

Attachment of communication transmitters to Endeavour Energy structures

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Revision History

This amendment replaces the following specifications:

MCI 0003 – Attachment of communication transmitters to Endeavour Energy structures Am. 4

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Contact Information

The latest version of this document and other standards, are located on Endeavour Energy's standards website located at:

<http://www.endeavourenergy.com.au/aspPortal/webengine/au/com/ee/asp/Standards/Standards>.

For any enquiries relating to the content of this document please contact the Standards Coordinator on 13 10 81.

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1 Documentation Scope

To set out the conditions for the attachment of communications transmitters, including mobile phone cells and other similar communications equipment, to Endeavour Energy's poles, columns and lattice towers (structures).

The cells and similar communications equipment covered by this Standard includes:

- mobile phone cells, such as those attached by telecommunications carriers; and,
- mobile phone transmitter/receivers and all RF emitting device.

This standard does not cover the requirements of working: on telecommunication equipment installed on Endeavour Energy structures; or, working on Endeavour Energy structures that have telecommunications equipment.

This standard does not apply to Endeavour Energy owned and / or operated Telecommunications equipment, transmitters and SCADA systems.

2 References

External Regulations		
NSW Work Health and Safety Act 2011		
NSW Work Health and Safety Regulation 2017		
Service and installation rules of New South Wales 2019		

External Standards		
Standard No.	Year	Title
ENA Doc 001	2019	National Electricity Network Safety Code
ENA NENS 04	2006	National guidelines for safe approach distances to electrical and mechanical apparatus
AS 2067	2016	Substations and high voltage installations exceeding 1 kV a.c.
AS 6947	R2019	Crossing of waterways by electricity infrastructure
AS/NZS 7000	2016	Overhead line design
AS/CA S009	2020	Installation requirements for customer cabling (Wiring Rules)
ARPANSA RPS S1	2021	Standard for Limiting Exposure to Radiofrequency Fields – 100 kHz to 300 GHz
Service rules	2019	Service and installation rules of New South Wales
Work Cover	2006	Work near Overhead Power Lines

Company Policies and Procedures	
Company Policy (Network) 9.1.10 – Network Electrical Safety	
Company Policy (Network) 9.6.1 – Network Connections	
Company Policy (Network) 9.6.9 – Facilities Access (Shared Infrastructure)	
Company Procedure GAM 0001 – Network Standards Framework: Preparation and Amendment of Network Standards	
Company Procedure GAM 0114 Granting dispensation for engineering documents	
Company Procedure GAM 0037 – Network Facilities Access Approval	
Company Procedure GAM 0089 – Authorisations Governance and Management	
Division Procedure GNV 1051 – Working in structures with communications transmitters	
Electric & Public Safety – Electric Safety Authorisations Manual	

Company Standards	
Earthing Design Instruction EDI 001	Earthing design risk assessment
Mains Construction Instruction MCI 0002	Attachment of communication cables to Endeavour Energy poles
Mains Design Construction MDI 0031	Overhead line design

3 Definitions and Abbreviations

3.1 Abbreviations

Term	Abbreviation
ABC	Aerial bundled cable
ACMA	Australia Communications and Media Authority
ASP	Accredited Service Provider
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
Authorised person	A person with technical knowledge or sufficient experience who has been approved, or who has delegated authority to act on behalf of Endeavour Energy, to perform the duty concerned.

MCI 0003 – Attachment of communication transmitters to Endeavour Energy structures

Broadband Communication Cables (BCC)	These include optical fibre cables and coaxial cables used for the provision of cable television and other information services either self-supported or supported by a metallic catenary wire.
CCT	Covered conductor thick
EWP	Elevated work platform
GIS	Graphical Information System
HV	High voltage (>1,000 volts alternating (ac) or 1,500 volts direct current (dc))
RF	Radio frequency
RFNSA	Radio Frequency National Site Archive
SCADA	System Control and Data Acquisition
SL	Streetlight /street lighting
UGOH	Underground to overhead transition pole
XLPE	Cross-linked polyethylene

