vegetation in helping to maintain the environmental balance and mitigate some of the negative impacts and social consequences of urbanisation eg. the creation of 'urban heat islands' and need for green / canopy cover to help offset the absorption and retention of heat. However, as an electricity distributor this also needs to be balanced against the critical need to manage the risks of vegetation intrusion to the electricity network that can cause:

- public safety incidents such as electrocution, or damage to a person's property;
- fire starts and the risk of bushfires that have devastating impacts including loss of human life and large-scale property destruction;
- restrict access for installation maintenance and repair of electricity infrastructure;
- reduce light levels from streetlights which can impact on crime prevention and road and pedestrian safety; and
- electricity supply interruptions which can also impact not only electricity customers but also other critical infrastructures and result in significant economic and social consequences.

Such landscaping may be subject to Endeavour Energy's Vegetation Management program and/or the provisions of the *Electricity Supply Act 1995* (NSW) Section 48 'Interference with electricity works by trees' by which under certain circumstances the cost of carrying out such work may be recovered.

Sydney's weather of storms and high winds can cause trees and branches to touch and short out the network or fall onto and damage overhead power lines. Heavy rain and flooding can also damage the electricity network. Many blackouts are caused from trees and shrubs damaging power lines and other network assets, especially during storms and periods of high winds.



Endeavour Energy's Transmission North had to repair a pole failure in April 2024 as a large tree fell on mains also resulting in damage to some customer switchboards and house fascias. Always treat fallen power lines as 'alive' and keep 8 metres away from them. Any trees, branches or other debris can also become 'alive' if they contact the damaged power lines.

The central activity is to clear vegetation and remove identified hazard trees that are in close proximity to electricity lines and to safely dispose of cut vegetation in accordance with Endeavour Energy's environmental obligations.



Poor tree selection and placement near overhead power lines in Moss Vale NSW in Endeavour Energy's franchise area. Source: Google Maps Street View.

Endeavour Energy regularly inspect and clear vegetation around electricity infrastructure. This not only includes tree trimming to overhead power lines but also ground clearing eg. for underground cable works or access tracks. As well as power, the infrastructure includes earthing cables (to allow a leaking/fault current to flow into the grounding system and be properly dissipated) and pilot cables (carrying protection signals or communications between substations). The poles may also carry data and telecommunications cables for other authorities / carriers.

The cost of vegetation management is a significant cost element in the company's operating budget (and the network charges to its customers). Endeavour Energy is constantly looking to improve its vegetation management practices to enable better maintenance, resulting in fewer faults and fewer outages of shorter duration and reducing costs.

The planting of large trees in the vicinity of electricity infrastructure is therefore not supported by Endeavour Energy. Suitable planting needs to be undertaken in proximity of electricity infrastructure. Only low growing shrubs not exceeding 3.0 metres in height, ground covers and smaller shrubs, with non-invasive root systems (less than 400 millimetres below ground level) are the best plants to use. Larger trees should be planted well away from electricity infrastructure (at least the same distance from overhead power lines as their potential full grown height) and even with underground cables, be installed with a root barrier around the root ball of the plant.



Although the spread of the tree on the opposite side of the road did not encroach safety clearances to the overhead power lines, the height meant that when the tree fell during a storm, it damaged the overhead power lines requiring repairs to restore electricity supply to customers. Source: https://web.yammer.com/main/org/endeavourenergy.com.au

Endeavour Energy's recommendation is that consideration be given to the removal of the existing street trees that are of nil to low ecological value and the trees be replaced with an alternative smaller planting to ensure appropriate clearances are maintained whilst minimising the need for future pruning. Alternatively, the minimum clearances for vegetation as required by the 'Service and Installation Rules of NSW' must be allowed for the details of which can be accessed via the following link to the NSW Climate and Energy Action website:

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

While trees and underground cables often coexist well together, it is also important to keep trees a safe distance away from the cables to prevent the root system from growing around and possibly into the cable ducts the lines. The tree could be seriously damaged if roots have to be cut to dig up and repair underground cables.

38 References

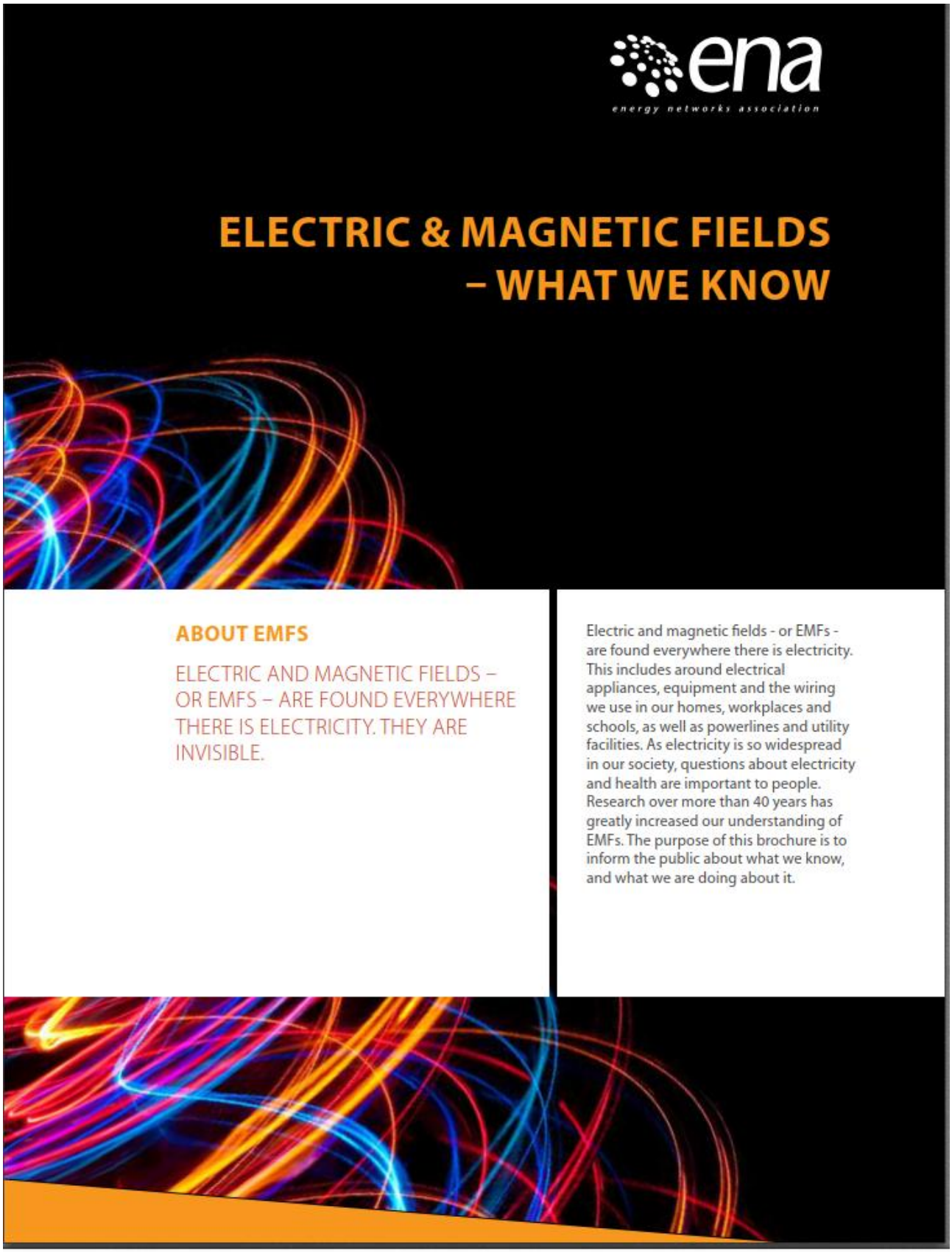
Conveyancing Act 1919 (NSW)
Electricity Supply Act 1995 (NSW).
Electricity Supply Amendment (Protection of Electricity Works) Act 2006 (NSW)
Environmental Planning and Assessment Act 1979 (NSW).
Electricity Supply (Safety and Network Management) Regulation 2014 (NSW)
Protection of the Environment Operations Act 1997 (NSW)
State Environmental Planning Policy (Transport and Infrastructure) 2021 (NSW)
State Environmental Planning Policy (Resilience and Hazards) 2021 (NSW)
ISSC 20 Guideline for the Management of Activities within Electricity Easements and Close to Electricity Infrastructure Industry Safety Steering Committee September 2012
Camden Council Development Control Plan 2011
NSW Planning & Environment 'Child Care Planning Guideline' August 2017
NSW Rural Fire Service 'Planning for Bush Fire Protection 2019'
NSW Government 'The Gibbs Report, Inquiry into Community Needs and High Voltage Transmission Line Development 1991'
NSW Streets Opening Coordination Council 'Guide to Codes and Practices for Streets Opening'
Energy Networks Association (ENA) 'Electric & Magnetic Fields – What We Know'
Australian Standard AS 1530 'Fire Test to Building Material – Standard'
Australian Standard AS2067: 2016 'Substations and high voltage installations exceeding 1 kV a.c.'
Australian Standard AS2419.1:2021 'Fire hydrant installations, Part 1: System design, installation and commissioning'
Australian Standard AS 2601—2001: 'The demolition of structures'
Australian Standard 2890 'Parking Facilities'
Australian/New Zealand Standard AS/NZS 7000: 2016: 'Overhead line design'
Australian/New Zealand Standard AS/NZS 3000:2018 'Electrical installations'
Australian / New Zealand Standard AS/NZS 1158: 2010 'Lighting for roads and public spaces'
Australian/New Zealand Standard AS/NZS 5139:2019 'Electrical installations - Safety of battery systems for use with power conversion equipment'
EcoJoule 'EcoVAR' Low Voltage STATCOM Manual Design, Construction, Installation, Operation, Maintenance and Commissioning Version 2 June 2024
Energy Networks Australia National Guidelines for Distribution Network Service Provider-owned Battery Energy Storage System ENA DOC 054-2025
Endeavour Energy Company Policy (Network) 9.1.1 – Bushfire Risk Management
Endeavour Energy Company Policy 9.2.3 (Network) 'Property Tenure for Network Assets'
Endeavour Energy Company Policy (Network) 9.2.5 – Network Asset Design
Endeavour Energy Company Procedure GAM 0114 - Granting Dispensations for Engineering Documents
Endeavour Energy's Branch Procedure (System Control) NCB 0615 'Flood Response Plan'
Endeavour Energy's Mains Design Instruction MDI 0044 'Easements and Property Tenure Rights'
Endeavour Energy Mains Design Instruction MDI 0028 'Underground distribution network design'
Endeavour Energy Mains Design Instruction MDI 0031 'Overhead line design'
Endeavour Energy Mains Construction Instruction MCI 0002 'Attachment of communication cables to Endeavour Energy poles'
Endeavour Energy Mains Construction Instruction MCI 0006 'Underground distribution construction standards manual'
Endeavour Energy Substation Design Instruction SDI524 'Fencing and Perimeter Security at Zone and Transmission Substations, and Switching Stations'
Endeavour Energy Earthing Design Instruction EDI 001'Earthing design risk assessment'
Endeavour Energy Drawing 86232 'Overhead Lines Minimum Clearances Near Structures'
Endeavour Energy Form FPJ7006 'Technical Review Request'
Endeavour Energy Form FPJ4015 'Application for the Relocation / Removal of Electrical Network Assets'
Endeavour Energy Form FPJ4603 'Permission to Remove Service / Metering by Authorised Level 2 Accredited Service Provider'
Endeavour Energy 'Alive and Dangerous'
Endeavour Energy 'Directions Paper for Consultation 1 July 2019 – 30 June 2024'
Endeavour Energy 'Distribution Annual Planning Report December 2020'
Endeavour Energy 'High Voltage Operational and Maintenance Protocol'
Endeavour Energy 'Land Interest Guidelines for Network Connection Works, Provision of Network Connection Services'

Endeavour Energy ‘Low Voltage Network Battery Document Roadmap February 2024 Version 1’
Energy NSW ‘NSW Public Lighting Code 2019’
Energy NSW ‘Service and Installation Rules of NSW’
Environment Protection Authority EPA 2013/0127 Noise Guide for Local Government
Fire and Rescue NSW Management of lithium-ion battery safety risks: A literature review of current knowledge and best practices SARET Research Program Publication No.: SRP-001, Document ID: D25/93142, Issued: 26 August 2025
SafeWork NSW ‘Work Near Underground Assets – Guide 2007’
WorkCover (now SafeWork NSW) ‘Work Near Overhead Power Lines Code of Practice 2006’
Xolta ‘BAT-79’ Low Voltage Ground Battery Manual Design, Installation, Operation, Maintenance Commissioning and Emergency Response Version 2 June 2024

Please note that whilst Endeavour Energy tries to keep all the references timely and accurate, it does not guarantee these to be current, accurate, or complete as they may be subject to change without notice and be updated or amended from time to time. Endeavour Energy assumes no liability for any errors, omissions, or reliance on outdated information.

39 Appendices

39.1 Energy Networks Association (ENA) ‘Electric & Magnetic Fields – What We Know’


ena
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.

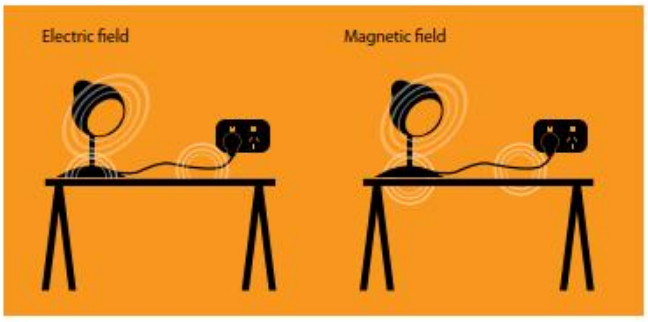
EMFS AND HEALTH

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

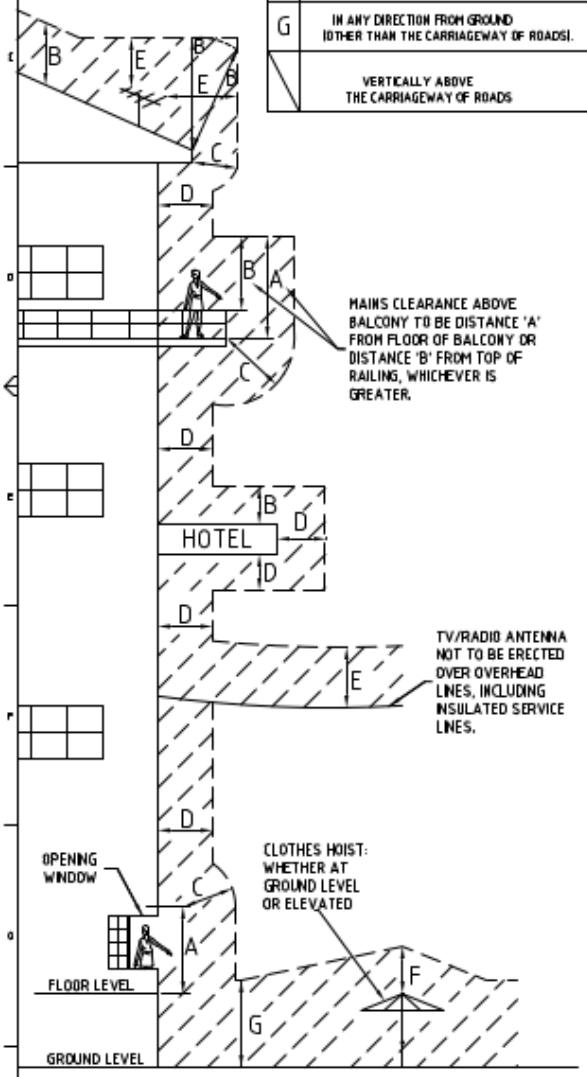
Energy Networks Association Ltd
P +61 2 6272 1555 E info@ena.asn.au
Level 1, 110 Giles St, Kingston ACT 2604
www.ena.asn.au

UPDATED DEC 2015 PUBLISHED FEB 2016



39.2 Endeavour Energy Drawing 86232 'Overhead Lines Minimum Clearances Near Structures'

	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 NORMALLY ACCESSIBLE TO PERSONS	2700	2700	3700	3700	2700	4500	5000
B	VERTICALLY ABOVE THOSE PARTS OF ANY STRUCTURE NOT NORMALLY ACCESSIBLE TO PERSONS BUT ON WHICH A PERSON MAY STAND	2000	2700	2700	2700	2700 NOTE 4	3700	4500
C	IN ANY DIRECTION (OTHER THAN VERTICALLY ABOVE) FROM THOSE PARTS OF ANY STRUCTURE NORMALLY ACCESSIBLE TO PERSONS, OR FROM ANY PARTS NOT NORMALLY ACCESSIBLE TO PERSONS BUT ON WHICH A PERSON CAN STAND	1000	900 NOTE 5 (1000)	1500	1500	1500 NOTE 4	2100	3000
D	IN ANY DIRECTION FROM THOSE PARTS OF ANY STRUCTURE NOT NORMALLY ACCESSIBLE TO PERSONS	100 NOTE 2	300 NOTE 2	600 NOTE 2	600	100	1500	2500
E	IN ANY DIRECTION FROM ANY PART OF AN OUTDOOR TELEVISION ANTENNA OR PART OF A STAYWIRE	1800	1800	1800	3000	3000	3000	3000
F	IN ANY DIRECTION FROM CLOTHES LINE	2000	3000	3000	3000	3000	3000	3000
G	IN ANY DIRECTION FROM GROUND (OTHER THAN THE CARRIAGEWAY OF ROADS).	5500 NOTE 6	5500	5500	5500 NOTE 5 (7500)	5500	5500 NOTE 5 (7500)	6700 NOTE 5 (7500)
	VERTICALLY ABOVE THE CARRIAGEWAY OF ROADS	5500	5500	5500	6000 NOTE 5 (7500)	5500	6700 NOTE 5 (7500)	6700 NOTE 5 (7500)



GENERAL NOTES

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

MINIMUM CLEARANCE REQUIREMENTS

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

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

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

Endeavour Energy

DO NOT SCALE DIMENSIONS IN MILLIMETRES

ORIGINAL SCALE NONE | APPROVED C.BROWN | DRAWN C.R.T. | DATE 16-2-95 | CHD

AUTHORISED W.ISLEY

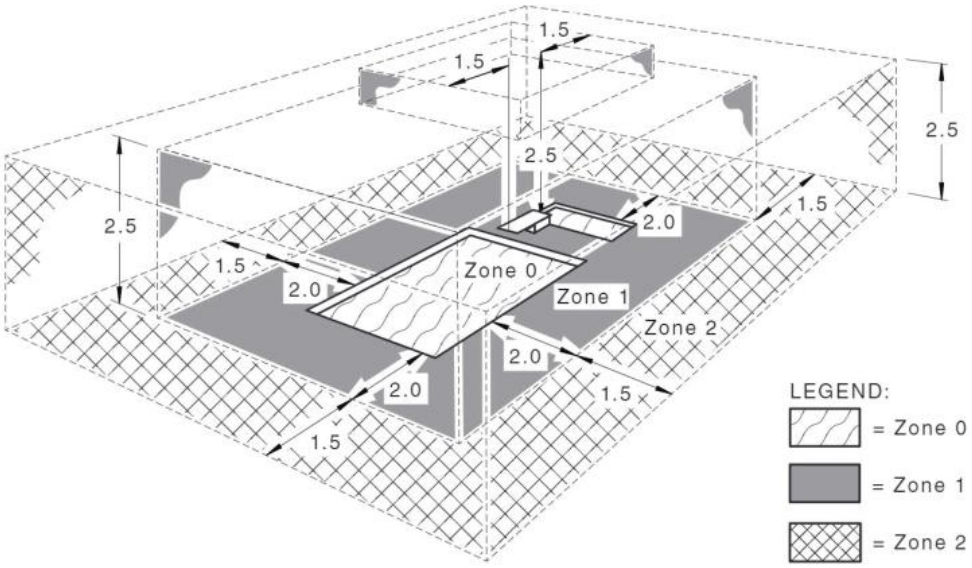
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Endeavour Energy OVERHEAD LINES
MINIMUM CLEARANCES NEAR STRUCTURES

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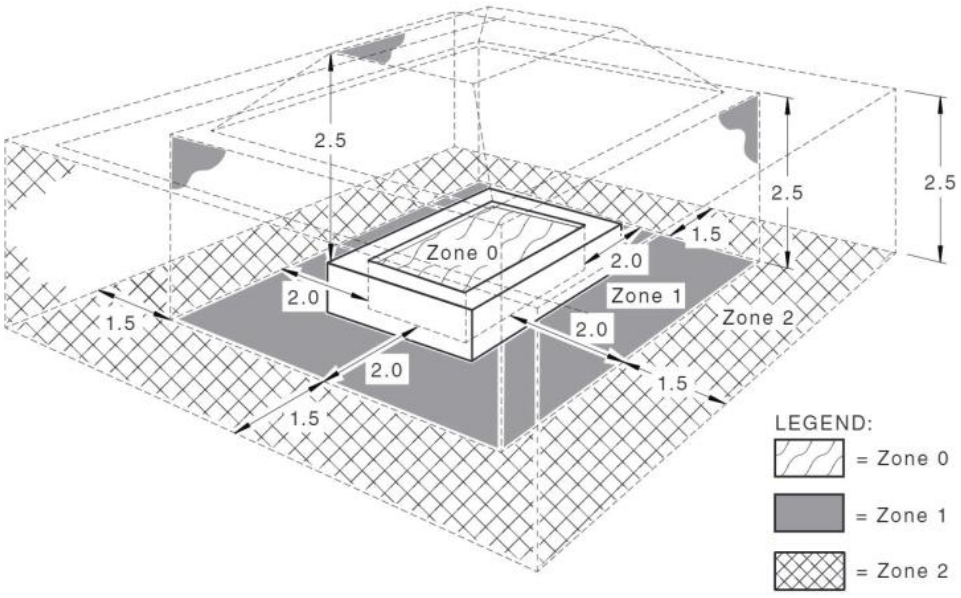
SHEET No 1 OF 1 SHEETS

39.3 Australian/New Zealand Standard AS/NZS 3000:2018 'Electrical installations' Figures 6.15 & 6.16.



DIMENSIONS IN METRES

FIGURE 6.15 ZONE DIMENSIONS OF IN-GROUND SWIMMING POOLS



DIMENSIONS IN METRES

FIGURE 6.16 ZONE DIMENSIONS OF ABOVE-GROUND SWIMMING POOLS

A classified zone is made up of 3 zones:

- Zone 0 being the area of the interior of the water container of the pool .
- Zone 1 being the area limited to zone 0, and a vertical plan 2 metres from zone 0.
- Zone 2 being the area limited by a vertical plane 1.5 metres external of Zone 1.

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Endeavour Energy

POWER together

ELECTRICAL SAFETY

FOR BUILDING AND CONSTRUCTION WORKERS



WORKPLACE FACT SHEET

KNOW THE DANGERS

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

THINGS YOU SHOULD DO BEFORE STARTING WORK

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

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

Endeavour Energy

BEFORE YOU DIG

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

SAFE WORK HABITS

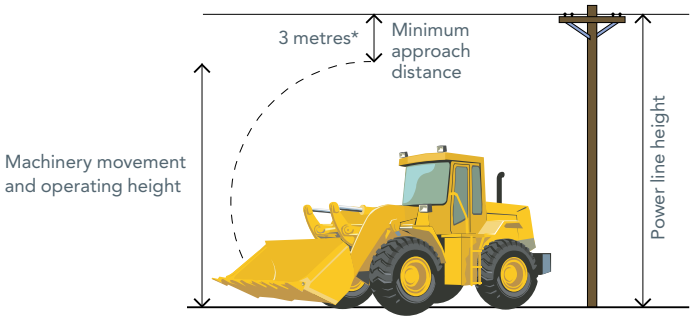
- Look up and locate overhead power lines and maintain at least the minimum approach distance from them.

Minimum safe approach distances when working near power lines

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

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

The distance that must be assessed prior to work



*Voltages up to 132,000 volts.

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

PERMIT TO WORK SYSTEMS

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

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

01 Has Dial Before You Dig been undertaken?

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

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

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

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

06 Is potholing included in the safe work procedure?

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

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

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

SAFETY EXCELLENCE

IN EMERGENCIES CALL 131 003

24 hours a day, 7 days a week

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

0611-ENE2352_BC

Fencing for security and the reduction of visual impact of a **Common Earthed** Padmount Substation:

- Metal, timber, plastic or masonry fencing, along with vegetation screening is permitted outside the easement.
- Conductive fencing is NOT allowed within 4m of a **Separately Earthed** substation easement without safeguards i.e., isolation panels or earthing as per Endeavour Energy's Earth Rod Detail dwg attached.
- Sail cloths and covers or tarps etc. are allowable up to the easement boundary if unattached to a building.
- Carport posts, metallic clothes hoists poles or posts cannot be located inside the padmount substation easement or UG underground cable easement areas nor encroach into them.
- Home | Before You Dig Australia (BYDA) service plans are required prior to any property excavation.
  Note: DBYD services plans do not indicate underground electrical consumer/service mains.
- Any ground excavation within the easement, must be done manually or by potholing with high pressure water hose or a vacuum, or a toothless mechanical scraping device, and always with an approved safety observer.
- Easement dimensions must not be reduced by any structures or thing e.g., fences, retaining walls, brick walls or their footings/foundations, terrace work or planting or overhanging vegetation, waste or excess soil etc.
- Ongoing clear entry and exit access around the substation easement area is paramount for our Work Health & Safety (WH&S) requirements.

No trees, or shrubs or bushes nor planter boxes or pot plants nor decorative features are allowed in the easement.

Note: You are not permitted to paint the substation other than its current shade of green without written approval.

https://www.bing.com/images/search?q=Decorative+Outdoor+Screens&form=RESTAB&first=1&tsc=ImageBasicHover

- No slip / trip hazards allowed in the easement. Tree stumps must be cut & grinded out 100mm below surface**.**
- Ventilation is required around and through the base and roof of the substation. No overhanging tree branches.
- Placing of Council bins or stock piling of any materials is Not 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 padlocked, the gate must open outward 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.

Regular Easement Maintenance: The easement must be maintained on a regular basis for staff work health and safety WH&S requirements. 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

- Retaining walls and its foundations must be constructed outside the electricity easement.
- The final height of a retaining wall should comply with the Local Council nor 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 / masonry 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 to accommodate a raised surrounding ground level.
- Future wall extensions would need to be properly footed. No footings are allowed in the easement.
- Current Before You Dig Aust. service plans are required before excavating for any purpose, especially for retaining wall footings and fence posts. Home | Before You Dig Australia (BYDA)

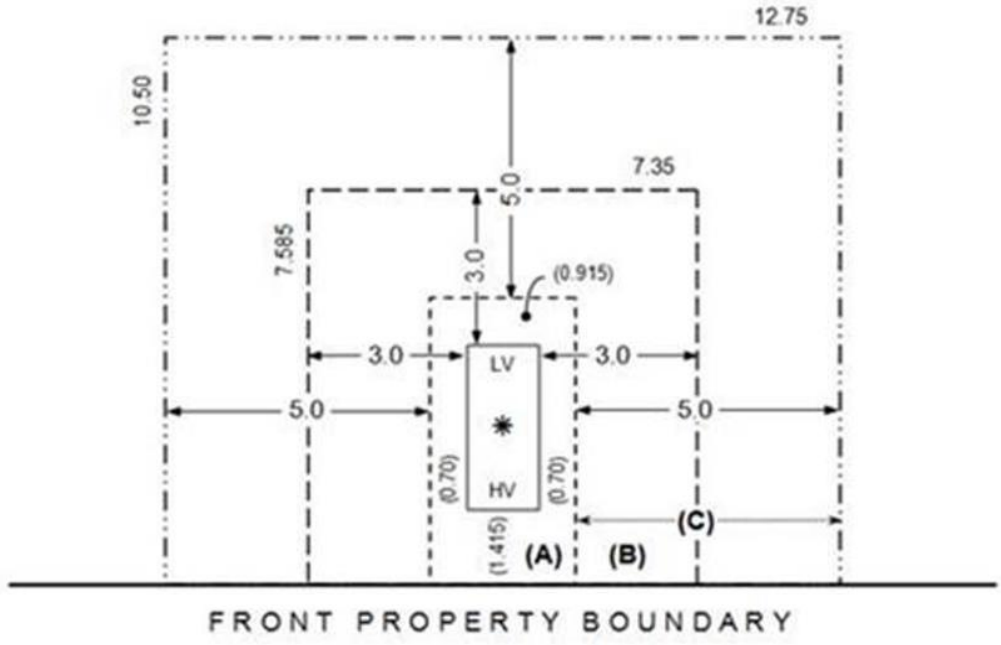








NOTE: Easement sizes vary. For illustration purposes only, below is a typical easement area 2.75m x 5.5m



- No building or object is permitted within the easement area **(A).**
- No building is permitted 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 and its projections 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 is permitted to be placed within the restriction site marked **(B)** or **(C)**.

The forgoing 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 e.g., 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.