3.2 General definitions

Term	Definition
Antenna	Transmitter, such as a wire or grid, sometimes mounted within a tube or panel, that emits and receives radio signals.
Communication hardware	In this document, communication hardware refers to the equipment associated with the transmitting device excluding the antenna, namely, the power supply, isolation device and any auxiliary equipment.
Exclusion zone	The safe working distance defined as the 'general public' in accordance to ARPANSA RPS S-1 standard, that has to be achieved from an energised radio frequency transmitter, which cannot be entered by any part of the body or metal object.
Broadband Communication Cables (BBC)	These include optical fibre cables and coaxial cables used for the provision of cable television and other information services either self-supported or supported by a metallic catenary wire.
Fibre optic cable	Used on some cells to provide communications with the telecommunications carrier's network (wire cables may be used).
General public limit	Limits for General Public RF exposure in accordance to ARPANSA RPS S-1
Microwave dish	Dish-shaped transmitter device, used on some cells, that emits and receives radio signals that allow the cell to communicate with the telecommunications carrier's network.

Mobile phone cell	Communications installation that communicates between mobile phones and the telecommunications carrier's network using radio signals. It usually includes antenna and communications hardware located on the ground or on the structure supporting the antenna.
Occupational limit	Limits for Occupational RF exposure in accordance to ARPANSA RPS S-1
Structure	Column, pole, lattice tower, for example, owned by Endeavour Energy and used to support Endeavour Energy's electricity distribution/transmission network and streetlighting assets.
Third party telecommunication carriers	Telecommunication carriers (such as Optus, Telstra, and Vodafone) that own and operate mobile phone cells within licensed space on Endeavour Energy's columns, poles and transmission towers.
Radio transmitter	A device used to send radio signals. Such transmitters have associated communications hardware installed on the ground or the structure supporting the antenna.

4 Actions

4.1 Pre-existing constructions

Endeavour Energy's network has had, and will continue to have, enhancements carried out for the purpose of providing a more reliable and safe electrical distribution system. Existing constructions which may not comply with this Standard shall generally be deemed acceptable except where a specific risk assessment indicates a significant risk to Endeavour Energy or the public. All new or replaced constructions shall comply with the requirements of this standard.

4.2 Mobile phone cell owner's responsibility

The cell owner is responsible for the safe design, installation, operation, maintenance, repair, augmentation, alteration and removal of the cell and associated cabling. The cell owner or operator is responsible to ensure all transmitting devices operate under a suitable ACMA license.

The cell owner is responsible for all costs associated with the above including all costs incurred by Endeavour Energy due to the attachment of the device on its structure.

The cell owner or operator is to ensure no harmful interference is caused to any Endeavour Energy Telecommunications / SCADA or radio system.

The cell owner is responsible for entering the installation details (Radio Communication Site Management Book) in the Mobile Carrier Forum (MCF) site at <https://www.rfnsa.com.au>. This information will provide those required to access the structure definitive information on the hazards of the particular installation.

The cell owner has the responsibility to inform the local council and affected residents about the cell installation on the structure. As part of the approval process with Endeavour Energy, the cell owner is to submit evidence that this has been completed.

All applications must be submitted to the Customer Network Solution section of Endeavour Energy and the Customer Network & Facilities Engineer will be responsible in coordinating this application process internally with other interested parties.

All applications must provide Endeavour Energy with the 'general public' and 'occupational' exclusion zones as defined in ARPANSA RPS S-1. If multiple transmitters are onsite the assessment must include all other transmitting devices and antennas on site, irrespective of the owner.

4.3 Worker training

Non-Endeavour Energy workers will need to be authorised for work on Endeavour Energy's network as detailed in Schedule 1 of Electrical Safety Authorisations Manual.

To be able to work on an Endeavour Energy asset with a communication asset attached, authorised personnel must also be accredited by industry accredited training centres for:

- pole top work;
- fibre optic cables; and,
- RF awareness.