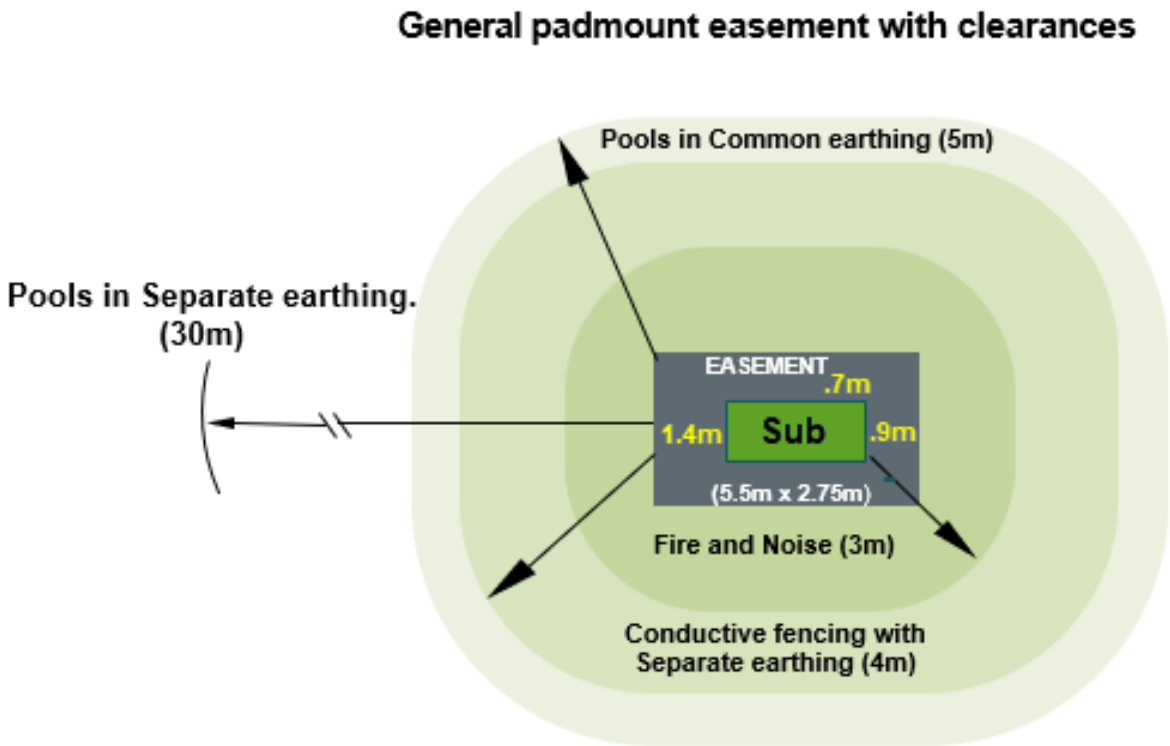
This Separately Earthed padmount substation uses timber fence posts around the easement to fence and secure the property but does not restrict ventilation or access. It has wood chips as a surface and no vegetation encroaching the easement.

- No metallic or conductive fencing can be erected or permitted to remain within **4 metres** from the substation easement without being insulated or have air-breaks or isolation panels or earthing as per Endeavour Energy's Earth Rod Detail 069575.dwg attached.
- No swimming pool or spa can be erected or permitted to remain within **30 metres** from the substation easement. This also applies to wading pools, open water features and open water tanks.
- For All electrical emergencies, contact Endeavour Energy on **131 003** for 24hr 7day assistance.

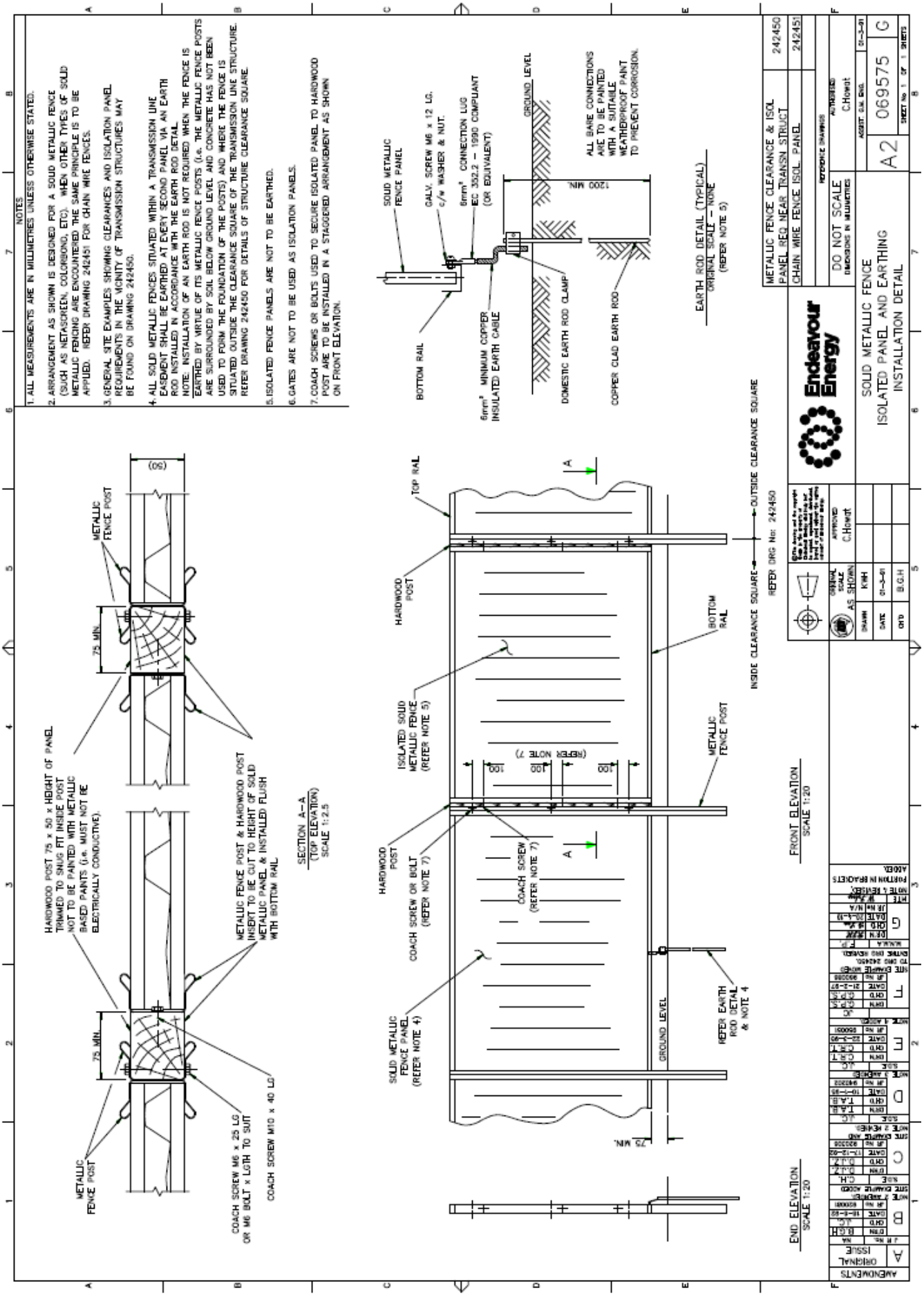


NOTE: Easement areas can be various sizes. You must check the 88B Instrument to get the correct size.

Below diagram is for **illustration purposes only:** A general easement area is approx. **2.75m x 5.5m.** You must check the correct easement size for the property.



For further details refer to Endeavour Energy's Mains Design Instruction Document 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.
Easements@endeavourenergy.com.au


NOTES
1. ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. ARRANGEMENT AS SHOWN IS DESIGNED FOR A SOLID METALLIC FENCE (SUCH AS NETASCREEN, COLORBOND, ETC). WHEN OTHER TYPES OF METALLIC FENCING ARE ENCOUNTERED THE SAME PRINCIPLE IS TO BE APPLIED. REFER DRAWING 242451 FOR CHAIN WIRE FENCES.
3. GENERAL SITE EXAMPLES SHOWING CLEARANCES AND ISOLATION PANEL REQUIREMENTS IN THE VICINITY OF TRANSMISSION STRUCTURES MAY BE FOUND ON DRAWING 242450.
4. ALL SOLID METALLIC FENCES SITUATED WITHIN A TRANSMISSION LINE EASEMENT SHALL BE EARTHED AT EVERY SECOND PANEL VIA AN EARTH ROD INSTALLED IN ACCORDANCE WITH THE EARTH ROD DETAIL.
NOTE: INSTALLATION OF AN EARTH ROD IS NOT REQUIRED WHEN THE FENCE IS EARTHED BY VIRTUE OF ITS METALLIC FENCE POSTS (i.e. THE METALLIC FENCE POSTS ARE SURROUNDED BY SOIL BELOW GROUND LEVEL AND CONCRETE HAS NOT BEEN USED TO FORM THE FOUNDATION OF THE POSTS) AND WHERE THE FENCE IS SITUATED OUTSIDE THE CLEARANCE SQUARE OF THE TRANSMISSION LINE STRUCTURE. REFER DRAWING 242450 FOR DETAILS OF STRUCTURE CLEARANCE SQUARE.
5. ISOLATED FENCE PANELS ARE NOT TO BE EARTHED.
6. GATES ARE NOT TO BE USED AS ISOLATION PANELS.
7. COACH SCREWS OR BOLTS USED TO SECURE ISOLATED PANEL TO HARDWOOD POST ARE TO BE INSTALLED IN A STAGGERED ARRANGEMENT AS SHOWN ON FRONT ELEVATION.
HARDWOOD POST 75 x 50 x HEIGHT OF PANEL TRIMMED TO SNUG FIT INSIDE POST NOT TO BE PAINTED WITH METALLIC BASED PAINTS (i.e. MUST NOT BE ELECTRICALLY CONDUCTIVE).
METALLIC FENCE POST
75 MIN.
(50)
METALLIC FENCE POST & HARDWOOD POST INSERT TO BE CUT TO HEIGHT OF SOLID METALLIC PANEL & INSTALLED FLUSH WITH BOTTOM RAIL
COACH SCREW M6 x 25 LG OR M6 BOLT x LGTH TO SUIT
COACH SCREW M10 x 40 LG
SECTION A–A (TOP ELEVATION) SCALE 1:2.5
SOLID METALLIC FENCE PANEL
GALV. SCREW M6 x 12 LG. c/w WASHER & NUT.
8mm² CONNECTION LUG EC 332.2 – 1990 COMPLIANT (OR EQUIVALENT)
GROUND LEVEL
1200 MIN.
ALL BARE CONNECTIONS ARE TO BE PAINTED WITH A SUITABLE WEATHERPROOF PAINT TO PREVENT CORROSION.
BOTTOM RAIL
6mm² MINIMUM COPPER INSULATED) EARTH CABLE
DOMESTIC EARTH ROD CLAMP
COPPER CLAD EARTH ROD
EARTH ROD DETAIL (TYPICAL) ORIGINAL SCALE – NONE (REFER NOTE 5)
TOP RAIL
HARDWOOD POST
ISOLATED SOLID METALLIC FENCE (REFER NOTE 5)
HARDWOOD POST
COACH SCREW OR BOLT (REFER NOTE 7)
SOLID METALLIC FENCE PANEL (REFER NOTE 4)
(REFER NOTE 7)
100
100
100
COACH SCREW (REFER NOTE 7)
A
A
BOTTOM RAIL
METALLIC FENCE POST
INSIDE CLEARANCE SQUARE
OUTSIDE CLEARANCE SQUARE
REFER DRG Nos 242450
GROUND LEVEL
REFER EARTH ROD DETAIL & NOTE 4
75 MIN.
FRONT ELEVATION SCALE 1:20
END ELEVATION SCALE 1:20
METALLIC FENCE CLEARANCE & ISOL PANEL REQ NEAR TRANSN STRUCT 242450
CHAIN WIRE FENCE ISOL PANEL 242451
Endeavour Energy
DO NOT SCALE
DIMENSIONS IN MILLIMETRES
SOLID METALLIC FENCE
ISOLATED PANEL AND EARTHING
INSTALLATION DETAIL
A2
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ORIGINAL ISSUE
AMENDMENTS





LAND INTEREST GUIDELINES FOR NETWORK CONNECTION WORKS

Provision of Network Connection Services

Prepared by Property Services

December 2022

Customer Network Solutions
Asset & Operations

Endeavour Energy

Version	Date	Prepared by	Comments
1	January 2014	Network Connections	
2	July 2014	Network Connections	Minor amendments
3	July 2021	Network Connections Property Services	Major amendments including name change from Property Tenure Guidelines
4	July 2021	Property Services	Final approved easement terms
5	December 2022	Customer Network Solutions	Section 6.0 only Amendment to timing of land interest registration

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1.0 DEFINITIONS AND ABBREVIATIONS

CAMS	Endeavour Energy's Customer Application Management System for Network Connection Works
Community Land	Land subject to a subdivision under the C*ommunity Land Development Act* 1989 and includes community property, precinct property and neighborhood property
Connection Project	Any Network Connection Works project other than a Subdivision Project
Constructor	Level 1 Accredited Service Provider
Contractual Licence	Any agreement the primary purpose of which is to enable the location of a Network Asset on above or under any land or to enable access to a Network Asset
Customer	Applicant for contestable connection services under a Model Standing Offer including the owner and development consultants engaged by the owner
CWE	Contestable Works Engineer authorised to certify a Design Drawing that satisfies Endeavour Energy's requirements
Definition Plan	A plan of survey, compiled plan or sketch plan prepared by a registered surveyor that defines a Land Interest site
Design Drawing	Electricity network construction drawing
Designer	Level 3 Accredited Service Provider
Distribution Network Lease	The lease of the EDMHC Distribution System to the Network Lessee on 14 June 2017
Distribution System	EDMHC's electricity distribution system
Easement Document	Any formal document to be entered into by EDMHC and the land owner that sets out the terms of a Land Interest including RPA Dealing and Section 88B
EDMHC	The Distribution System lessor Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878
EDMHC Property Protocol	A document setting out approved clauses and terms for use in Land Interests acquired on behalf of EDMHC by EENAP
EENAP	The Distribution System lessee Endeavour Energy Network Asset Partnership ABN 30 586 412 717
Endeavour Energy	The Distribution System sub-lessee Endeavour Energy Network Operator Partnership ABN 11 247 365 823 trading as Endeavour Energy

ESA	*Electricity Supply Act 1995*
FPJ5013 Form	Agreement for Entry, Grant and Creation of Easement
Land Interest	An easement, restriction, right of access, positive covenant. Contractual Licence or Site-Specific Conditions providing appropriate rights for the installation of a Network Asset in, on, or over land
LRS	NSW Land Registry Services – a business owned by the Australian Registry Investments Trust which is responsible for land titling and plan registration in NSW
Model Standing Offer	Either *Model Standing Offer for a Standard Connection Service* or *Model Standing Offer for a Standard Connection Service (Subdivision & Asset Relocation)*
Network Asset	Includes all transmission, high voltage and low voltage electrical equipment that is operated by Endeavour Energy (including any earthing cables)
Network Connection Works	Works required to augment or extend the Distribution System under the relevant Model Standing Offer
NOA	Notification of Arrangement document issued by Endeavour Energy to indicate that all requirements for the supply of electricity to new lots in a subdivision have been satisfied
Premises Connection Assets	A component of the Distribution System dedicated to the supply of electricity to the site including service lines from the street to the Customer's electrical installation
Property Services	Endeavour Energy's property team responsible for assessing and approving Land Interest issues
Protection Zone	An area around Premises Connection Assets shown in the Design Drawing to be protected by Site-Specific Conditions
PTB	Refundable property tenure bond paid to Endeavour Energy to allow construction, inspection and commissioning of a Connection Project prior to the Customer granting required Land Interest/s.
Restriction	Restriction on the Use of Land created under *Conveyancing Act 1919*
Public Road	Land dedicated to the public under *Roads Act 1993* including pathways and laneways
Registered Land Interest	An easement, restriction, right of access or positive covenant
RPA Dealing	A prescribed form under the *Real Property Act 1900* that includes Transfer Granting Easement [LRS form 01TG] , Restriction on the Use of Land by a Prescribed Authority [LRS form 13RPA], Positive Covenant [LRS form 13PC]

Section 88B	Instrument accompanying a deposited plan that creates a Land Interest under the provisions of Section 88B of the C*onveyancing Act 1919*
Site-Specific Condition	A condition of connection to premises that is peculiar to those premises
Subdivision Project	Any Network Connection Works project other than a Connection Project that requires a NOA
Transmission Network Asset	Network Asset designed to operate at a voltage above 22kV

2.0 INTRODUCTION

A Customer may carry out Network Connection Works under one of the Endeavour Energy Model Standing Offers for a Standard Connection Service.

Under the Model Standing Offer the Customer must, as and when required, grant Land Interests which in the opinion of Endeavour Energy are required in respect of the land or premises of any person, where any part of the Distribution System is or will be located.

The purpose of this document is to explain the procedures for the creation of Land Interests under the Model Standing Offer.

2.1 Electricity Supply Act 1995

Electricity works are owned separately from the land in, on or over which they are situated and ownership of land in, on or over which electricity works are situated does not constitute ownership of those works. [ESA Section 51]

The ESA provides that a person who owns, controls or operates a distribution system (“the Distributor”) may require the installation of services lines and service equipment to supply electricity to or from a Customer.

If the supply of electricity required by a Customer exceeds that which can be provided by a service line from its street mains, the Distributor may require the Customer to provide a place to accommodate the Distributor’s transformers, switchgear or other equipment. The Customer is required to provide such accommodation free of cost. [See ESA Sections 26-28]

A distributor may carry out any work comprising or connected with the alteration, maintenance or removal of existing electricity works on any land. [See ESA section 45]

The ESA applies to all Network Connection Works upon issue of a Letter of Acceptance under a Model Standing Offer.

2.2 Distribution Network Lease

On 14 June 2017 the NSW Government commenced the long-term lease of the Distribution System and all existing Network Assets including Land Interests were vested in EDMHC.

The Distribution System was simultaneously leased to EENAP and sub-leased to Endeavour Energy.

The *Electricity Network Assets (Authorised Transactions) Act 2015* defines the creation, assurance or extinguishment of an interest in land as 'land acquisition functions' which EDMHC cannot exercise in its own right, however, EENAP has full power and authority to exercise those functions on behalf of EDMHC.

Under the Distribution Network Lease all new Network Assets must be supported by an appropriate right to locate them on, above or under the land. [DNL Clause 2.9(c)]

All new Land Interests must be granted to or vested in EDMHC, however, all land interests must be exercised by EENAP and its nominee Endeavour Energy, who are responsible for performing any obligations of EDMHC.

2.3 Contact Details for Advice

Enquiries in relation to the creation of Land Interests in Network Connection Works should be directed to: network_property@endeavourenergy.com.au

Administrative enquiries regarding Network Connections Works and the issue of NOA for Subdivision Projects should be directed to: CWAdmin@endeavourenergy.com.au

General enquiries regarding existing easements should be directed to: Easements@endeavourenergy.com.au

3.0 A NEW GUIDELINE FOR LAND INTERESTS

The current property tenure process for the Network Connection Works process was designed more than 20 years ago when responsibility for creating property tenure for new Network Assets moved to the Customer in line with the transfer of design and construction responsibilities to the Customer. Despite the provision of support services this responsibility often brought difficulties for the Customer particularly if the Customer was lacking in experience in the conveyancing process.

The PTB method for Connection Projects has become difficult to manage and leaves new Network Assets unprotected by a Registered Land Interest for too long or not at all. From the Customer's perspective, the payment of a PTB causes difficulties and deprives the Customer of a portion of its working capital.

In an effort to improve the process for both the Customer and Endeavour Energy, Endeavour Energy is introducing two new forms of unregistered Land Interests for Connection Projects known as Site-Specific Conditions [see Section 4] and a Contractual Licence [see Section 9].

A Contractual Licence will only apply to short term assets where the Customer will remove the Network Assets when no longer required.

For Connection Project Design Briefs issued by Endeavour Energy from 2 August 2021, achieving a Land Interest through the application of Site-Specific Conditions may be allowed.

If Site-Specific Conditions are inappropriate and Registered Land Interests are required, the Customer will be required to register any Land Interests before the Constructor commences the Network Connection Works. [see Section 6]

For Subdivision Projects, the current process will remain and Registered Land Interests will continue to be created by the plan of subdivision after the issue of the NOA. [see Section 5]

4.0 SITE SPECIFIC CONDITIONS

The Model Standing Offer and Chapter 5A of the *National Market Rules* allow for the application of Site-Specific Conditions for Premises Connection Assets.

Site-Specific Conditions is a type of statutory right allowing Endeavour Energy to accommodate its equipment on the premises that is being supplied.

4.1 Site-Specific Conditions Criteria

a) Not appropriate for Subdivision Projects.

b) Not appropriate for Transmission Network Assets.

c) The Customer carrying out Network Connection Works under the Model Standing Offer must be supplied by the Premises Connection Assets installed under the Model Standing Offer.

d) May be appropriate for distribution Network Assets such as an indoor substation, padmount substation, pole mounted substation, HV switching cubicle, LV switching cubicle or LV pillar.

e) Premises Connection Assets must be located on the Public Road frontage and be directly accessible from the Public Road.

f) Premises Connection Assets must be located a minimum distance from the side boundary, as relevant to the type of asset, and the dimensions of its Protection Zone.

g) Premises Connection Assets must be within one land parcel being supplied by the Premises Connection Assets.

4.2 Property Information Required for Design Drawing Certification

The Design Package must include:

a) Current title search (not more than 1 month old) obtained from LRS information wholesaler,
b) Customer provides signed FPJ4689 Notice of Acceptance of Site-Specific Conditions
c) Proposed final levels within 5 metres of proposed Network Assets,
d) Proposed retaining walls within 5 metres of proposed Network Assets, and
e) Proposed and existing utilities within 5 metres of proposed Network Assets.

4.3 Process for Site-Specific Conditions

a) Designer submits a Method of Supply locating the new Premises Connection Assets to qualify for the application of Site-Specific Conditions.

b) CWE issues Design Brief to the Designer confirming required Site-Specific Conditions.

c) Designer submits a Design Package to CWE including Property Information

d) The Design Drawing should include a Protection Zone diagram showing the assets covered and the extent of the Protection Zone.

e) CWE certifies the Design Drawing including a notation of the use of Site-Specific Conditions – “Site-Specific Conditions apply to the Protection Zone shown in this design”.

f) Constructor submits Letter of Intent and proceeds with construction of Network Connection Works.

g) The application of Site-Specific Conditions will be noted on the Permission to Connect.

5.0 REGISTERED LAND INTERESTS REQUIRED WHEN SUBDIVIDING LAND

5.1 Urban Requirements

Endeavour Energy will require the registration of Land Interests for:

a) all new transmission, high voltage and low voltage Network Assets; and
b) all existing transmission, high voltage and low voltage Network Assets located within the Customer's land.

5.2 Non-urban Requirements

Endeavour Energy will require the registration of Land Interests for:

a) all new transmission, high voltage and low voltage Network Assets;
b) all existing transmission Network Assets located within the Customer's land;
c) all existing high voltage Network Assets located within the Customer's land; and
d) all existing low voltage Network Assets that will be used to supply any adjoining land outside the subdivision.

5.3 Exception for Existing Network Assets in a Compiled Lot

The creation of a Land Interest is **not** required for existing Network Assets within any lot in a subdivision that has two or more boundaries that do not need to be surveyed and where an exemption for compiled boundaries has been issued by LRS.

The purpose of this exception is to minimise the Customer's survey expense associated with creating Land Interests within a compiled lot.

5.4 Community Title Subdivisions

Community title is a type of shared property established by the *Community Land Development Act 1989* and characterised by community property comprising land and facilities under shared ownership and a management statement explaining how the shared property will be used and maintained.

The *Community Land Development Act 1989* defines three types of shared property in three types of schemes:

a) Community property in community schemes
b) Precinct property in precinct schemes
c) Neighbourhood property in neighbourhood schemes

Community land developments are created by a plan of subdivision and Land Interests must be created in favour of EDMHC under Section 88B of the *Conveyancing Act 1919*.

Endeavour Energy will own and maintain all high voltage Network Assets within the development. Either EDMHC or the community title association may own and maintain the low voltage assets and/or public lighting network as determined in the Design Drawing.

Endeavour Energy may request the inclusion of by-laws in Part 5 of the management statement covering the use of access ways and the ownership of low voltage Network Assets.

5.5 Property Information Required for Design Drawing Certification

When subdividing land the Design Package must include:

a) Draft plan of Subdivision,
b) Proposed final levels within 5 metres of proposed Network Assets,
c) Proposed retaining walls within 5 metres proposed Network Assets, and
d) Proposed and existing utilities within 5 metres of proposed Network Assets.

5.6 Process When Subdividing Land and Registered Land Interests are required

a) The Designer submits a Method of Supply

b) If a Land Interest is required within land that is not owned by the Customer, the Customer must negotiate and register the Land Interest on this land prior to applying for Design Drawing certification.

c) CWE issues Design Brief to the Designer confirming Land Interests are required for proposed Network Assets.

d) Designer submits Design Package to CWE for certification

e) CWE certifies Design Drawing after relevant procedures

f) Constructor submits Letter of Intent and proceeds with construction of Network Connection Works

g) Customer/surveyor applies to CWAdmin for NOA and provides final Easement Document

h) CWAdmin issues NOA after relevant procedures

i) Customer lodges Easement Document for registration by LRS

6.0 REGISTERED LAND INTERESTS REQUIRED WHEN NOT SUBDIVIDING LAND

6.1 Urban Requirements

Endeavour Energy will require the registration of Land Interests for:

a) All new transmission Network Assets

b) all new high voltage Network Assets;

c) any new low voltage Network Assets located on an adjoining lot that will be used to supply the development;

d) all new consumers mains that are outside the lot occupied by the premises to be supplied (this may require an inter-allotment easement); and

e) all existing Network Assets that will be used to supply a new Network Asset.

6.2 Non-urban Requirements

Endeavour Energy will require the registration of Land Interests for:

a) All new transmission Network Assets
b) all new high voltage Network Assets; and
c) all new low voltage Network Assets.

Endeavour Energy will **not** require the creation of a Land Interest for an existing overhead power line without an easement if the power line is upgraded within the line of existing poles.

6.3 Property Information Required for Design Drawing Certification

The Design Package when **not** subdividing land must include:

a) Current title search (not more than 1 month old) obtained from an LRS information wholesaler,
b) Draft Plan of Easement, Administration Sheets and Section 88B or draft RPA dealing
c) Proposed final levels within 5 metres of proposed Network Assets,
d) Proposed retaining walls within 5 metres of proposed Network Assets, and
e) Proposed and existing utilities within 5 metres of proposed Network Assets.

6.4 Process When Not Subdividing Land and Registered Land Interests are required

a) Designer submits a Method of Supply

b) CWE issues Design Brief to the Designer confirming Land Interests are required for proposed Network Assets.

c) Designer submits a Design Package to CWE including Property Information

d) CWE certifies the Design Drawing

e) Constructor submits Letter of Intent, receives a Permission to Construct letter and proceeds with construction

f) Registered surveyor pegs the site in readiness for construction

g) Constructor completes construction

h) Registered surveyor completes the survey

i) Customer submits the Easement Document to Property Services for approval and signing

j) EENAP signs and returns Easement Document to Customer

k) Customer arranges for signing by others and lodgement for registration at LRS

l) Customer provides PDF images of registered Easement Document to Property Services minimum 3 weeks prior to outage date

m) Property Services confirms to CWAdmin and Customer that outage may proceed

7.0 TYPES OF REGISTERED LAND INTERESTS

7.1 Easement

If Site-Specific Conditions are inappropriate Registered Land Interests will be required.

The EDMHC Property Protocol has standard Land Interest terms for:

a) Easement for Padmount Substation or Switching Station or Auto Transformer
b) Easement for Underground Cables and/or Street Lighting Equipment
c) Easement for Overhead Power Lines
d) Easement for Overhead Power Lines and Underground Cables
e) Easement for Indoor Substation
f) Easement for Support Stay
g) Right of Access

7.2 Easements for Indoor Substations

If an indoor substation does not qualify for Site-Specific Conditions, Endeavour Energy will require an easement for the indoor substation and any associated cableways and access routes.

The boundaries of an easement for indoor substation should be defined by the internal face of the walls, ceiling and floor of the substation room and associated cableways. An easement for the cableway from the Public Road to the substation room may also be required.

These easements may need to be limited in height and depth. The survey plan will need to show any height and depth limitations as reduced levels (RLs) on Australian Height Datum.

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

If the indoor substation is located within a separate building with its own walls and roof, a positive covenant is required to be created regarding repair and maintenance of this building.

An indoor substation is a high voltage danger area. The substation room is a security area protected by security locking, hence, restricted access provisions apply. An authorised person from Endeavour Energy must accompany surveyors inside a commissioned indoor substation room at all times.

A surveyor requiring access to an indoor substation room should contact Property Services, allowing a minimum of three days' notice to enable suitable arrangements to be made.

7.3 Restriction on the Use of Land

A restriction prevents the owner from using a defined part of the land in a particular way but does not provide any right of access or allow Network Assets to be installed for or by Endeavour Energy.

The EDMHC Property Protocol has standard Restriction terms for:

a) Fire Rating of Buildings
b) Swimming Pools and Spas
c) Metallic Structures

In some situations, Endeavour Energy requires one or more Restrictions to be created by registration on the title of the land to ensure appropriate segregation from a Network Asset is maintained by both current and future owners.

7.3.1 Padmount Substation Restrictions

Subdivisions	Common earthing	Separate earthing
Urban residential URS	**3m fire restriction [1]** **5m swimming pool restriction [2]**	3m fire restriction [1] metallic structure/fence restriction [3] swimming pool restriction [3]
Other urban UIS, UCS	**3m fire restriction [1]**	3m fire restriction [1] metallic structure/fence restriction [3]
Non urban residential NRS	**3m fire restriction [1]** **5m swimming pool restriction [2]**	3m fire restriction [1] metallic structure/fence restriction [3] swimming pool restriction [3]
Other non urban NIS, NCS	**3m fire restriction [1]**	3m fire restriction [1] metallic structure/fence restriction [3]

[1] distance measured from plinth
[2] distance measured from substation easement
[3] distance measured from substation easement as determined by earthing design

Connections of load, asset relocations and public lighting	Common earthing	Separate earthing
Urban (including high and medium density residential) UML, UCL, UIL, UUL, ULL, ARP, PLT	**3m fire restriction [1]**	3m fire restriction [1] metallic structure/fence restriction [2]
Non Urban NCL, NIL, NLL, NRL, ARP, PLT	**3m fire restriction [1]**	3m fire restriction [1] metallic structure/fence restriction [2]

[1] distance measured from plinth
[2] distance measured from substation easement as determined by earthing design

7.3.2 Switching Station Restrictions

If a switching station is built in a padmount substation cubicle that has provision for a future transformer, the restriction requirements are in accordance with the table in section 7.3.1.

If a switching station is built in a standard switching station cubicle that does not have provision for a future transformer, the restriction requirements are as detailed in the table below.

Project types	Common earthing	Separate earthing
Urban residential land uses	**5m swimming pool restriction [1]**	metallic structure/fence restriction [2] swimming pool restriction [2]
Non-urban and non-residential land uses	No restriction required	

[1] distance measured from substation easement
[2] distance measured from substation easement as determined by earthing design

7.3.3 Pole-mounted Substation Restrictions

Project types	Common earthing	Separate earthing
All land uses	**No restriction required**	metallic structure/fence restriction [1] swimming pool restriction [1]

[1] distance measured in all directions from the high voltage earthing cables and rods as determined by earthing design

7.4 Right of Access

Wherever possible, Network Assets should be located adjacent to a Public Road, with the easement boundary abutting the Public Road boundary.

Endeavour Energy has general access rights under its standard easement terms, however, there are special situations where a defined right of access will be required to ensure practical access to the new Network Asset is permanently available.

7.4.1 Padmount Substations and Switching Stations

If the substation site is not abutting a Public Road boundary, a defined right of access may be required that is trafficable to trucks from the Public Road to the substation site.

The requirement for a defined right of access may be waived if the substation site is located:

a) Within a large public institution where unrestricted access is generally available, for example, a public hospital or university campus

b) Within a commercial site that is accessible to the public during daylight hours, for example, a shopping centre car park or medical centre car park

c) Abutting a trafficable easement at least 5.0 metres wide in favour of EDMHC

d) Within Community Property land in a community title development and the substation easement abuts an open access way shown in the Community Property plan

e) Within Common Property in a strata title development and the substation abuts the common driveway used by the lot owners.

f) Within utility facilities, for example a sewage treatment plant or pumping station

g) Within public parks and reserves

h) Within public schools

i) Within any property if Endeavour Energy determines a defined right of access is not required

If a switching station is located on the front property boundary, a defined right of access to a padmount substation located deeper within the property will not be required.

7.4.2 Above Surface Assets

Endeavour Energy will require a defined right of access if there is an above surface asset, for example, distribution pillar, that is not accessible from:

a) a Public Road abutting the lot on which the new Network Asset is located; or
b) a right of carriageway benefiting the lot on which the new Network Asset is located; or
c) a trafficable easement at least 5.0 metres wide in favour of EDMHC that abuts the lot on which the new Network Asset is located.

7.5 Positive Covenant

A positive covenant requires the owner to carry out work, such as the maintenance of a fire screen wall associated with Endeavour Energy's Network Assets.

If the customer is unable to provide a 3 metre fire clearance around a padmount substation, Endeavour Energy may allow the construction of suitable fireproof screen wall to protect adjacent buildings and properties. The wall must be approved by local council and the Customer must:

a) Show the location of the structures on the Definition Plan.
b) Create a registered positive covenant for the maintenance of these structures.
c) Provide written evidence from an architect or engineer confirming that the structures, as constructed, conform to the approved Design Drawing proposal in relation to the FRL (fire resistance level).

8.0 CREATION OF REGISTERED LAND INTERESTS

Land Interests must be created in favour of **EDMHC**.

Land Interests may be created by either method set out below.

8.1 Creation by Section 88B

The most commonly used method of creation is by defining the relevant site on a Definition Plan suitable for registration as a deposited plan at LRS and preparing a Section 88B that incorporates the relevant Land Interest terms.

All Section 88Bs creating Land Interests in favour of EDMHC must be signed by an attorney appointed by EENAP.

The Section 88B and the plan administration sheet must be signed by all owners and any mortgagee/s before lodgement at LRS. Any registered lessee and Caveator must also provide its consent.

The Land Interest is created upon registration by LRS.

8.2 Creation by RPA dealing

Land Interests may be created using various RPA Dealings available from the LRS website.

RPA Dealings must refer to a Definition Plan that is either attached to the dealing or has been registered separately (unless the whole parcel is to be affected).

RPA Dealings must be signed by the owner, EENAP and any mortgagee. Consent from any registered lessee and Caveator will be required.

RPA Dealings must be registered at LRS. The Land Interest is created upon registration.

9.0 CONTRACTUAL LICENCE

A Contractual Licence allows Endeavour Energy to install and maintain Network Assets on a parcel of land. A Contractual Licence is:

- Defined by a written document that does not require a Definition Plan;
- Requires the consent of EDMHC
- Benefits EDMHC
- Is **not** registered by LRS nor recorded on the Certificate of Title; and
- Does not bind subsequent owners.

A Contractual Licence will be a satisfactory form of Land Interest if the Network Asset is temporary, the land is controlled by a Government entity and ownership is unlikely to change during the proposed period of occupation.

The terms of a proposed Contractual Licence must be negotiated and agreed upon prior to certification of the Design Drawing, which must show a licensed area for the protection of the Network Assets.

A Contractual Licence should be prepared in the form of a Deed which is a written instrument signed in the presence of a witness and delivered by the parties to each other.

10.0 SPECIAL ARRANGEMENTS INVOLVING GOVERNMENT AUTHORITIES

10.1 Public Roads

A Public Road is controlled by a road authority which may be the local council, Transport for NSW or Crown Lands NSW.

A Public Road may be either formed or unformed and includes all land between the opposing front property boundaries.

If the Public Road is unformed, it is often called a paper road; however, it is still under the control of one of the three road authorities.

Although Endeavour Energy does **not** require Land Interests in Public Roads, the Customer is required to submit details of proposed construction work to the relevant road authority for approval prior to the construction of any Network Assets.

10.2 Crown Land

Most Crown land is managed by local Councils on behalf of Crown Lands NSW.

The creation of a Registered Land Interest requires approval from a delegate of the Minister for Lands.

Crown land may be subject to Native Title and Aboriginal Land Claims which may prevent the grant of Registered Land Interests.

10.3 Water NSW Land

Water NSW owns and manages water catchment areas.

Water NSW will grant Land Interests over its land but may require Endeavour Energy's standard terms to be modified and compensation may be payable.

10.4 National Parks & Wildlife Service Land

Land dedicated as wilderness area, national park, state recreation area, regional park, and nature reserve is managed by the NSW National Parks & Wildlife Service which is part of the Department of Planning Industry and Environment.

Endeavour Energy is usually required to enter into a formal deed of easement under Section 153 of the *National Parks & Wildlife Act 1974* and compensation may be payable.

10.5 Forestry Land

Land dedicated as state forest is managed by Forests NSW/Department of Primary Industries.

Forestry land may be subject to native title.

Forests NSW may grant an *Occupation Permit* and an annual rent may be payable.

10.6 Rail Corridors

The Transport Assets Holding Entity of NSW owns the NSW rail corridors.

Network Assets located within a rail corridor require a Registered Land Interest.

11.0 PROPERTY TENURE BONDS (DESIGN BRIEFS ISSUED BEFORE 2 AUGUST 2021)

This section applies to legacy projects where a PTB has been taken to allow Network Connection Works to be connected to the Distribution System.

11.1 Ownership and Refund of PTBs

If a PTB is paid by bank cheque, Endeavour Energy deems the right of refund belongs to the bond payer nominated on the FPJ5013 Form.

PTB paid by cheque or EFT will be refunded by EFT.

If the PTB was provided as a bank guarantee, the original bank guarantee will be returned to the bank's customer not directly to the bank.

Upon becoming aware of the completion of property tenure, Endeavour Energy will initiate refund of the PTB.

If current address or bank account details for the refund cannot be verified, the PTB will be retained until the bond payer contacts Endeavour Energy.

If the Connection Project is cancelled, Endeavour Energy will need to be informed in writing in order to initiate the PTB refund process.

11.2 Forfeiture of PTB

If a change in circumstances makes it impossible or impractical to complete the property tenure within the required six months period, the bond payer must contact the Property Services as soon as such a delay becomes apparent.

Endeavour Energy may deem the developer to have lost the right of refund if:

- the property tenure is not completed within six months of the network asset being commissioned, or
- the land changes ownership before the six months period has elapsed and the property tenure has not been completed.

If Endeavour Energy deems the right of refund to have been lost, it will notify the bond payer in writing.

If the right of refund is lost, the PTB is deemed to be forfeited and the ownership of the PTB is transferred to Endeavour Energy as compensation for the breach of the bond payer's agreement to complete the property tenure.

If a forfeited PTB was provided as a bank guarantee, Endeavour Energy will draw on the bank for the full amount.

12.0 EXTINGUISHMENT OR RELEASE OF LAND INTERESTS

EENAP is authorised under section 36 of the *Electricity Network Assets (Authorised Transactions) Act 2015* to extinguish Land Interests on behalf of EDMHC.

The right to extinguish is restricted to Land Interests vested in EDMHC and includes Land Interests created in the name of:

a) Endeavour Energy

b) Integral Energy Australia

c) MetSouth Energy

d) Prospect Electricity and its local government electricity predecessors such as Prospect County Council

e) Illawarra Electricity and its local government electricity predecessors such as Illawarra County Council

f) Easements assigned by the Electricity Commission of NSW to Prospect Electricity on 3 June 1994 [Listed in GG No 76 pages 2706-2731]

g) Easements assigned by the Electricity Commission of NSW to Illawarra Electricity on 3 June 1994 [Listed in GG No 76 pages 2687-2705]

h) Public Works' electricity easements transferred under *Energy Services Corporations Act 1995* to Integral Energy Australia on 25 September 1998. [Listed in GG No 139 page 7814-7815]

12.1 Release by Section 88B

A Section 88B releasing an easement in favour of EDMHC under Part 1A must be signed by an attorney of EENAP.

EENAP's execution clause must be added to the Section 88B.

It is **not** possible to release a restriction or a positive covenant under Part 1A of a Section 88B. This must be done by RPA Dealing.

12.2 Release by RPA dealing

A RPA Dealing releasing Land Interests in favour of EDMHC must be signed by an attorney of EENAP.

The most practical RPA Dealing for the cancellation of an easement is LRS form 20ECE, as the alternative Transfer Releasing Easement form requires payment of stamp duty.

The RPA Dealing for the release of a restriction is LRS Form 13RRE.

13.0 TERMS & DIAGRAMS FOR SITE-SPECIFIC CONDITIONS

13.1 Premises Connection Assets Site-Specific Conditions

1.0 Background

1.1 Where the supply of electricity exceeds that which can be supplied by a service line from the street mains the Network Operator may require the customer to provide a place to accommodate its electrical equipment ("Premises Connection Assets"). (See section 28 *Electricity Supply Act 1995*)

1.2 Under Chapter 5A of the National Market Rules and the Model Standing Offer a Customer may be connected to the distribution system subject to Site-Specific Conditions.

1.3 These Conditions are imposed in lieu of the Customer creating a registered Land Interest for the Premises Connection Assets.

2.0 Definitions

2.1 **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.

2.2 **Customer** means the person that submits an application for a Connection Service and includes any subsequent Owner.

2.3 **Premises Connection Assets** means all components of the Network Owner's Distribution System dedicated to the supply of electricity to the Site from the Network Owner's Distribution System.

2.4 **Protection Zone** means any part of the Site that accommodates Premises Connection Assets and is shown as a Protection Zone in the Design Drawing.

2.5 **Network Operator** has the same meaning as the Electricity Supply Act 1995.

2.6 **Network Owner** means Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878 who may exercise its rights by any persons authorised by it.

2.7 **Model Standing Offer** means the Endeavour Energy Model Standing Offer for a Standard Connection Service for Customers.

2.8 **Owner** means the person who controls the Site.

2.9 **Site** means the Customer's premises supplied by the Premises Connection Assets.

3.0 The Owner must:

3.1 provide a Protection Zone for use by the Network Owner and the Network Operator to accommodate the Premises Connection Assets,

3.2 provide the Protection Zone free of cost,

3.3 maintain the Protection Zone in a satisfactory state of repair, but is not responsible for maintaining the Premises Connection Assets,

3.4 not change surface levels within the Protection Zone

3.5 not install anything or plant trees and shrubs within the Protection Zone without the Network Operator's prior written approval,

3.6 if the Protection Zone is located within its building, not interfere with the ventilation of the Protection Zone,

3.7 not direct drainage into the Protection Zone,

3.8 not do or permit to be done anything that restricts the Network Operator's access to the Premises Connection Assets, and

3.9 if the Protection Zone is located outside its building, not construct or maintain a substantial structure with roof and walls unless the external surface of the structure has:

3.9.1 *120/120/120 Fire Rating* within 1.5 metres of the Premises Connection Assets, and

3.9.2 *60/60/60 Fire Rating* between 1.5 and 3 metres from the Premises Connection Assets.

4.0 The Network Operator may:

4.1 install, repair, replace, maintain, modify, use, operate and remove Premises Connection Assets within the Protection Zone,

4.2 enter the Site using the most practical route at all reasonable times (and at any time in the event of an emergency) and remain there for any reasonable time,

4.3 if the Protection Zone is located within a building, install its own security doors to gain access and to prevent access by others,

4.4 install conduits, cables, and pipes on, under or through the Site for the purpose of connecting the Protection Zone with any services and to operate those services, and

4.5 supply other customers from the Premises Connection Assets.

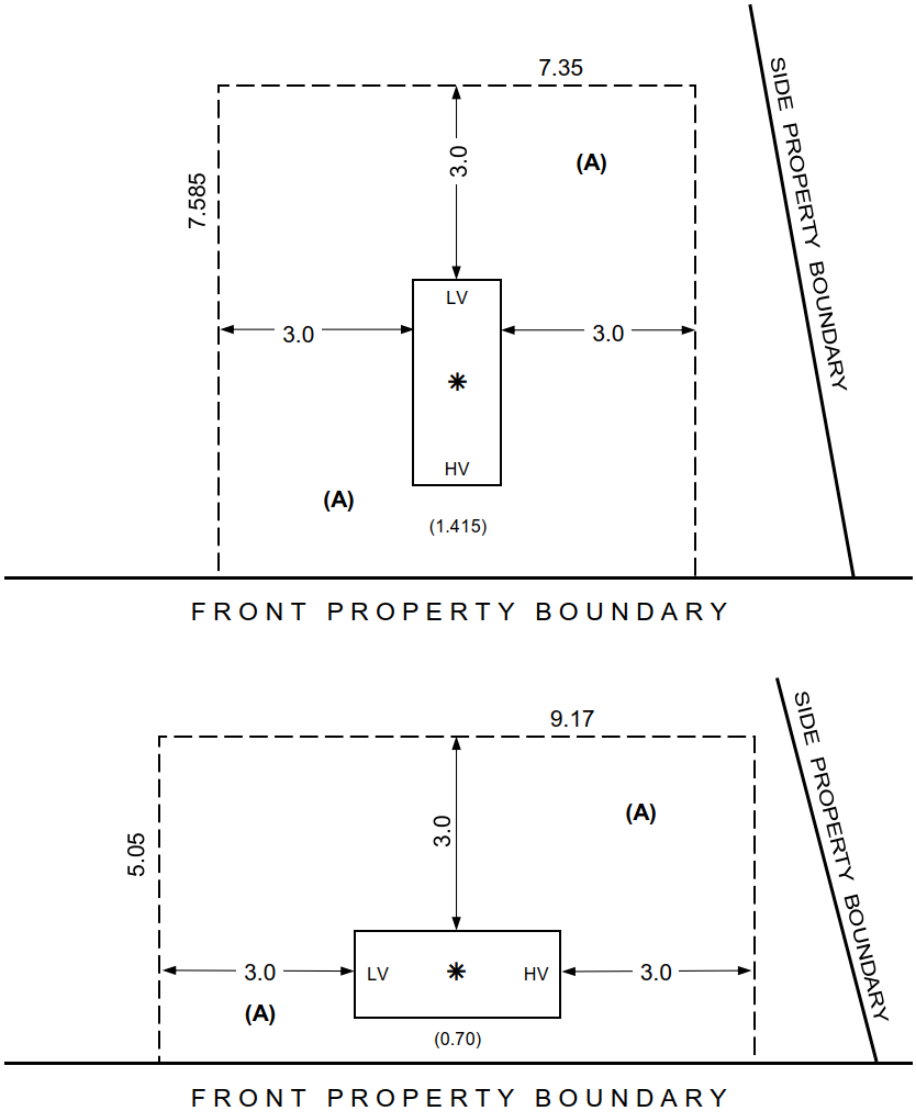
5.0 The Network Operator must:

5.1 maintain the Premises Connection Assets in a safe and reliable condition,

5.2 not cut, drill or demolish any part of the Site without the written permission of the Owner and in accordance with such conditions as the Owner may reasonably impose, and

5.3 take reasonable precautions to minimise disturbance to the Site and restore the Site as nearly as practicable to its original condition.

13.2 Padmount Substation Protection Zone Diagram



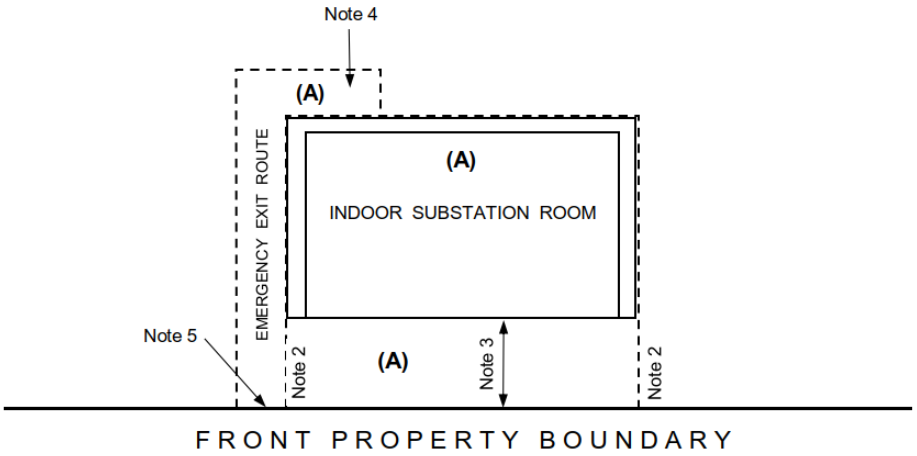
For use with Common Earthed substations in Non - Residential applications only.

(A) Protection Zone
Measured 3.0m from the concrete plinth as shown.

✱ Substation plinth 1.35m x 3.17m at top of concrete
(All offsets to plinth shown from top of concrete)

Note: The Protection Zone must not encroach onto an adjoining lot

13.3 Indoor Substation Protection Zone Diagram

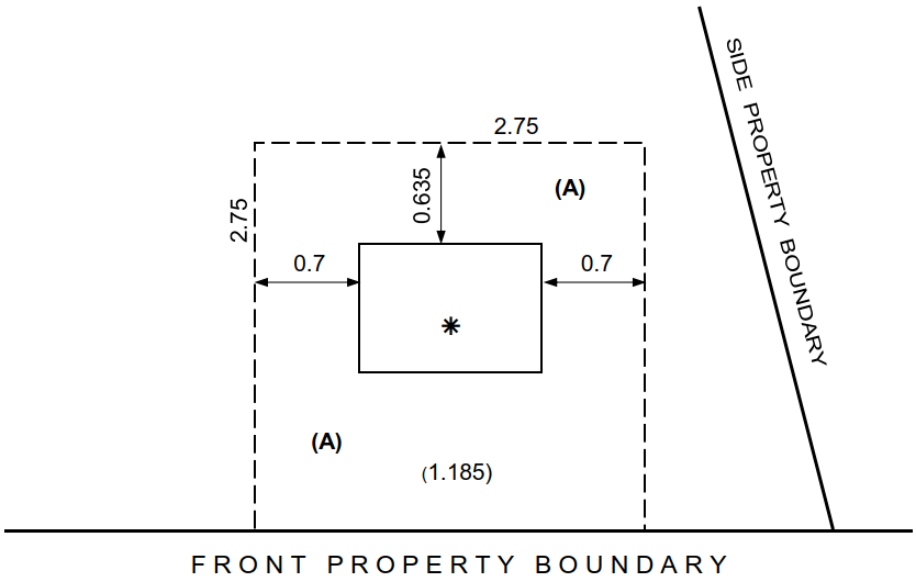


(A) Protection Zone

Notes:

1. Protection zone boundary is located along the outside face of the substation walls.
2. If the front wall of the substation is located inside the front property boundary, the side boundaries of the protection zone are to be extended to meet the front property boundary.
3. The maximum distance allowed between the front property boundary and the indoor substation is 3.0m.
4. If a substation room requires a separate emergency exit route, the route is to be included as part of the protection zone.
5. The minimum width of an emergency exit route is 1.0m.

13.4 Switching Station (High Voltage or Low Voltage) Protection Zone Diagram



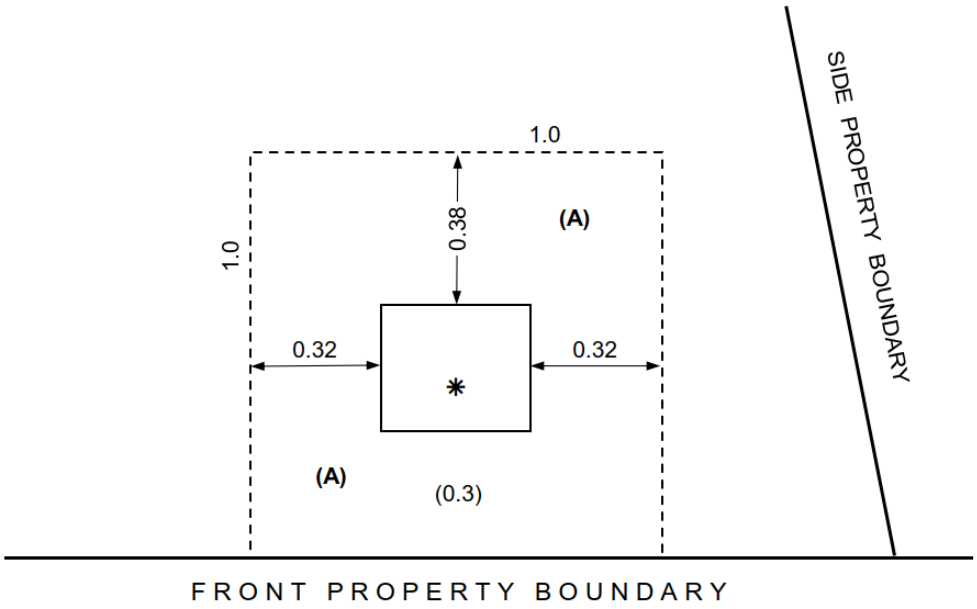
For use with Common Earthed substations in Non - Residential applications only.

(A) Protection Zone
Measured 0.635m and 0.7m from the concrete plinth as shown.

✳ Switching Station plinth 1.35m x 0.93m at top of concrete
(All offsets to plinth shown from top of concrete)

Note: The Protection Zone must not encroach onto an adjoining lot

13.5 LV Pillar Protection Zone Diagram

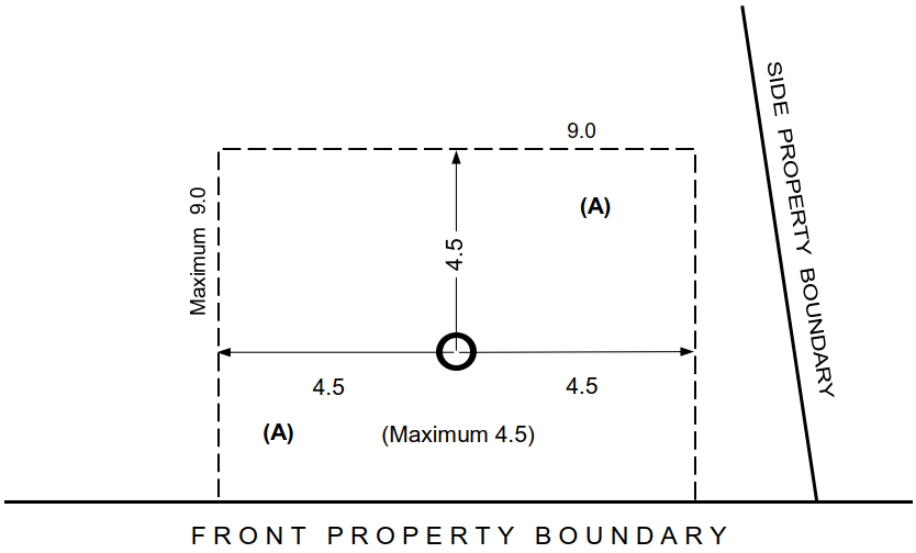


(A) Protection Zone
Distances measured from top of pillar base

✱ Pillar base 0.36m x 0.32m at top of base
(All offsets to pillar shown from top of the base section)

Note: The Protection Zone must not encroach onto an adjoining lot

13.6 Pole-mounted Substation Protection Zone Diagram



(A) Protection Zone
Measured 4.5m from the centre of the pole

Pole supporting a substation

Note: The Protection Zone must not encroach onto an adjoining lot

14.0 REGISTERED LAND INTEREST TERMS

14.1 Easement for Padmount Substation or Switching Station or Auto Transformer

1.0 Definitions

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

1.2 **electrical equipment** includes electrical transformer, electrical switchgear, protective housing, concrete plinth, underground electrical cable, duct, underground earthing system, and ancillary equipment.

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

1.4 **land** means the lot or Torrens title land that is burdened by this easement.

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

1.6 **prescribed authority** means Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878 and its successors (who may exercise its rights by any persons authorised by it).

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

1.8 **structure** includes building, wall, retaining wall, carport, driveway, fence, swimming pool, and fixed plant or equipment; but excludes garden furniture and garden ornament.

2.0 The prescribed authority 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 land 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,

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

2.6 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 the prescribed authority will take reasonable precautions to minimise disturbance to the land and will restore the land as nearly as practicable to its original condition.

4.0 The owner agrees to obtain the written consent of the prescribed authority, and comply with any conditions of consent reasonably imposed by the prescribed authority, prior to:

4.1 installing or permitting to be installed any services or structure within the easement site, or

4.2 altering the surface level of the easement site, or

4.3 doing or permitting to be done anything that restricts access to the easement site by the prescribed authority.

5.0 Electricity Network Assets (Authorised Transactions) Act 2015

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

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 the prescribed authority.

14.2 Easement for Underground Cables and/or Street Lighting Equipment

1.0 Definitions

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

1.2 **electrical equipment** includes underground electrical cable, duct, service pillar, underground earthing system, street lighting equipment, communications cable, and ancillary equipment.

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

1.4 **land** means the lot or Torrens title land that is burdened by this easement.

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

1.6 **prescribed authority** means Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878 and its successors (who may exercise its rights by any persons authorised by it).

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

1.8 **structure** includes building, wall, retaining wall, carport, driveway, fence, swimming pool, and fixed plant or equipment; but excludes garden furniture and garden ornament.

2.0 The prescribed authority 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 land 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,

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

2.6 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 the prescribed authority will take reasonable precautions to minimise disturbance to the land and will restore the land as nearly as practicable to its original condition.

4.0 The owner agrees to obtain the written consent of the prescribed authority, and comply with any conditions of consent reasonably imposed by the prescribed authority, prior to:

4.1 installing or permitting to be installed any services or structure within the easement site, or

4.2 altering the surface level of the easement site, or

4.3 doing or permitting to be done anything that restricts access to the easement site by the prescribed authority.

5.0 Electricity Network Assets (Authorised Transactions) Act 2015

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

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 the prescribed authority.

14.3 Easement for Overhead Power Line

1.0 Definitions

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

1.2 **electrical equipment** includes pole, overhead electrical cable, underground electrical cable, duct, underground earthing system, and ancillary equipment.

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

1.4 **land** means the lot or Torrens title land that is burdened by this easement.

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

1.6 **prescribed authority** means Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878 and its successors (who may exercise its rights by any persons authorised by it).

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

1.8 **structure** includes building, wall, retaining wall, carport, driveway, swimming pool, and fixed plant or equipment; but excludes garden furniture and garden ornament.

2.0 The prescribed authority 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 land 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,

2.5 install its own access gates and locks,

2.6 trim or remove any vegetation from the land 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 the prescribed authority will take reasonable precautions to minimise disturbance to the land and will restore the land as nearly as practicable to its original condition.

4.0 The owner agrees to obtain the written consent of the prescribed authority, and comply with any conditions of consent reasonably imposed by the prescribed authority, prior to:

4.1 installing or permitting to be installed any services or structure within the easement site, or

4.2 altering the surface level of the easement site, or

4.3 doing or permitting to be done anything that restricts access to the easement site by the prescribed authority.

5.0 Electricity Network Assets (Authorised Transactions) Act 2015

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

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 the prescribed authority.

14.4 Easement for Overhead Power Lines and Underground Cables

1.0 Definitions

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

1.2 **electrical equipment** includes pole, overhead electrical cable, underground electrical cable, duct, service pillar, underground earthing system, and ancillary equipment.

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

1.4 **land** means the lot or Torrens title land that is burdened by this easement.

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

1.6 **prescribed authority** means Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878 and its successors (who may exercise its rights by any persons authorised by it).

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

1.8 **structure** includes building, wall, retaining wall, carport, driveway, swimming pool, and fixed plant or equipment; but excludes garden furniture and garden ornament.

2.0 The prescribed authority 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 land 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,

2.5 install its own access gates and locks,

2.6 trim or remove any vegetation from the land 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 the prescribed authority will take reasonable precautions to minimise disturbance to the land and will restore the land as nearly as practicable to its original condition.

4.0 The owner agrees to obtain the written consent of the prescribed authority, and comply with any conditions of consent reasonably imposed by the prescribed authority, prior to:

4.1 installing or permitting to be installed any services or structure within the easement site, or

4.2 altering the surface level of the easement site, or

4.3 doing or permitting to be done anything that restricts access to the easement site by the prescribed authority.

5.0 Electricity Network Assets (Authorised Transactions) Act 2015

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

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 the prescribed authority.

14.5 Easement for Support Stay

1.0 Definitions

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

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

1.3 **land** means the lot or Torrens title land that is burdened by this easement.

1.4 **owner** means the registered proprietor of the land and its successors (including those claiming under or through the registered proprietor).

1.5 **prescribed authority** means Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878 and its successors (who may exercise its rights by any persons authorised by it).

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

1.7 **structure** includes building, wall, retaining wall, carport, driveway, fence, swimming pool, and fixed plant or equipment; but excludes garden furniture and garden ornament.

1.8 **support stay** includes pole, concrete strainer block, cable, wire, and ancillary equipment.

2.0 The prescribed authority may:

2.1 install a support stay within the easement site,

2.2 excavate the easement site to install the support stay,

2.3 enter the land 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,

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

2.5 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 the prescribed authority will take reasonable precautions to minimise disturbance to the land and will restore the land as nearly as practicable to its original condition.

4.0 The owner agrees to obtain the written consent of the prescribed authority, and comply with any conditions of consent reasonably imposed by the prescribed authority, prior to:

4.1 installing or permitting to be installed any services or structure within the easement site, or

4.2 altering the surface level of the easement site, or

4.3 doing or permitting to be done anything that restricts access to the easement site by the prescribed authority.