Note: Any work on Endeavour Energy Transmission towers must be carried out by Endeavour Energy employees.

4.4 Use of elevated work platforms

EWPs to be used for work on or near Endeavour Energy's assets shall have available a current Electrical Test certificate for the elevated work platforms (EWP's).

All EWPs, cranes, plant, vehicles, individual's tools and equipment used on or near Endeavour Energy's electrical network must comply with the WorkCover, Work Near Overhead Power Lines Code of Practice 2006.

4.5 Safe approach distances to Endeavour Energy's network

All conductors, including insulated/covered conductors, must be treated as live and the clearances in the Endeavour Energy Electrical Safety Rules must be maintained.

4.6 Structure suitability

Endeavour Energy retains the right to use its structures for the purpose of the distribution of electricity, with the minimum cause of disruption, to its customers.

The suitability of an Endeavour Energy structure for communication equipment will depend upon:

- The possible impact of the carrier's equipment on Endeavour Energy's ability to perform its continual operation of its network; and,
- Any future plans for augmentation, relocation and maintenance of Endeavour Energy's network.
- The mechanical strength of the structure and the proposed additional loading due to the communication equipment. Calculations shall be submitted with any application to install assets on Endeavour Energy's assets. Endeavour Energy will assess the suitability of the assets on EE's structure according to Australian standards. All assessment cost shall be borne by the requestor.

In addition to the above, some sites may have further restrictions and limitations due to unavoidable emergency outages - higher voltage and higher power capacity sites tend to be more critical (refer clause 5.7.6).

The carrier's application shall include consideration of a voltage rise at the structure and the impact on their asset and staff. Voltage rise should be assessed against the requirements of Earthing Design Instruction EDI 001 – Earthing design risk assessment. A comprehensive earthing report must be submitted when installing on a Transmission tower and structures.

4.7 Pole and column requirements

4.7.1 General conditions

All carrier installations must not unduly interfere with Endeavour Energy's construction and maintenance activities.

If an antenna is installed beneath a streetlight outreach arm, these locations could be subject to outages due to regular streetlight maintenance activities.

Structural deviations from Endeavour Energy's construction Standards for poles and columns are not acceptable.

Climbing access to Endeavour Energy's assets by ladder is required past an antenna that is mounted below a network circuit and this may require a special design for the mounting of the cell.

Any future corrective action required on the pole footing, due to pole movement that has been established as caused by the addition of a carrier's equipment, shall be carried out at the carrier's expense.

Where antennas are to be installed on columns, antennas shall have a 750mm vertical separation from streetlight lanterns and shall not be facing the direction of the lantern.

4.7.2 Clearances between antenna and network mains

Antenna and cells may be located as follows:

Table 1: Minimum clearances between network mains and communications equipment

Voltage Level	Insulation	Location of transmitter	Clearance from antenna to the lowest circuit (See Note 1)
33kV - 132kV	Bare	Beneath or Above ³	3000mm
11kV & 22kV	Bare, HVABC, CCT	Beneath	1800mm
LV and SL	Bare	Beneath	750mm
	LVABC + Insulated SL	Beneath	750mm
BCC	Insulated	Beneath and Above ²	300mm

Notes:

1 – The distances shown apply vertically on the pole.

2 - Where there is no BCC, the antenna may be located in the BCC space, provided all other spacing requirements are met.

3 – Antennas only permitted above bare conductors (phase and earth wire) on tower structures.

4.7.2.1 Poles with multiple circuits

Where a pole has multiple circuits, the antenna shall be installed below the lowest circuit and only the clearance of this circuit, as indicated in Table 1, shall apply. The only exception to this clause is insulated LV

or SL circuits, which may have an antenna installed above and therefore shall also comply with the minimum clearances for the above circuit as stated in Table 1.

4.7.3 Communication hardware and power supply clearances

The communication hardware and associated power supply equipment shall be located:

- Outside the vertical exclusion zone distance for the type of antenna installed. The exclusion zones are specified in Division Procedure GNV 1051 – Working on Structures with Communications Transmitters.
- A minimum of 3.0 metres from the bottom of the equipment and ground. If this cannot be achieved, the hardware may be installed lower, however, a clearance of 3.0 metres above the equipment is required.