5.0 Electricity Network Assets (Authorised Transactions) Act 2015

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

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 the prescribed authority.

14.6 Easement for 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 land 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 **install** includes construct, repair, replace, maintain, modify, use, and remove.

1.5 **land** means the lot or Torrens title land that is burdened by this easement.

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

1.7 **prescribed authority** means Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878 and its successors (who may exercise its rights by any persons authorised by it).

1.8 **services** includes electricity, telephone, communications, ventilation, water, sewage, and drainage services.

2.0 The prescribed authority 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 land 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,

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 The prescribed authority agrees to obtain the written consent of the owner, and comply with any conditions of consent reasonably imposed by the owner, prior to cutting, drilling, altering or demolishing any part of the building as necessary to install or operate the electrical equipment.

4.0 In exercising its rights under this easement the prescribed authority will take reasonable precautions to minimise disturbance to the land and will restore the land as nearly as practicable to its former condition.

5.0 The owner agrees to obtain the written consent of the prescribed authority, and comply with any conditions of consent reasonably imposed by the prescribed authority, prior to:

5.1 installing or permitting to be installed any thing within the easement site, or

5.2 interfering with, allowing to be interfered with, or preventing the ventilation of the easement site, or

5.3 directing or allowing to be directed drainage into the easement site, or

5.4 doing or permitting to be done anything that restricts access to the easement site by the prescribed authority.

6.0 Electricity Network Assets (Authorised Transactions) Act 2015

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

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 the prescribed authority.

14.7 Right of Access

1.0 Definitions

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

1.2 **land** means the lot or Torrens title land that is burdened by this easement.

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

1.4 **prescribed authority** means Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878 and its successors (who may exercise its rights by any persons authorised by it).

2.0 The prescribed authority 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 land, and
2.2.2 taking anything on to the land, and
2.2.3 carrying out work within the access site such as constructing, placing, repairing or maintaining trafficable surfaces, driveways or structures.

3.0 In exercising its rights under this easement, the prescribed authority must:

3.1 ensure all work is done properly, and

3.2 cause as little inconvenience as is practicable to the owner and any occupier of the land, and

3.3 cause as little damage as is practicable to the land and any improvement on it, and

3.4 restore the land as nearly as is practicable to its former condition, and

3.5 make good any collateral damage.

4.0 Electricity Network Assets (Authorised Transactions) Act 2015

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

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 the prescribed authority.

14.8 Restriction on the Use of Land – Fire Rating of Buildings

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 **owner** means the registered proprietor of the lot or Torrens title land that is affected by this restriction and its successors (including those claiming under or through the registered proprietor).

1.5 **prescribed authority** means Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878 and its successors (who may exercise its rights by any persons authorised by it).

1.6 **restriction site** means that part of the lot or Torrens title land that is affected by this restriction on the use of land.

2.0 No building shall 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 more than 1.5 metres from the substation footing has a 60/60/60 fire rating, and

2.3 the owner provides the prescribed authority with an engineer’s certificate to this effect.

3.0 The 120/120/120 fire rating and 60/60/60 fire rating must be achieved without the use of fire fighting systems such as automatic sprinklers.

4.0 No doors or opening windows are permitted to be erected within the restriction site on the external surface of a building within 3 metres from the substation footing.

5.0 Electricity Network Assets (Authorised Transactions) Act 2015

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

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 the prescribed authority.

14.9 Restriction on the Use of Land – Swimming Pools and Spas

1.0 Definitions

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

1.2 **owner** means the registered proprietor of the lot or Torrens title land that is affected by this restriction and its successors (including those claiming under or through the registered proprietor).

1.3 **prescribed authority** means Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878 and its successors (who may exercise its rights by any persons authorised by it).

1.4 **restriction site** means that part of the lot or Torrens title land that is affected by the restriction on the use of land.

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

3.0 Electricity Network Assets (Authorised Transactions) Act 2015

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

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 the prescribed authority.

14.10 Restriction on the Use of Land – Metallic Structures

1.0 Definitions

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

1.2 **owner** means the registered proprietor of the lot or Torrens title land that is affected by this restriction and its successors (including those claiming under or through the registered proprietor).

1.3 **prescribed authority** means Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878 and its successors (who may exercise its rights by any persons authorised by it).

1.4 **restriction site** means that part of the lot or Torrens title land that is affected by the restriction on the use of land.

2.0 No metallic structure shall be erected or permitted to remain within the restriction site except for metallic fencing if the fence panels are insulated from the fence posts and from the ground.

3.0 Electricity Network Assets (Authorised Transactions) Act 2015

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

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 the prescribed authority.

14.11 Positive Covenant – Fire Screen Wall

1.0 Definitions:

1.1 **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.

1.2 **fire screen wall** means a wall constructed of non-combustible material that achieves a 120/120/120 fire rating up to a minimum height of 6 metres from the level of the substation footing, including any structures attached to the wall such as a fire screen overhang, a fire screen roof, eaves and gutters.

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

1.4 **positive covenant site** means that part of the lot or Torrens title land that is affected by this positive covenant.

1.5 **prescribed authority** means Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878 and its successors (who may exercise its rights by any persons authorised by it).

2.0 The owner covenants with the prescribed authority that:

2.1 the owner will construct a fire screen wall within the positive covenant site; and

2.2 the owner will maintain the fire screen wall in a satisfactory state of repair and in accordance with any reasonable conditions that the prescribed authority may impose.

3.0 Electricity Network Assets (Authorised Transactions) Act 2015

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

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 the prescribed authority.

15.0 BY-LAWS FOR COMMUNITY TITLE SUBDIVISIONS

15.1 Access Ways

To maintain access to new Network Assets by Endeavour Energy, the following by-law must be incorporated into all community title management statements.

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.

15.2 Ownership of Assets by the Association

Where the community association is responsible for the low voltage electricity system (including street lighting) within the community title development, the following by-law must be incorporated into all community title management statements.

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.

16.0 CONTRACTUAL LICENCE TEMPLATE

Cover Page:
Licence for Electrical Equipment
[insert site description]
The Licensor and the Licensee enter into this licence in accordance with Schedule 1 and Schedule 2.

Schedule 1 – Commercial Terms

Land	
Building:	
Licensed Area:	Part of the [Building on the Land OR Land] being [insert] as shown on the plan in
Licence Fee	$1 plus GST
Commencing Date:	
Expiry Date	
Term	The period from the Commencing Date to the Expiry Date subject to the terms of this Licence
Licensee:	Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878.
Licensee address:	C/- Endeavour Energy – 51 Huntingwood Drive, Huntingwood NSW 2148
Licensor:	
Licensor address:	
Access Hours:	
Electrical Equipment:	[describe equipment] in accordance with the Design Drawings
Design Drawings	Endeavour Energy drawing no. [insert]
Variations to Conditions	[Insert if applicable: 1. Improvement means any building, structure or improvement. 2. Restriction Site means [describe area]. 3. The Licensor must not construct, install, build or maintain (**erect)** or permit to be erected within the Restriction Site any Improvement unless: (a) the external surface of the Improvement erected within 1.5 metres from the Electrical Equipment has a 120/120/120 fire rating, and (b) the external surface of the Improvement erected more than 1.5 metres from the Electrical Equipment has a 60/60/60 fire rating, and (c) the Licensor provides the Licensee with an engineer's certificate to this effect.

	4. The 120/120/120 fire rating and 60/60/60 fire rating must be achieved without the use of fire fighting systems such as automatic sprinklers. 5. The Licensor must not erect or install or permit to be erected or remain: (a) within 3 metres from the Electrical Equipment any doors or opening windows on the external surface of an Improvement; or (b) any metal structure within the Restriction Site (except for metallic fencing if the fence panels are insulated from the fence posts and from the ground).]

Schedule 2 – Licence Terms

1. The Licensor grants to the Licensee an exclusive licence of the Licensed Area to:

   (a) construct, install, build, maintain, remove from and repair the Electrical Equipment in the Licensed Area;

   (b) excavate the Licensed Area to install the Electrical Equipment;

   (c) use and operate the Electrical Equipment for the transmission of electricity;

   (d) enter the Land using the most practical route over the Land owned by the Licensor (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;

   (e) trim or remove any vegetation from the Land that interferes with or prevents reasonable access to the Licensed Area site or the Electrical Equipment, and

   (f) remove any encroachments from the Licensed Area and recover the costs of carrying out the removal work and repairing any damage done to the Electrical Equipment by the encroachment.

2. In exercising its rights under this licence the Licensee will take reasonable precautions to minimise disturbance to the Licensor.

3. Subject to its rights in this licence, the Licensee will repair any damage it causes to the Licensed Area.

4. At the end and of this Licence the Licensor will at its cost remove the Electrical Equipment and restore the Licensed Area as nearly as practicable to its former condition.

5. The Licensor acknowledges receipt of the Licence Fee from the Licensee for the Term.

6. The Licensor must obtain the Licensee's prior written consent and comply with the Licensor's reasonable conditions, prior to:

   (a) installing or permitting to be installed any services or structure within the Licensed Area,

   (b) altering the surface level of the Licensed Area, or

   (c) doing or permitting to be done anything that interferes with the Electrical Equipment or restricts the Licensors' access to the Licensed Area.

7. If the Licensee requires that the Electricity Equipment remain on the Land at the end of the Term the Licensor:

   (a) must if requested by the Licensee grant a further licence of the Licensed Area to the Licensee for a new 'Term' nominated by the Licensee but otherwise on the same terms as this licence with a new 'Commencing Date' being the day after the Expiry Date; and

   (b) otherwise acknowledges and does not object to the Licensee's rights to retain the Electrical Equipment on the Licensed Area under Section 28 of the Electricity Supply Act 1995

8. Subject to clause 7 this licence terminates automatically at the end of the Term or the removal of the Electricity Equipment (whichever occurs first).

9. If the Licensor sells the Land it must at the Licensor's cost novate this licence to the purchaser of the Land. The Licensee may novate this licence to another party on notice to the Licensor. The Licensor must do all things reasonably required by the Licensee to document a novation of this Licence in accordance with this clause 9.

10. The Licensor releases Licensee and agrees that the Licensee is not liable for, any cost, claim, loss, liability, damage, proceeding, order, judgment or expense (Claim) arising from, or incurred in connection with the Licensee's use of the Licensed Area, this licence or the Electrical Equipment except to the extent arising due to the negligent act or omission or the default of the Licensee.

11. The Licensor indemnifies the Licensee from and against all Claims for death, injury, loss, interference or damage arising from, or which the Licensee incurs or is liable for as a result of or in connection with the act, omission, negligence or default of the Licensor (or its employees, agents, contractors or invitees) or failing to keep the Licensed Area secure.

12. Any notice must be in writing and sent to the address or email address of the party as shown in Schedule 1 (as varied by notice). If sent by post, the notice is taken to have been received 3 business days after being posted.

13. This Licence is governed by the laws of the state or territory in Australia in which the Licensed Area is located. The parties submit to the non–exclusive jurisdiction of courts exercising jurisdiction in that state or territory.

14. GST means any goods and services tax imposed under A New Tax System (Goods and Services Tax) Act 1999 (Cth) in respect of taxable supplies made under this Licence.

15. Capitalised expressions used in this licence are defined in Schedule 1.

16. Reference to a statute includes any amendments, re–enactments or replacements of it.

17. Each party must bear its own costs of and incidental to the negotiation, preparation and execution of this licence.

18. This licence does not confer upon the Licensee any estate or interest in the Licensed Area or the Land and in particular this licence will not operate as a demise or constitute any contract of tenancy.

19. This Licence may be executed in any number of counterparts. All counterparts taken together will be taken to constitute one agreement.

Background to Distribution Network Lease

20. On 14 June 2017, Epsilon Distribution Ministerial Holding Corporation (as Lessor), on behalf of the State of New South Wales, entered into a 99 year lease of Endeavour Energy's Distribution Network (refer to NSW Government Gazette No 62 of 14 June 2017). The Lessee is the Asset Partnership, which has sub-leased its interest in the lease to the Operator Partnership which operates the business, trading as Endeavour Energy.

21. **Asset Partnership** means the Endeavour Energy Network Asset Partnership ABN 30 586 412 717, consisting of the following entities in each of their respective shares as tenants in common.

Entity	Share
Edwards A Pty Limited ACN 618 642 961	50.4%
ERIC Epsilon Asset Corporation 1 Pty Ltd ACN 617 221 575	12.4%
ERIC Epsilon Asset Corporation 2 Pty Ltd ACN 617 221 655	12.4%
ERIC Epsilon Asset Corporation 3 Pty Ltd ACN 617 221 708	12.4%
ERIC Epsilon Asset Corporation 4 Pty Ltd ACN 617 221 726	12.4%

22. **EDMHC** means the Epsilon Distribution Ministerial Holding Corporation ABN 59 253 130 878.

23. **Operator Partnership** means the Endeavour Energy Network Operator Partnership ABN 11 247 365 823, consisting of the following entities in each of their respective shares as tenants in common.

Entity	Share
Edwards O Pty Limited ACN 618 643 486	50.4%
ERIC Epsilon Operator Corporation 1 Pty Ltd ACN 617 221 735	12.4%
ERIC Epsilon Operator Corporation 2 Pty Ltd ACN 617 221 744	12.4%
ERIC Epsilon Operator Corporation 3 Pty Ltd ACN 617 221 753	12.4%
ERIC Epsilon Operator Corporation 4 Pty Ltd ACN 617 221 771	12.4%

24. Notwithstanding any other **provision** of this Licence the Licensor acknowledges and agrees that the Asset Partnership (or any entity forming part of the Asset Partnership, jointly and severally) and any nominee of that partnership (which may include the Operator Partnership or any entity forming part of the Operator Partnership, joint and severally) may, without the need for any further approvals or agreements, exercise the rights and perform the obligations of the EDMHC under this License as if the Asset Partnership and Operator Partnership (as applicable) was the EDMHC, but for only so long as the Asset Partnership continues to be the Lessee of EDMHC's distribution system.

Plan page/s:
Plan
[insert plan]

Executed as a deed

[insert execution clause for Licensor]

……..as agent for Michael Pratt, NSW Treasury Secretary (NSW Treasurer's delegate under delegation dated 24 November 2015), on behalf of the **Epsilon Distribution Ministerial Holding Corporation** ABN 59 253 130 878.

_____
Signature of witness

_____
Name of witness

(BLOCK LETTERS)

17.0 EXECUTION CLAUSES

17.1 Execution Clause for 88B

I certify that the attorney signed this instrument in my presence.

Signed by the attorney named below who signed this instrument pursuant to the power of attorney specified for **Endeavour Energy Network Asset Partnership (ABN 30 586 412 717)** on behalf of **Epsilon Distribution Ministerial Holding Corporation (ABN 59 253 130 878)** pursuant to section 36 of the *Electricity Network Assets (Authorised Transactions) Act 2015* (NSW)

Signature of witness:

_____

Name of witness:

_____

Address of witness:
c/- Endeavour Energy
51 Huntingwood Drive
Huntingwood NSW 2148

Signature of attorney:

_____

Attorney name: _____

Attorney position: _____

Power of attorney: Book _____

No _____

EE reference: _____

Date: _____

17.2 Execution Clause for RPA Dealing

I certify that I am an eligible witness and the attorney signed this instrument in my presence.

Certified correct for the purposes of the Real Property Act 1900 by the attorney named below who signed this instrument pursuant to the power of attorney specified for **Endeavour Energy Network Asset Partnership (ABN 30 586 412 717)** on behalf of **Epsilon Distribution Ministerial Holding Corporation (ABN 59 253 130 878)** pursuant to section 36 of the *Electricity Network Assets (Authorised Transactions) Act 2015* (NSW)

Signature of witness:

_____

Name of witness:

_____

Address of witness:
c/- Endeavour Energy
51 Huntingwood Drive
Huntingwood NSW 2148

Signature of attorney:

_____

Attorney name: _____

Attorney position: _____

Power of attorney: Book _____

No _____

EE reference: _____

Date: _____

Living with Easements



Endeavour Energy

POWER together

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What is an Easement

An easement is a legal right granted by a property owner over their land that permits another party to use the land for a specified purpose. Once an easement is granted, it remains on the land title in perpetuity and each subsequent property owner is bound by the easement rights until the beneficiary of the easement cancels the rights.

An easement can come in different forms and with various rights. These rights are known as the easement terms.

As an easement is just rights to use/occupy a portion of the land for a specific purpose, ownership of that part of the land that the easement site is located remains with the property owner.

Endeavour Energy easements – Why they are required

Electricity suppliers, such as Endeavour Energy, need electricity easements so they can safely access, operate and maintain a reliable and safe electricity network.

Electricity easements supplement the rights provided by NSW legislation under the Electricity Supply Act 1995 and permit electrical infrastructure, such as poles, overhead electricity conductors, underground electricity cables and electricity substations, to be installed on private land.

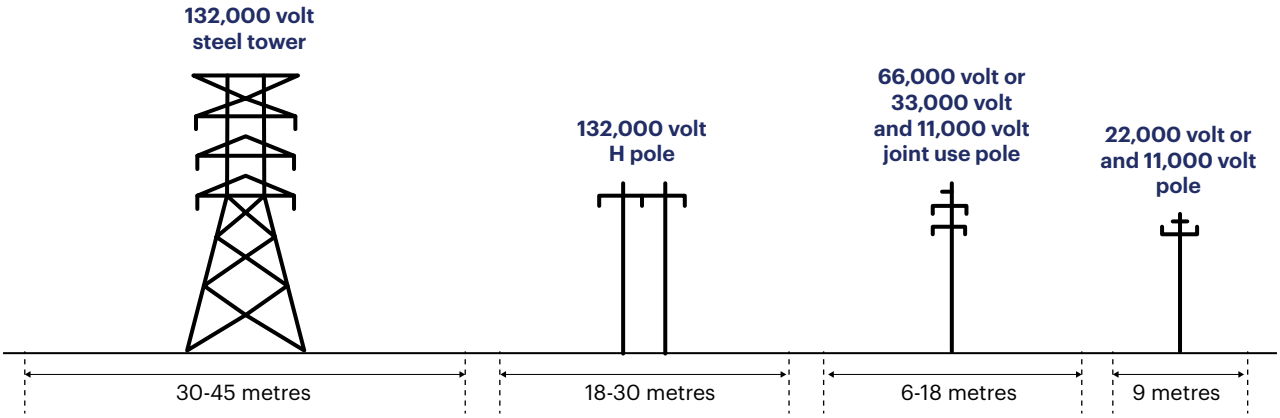
Endeavour Energy electricity easements have been formulated to ensure a safety clearance zone can be maintained around the electricity infrastructure and to allow Endeavour Energy staff access to the asset in cases of an emergency or for planned maintenance purposes.

Property owners must allow Endeavour Energy staff to access powerlines, transformers and other network equipment that is located within an electricity easement on their property. This might mean installation of a Utility Lock for dual access purposes on gates.

Common types of Endeavour Energy easements – what do they look like?

Overhead powerline easement

This easement protects overhead electrical infrastructure such as towers, poles and stays including conductors and can range from 9m wide to 45m wide depending on the voltage of the powerline. The higher the voltage, the wider the easement needs to be. This is to ensure there is suitable safety blowout clearance between the conductor and any building, structure, or vegetation near the powerline as conductor can swing in windy conditions.



Some typical Endeavour Energy easement power lines

Exclusion Zone around a pole or tower

Endeavour Energy has developed an exclusion zone around Endeavour Energy powerlines, towers and structures that enables suitable activities within easements, while providing a safe access and work clearance areas near the asset to protect the network and provide public safety.

Exclusion zones measured at ground level, are,

- 5.0 metres radius from a power pole, and
- 10.0 metres radius from the leg of towers/stanchions.

Most activities are prohibited within the exclusion zone, to ensure unobstructed access to the pole or tower in case it needs to be replaced.

Underground Cable easement

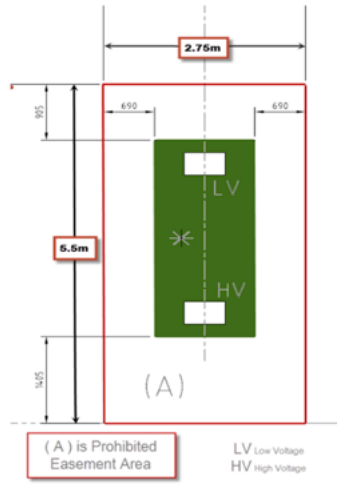
This easement protects underground infrastructure such as cables, conduits and pillars and generally range from 1m wide to 6m wide depending on the voltage of the cable. See table 1 below. The higher the voltage, the wider the easement needs to ensure a suitable safety clearance is maintained when excavating the ground near the cable and to allow reasonable access to the cable for maintenance and upgrade purposes.

Minimum easement width table

Voltage	Asset type	Construction	Minimum Easement (m)
400v - 22kv	Cables	Ducted / direct buried	3
		Concrete covered ducts (Min 75 mm concrete cover at Standard burial depth)	1
33kv - 132kv	Cables (Single feeder only)	Ducted / direct buried	5
		Cable pits / joint bays	6

Padmount Substation easement

This easement protects electricity transformer infrastructure that connect to the underground electricity network. The transformer equipment is in a locked cubicle, normally green in colour (example shown below), and **the minimum standard easement is 5.5m long X 2.75m**, however this may vary at times to suit the location conditions.



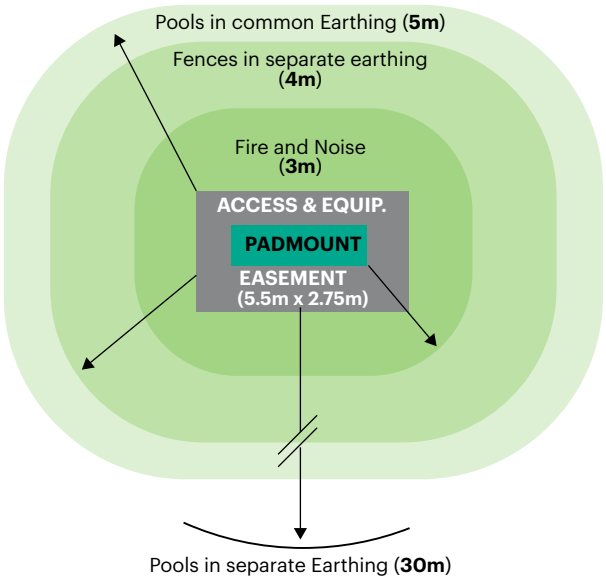


Example of a padmount substation

Padmount Substation restriction zone

Associated with a padmount substation easement, Endeavour Energy may register on the land title, restrictions on the use of land that allows Endeavour Energy to control development near a padmount substation for safety purposes. The most common restrictions are:

1. **Fire restriction zone** – This restriction requires any building within 3m of the padmount substation to meet the appropriate fire resistance level in compliance with Australian Standard 1530 and the National Construction Code (NCC). An electricity padmount substation is considered a fire source under the NCC and the purpose of this restriction is to minimise and protect the building from damage should a fire occur in the padmount substation.
2. **Swimming pool restriction zone** – This restriction prohibits a swimming pool or spa being installed within a certain area near the padmount substation easements depending on the earthing system installed with the substation. The purpose of this earthing system is to ensure the safe and reliable operation of the electrical network at the time of an electricity fault occurring in the substation. Swimming pools and spas near an earthing system require particular care and assessment, due to the increased risk of persons being vulnerable to electrical shock if an earthing fault occurs in the padmount substation. Swimming pools and spas installed near a padmount substation should be equipotential bonded and earthed and/or separately isolated in accordance with Australian Standard AS/NZS 3000.
3. **Metal Fencing and structure restriction zone** – This restriction is to provide a safety clearance between metallic fences/structures and padmount substations with separate earthing. It prohibits metal structures being erected near the padmount substation and requires metallic fencing near the substation to be insulated from the fence posts and from the ground.



Padmount easements and clearances

What activities are allowed within an electricity easement or near electricity infrastructure.

For many years, Endeavour Energy has assessed the safety risk of various activities that residences and businesses have sought to place in an easement. These assessments have considered the safety impact of the activity to the electricity infrastructure whilst maintaining appropriate access to operate the electricity infrastructure.

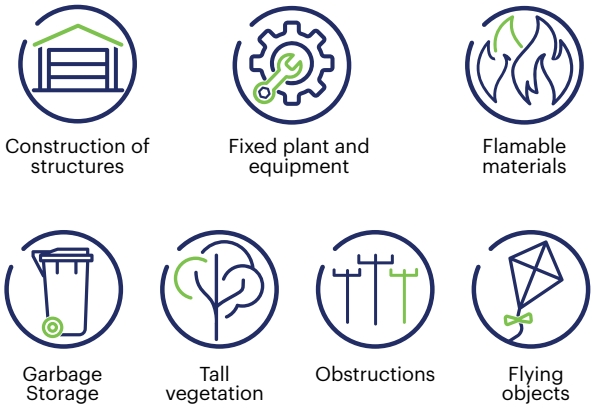
If you are proposing an activity or development within or adjacent to an easement, you must contact Endeavour Energy and seek advice/permission if the activity or development can proceed and if any conditions will apply.

Endeavour Energy will assess each request on its own merit and consider the impact of the activity or development on the electricity asset located in the easement. This will include safe access for Endeavour Energy staff working on the asset and safety considerations for the occupants of the land.

Written advice will be provided for each request that either gives permission or deny the request.

Examples of Prohibited activities in an Endeavour Energy Easement

The following are examples of activities that are prohibited within an Endeavour Energy easement and **No Approval** will be given under any circumstance.



- Residential houses, granny flats, garages, shipping containers or large structures.
- Commercial and Industrial buildings.
- Swimming pools and Spas – inground and above ground.
- Excavating or filling the land over an underground cable.
- Excavating or filling the land under a powerline within 5.0 metres of any power pole, support wire or within 10.0 metres of a steel tower structure.
- Obstructions within 5.0 metres of any power pole, support wire or within 10.0 metres of a steel tower structure.
- Storage of any flammable, corrosive, combustible or explosive materials and liquids such as petrol, diesel fuel and gas bottles.
- Planting or cultivating trees or shrubs which exceed 3.0 metres in height or that have a root system greater than 400mm deep.
- Sound walls, Fire/Blast walls, Retaining walls or their footings or foundations.

How can I seek Endeavour Energy's permission?

You can seek Endeavour Energy's permission to carry out activity or development within or adjacent to an Endeavour Energy easement by emailing **easements@endeavourenergy.com.au**

This should be done prior to proceeding with the activity or seeking a development consent from the Local Council or your consent authority. Endeavour Energy's permission is given as holder of the easement only and does not constitute approval to carry out the activity or development required under any Planning legislation.

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

Your request for permission should include the following information:

Name of applicant and/or company or Council	✓
Contact information including phone number, address and email address	✓
Property address and Lot and DP no.	✓
Description of the proposed activity or development including its height, depth and location and an assessment of impact on Endeavour Energy's electricity infrastructure.	✓
A detailed legible and to-scale plan showing the proposed activity in relation to property boundaries and Endeavour Energys easement and electricity infrastructure which includes measurements.	✓
For large scale subdivisions, a Site Plan showing how existing easements and electricity proposed access to the easement and electricity infrastructure.	✓
If the activity involves earthworks in an Endeavour Energy easement that has overhead powerlines, a centreline conductor profile survey showing the distance between the existing ground surface level and proposed finished surface levels and the existing conductors.	✓

Who is responsible for Maintenance of the easement site

The land on which an easement is granted remains in the ownership of the property owner with the easement rights permitting Endeavour Energy to install, access and maintain electricity infrastructure. The maintenance of an easement site such as lawn growing and mowing, rubbish and vegetation control and removal, remain the responsibility of the property owner, the same as the rest of their land.

Should Endeavour Energy access or undertake work on the electricity infrastructure in the easement and causes damage to the land, Endeavour Energy must repair and restore the land back to the condition it was before access was obtained.

Easement Maintenance around a Padmount Substation

Endeavour Energy has a responsibility to its staff under Work Health and Safety legislation to provide a safe work environment when working on padmount substations. Endeavour Energy staff regularly attend padmount substations, sometimes at night, when a fault occurs on the network, so it is important have clear unhindered access to the substations with no obstacles or obstructions in the vicinity of the substation that may accidently cause an injury to staff.

Therefore, it is important for the property owner to periodically maintain the area around the padmount substation in a clear and tidy state. Vegetation and fencing should not be placed in a padmount substation easement at all as this restricts access for operation and maintenance.

Having vegetation growing in proximity to the padmount substation is a fire risk that could cause damage to both the padmount substation and any house or building nearby.



Correctly maintained padmount surrounding area

For property owners who may find it onerous to maintain the easement on a regular basis, they may consider covering the surface of an easement around a padmount substation with material that can be easily removed and restored such as grass, wood chips, stones, gravel, or bitumen. As an example, the property owner at their cost, may do the following:

- 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
- Laying of a suitable porous weed mat; and
- Covering the weed mat with 20mm min. size blue metal or coloured stones, wood bark/chips, asphalt or install pavers that are easily lifted.

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

Will an easement impact the value of a property?

Yes, an easement does impact the value of your land. Therefore, when an easement is initially acquired, the property owner is usually compensated in accordance with the *Land Acquisition (Just terms Compensation) Act 1919*.

Once an easement is created it remains on the land title in perpetuity and is an encumbrance that remains with the land. Subsequent property owners are not entitled to any compensation.

An easement can affect the use and development of your property by controlling what you can build in the easement, or near electricity infrastructure, what size trees you can plant, and what outdoor activities you can carry out within the easement.

If you have any questions or concerns about any planned activities or work within an easement or proximity to any electrical infrastructure, please contact us by email at: **easements@endeavourenergy.com.au.**

NOTE: For all electrical incidents, contact Endeavour Energy Emergency Services on 131 003 immediately. Available 24/7.



Endeavour Energy

POWER together

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.

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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

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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.

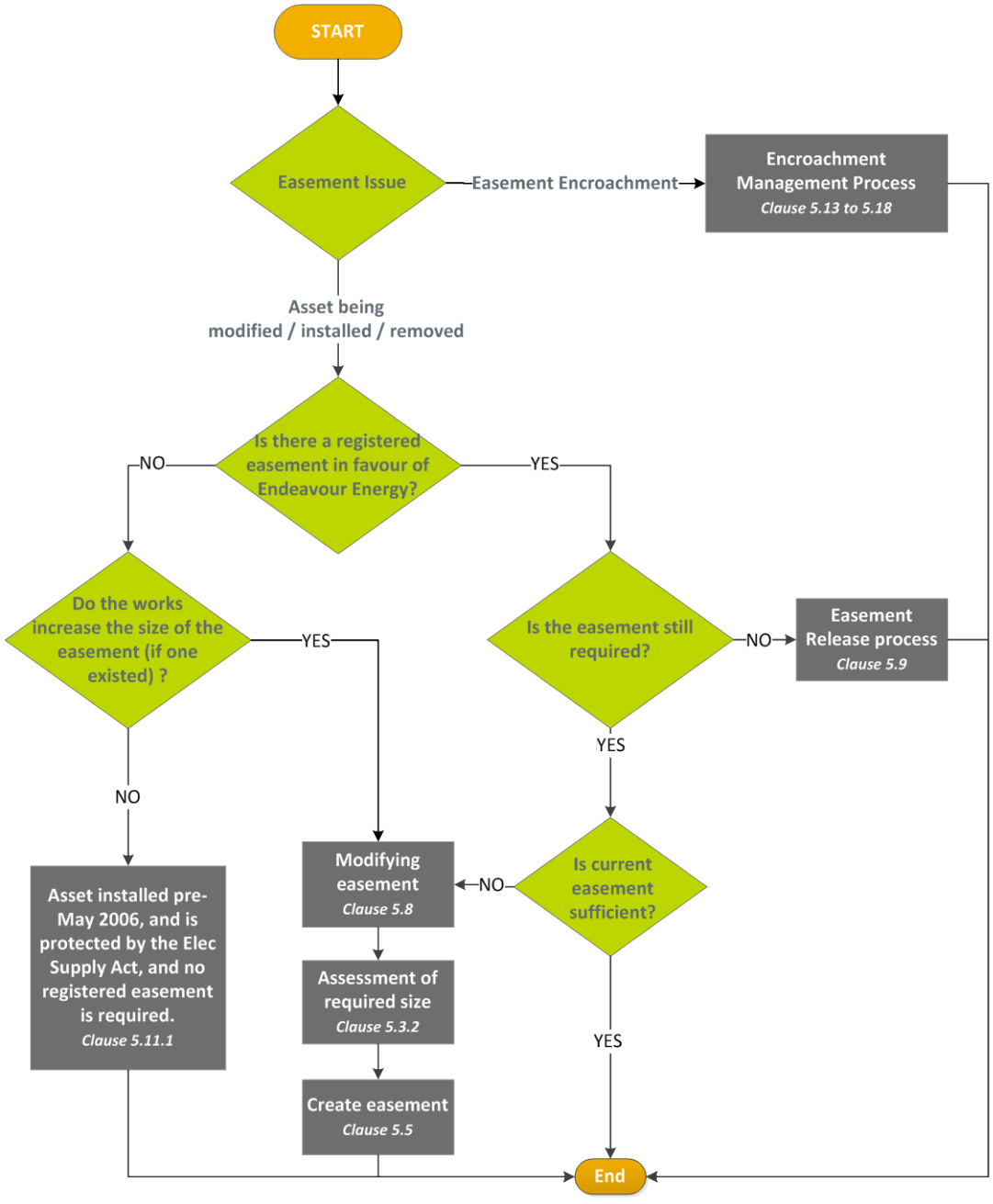


Figure 1 - Easement Management Flowchart

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.

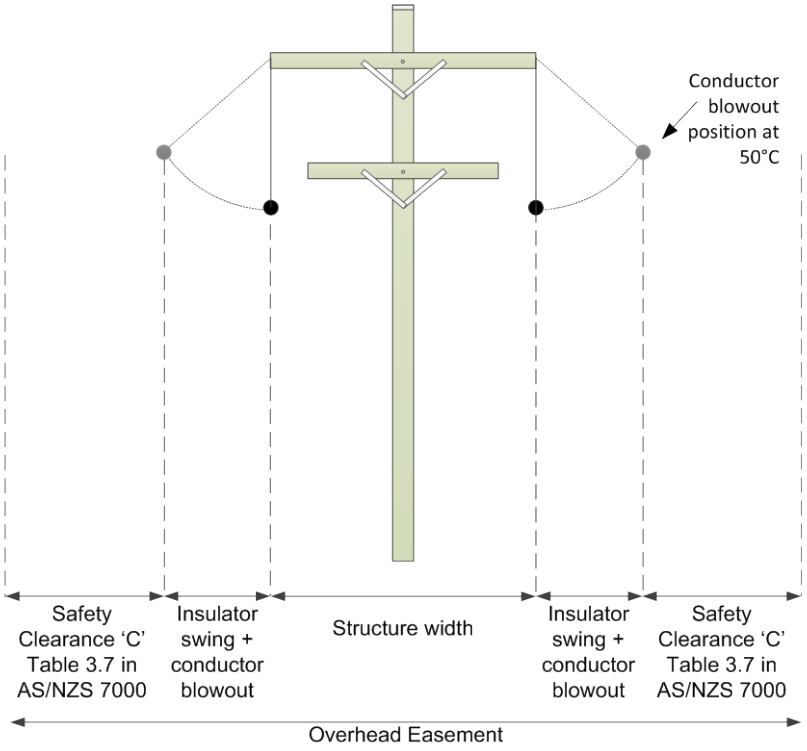


Figure 2 - Minimum overhead easement

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

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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.

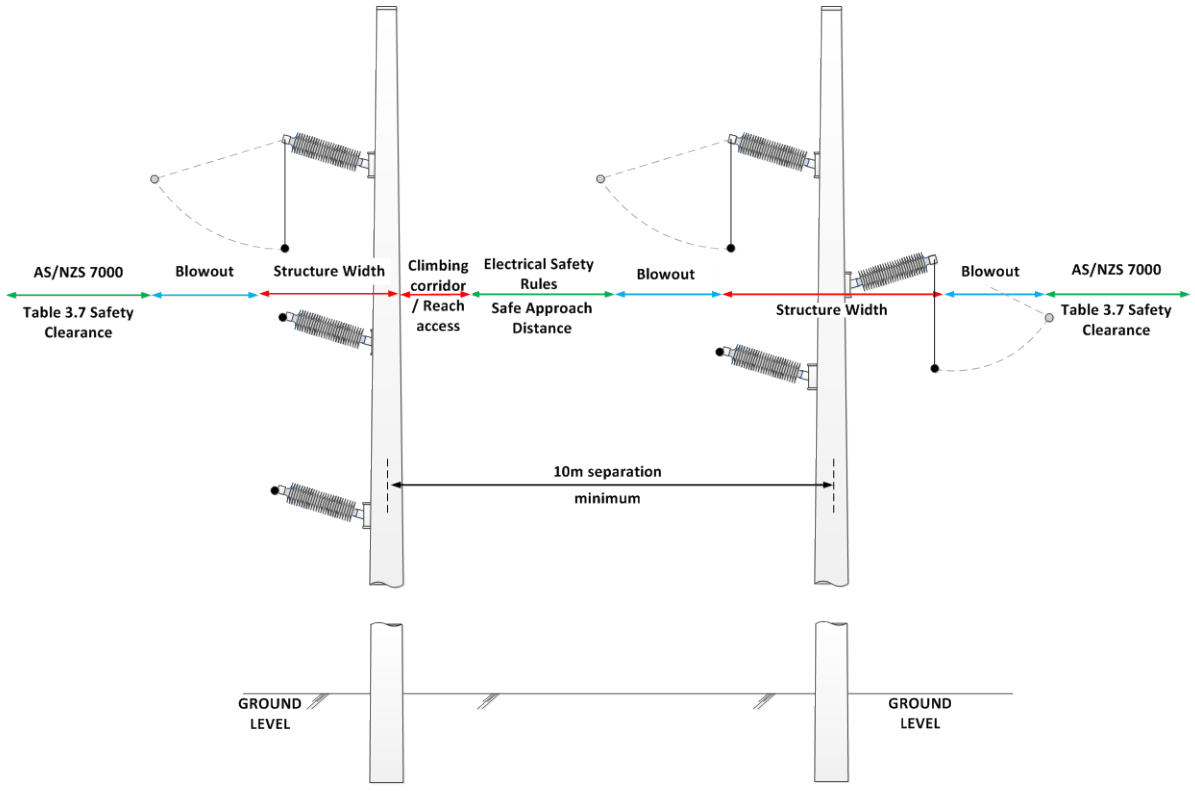


Figure 3 – Easement requirements for parallel feeders
(Structure on the right assumed to have the greatest conductor blowout)

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.

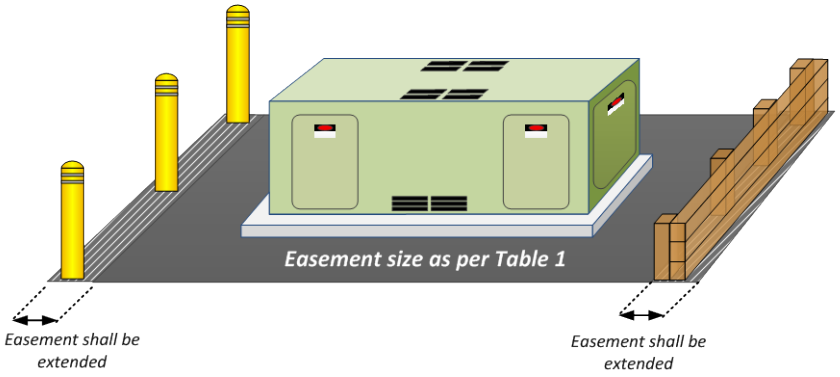


Figure 4 - Easements to include retaining wall or safety bollard

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.

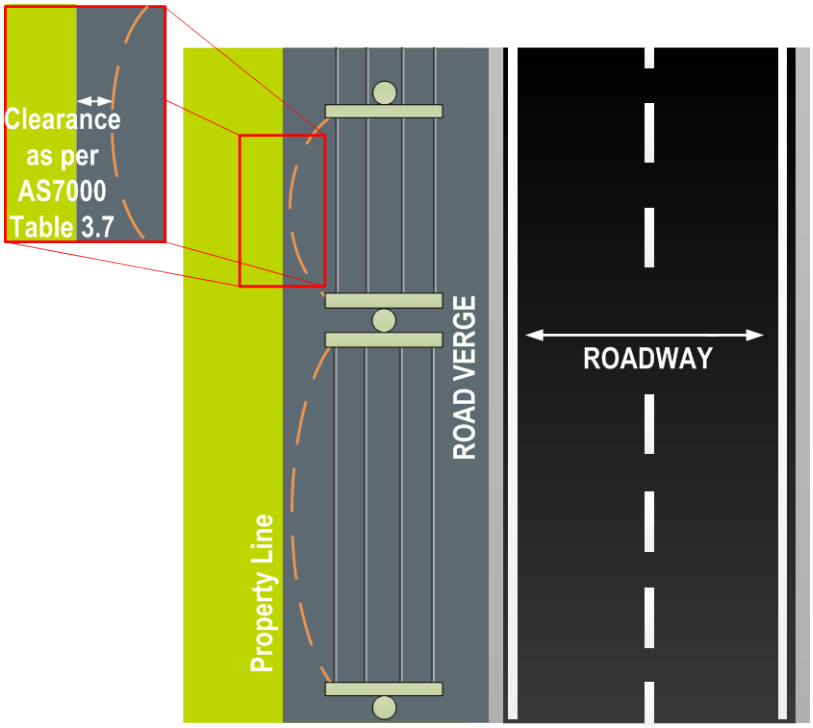


Figure 5 - Roadway requirements

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.

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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.

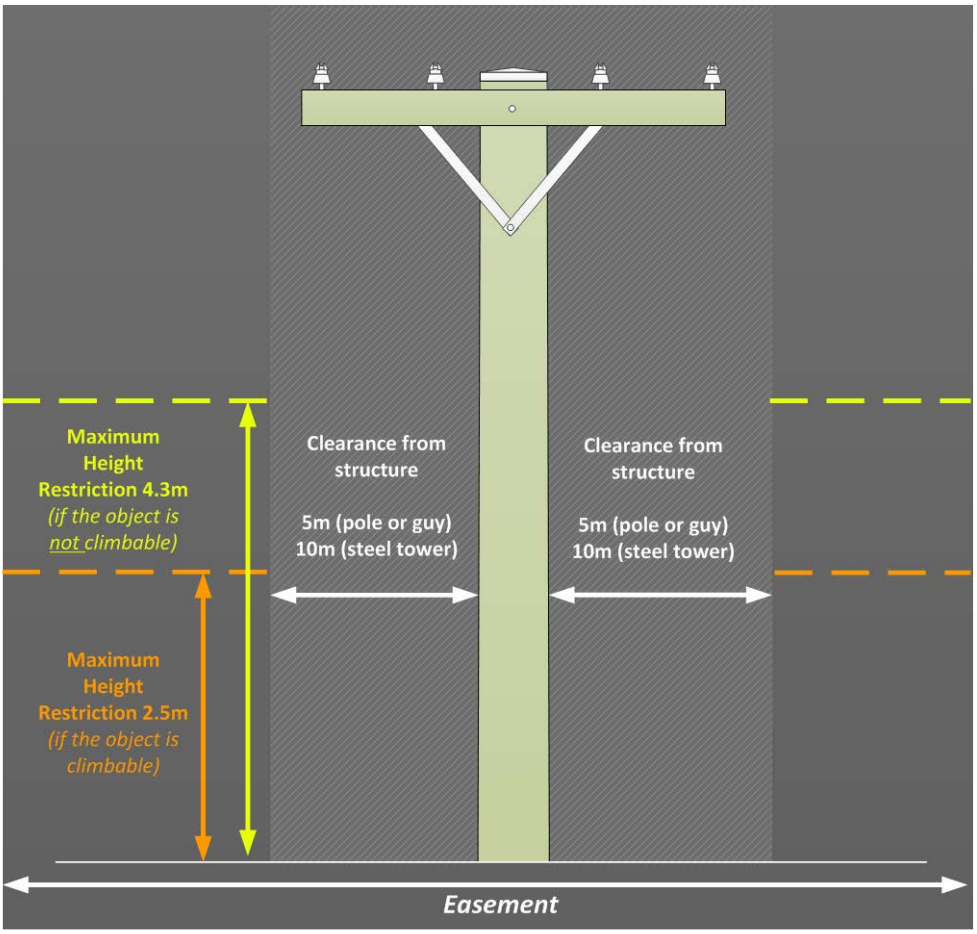


Figure 6 - Overhead line restriction within easement

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.

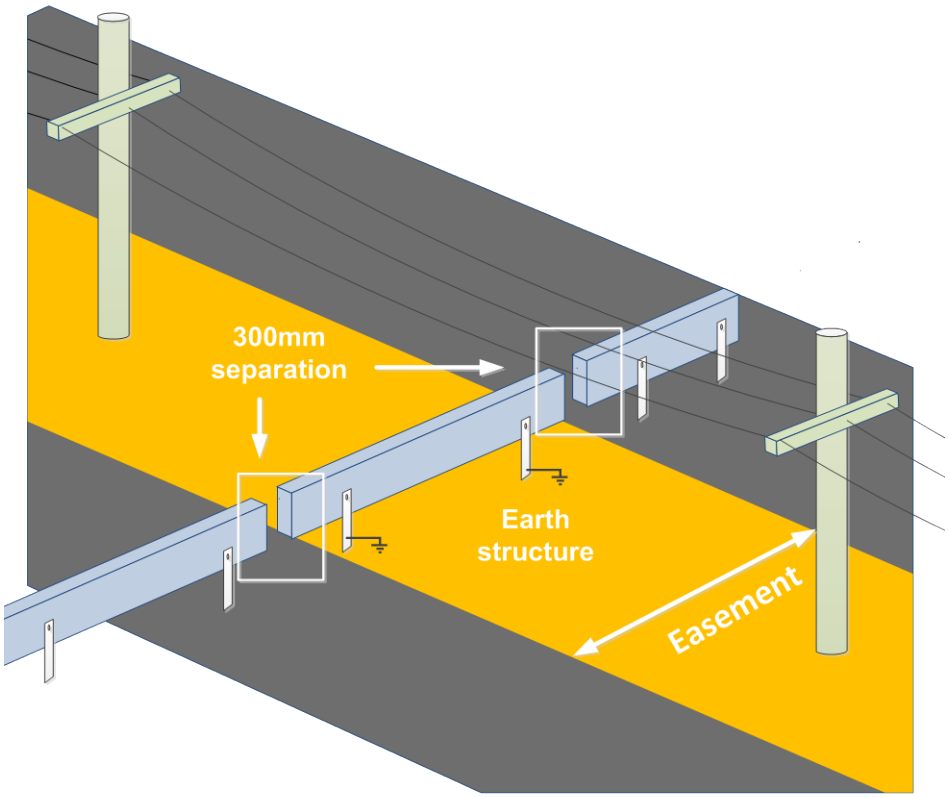


Figure 7 - Safety Barrier Requirement

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.

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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.

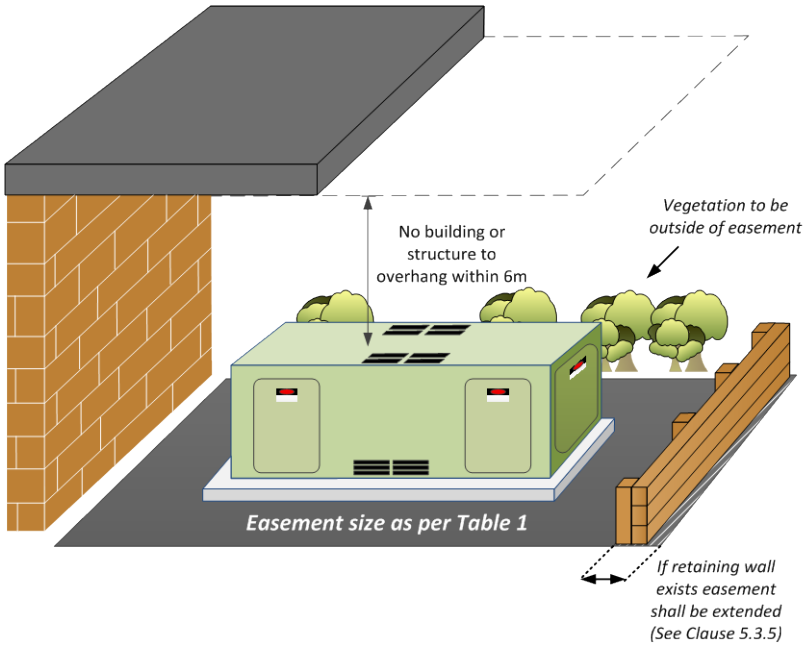


Figure 8 - Padmount Substation Easement Requirements

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".

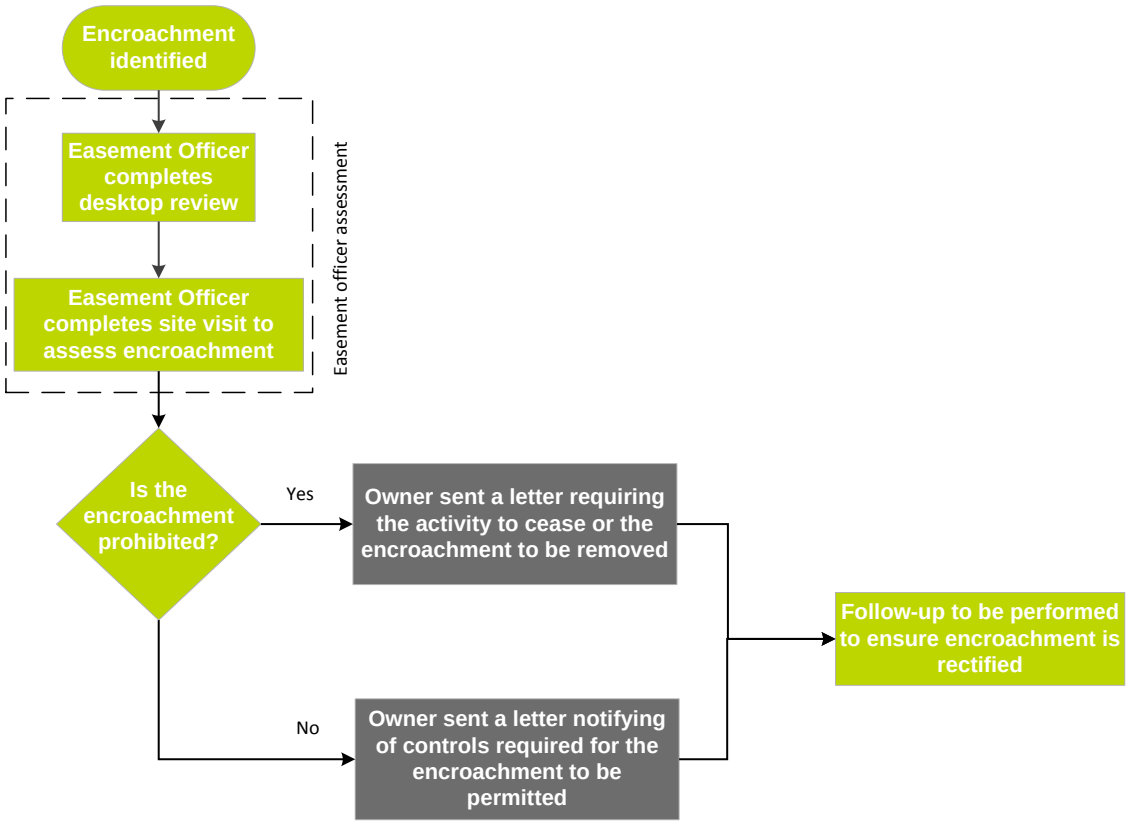
This requirement may impose restriction zones around Endeavour Energy's assets limiting the use of land within the defined area(s).

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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.

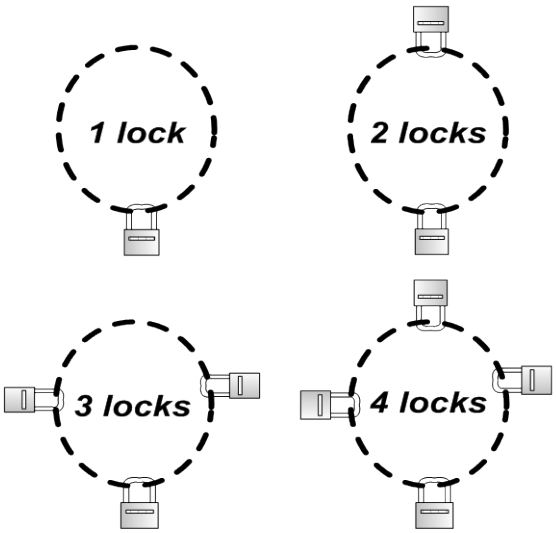


Figure 9 – Locking arrangements for shared access gates

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.

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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

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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.

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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.*

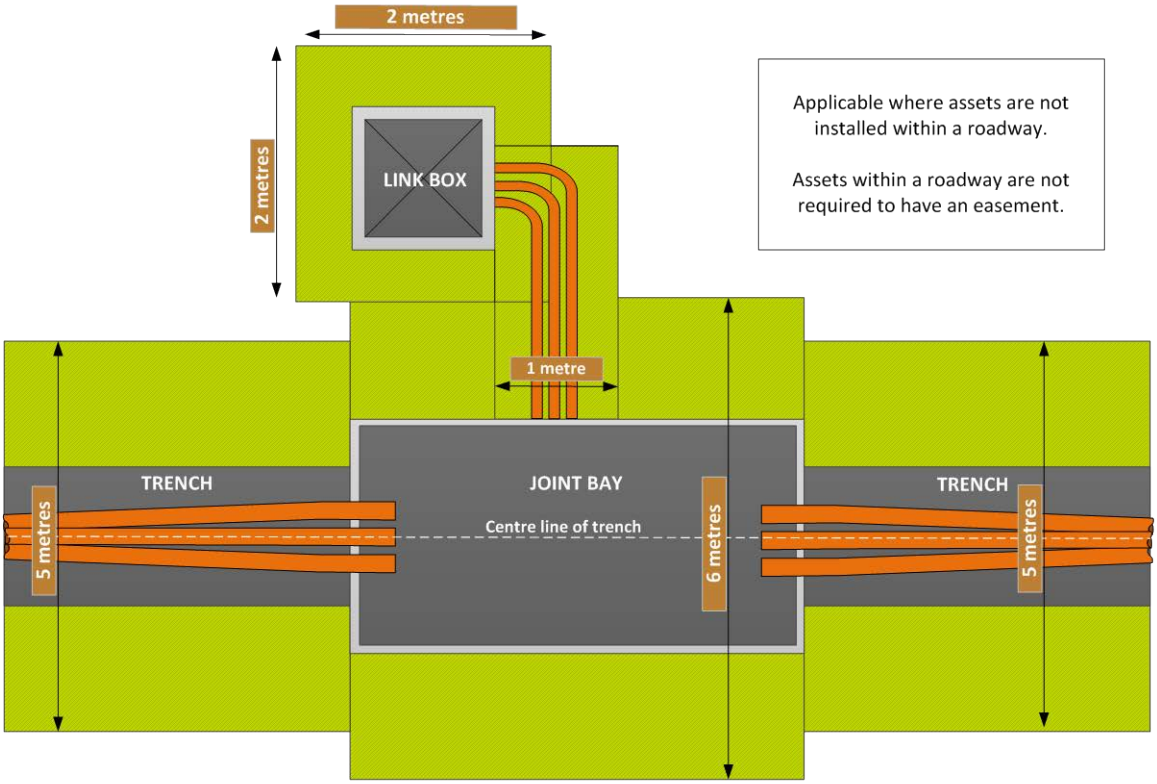
Where the ownership of any part of the electricity network (HV, LV or street lighting) within the community title development is to be the responsibility of the community association, the following by-law must be incorporated into the community title management statement:

> **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.*

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Annexure 4 Typical easement layouts

A4.1 - Underground assets



A4.2 – UGOH and Stay pole easements

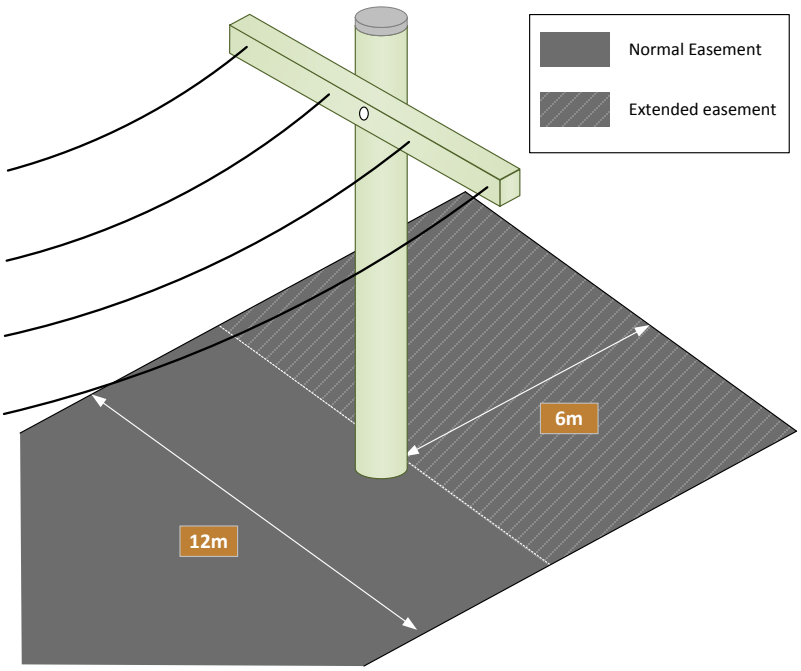


Figure 10 –UGOH pole easement

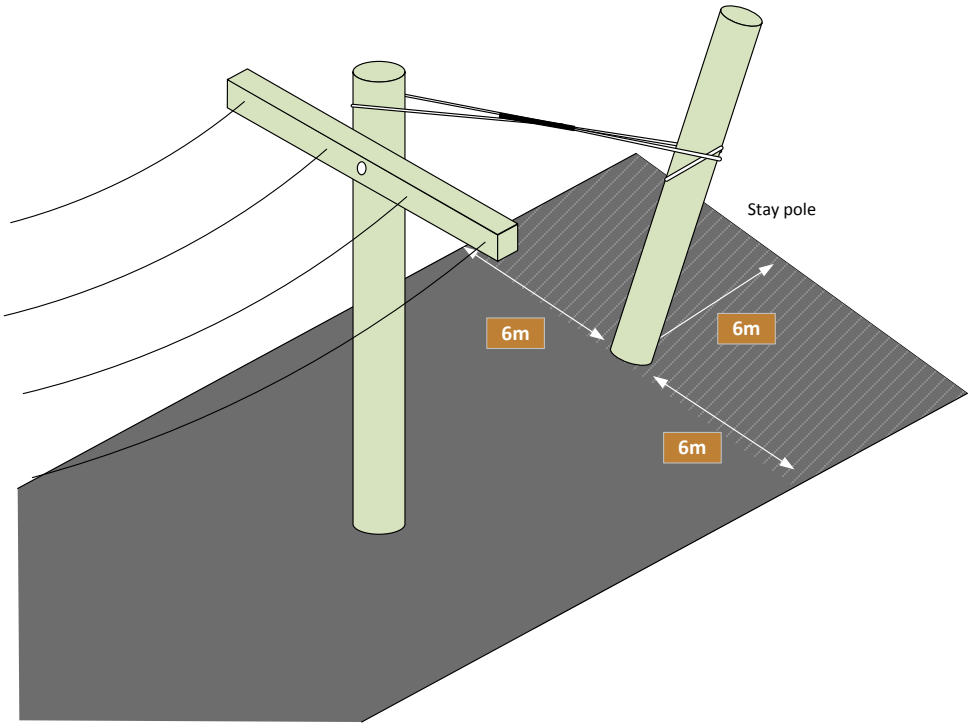


Figure 11 – Stay / Ground pole easement

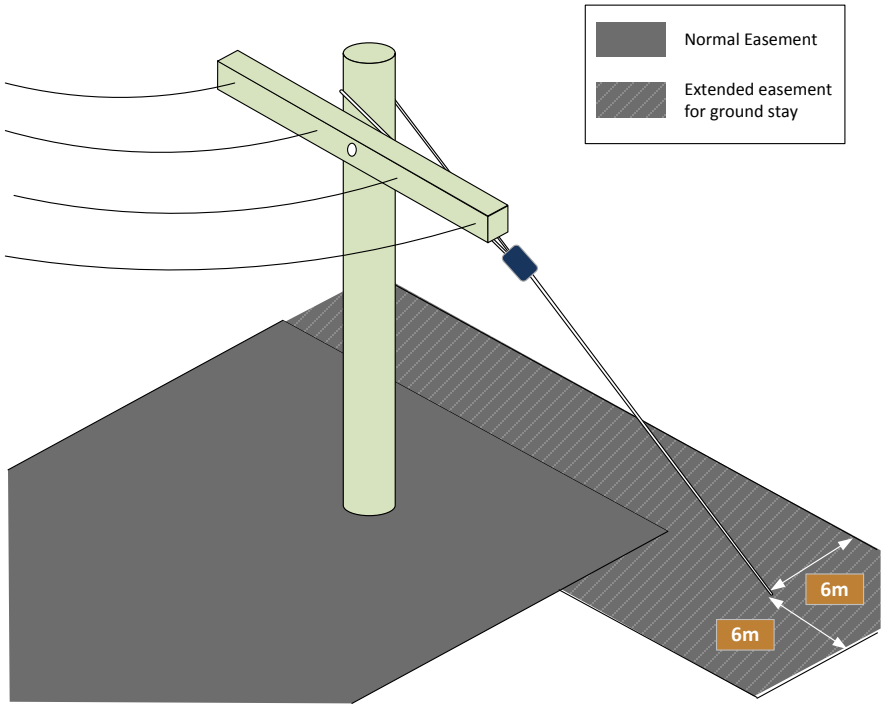
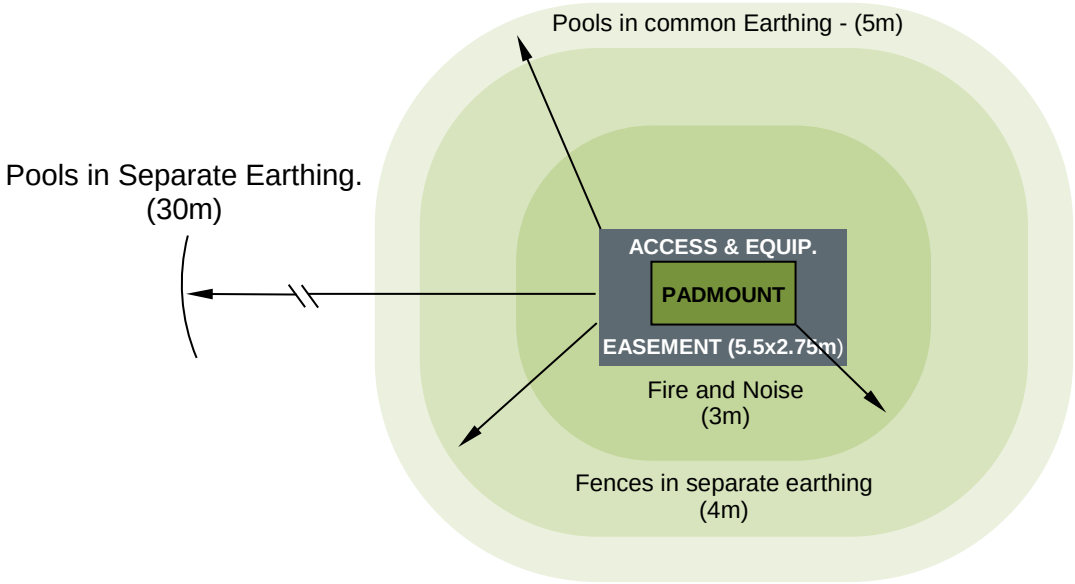


Figure 12 – Ground stay easement

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		✓				✓				✓		

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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.