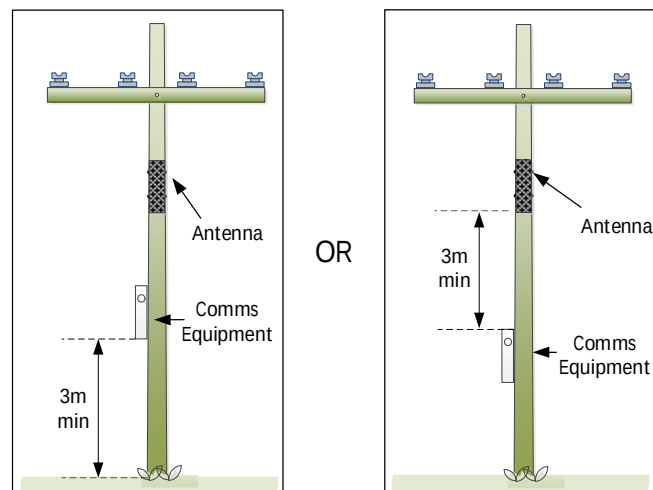


Figure 1: Communication hardware clearances

4.7.3.1 Other clearances

A 500mm separation is required from streetlight and service leads/tails, streetlight brackets, chokes, stay fittings and bearer wires.

4.7.4 Separation from metallic fittings on poles

Some Endeavour Energy poles carry unearthed, metallic fittings that are capable of becoming live as a result of the breakdown of primary insulation (for example, steel conduit, light fittings and their outreach arms, and choke boxes).

Persons working on wooden poles should be aware of the possibility of metallic fittings becoming live and must employ safe working procedures when working near unearthed, pole mounted, metallic fittings.

The minimum separation between any unearthed metal on the pole, not including pole steps or steel conduit saddles, and telecommunication equipment or leads shall be 50mm in any direction. On poles redressed for communications equipment, Endeavour Energy network metallic fittings shall not be installed within 50mm of the area reserved for communications infrastructure.

4.7.5 Third party telecommunication carriers

The carrier must remain at least 300mm clear of existing Broadband infrastructure (BBCC) at all times whilst also maintaining the required separation from Endeavour Energy's mains, as set out in clause 4.7.2. The carrier is responsible for negotiations with the Broadband owner to relocate any of their equipment.

4.7.6 Prohibited locations

Antenna and associated equipment shall not be located:

- On streetlight columns that are hinged near the base. See figure 2.
- Where the antenna's general public emission zone comes within 500mm of where a worker can be during works on Endeavour Energy's assets.
- On poles frequently visited for work by Endeavour Energy, as described below:
 - o Pole mounted substations.
 - o Pole mounted capacitors banks, batteries and LV Statcoms.
 - o HV air break and load break switches and underslung links.
 - o HV auto reclosers and sectionalisers, and similar devices.
 - o Pole mounted Endeavour Energy's SCADA and telecommunications equipment.
 - o Tee-off poles and underground to overhead (UGOH) connections, excluding services.



Fig. 2 Based hinged column

- Above bare, covered and PVC insulated conductors (not including on tower installations).

Endeavour Energy SCADA and telecommunications equipment shall not be subject to the restrictions of this standard.

4.7.7 Direction of pole mounted communication hardware

Communications hardware and power supply equipment shall be mounted on the footpath side of the structure as indicated in Figure 3. Antennas may be mounted on any side of the pole.