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Where to draw the line on safety clearances from electricity assets

March 2024



Endeavour Energy

POWER together

Purpose

This brochure is designed to give guidance and information to anyone proposing to work or undertake activities near Endeavour Energy's overhead or underground electricity assets.

It is intended as a quick reference guide on basic safety and the location of assets., and highlights key issues around particular types of development and risk areas and how to minimise their impact. It does not claim to authorise or agree safe systems of work or contain all of the information required to complete work near or within clearances of Endeavour Energy's electricity assets. It does however provide information of other documents and contacts where you can get more detailed advice.

The requirements for maintaining safe distances from electricity assets are detailed in the State Environmental Planning Policy (Transport and Infrastructure) 2021 (Part 3, Division 5 – Electricity transmission or distribution, Subdivision 2 – Development likely to affect an electricity transmission or distribution network), which requires local councils to seek comments from Endeavour Energy before approving any development application where electricity infrastructure is present.

Under the provision of the Electricity Supply Act 1995 (NSW), buildings or structures too close to electricity infrastructure may under Section 49 'Obstruction of electricity works be regarded as interfering with electricity works and Endeavour Energy may issue a written notice to 'modify or remove the structure or thing'.

It is not intended as an exhaustive list of matters for consideration. Further advice is available via:

- Endeavour Energy's website http://www.endeavourenergy.com.au .
- General enquiries
    - Call: 133 718 (Monday to Friday - 8am to 6pm)
    - Or use the email enquiry form available via the following link: https://www.endeavourenergy.com.au/contact-us/general-enquiry

Full details about safe work practices, including penalties for non-compliance, are set out in the Safe Work Australia document *Working in the vicinity of overhead and underground electric lines guidance material*. The document can be viewed at the following link:

https://www.safeworkaustralia.gov.au/collection/working-vicinity-overhead-and-underground-electric-lines-guidance-material

Disclaimer

This document, and the information it contains, may change as new information becomes available or if circumstances change.

Anyone proposing to rely on or use the information in this document should independently verify and check the accuracy, completeness, reliability and suitability of that information for their own purposes.

Managing risks in Endeavour Energy's network

Endeavour Energy is responsible for powering NSW's fastest growing regions, sustaining the jobs and lifestyles of 2.7 million Australians. Our network spans more than 25,000 sq km and includes communities from the central west of NSW, to the Blue Mountains, Greater Western Sydney, Southern Highlands, Illawarra and South Coast of NSW. We supply electricity to support major infrastructure including rail, hospitals, data centres, advanced manufacturing and fully automated distribution centres; and support the growth of these regions to ensure that our customers can draw from energy that supports a sustainable future.

Our critical electricity infrastructure includes more than 430,000 power poles and streetlight columns, 207 major substations and 32,600 distribution substations connected by nearly 60,600 kilometres of underground and overhead cables which are integrated with renewable energy sources, including 220,000 residential solar connections, industrial solar and large-scale batteries.

The management of public safety risks posed by the Endeavour Energy network involves elements associated with both the management of the network assets; and the ability of the company to influence the behaviour of the public in the vicinity of the network. This document aims to help provide guidance and assistance for members of the public throughout various stages of design, maintenance and construction related activity,



Ensuring you are in the clear

All buildings and other structures must comply with minimum safety clearances from overhead electricity conductors.

The minimum distances from the closest conductor to the building or other structures must be maintained during strong winds or high operating temperatures. Under these conditions, the conductor can swing or sag considerably towards the building or structure.

The minimum safety clearances are shown in the table and illustrations in this brochure. They have been prepared to suit Endeavour Energy's asset construction practices.



High risk activities that impact Minimum Safety Clearances

- Knock-down/rebuilds, where a single storey home is replaced by a larger double storey home, or where land is rezoned to allow multi-storey construction, such as apartments or town houses
- Moving the location of a driveway or building driveways close to pillars or poles
- Installing a tall antenna in areas where broadcast reception is poor
- Erecting a flagpole
- Any building work near underground or overhead power lines
- Work on roof spaces, guttering or facia boards where overhead service lies connect
- Erecting a cubby house
- Raising the ground level below power lines
- Erecting metal fences or scaffolding close to poles or lines
- Excavating near poles or underground cables and assets (retaining walls, fencing, etc.)
- Using a crane near overhead lines
- Vegetation management near powerlines
- Installation of a swimming pool in most cases is generally unsuitable for installation near electricity assets and rarely allowed

Easements

Endeavour Energy's preference is to install electricity distribution infrastructure on public land such as within a Council reserve and public road. Sometimes Endeavour needs to install new infrastructure to supply customers or to maintain or improve equipment for existing services on private land and this may require the creation of an easement.

If there's an easement on your property, it will be registered on your land title. To check always refer to the relevant property title for encumbrances and the associated deposited plan and / or the dealing document. Not all easements for electricity infrastructure will necessarily benefit Endeavour Energy and as an example for low voltage service conductors the easement may benefit adjoining land/lot.

The point of attachment for a property's electricity supply is normally located near the front boundary or in the front setback of the property and does not require an easement to be granted.

Endeavour Energy has developed a brochure 'Living with Easements' explaining the types of easements and activities that may be prohibited or allowed within an easement, which can be downloaded from:

https://www.endeavourenergy.com.au/__data/assets/pdf_file/0029/58835/Endeavour-Energy-Living-with-Easements-Sep23.pdf

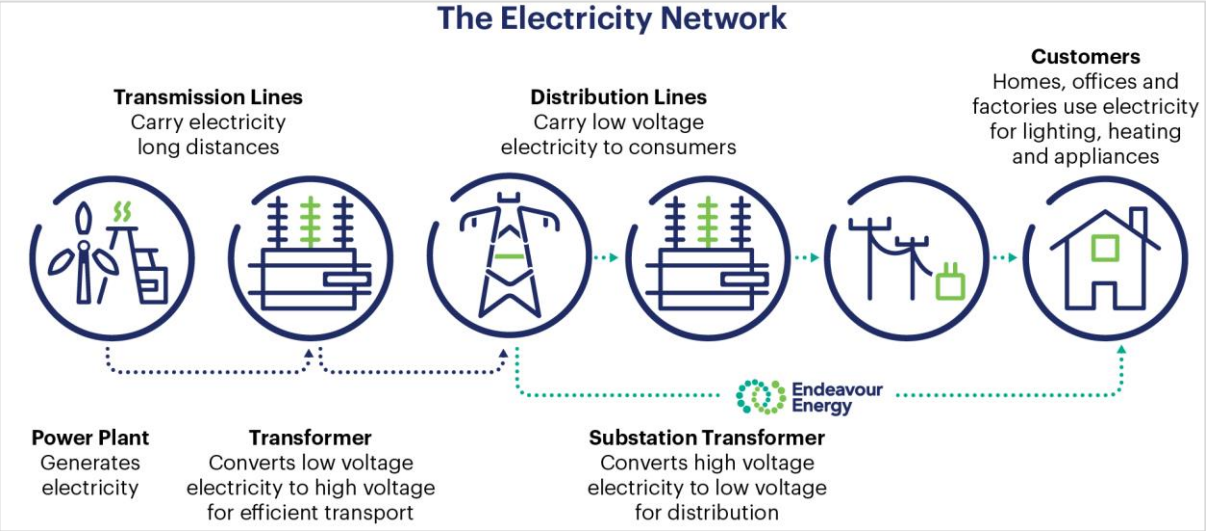


Types of electricity assets

Traditional supply of , electricity involves distribution of electricity generated a long way from homes and businesses, at high voltages to bulk supply points over the transmission system operated by Transgrid. From here Endeavour Energy transports electricity to our sub-transmission and zone substations, which usually service entire suburbs, transform electricity to mid voltage levels (11,000 or 22,000 volts).

When electricity arrives at the location where it is required, distribution substations further transform the electricity to 400 or 230 volts.

Underground cables and/or overhead power lines then carry this low voltage electricity to the customer connection points located on the customer's premises to service their electricity load.



The following sections provides details of typical underground and overhead electricity assets. Underground assets are more prevalent in urban areas but often both types of electricity assets may be present.

Overhead electricity assets

Overhead electricity assets consist of two main parts – poles (or sometimes towers for transmission voltage) and conductors (or powerlines / wires). Poles are typically made of timber, concrete or composites and towers are typically steel lattice structures mounted on concrete foundations.

Their design varies due to factors such as voltage, conductor type and the strength of structure required. Conductors, which are the 'live' part of the overhead line, hang from poles and towers on insulators. In addition to power, some underground line routes have earth cables and pilot / telecommunications cables.



Transmission, high voltage and low voltage overhead power lines in Long Street Smithfield. There are also high voltage underground cables coming from the pole going to the padmount substation. Source: Google Maps Street View.



Pole mounted substation in Wellington Street Riverstone. Source: Google Maps Street View.

Working with safety near Low Voltage Overhead Service Conductors

Low voltage overhead services conductors (sometimes referred to as service mains) are the overhead conductors (there may be more than one) from an Endeavour Energy distribution pole to a customer connection point (also referred to as point of attachment) on a building, structure or pole.



Low voltage service conductors and customer connection points must comply with the 'Service and Installation Rules for New South Wales'. The Service and Installation Rules (Rules) for New South Wales cover the requirements for the connection of electrical installations to the distribution network. The Rules are used by electricians and Accredited Service Providers.

https://www.energy.nsw.gov.au/nsw-plans-and-progress/regulation-and-policy/service-and-installation-rules

The point of attachment (POA) is where the electrical wires attach to a home or building.

When work is being carried out near the point of attachment, special care must be taken to avoid contact with these electrical wires, and the mounting bracket, or to avoid damaging them.

The safe distance from a point of attachment varies depending on the activity being performed.

Refer to the Safe Work NSW Work Near Overhead Powerlines Code of Practice for specific advice.

Care must be taken with activities such as:

- Cleaning leaves from guttering.
- Painting gutters, facades and eaves.
- Pruning trees and shrubs (particularly around the electrical wires).
- Attaching aluminium cladding to facades and the eaves.
- Replacing the guttering.



Safe Approach Distances

Ordinary Persons

Table 1 below (extracted from the Safe Work NSW Work Near Overhead Powerlines Code of Practice) 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

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

Additional information can be found in the SafeWork – Work Near Overhead Power Lines Code of Practice and must be adhered to at all times.

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

Extract of SafeWork NSW Work Near Overhead Powerlines: Code of Practice 2006, Section 8.2, Table 4 'Approach distances for work near low voltage overhead service lines'.

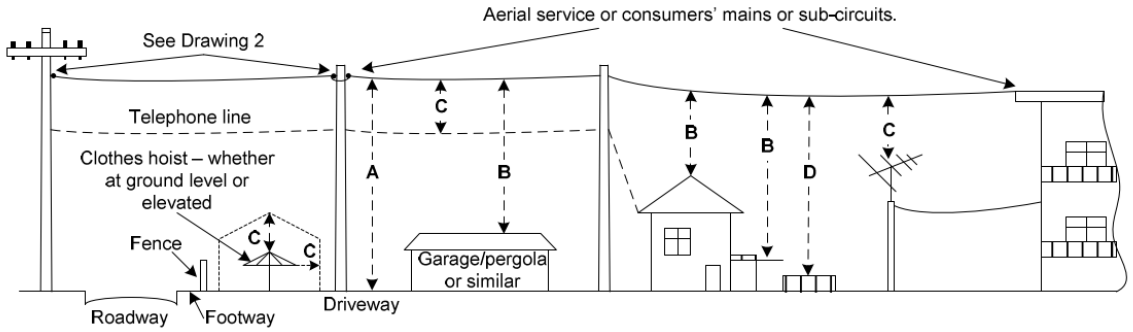
Minimum Clearance over Structures, Roads and Driveways

The minimum safety clearances over structures, roads and driveways are shown in the following drawings.

Remember – these are the minimum safety distances. The minimum safety distance is 3 metres, in some cases, the distance may increase to ensure public safety.

Drawing 1: Minimum safety clearances over structures

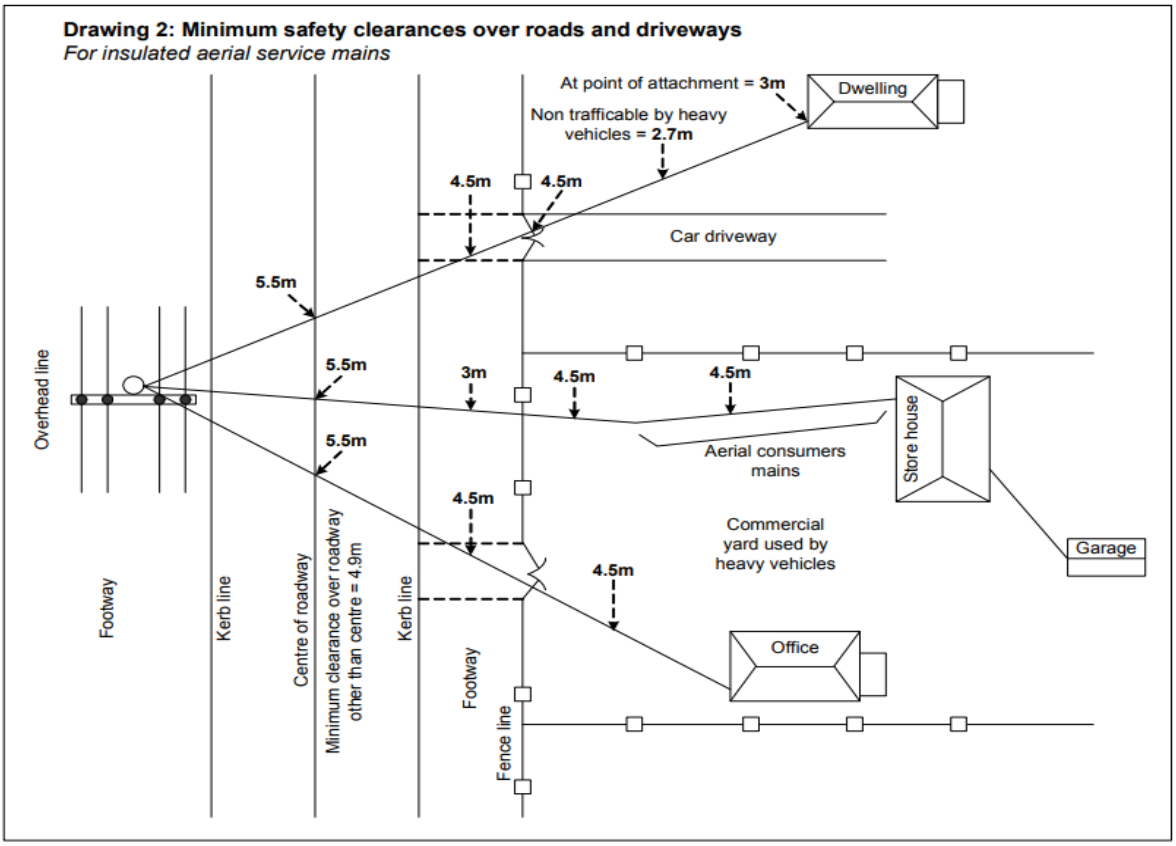
Aerial consumers' and service mains



Application / Type of aerial conductor	Minimum height above buildings, structures, ground or elevated areas (mm)		From, **buildings, TV/ radio** antenna or stay wire and **telephone lines** (mm).	Above water level in swimming pool, above walkway around pool	Above areas where irrigation pipes are used, or above areas where sail craft are used
	Over ground	Over roofs			
	A	B	C	D	
Bare or insulated live conductors	Bare 5500 Insulated 4500	3700	2000 3000 for clothes lines	Not permitted	Refer to Integral Energy

Drawing 2: Minimum safety clearances over roads and driveways

For insulated aerial service mains



Look up and Live

Before undertaking work on a site with overhead power lines, the location of powerlines can be checked with the free Look up and Live app which is available via the following link: www.lookupandlive.com.au



The Look up and Live map is an interactive geospatial map that has been developed to display the electricity networks of various distributors including Endeavour Energy.

It is a simple worksite planning tool which provides information on powerline safety and allows specific information to be obtained from Endeavour Energy concerning how to minimize the risk of contact while working in proximity to the electricity network.

When onsite, there are several ways to identify the location of electricity infrastructure to keep your workers and contractors safe. Here are the key ones:
Pre-plan your job by consulting with Endeavour Energy. We provide advice to the building industry, councils or any other organisation or individuals working near our overhead network.

Place an enquiry by completing a Request for Safety Advice and emailing it to construction.works@endeavourenergy.com.au

Develop site plans identifying the location of electrical infrastructure and effectively communicate these plans to staff. Keep the plans available.

Designate and mark out travel paths around the site away from overhead powerlines. These can be used for moving ladders or long objects, and operating tip trucks, elevated platforms, drilling or excavating machinery, backhoes etc.

Use visual indicators such as tiger tails, signage, spray paint or bunting to highlight the presence of overhead powerlines, underground cables, and electrical infrastructure.

Remember that tiger tails and covers are not insulators, and their presence does not mean you can work closer to powerlines. They simply provide a visual indicator to alert you to the presence of powerlines and they do not make powerlines safe to touch under any circumstances.

Use range-limiting devices on excavators and cranes to assist in maintaining clearances from powerlines.

Avoid contact with the point of attachment (where the power comes into a building). If you cannot maintain the required clearances, arrange for a power outage by calling Endeavour Energy on 131 003. Assign an observer, whose only job is to monitor and ensure safe clearances are maintained between operating machinery and powerlines

Always report any contact with powerlines immediately to Endeavour Energy on 131 003.

Underground Electricity Assets

Underground electricity assets include but are not limited to cables (in addition to power, some underground line routes have earth cables and pilot / telecommunications cables), conduits, pillars, streetlight columns, switch station, padmount and indoor substations all of which are ‘live’ and ever-present parts of the electricity distribution network.

Cables can be laid in a range of locations such as the road, footpath, council parks, private property or in bridges and tunnels, and consist of a conducting core surrounded by layers of insulation and armour. Underground electrical cables are not necessarily protected by concrete, covered with slabs, marker tapes or other indicators of their presence and are frequently not enclosed in conduits.

Working near a cable may result in electric shock even if no contact is made with the core of the ‘live’ cables. In addition to personal loss and serious injury, repairs to underground cables and equipment are expensive.





Low voltage pillar, streetlight column and padmount substation at Goodison Street North Kellyville.
Source: Google Maps Street View.

Underground Services

Care must also be taken to ensure that building or excavation activities do not infringe on underground cable, ducts, and protective overs.

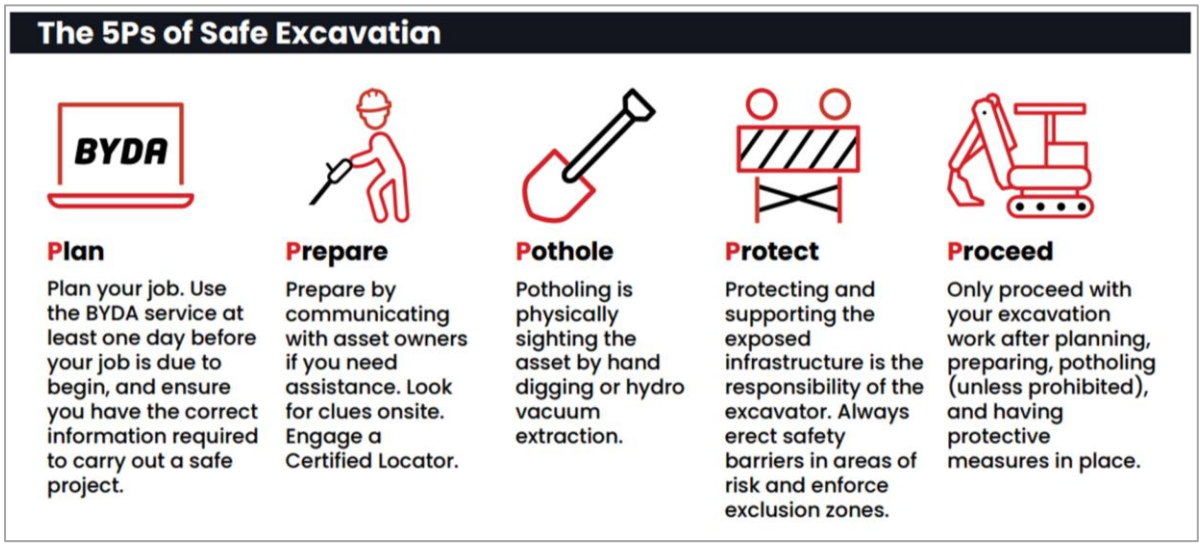
The definition of 'excavation' or 'penetration of ground' regarding requirement for BYD or DA notification is any work involving the penetration of the ground or surface of the earth including cutting or caisson, chasing, boring, piering or the digging of trenches, ditches, shafts, wells, tunnels, drifts and rises below the finished levels of the ground surface or finished ground levels. This also includes works involving the movement or placement of soil or other surface materials by removing, boring, or forcing objects into the ground or the surface of the earth.

Before undertaking any work in the vicinity of underground cables, advice should be obtained from the ***Before You Dig Australia (BYDA)*** service.

Before You Dig is a FREE national referral service supported by Endeavour Energy and other major service providers that supplies plans of where electricity, water, gas and telecommunications cables and assets are located, so you know whether it is safe to dig. Contact BYDA on 1100 (Free call) for information, and download the BYDA App on iOS or Android, or visit www.byda.com.au and register to get plans sent to your email address.

NSW legislation requires people who are planning excavation work to obtain copies of underground electricity cable plans from Before You Dig Australia. The plans must be no more than 30 days old when excavation commences.

The aim of the legislation is to ensure workers can establish the exact location of cables and avoid coming into contact or damaging them. It also ensures worker safety and prevents disruption to Endeavour Energy's electricity network.



Excavation Near Overhead Structures

All persons proposing excavation work deeper than 150mm (300mm without machinery or power tools) are required to contact BYD before commencing work.

Section 49A ‘Excavation work affecting electricity works’ of the of Electricity Supply Act 1995 (NSW) covering the carrying out or proposed carrying out of excavation work in, on or near electrical infrastructure allows Endeavour Energy to serve written notice to modify or not to carry out the excavation work.

Trenching adjacent to existing structures presents a stability hazard on the structure as the ground conditions are compromised. It is critical that sufficient fill remain around the base of the structure maintaining a zone of influence ratio of at least 1:1.

For example: if the excavation is 1m deep, 1m of ground fill must remain around the structure.



Where this cannot be achieved, and/or where ground conditions are adversely affected; you must contact Endeavour Energy to assess the structure and supporting of the structure via mechanical means.



This excavation for a basement at 6 Sorrell Street Parramatta NSW for a mixed use 8 storey development in 2015 was identified by Endeavour Energy’s Regional Services North as being unsafe due to the integrity of padmount substation 7858 located on the adjoining lot being compromised and access not being available. This resulted in the ‘switching out’ of the substation from the network until the site conditions were again deemed to be safe.

Vegetation Management

Please think carefully about the suitability of trees before planting in close proximity to electricity distribution infrastructure. Large trees planted pose significant challenges for Endeavour Energy, and for this reason it recommends the following be avoided:

- Planting of trees which exceed 3 metres in mature height (without the need for pruning) under overhead power lines. Power poles may also carry telecommunications infrastructure below the power lines which may also be impacted.
- Planting of trees closer than their mature height to the closest conductor i.e., should the tree fall over, it should not damage the overhead power lines.
- Planting of trees within 5m of a power pole.
- No plants with significant root systems that grow greater than 400 millimetres below ground level be planted near underground cables.
- Planting of trees too close to streetlight columns that will require regular pruning to prevent foliage from blocking the light.

Endeavour Energy are responsible for managing vegetation in areas outside the customer's property boundaries. Customers are responsible for keeping trees that grow on their property a safe distance from overhead power lines.

Note: Private property includes the shared parcels within a strata plan not just the individual dwelling parcels of the strata.

You cannot trim your trees yourself if:

- The tree or branch to be pruned is closer than 3 metres to any power line.
- Any part of your body or equipment comes within 3 metres of any power line.
- The tree or branch is above your service line.

Should you ever need to trim or remove trees on your own premises, Endeavour Energy recommends that you have the work done by an accredited contractor with a minimum of Certificate II ESI - Powerline Vegetation Control from a Registered Training Organisation.

Further details of Endeavour Energy's vegetation management practices can be found on: https://www.endeavourenergy.com.au/safety/vegetation-management



Public Safety Resources

Workers involved in work near electricity infrastructure run the risk of receiving an electric shock and causing substantial damage to plant and equipment. Please find attached copies of Endeavour Energy's public safety training resources, which were developed to help general public / workers to understand why you may be at risk and what you can do to work safely.

The public safety training resources are also available via Endeavour Energy's website under 'Home > Safety' or via the following link:
https://www.endeavourenergy.com.au/safety

Endeavour Energy developed a Public Safety Plan that details how we will invest and tailor activities to target at risk groups through safety awareness campaigns, educational programs, asset management programs, business processes and promote safe behaviours to reduce interaction with electricity infrastructure:

- Endeavour Energy Public Safety Plan FY24
  https://www.endeavourenergy.com.au/__data/assets/pdf_file/0018/70119/Public-Safety-Plan-FY24.pdf

SafeWork provides key safety information on how to protect persons from the risks arising when working or undertaking activities near overhead power lines and underground cables including:

- Safe Work Australia - General guide for working in the vicinity of overhead and underground electric lines"
  https://www.safeworkaustralia.gov.au/resources-and-publications/guidance-materials/general-guide-working-vicinity-overhead-and-underground-electric-lines

- SafeWork NSW Work Near Underground Assets – Guide 2007
  https://www.safework.nsw.gov.au/__data/assets/pdf_file/0009/54378/SW08773-Work-near-underground-assets-guide.pdf

- SafeWork Australia – Excavation Code of Practice
  https://www.safework.nsw.gov.au/__data/assets/pdf_file/0019/52147/Excavation-work-COP.pdf

- SafeWork 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 addition, the following documents to support safety in design and construction:

- Australian / New Zealand Standard AS/NZS 7000 – 2016: 'Overhead line design'

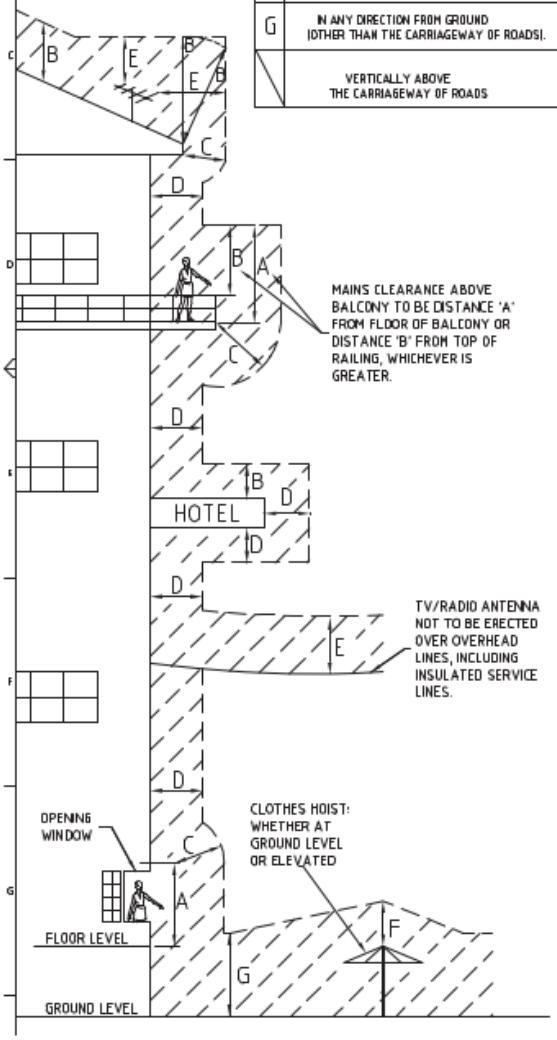
  If you would like to read an entire document, you will have to purchase the standard from Standards Australia https://www.standards.org.au or alternatively some libraries maintain access to Australian Standards.