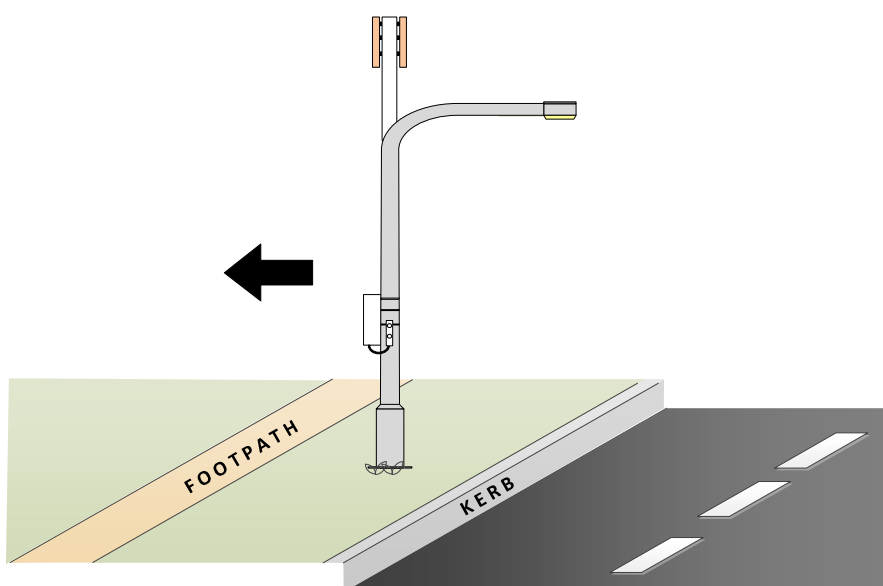


Figure 3: Location of the pole mounted hardware

The supply to the power supply equipment is subject to a network connection agreement with Endeavour Energy, as well as an agreement with an electricity retailer.

The location of the network connection shall be recorded in Endeavour Energy's GIS.

4.7.8 Attachment to structure

The cell shall be attached to Endeavour Energy's structures as follows:

- Steel columns: galvanised or stainless steel bolts and nuts, self-tapping screws or strapping.
- Wood poles: galvanised or stainless steel bolt or strapping.

All proposed attachments methods shall be demonstrated not to impact the mechanical integrity of the asset it is being attached to.



Figure 4: Typical stainless steel banding

4.8 Lattice tower requirements

Antenna, antenna support steelwork, cabling and the like, are not permitted outside the tower legs on the two faces between the tower legs and the electrical transmission conductors, refer to [Figure 5](#).

The antenna support steelwork and antenna may be permitted outside the tower legs on the other two faces (faces A and B), however antennas are to be located above the top of the tower.

The antenna cabling, except for the connection loops to the antenna, shall be located inside the tower legs attached to the climbing leg of the tower

These requirements apply to all towers (suspension and strain).

For each proposed location, the carrier shall submit their proposal to Endeavour Energy to be assessed for location and attachment suitability and structural adequacy.

Ground mounted communications huts shall be located either, within the tower legs, or outside the electricity easement. The need for Endeavour Energy to have vehicles around the base of the tower for work shall be considered in the placement of the communication hut.