- Energy NSW 'Service and Installation Rules for New South Wales' which cover the requirements for the connection of electrical installations to the distribution network
  https://www.energy.nsw.gov.au/nsw-plans-and-progress/regulation-and-policy/service-and-installation-rules

Appendices

Endeavour Energy Drawing 86232 ‘Overhead Lines Minimum Clearances Near Structures’

APPLICATION \ NOMINAL VOLTAGE (U) & CONDUCTOR		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).

endeavourenergy.com.au

Endeavour Energy

POWER together

LIVING SAFELY WITH ELECTRICITY

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

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

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

Did you know?

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

01 Call Emergency Services on **000**.

02 Request an ambulance if anyone is injured.

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

SAFETY EXCELLENCE

IN EMERGENCIES CALL 131 003

24 hours a day, 7 days a week

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

0611-ENE2351-CONT

SAFETY ON THE JOB



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

Endeavour Energy

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

Endeavour Energy

BE ALERT AT WORK

Do you know where the underground cables are?

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

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

Check, double check, triple check and reassess

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

Completed your job?

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

Transporting trees?

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

Excavating?

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



Look up and live

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

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

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

HOW CAN YOU HELP?

Electricity can jump

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

Five things to remember

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

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

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

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

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

DIAL BEFORE YOU DIG®
www.1100.com.au

SAFETY PLAN FOR PLUMBERS

Purpose

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

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

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

Bridge the gap

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

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

Get a sparky

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



Storm precautions

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

Check power points

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

HOW CAN YOU HELP?

Be aware

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

The risks increase if you:

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

Plan the job

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

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

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

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

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

YOUR SAFETY IS OUR PRIORITY

The danger

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

DANGER IN THE PIPELINE



SAFETY EXCELLENCE

IN EMERGENCIES CALL 131 003

24 hours a day, 7 days a week

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

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51 Huntingwood Drive
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T: 131 081 • F: 61 2 9853 6000

Endeavour Energy

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

Endeavour Energy

Erection and Dismantling of Scaffolding in Proximity to Endeavour Energy Overhead Assets

I am writing to you to advise you of Endeavour Energy and Work Cover's requirements regarding the erection of scaffolding near Endeavour Energy's overhead network.

For nominal voltages up to and including 33,000volts, Endeavour Energy has the following requirements:

1. You must comply with the requirements contained within the *WorkCover Code of Practice – Work N*ear *Overhead Power Lines* ("*the Code*"). *(WorkCover of NSW Publication No. 1394)*
2. You must complete a written risk assessment, have safe work method statements and engage safe systems of work in accordance with *the Code.*
3. The safe approach distances of 4000mm in accordance with table 1 of *the Code* should be maintained at all times from all conductors.
4. Erecting scaffolding within the safe approach distance of live overhead conductors is not permitted. Overhead conductors will be isolated and made safe in accordance with Endeavour Energy's safety rules.
5. Once erected, and with an impenetrable barrier (hoarding) as described in *the Code* affixed in place, the conductors may be re-energised, with safe approach distances reduced as shown in Table B and diagram 1.
6. Scaffolding must be erected to ensure movement of the scaffold towards the overhead conductors is prevented. Sag and wind movement of the conductors must be taken into account when determining safe approach distances.
7. Removal of scaffolding from the proximity of overhead conductors shall only be carried out with the conductors isolated and made safe in accordance with Endeavour Energy's safety rules.

Scaffolding *near* Overhead Powerlines up to and including 33kV

Where metallic scaffolding or associated components are likely to come within 4.0 metres of existing overhead conductors, under worst conditions of conductor sag and wind movement (blowout), the precautions in **Table A** will apply until the erection of the scaffolding is complete. The same applies when scaffold is dismantled. When the scaffold has been erected the conditions of **Table B** apply.

Note: Endeavour Energy may implement a range of control measures including de-energisation, short circuiting and earthing, issuing access authorities or approval to work, installation of cable covers and re-routing of cables.

Table A – Clearances to Scaffolds – <u>ERECTION & DISMANTLING</u>

<table>
<tr><th>Voltage</th><th>Conductor</th><th>Clearance (Horizontal)
(Max Blowout must be added)</th><th>Safety Conditions</th></tr>
<tr><td rowspan="5">Low voltage
Including Aerial Services & Aerial street lighting circuits</td><td rowspan="2">Open Wire
(Bare)</td><td>Up to and including 4.0m</td><td>Isolated, Cable Covers, and appropriate authority,
or relocate.</td></tr>
<tr><td>More than 4.0m</td><td>Appropriate risk assessment.</td></tr>
<tr><td rowspan="3">ABC</td><td>Up to and including 0.3m</td><td>Isolated, Cable Covers, and appropriate authority,
or relocate.</td></tr>
<tr><td>More than 0.3m and up to and including 1.0m</td><td>Isolated, Cable Covers, and appropriate authority,
or Cable Covers and Safety Observer.</td></tr>
<tr><td>More than 1.0m and up to and including 4.0m</td><td>Cable Covers and appropriate risk assessment.</td></tr>
<tr><td colspan="2" rowspan="2">High Voltage (upto and including 33kV)</td><td>Up to and including 4.0m</td><td>Isolated and appropriate authority.</td></tr>
<tr><td>More than 4.0m.</td><td>Appropriate risk assessment.</td></tr>
<tr><td colspan="2">High voltage > 33kV</td><td colspan="2">To be referred to Network Operator.</td></tr>
</table>

Table B: Clearances to Scaffolds – <u>WHEN ERECTED</u>

Voltage	Conductor	Clearance (Horizontal) (Max Blowout must be added)	Safety Conditions
Low voltage Including Aerial Services & Aerial Switch Wires	*Open Wire* (Bare)	*Less than 0.6m*	Isolated*, Cable Covers, and appropriate authority,* ***or*** *relocate.*
		0.6m to 4.0m	*Cable Covers and* hoarding *with internal signage*
	ABC	Less than 0.1m	Isolated*, Cable Covers, and appropriate authority,* ***or*** *relocate.*
		0.1m to 0.3m	Cable Covers and *hoarding* with internal signage.
		0.3m to 4.0m	Cable Covers.
High Voltage (up to and including 33kV)	*Open Wire* (Bare) & *CCT*	Less than 1.5m	Conductor relocation, **or** *isolation*, *hoarding* with internal signage and appropriate authority.
		1.5m to.4.0m	*Hoarding* with internal signage.
	ABC	Less than 0.3m	*Conductor relocation,* ***or*** isolation*,* hoarding *with internal signage and appropriate authority.*
		0.3m to 4.0m	*Hoarding* with internal signage
High voltage > 33kV	Bare	To be referred to Network Operator.	

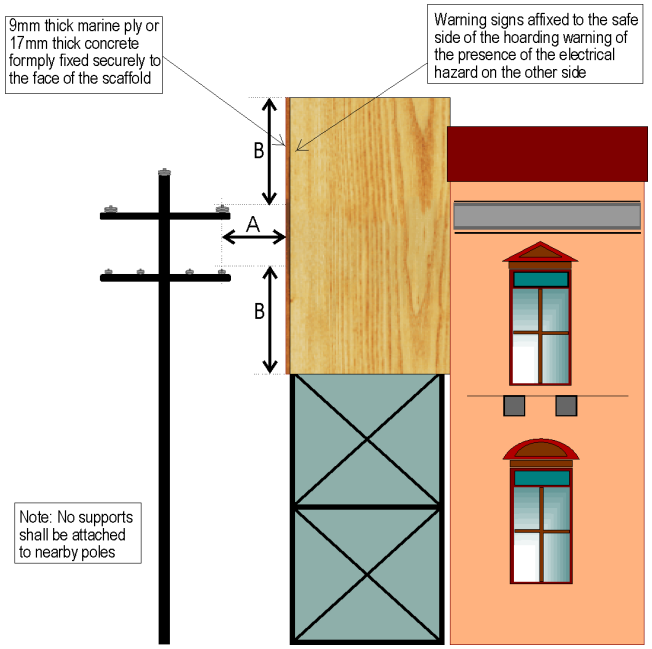
Diagram 1 below depicts the Minimum Clearances between <u>erected</u> scaffolding and a LIVE power line when a <u>non-conductive</u> *hoarding* is used to provide an impenetrable barrier to tools, materials and equipment. The clearances shown are HORIZONTAL SAFETY CLEARANCES and vertical mechanical clearances from the conductors. This Appendix is to be read in conjunction with the requirements of this Guide

WARNING

This Appendix only applies to erected scaffolding. It does not apply to scaffolding either being erected or dismantled.

Clearances for scaffolding under construction are found in Table A.

The clearances for 'A' below are worst case. Conductor Blowout must be added to establish all site specific safety clearances.



Voltage	Conductor Type	Minimum Clearances for "A"	Minimum Clearance for "B"
Low voltage (Including Aerial Services & Aerial Street light circuits)	*Open Wire* (Bare)	0.6m	2.0m
	ABC	0.1m	1.0m
High voltage up to and including 33kV	Bare & *CCT* or *CC*	1.5m	2.0m
	ABC	0.3	2.0m
High voltage > 33kV	Bare	Refer to the Network owner	

Notes:

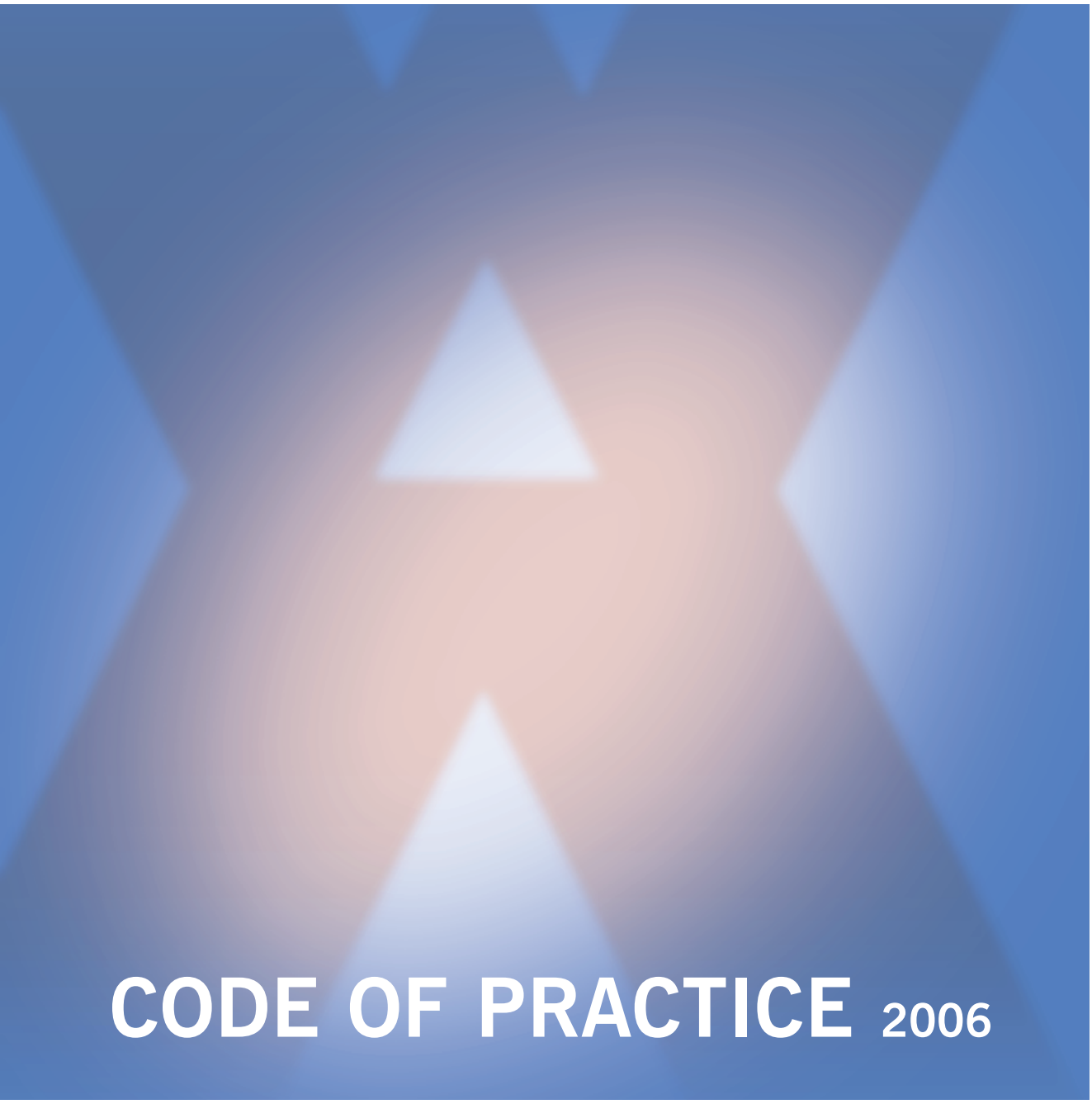
1) Gaps between fitted sheets of approved plywood should not exceed 3mm
2) No exposed cut or drilled holes are permitted in the sheets of plywood
3) Installer is responsible for attaching plywood to the scaffold, and ensuring that the arrangement can sustain an appropriate wind load

4) Warning signs should 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* should not be removed.
5) 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.

For all scaffold enquiries please email construction.works@endeavourenergy.com.au

WorkCover
NEW SOUTH WALES

WORK NEAR
OVERHEAD POWER LINES



CODE OF PRACTICE 2006

WorkCover. **Watching out for you.**

New South Wales Government

Disclaimer

This publication may contain occupational health and safety and workers compensation information. It may include some of your obligations under the various legislations that WorkCover NSW administers. To ensure you comply with your legal obligations you must refer to the appropriate legislation.

Information on the latest laws can be checked by visiting the NSW legislation website (www.legislation.nsw.gov.au) or by contacting the free hotline service on 02 9321 3333.

This publication does not represent a comprehensive statement of the law as it applies to particular problems or to individuals or as a substitute for legal advice. You should seek independent legal advice if you need assistance on the application of the law to your situation.

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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.

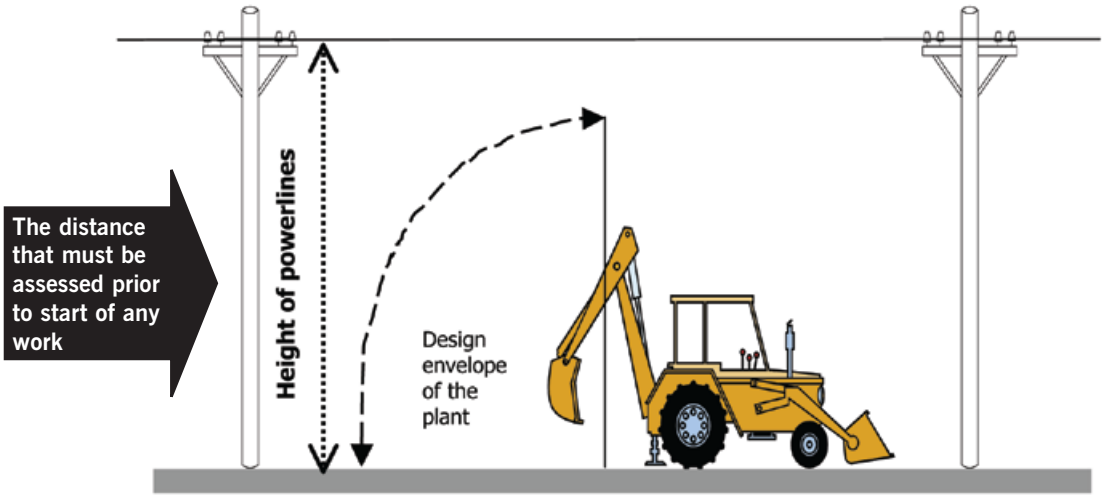


Figure 1: Distance that must be assessed for each worksite

- 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.

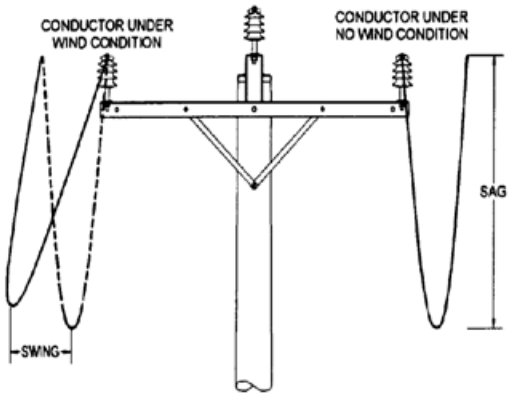


Figure 2: Illustration of overhead power line 'sag or swing'

- 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).

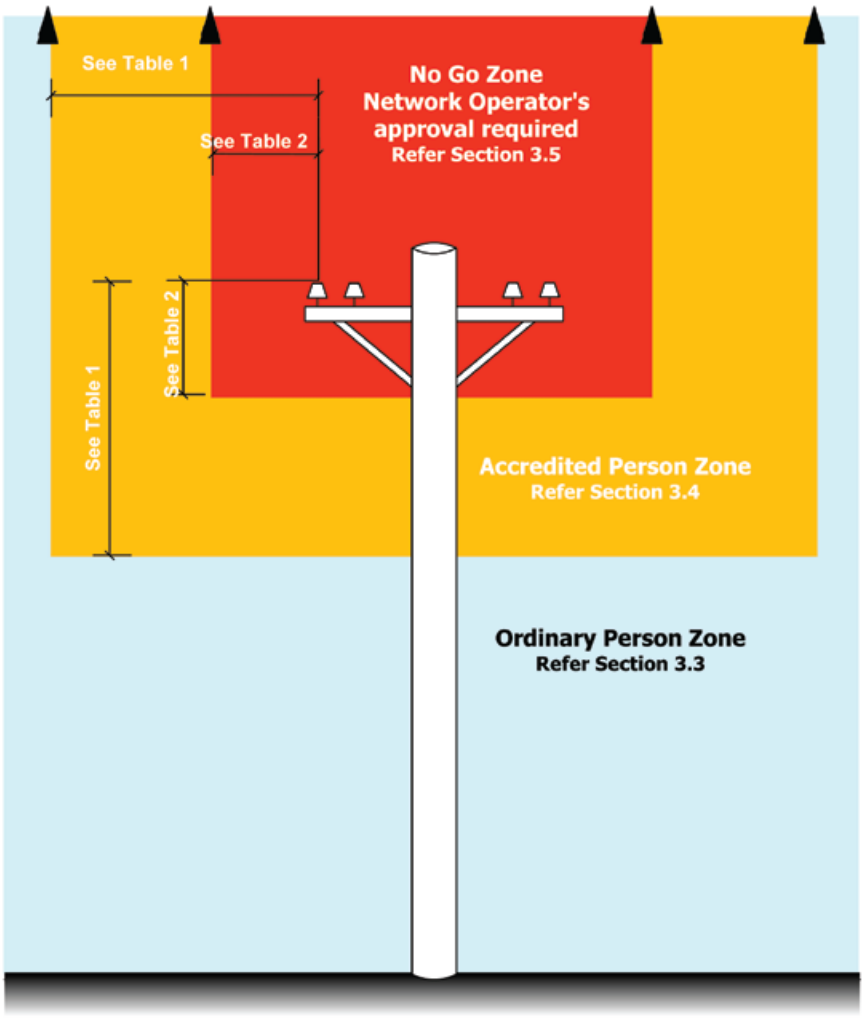


Figure 3 – Approach distances and work zones near overhead power lines

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

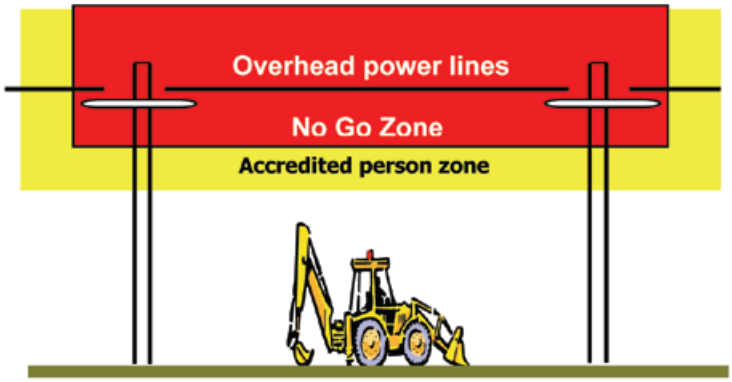


For the operation of cranes, mobile plant and other types of load shifting equipment the approach distances specified in this code of practice are greater than those described in the National Certificate of Competency – Assessment Instruments. Where any discrepancy exists between the National Assessment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

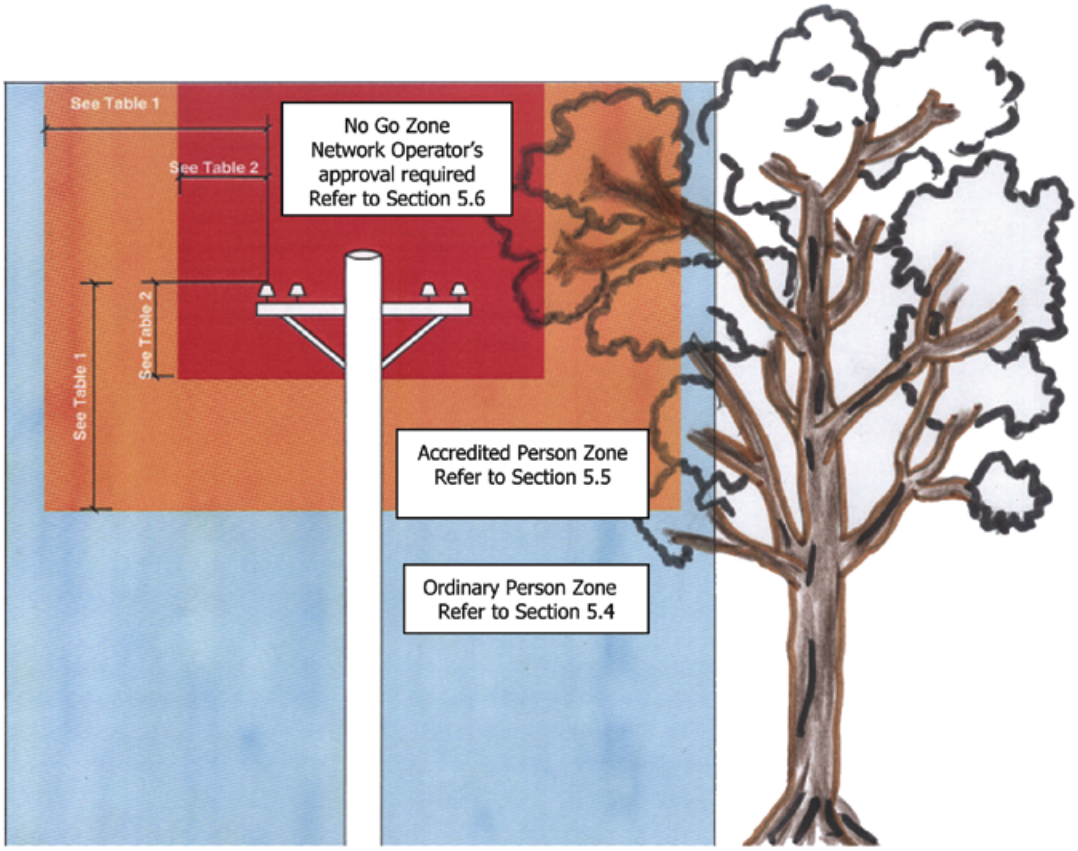


Figure 9 – Work zones for tree management near overhead power lines

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.

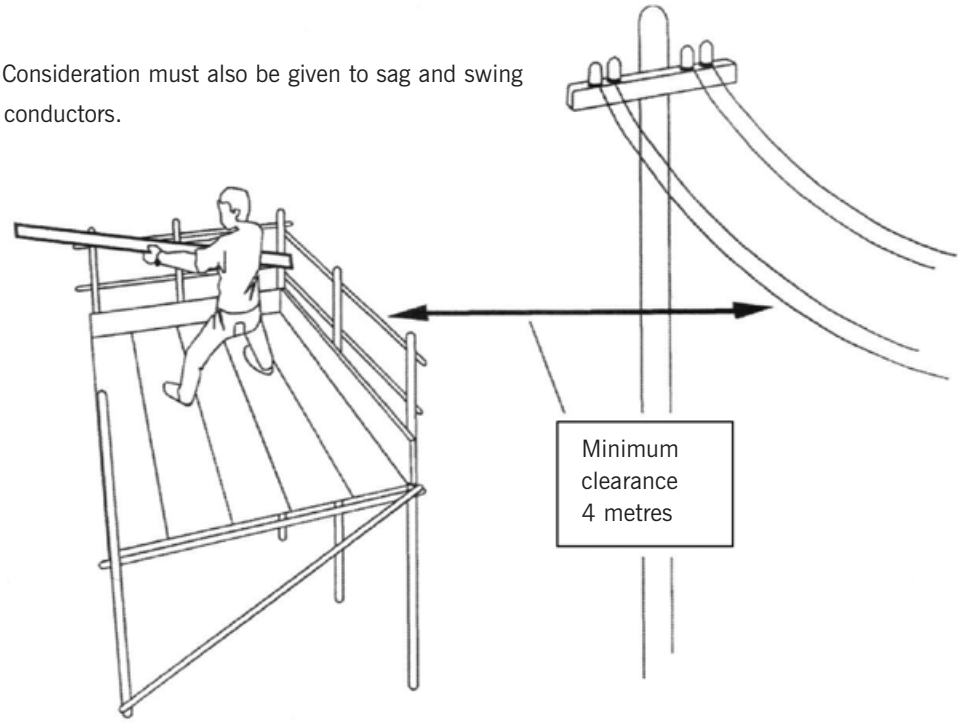
6.5 Control measures for the erection and dismantling of scaffolding near overhead power lines up to and including 33kV

(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.

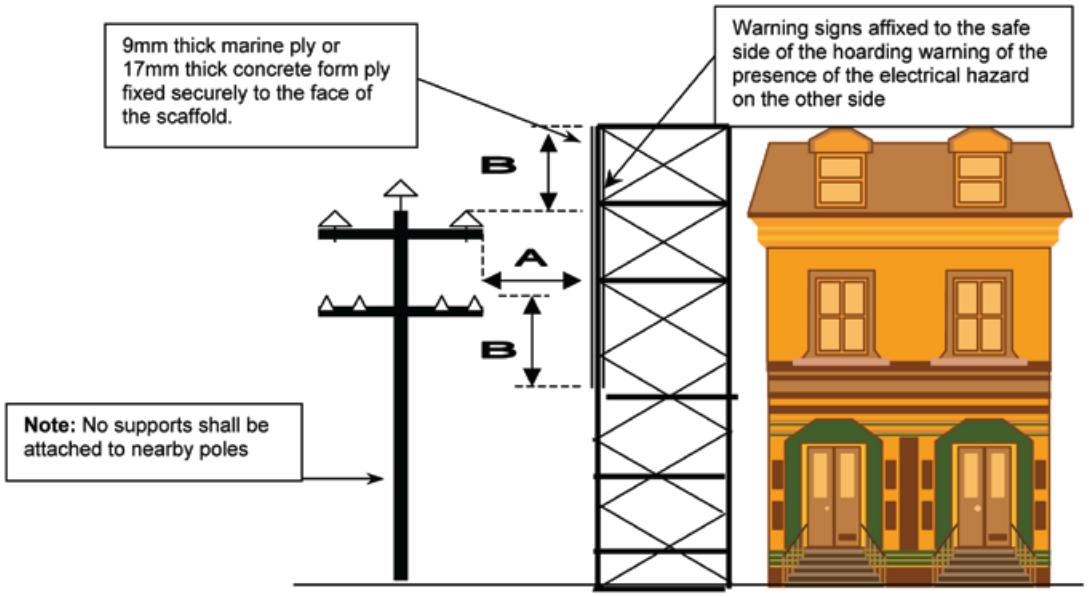


Figure 12 – Scaffolding with hoarding

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.

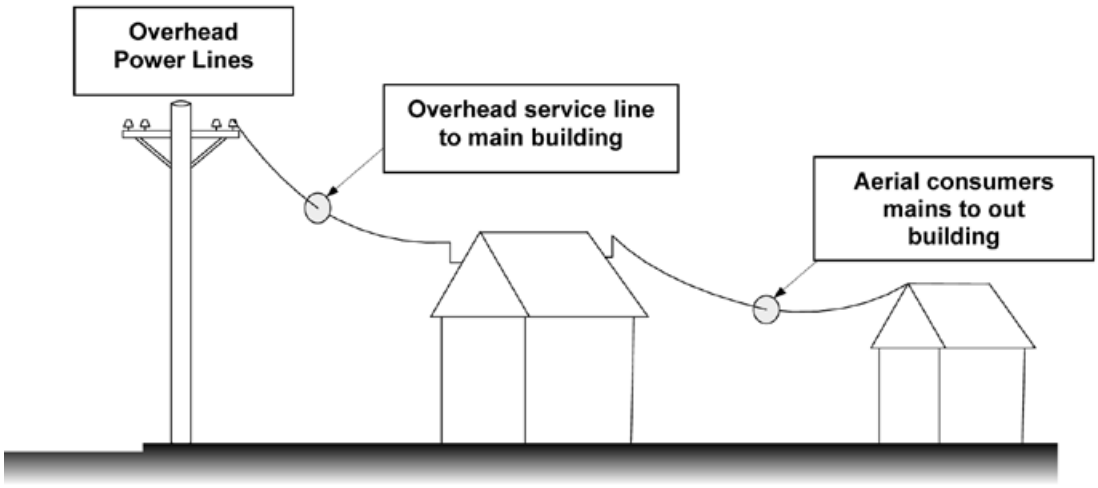


Figure 14 – Low Voltage Overhead Service Lines

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).

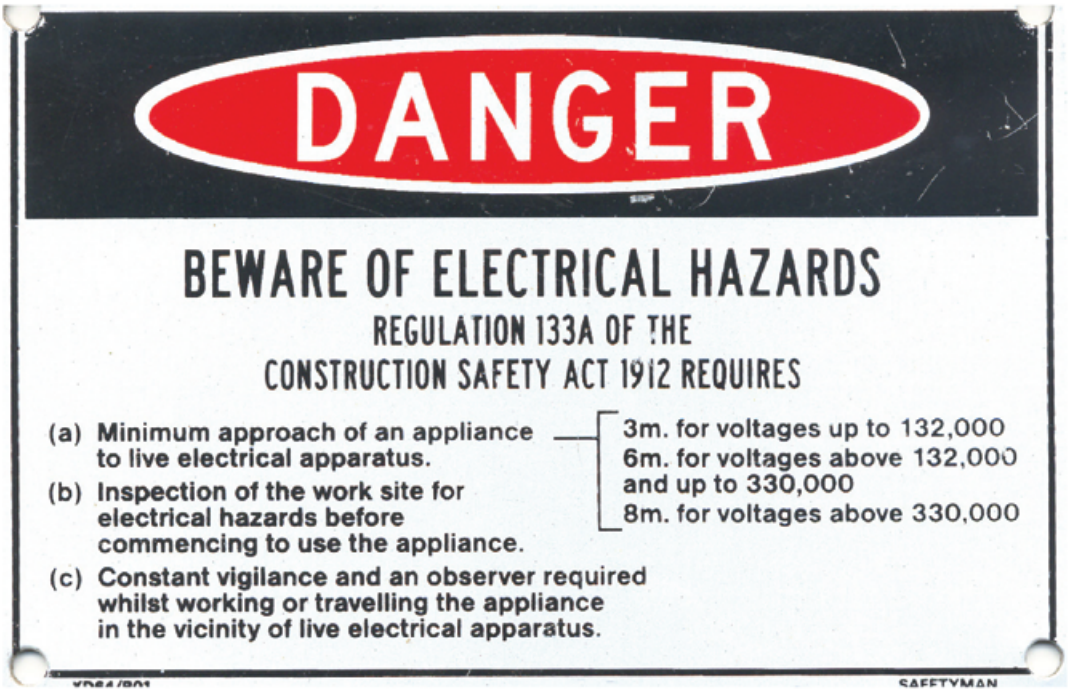
Working near overhead powerlines can be a high-risk activity and any contact with overhead power lines must be notified to WorkCover NSW and the relevant network operator in accordance with the requirements of the relevant legislation.

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.

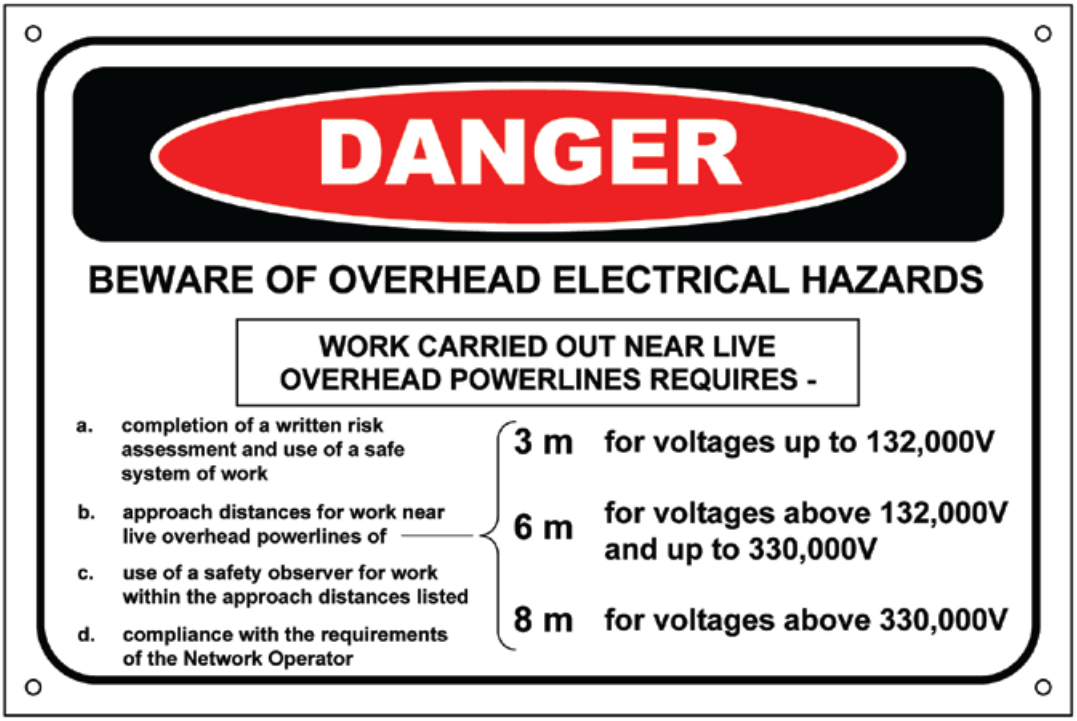
APPENDIX 1– WARNING NOTICE FOR OVERHEAD ELECTRICAL HAZARDS

(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:**	**Control measures:**
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*	*List all safety controls such as:* • *Access authority* • *Safety Harness* • *Mechanical Controls / PPE* • *Safety Observer required*
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.**

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.

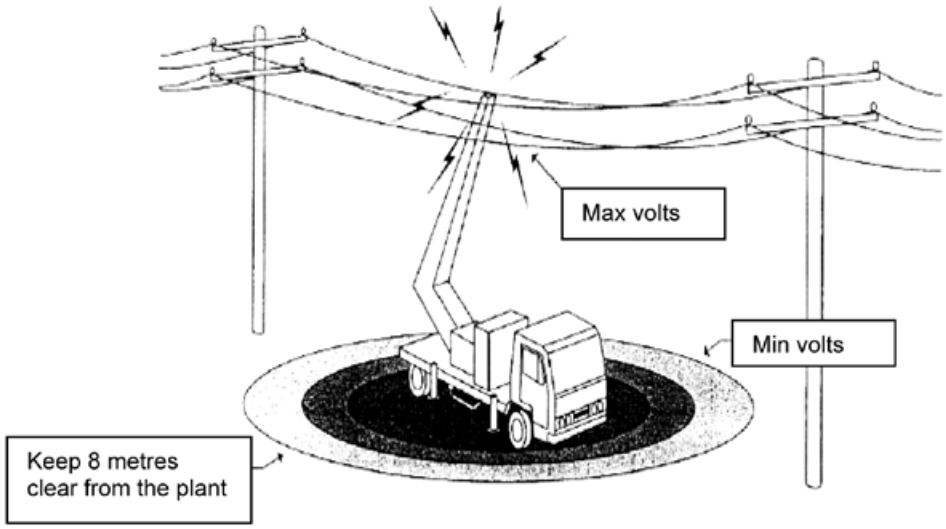


Figure 17: Affected area surrounding mobile plant when in contact with a live overhead power line

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.

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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.*

Disclaimer
This publication may contain information about the regulation and enforcement of work health and safety in NSW. It may include some of your obligations under some of the legislation that SafeWork NSW administers. To ensure you comply with your legal obligations you must refer to the appropriate legislation.
Information on the latest laws can be checked by visiting the NSW legislation website www.legislation.nsw.gov.au
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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

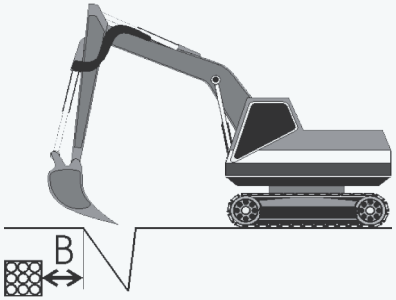
5.1.2 Safety considerations for Low, High or Extra High Voltage electrical cables

- 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.

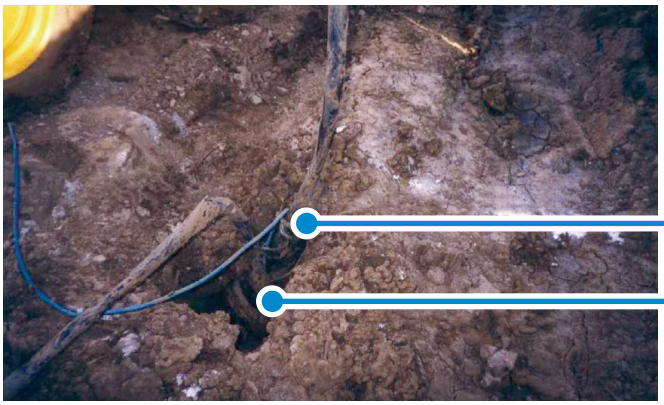
When people in west Sydney picked up their phones and found no signal, they might have expected their mobiles or other carrier services to fill the gap. But Telstra, Optus, AAPT, Vodafone and Primus were all affected to some extent.

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.

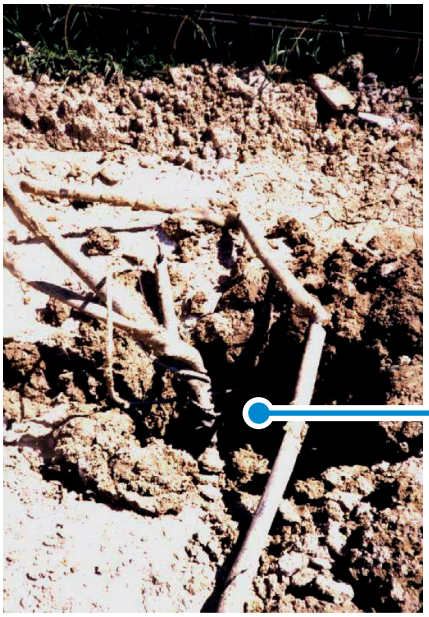


Sub-ducts and cables laying on the construction site, pulled out by an auger.



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:

_____

_____

_____

_____

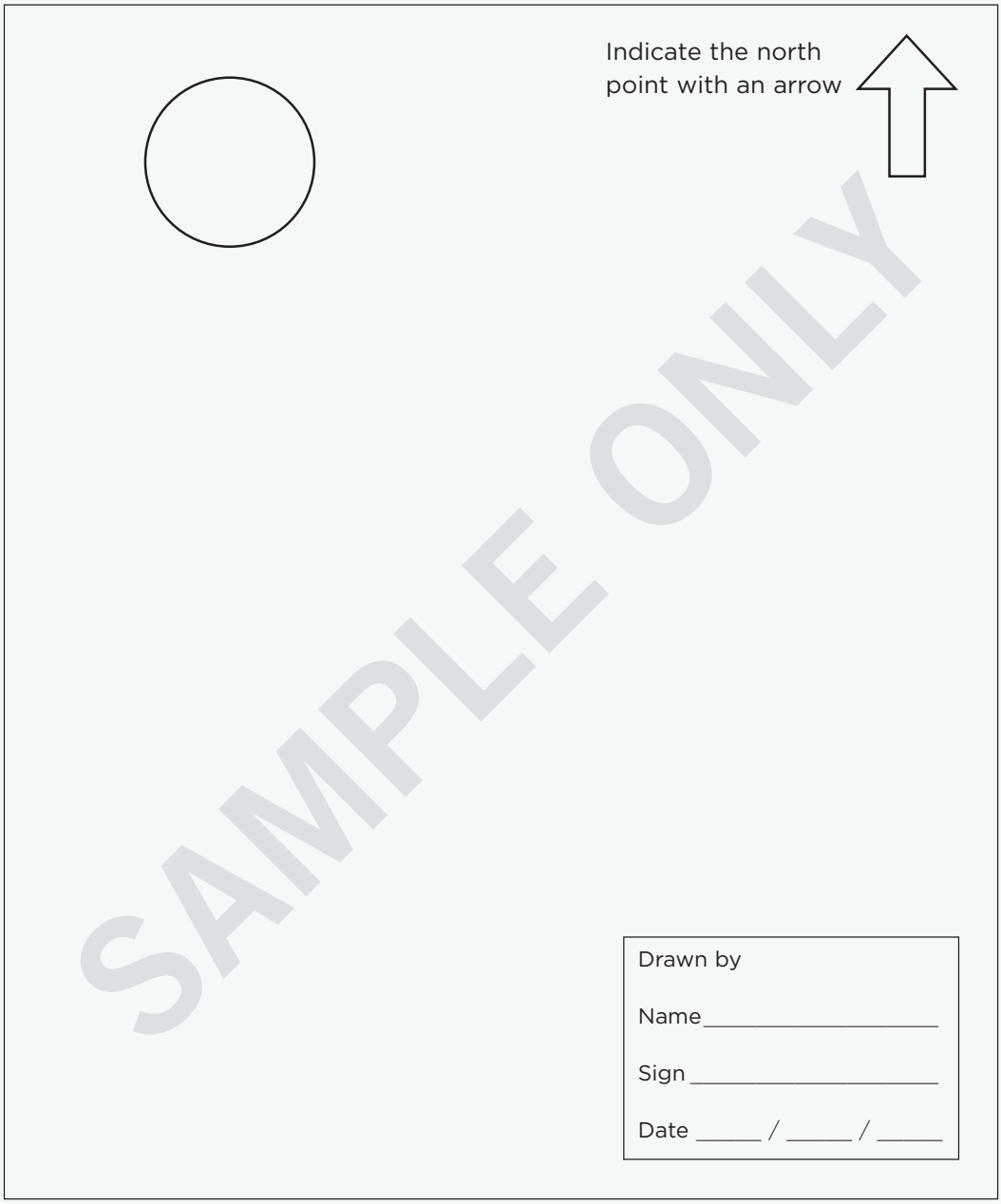
Plans verified and confirm all assets as located? ☐ Yes ☐ No

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

SAMPLE ONLY

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

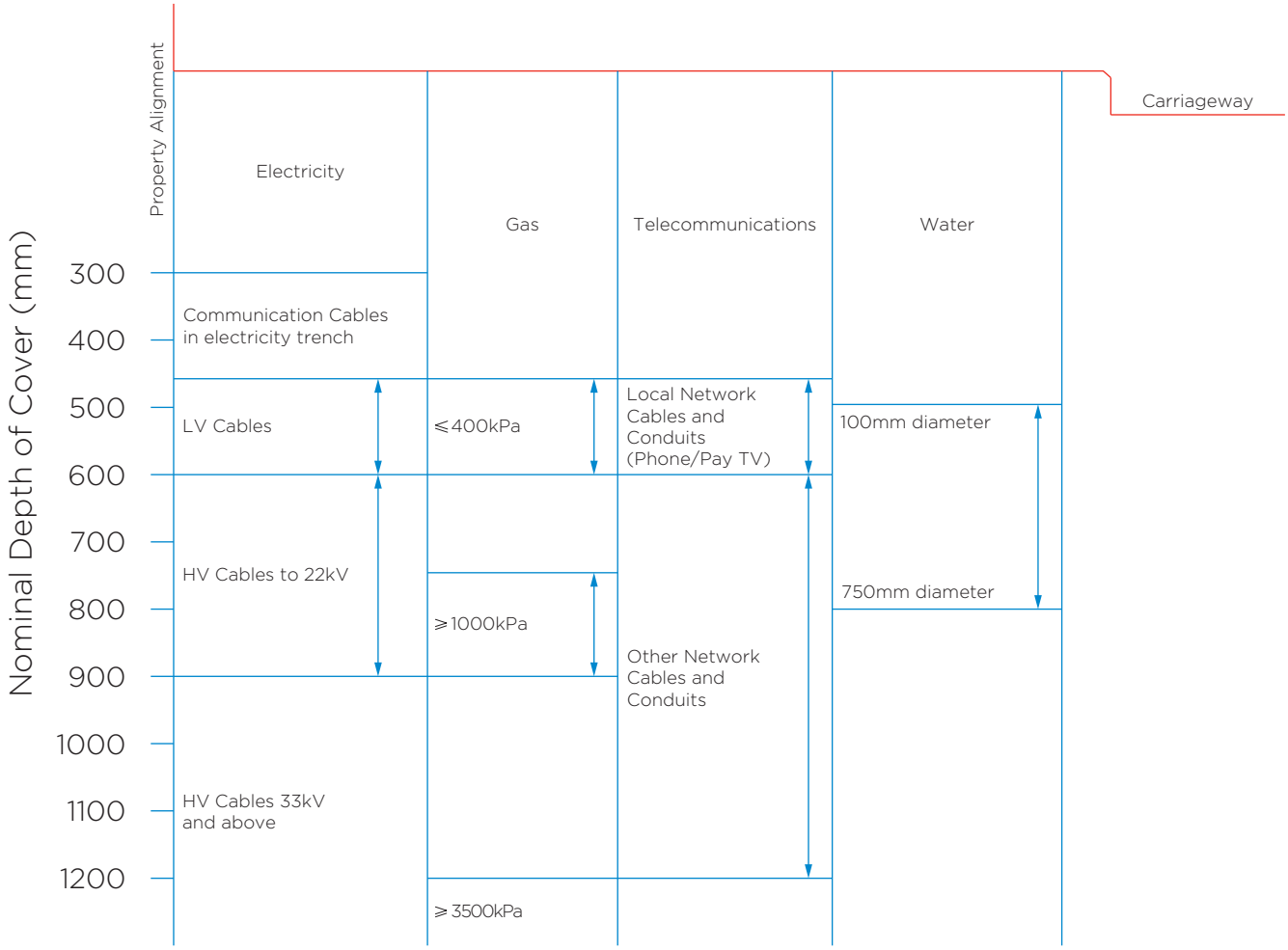
The diagrams in this section have been sourced from the publication entitled *Guide to Codes and Practices for Streets Opening 2007* published by the NSW Streets Opening Conference (SOC). These diagrams are typical examples only, and may not be up-to-date. The current edition of the SOC document should 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.

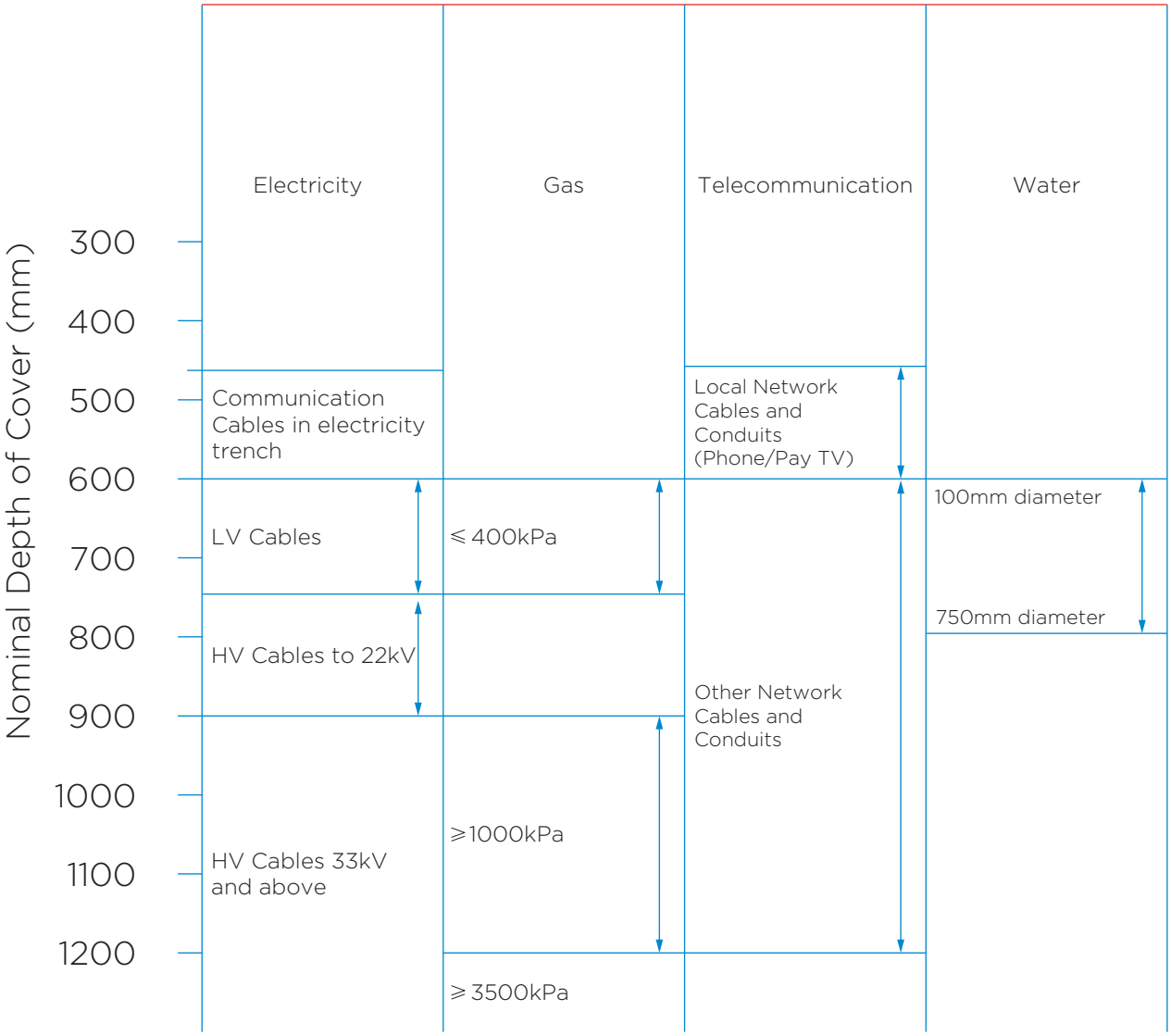
13.1 NOMINAL DEPTH OF COVER OF UTILITY SERVICES IN ROAD RESERVES

13.1.1 In footways



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

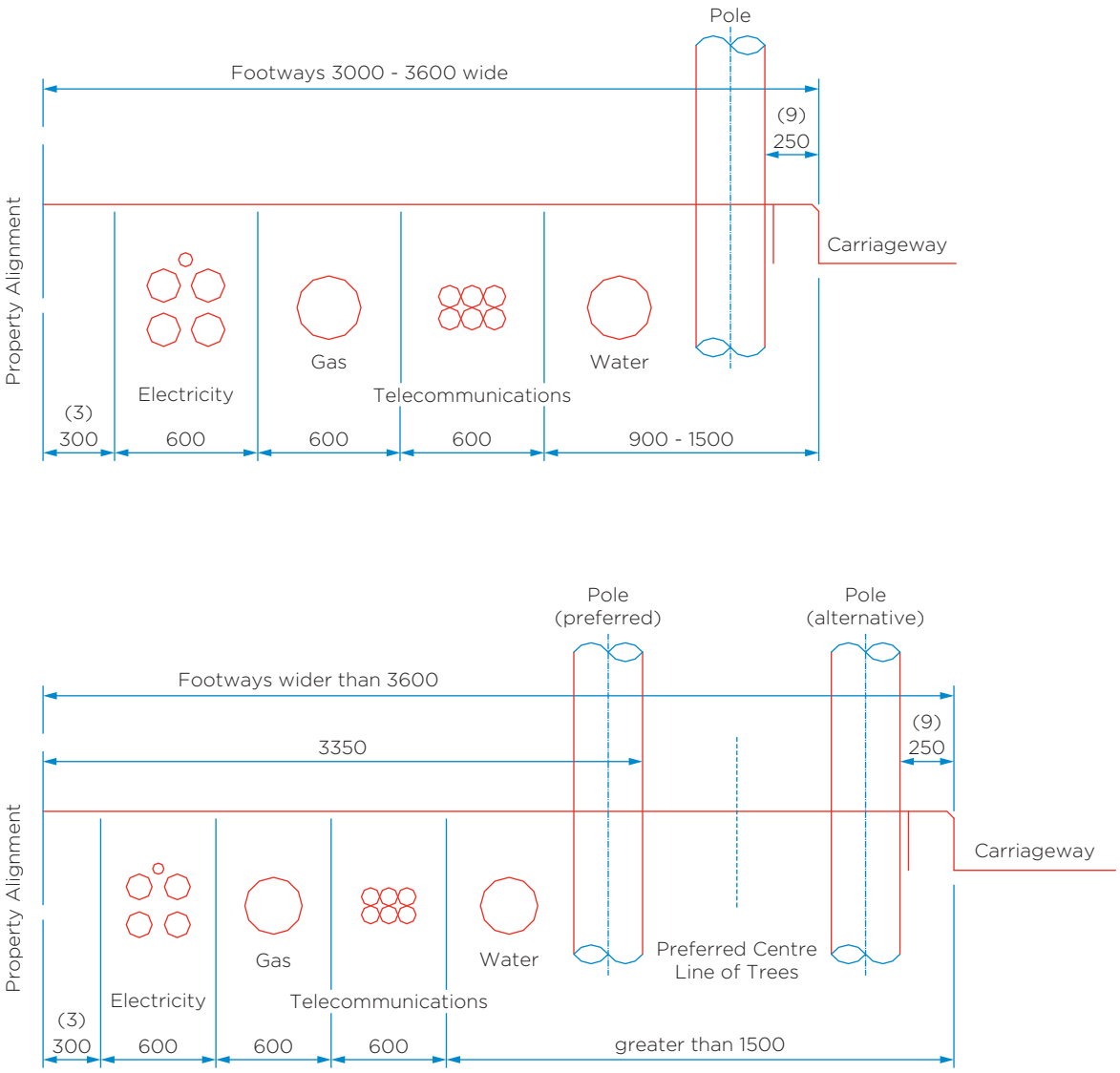
13.1.2 In carriageways



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

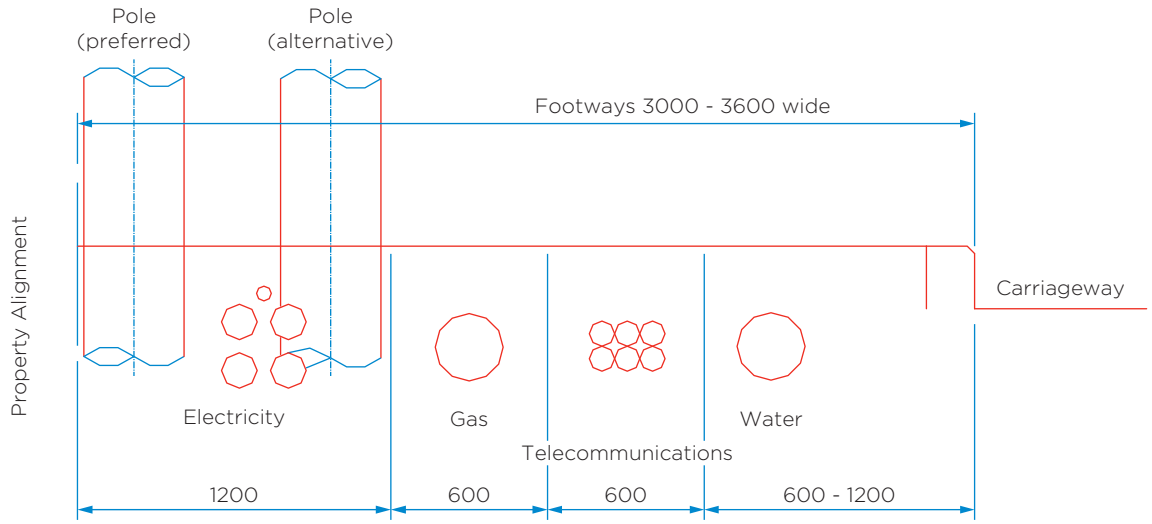
13.2 UTILITY/SERVICE PROVIDER ALLOCATION OF SPACE IN FOOTWAYS

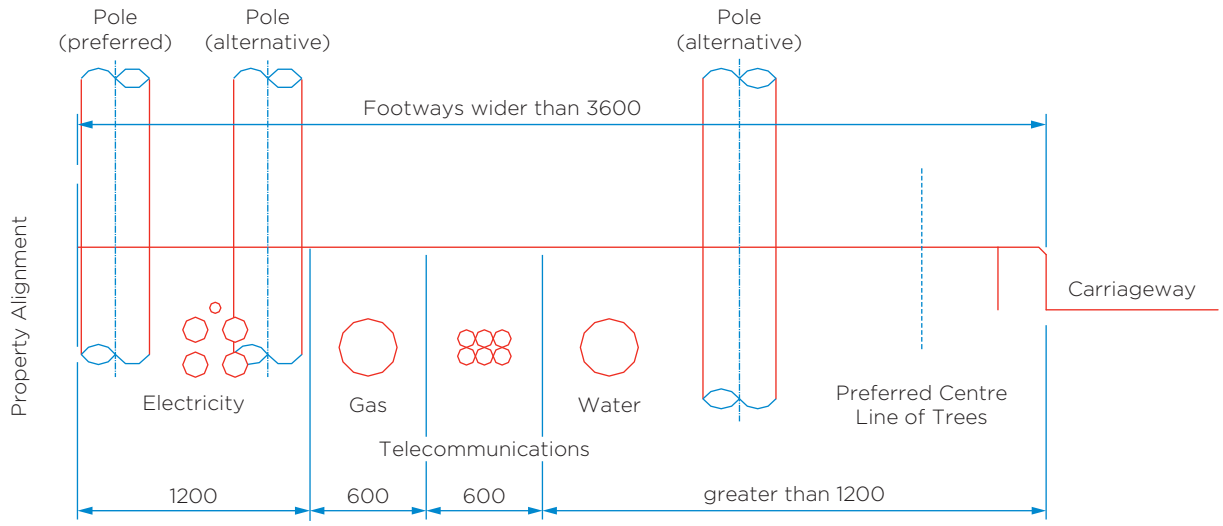
13.2.1 Streets dedicated prior to 1 January 1991



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

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