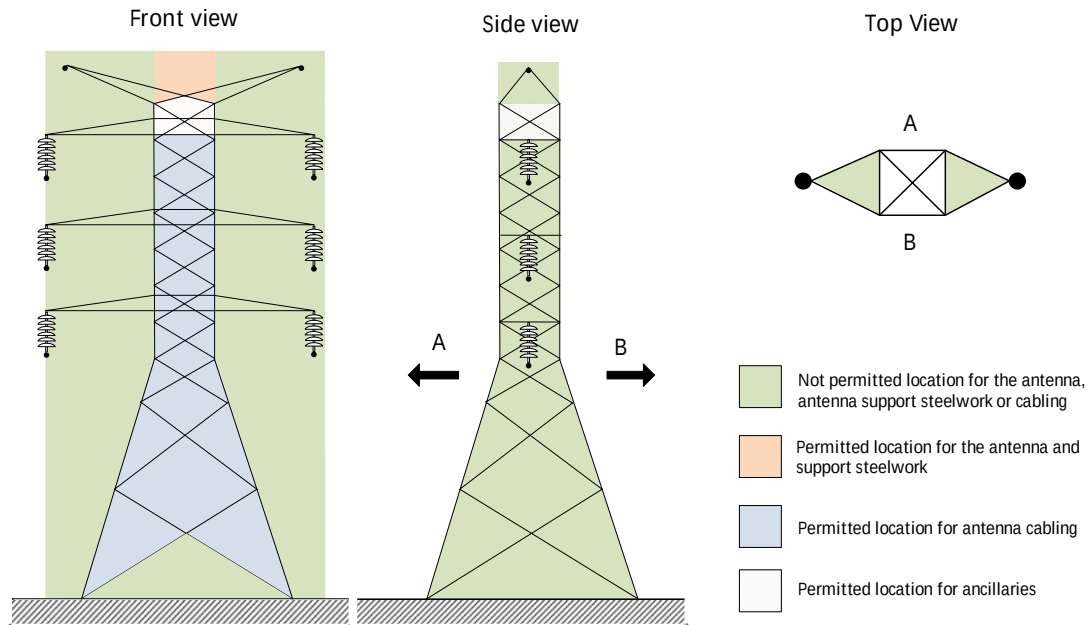


Figure 5: Permitted locations for antenna and support steelwork

4.9 Zone and Transmission Substation requirements

Third party communication transmitters on structures within a substation site will generally not be considered. Any proposals that impact on a substation site must be submitted for approval to the Endeavour Energy Strategic Property Manager and Equipment Delivery Manager.

Endeavour Energy communications equipment is permitted within a substation.

4.10 Relocation and modification of current Endeavour Energy's structures

4.10.1 Cell owner requested asset relocation

At the request and expense of the proponent, relocation works can be carried out. Relocation of assets shall be carried out in accordance with Endeavour Energy's Company Policy 9.6.5 – Contestable Works, and this instruction.

The following Endeavour Energy assets may be relocated:

- A dedicated streetlight pole replaced with a column.
- Relocation and/or replacement of a streetlight fitting to maintain clearances.
- A streetlight conductor may be lifted to the minimum 350mm clearance below the crossarm. If bare, it shall be replaced with an XLPE insulated conductor.
- Overhead circuits may be altered as in clause 4.10.2.
- Rearrangement and/or replacement of aerial service cables.

The cell owner may negotiate the relocation of other assets, including communication assets, which may be already attached to the pole. However, this will need to be agreed to by the owner of the asset.

4.10.2 Cell owner requested modification to current overhead constructions

Where no alternative structure exists, a carrier may propose a different overhead construction of an Endeavour Energy structure to be able to install their communications equipment. To be considered, a dispensation request shall be submitted to [Equipment Delivery Manager](#), as detailed in Division Procedure [GAM 0114](#) – Granting Dispensation from Engineering Documents.

4.10.3 Endeavour Energy initiated changes to the network

Endeavour Energy reserves the right to change its structure at any time.

In the situation where a cell owner's transmitters are attached to a structure which needs to be modified, the cell owner will be notified and has the responsibility to disassemble and remove the transmitter(s). Endeavour Energy's right to own a structure on public land is dependent upon its use for electricity distribution. The undergrounding of all electrical circuits would normally require the removal of all associated poles however, where the carrier requests, the pole ownership may be transferred to that carrier.

4.10.4 Multiple antenna

When installing additional antenna on a structure, it is the responsibility of the carrier to:

- Negotiate with owners of existing cells;
- Provide Endeavour Energy with the with the 'general public' and 'occupational' exclusion zones as defined in ARPANSA RPS S-1. If multiple transmitters are onsite the assessment must include all other transmitting devices and antennas on site, irrespective of the owner.
- An assessment of the structure shall be submitted.

4.11 Circuit separation within steel columns

Communications wiring and equipment installed within steel columns shall be segregated from mains and street lighting wiring and equipment in accordance with AS/CA S009 clause 16.3.

4.12 General Requirements

4.12.1 Right to cancel application

Endeavour Energy has the right to:

- reject a new or augmentation application; cancel approval to construct; or, terminate a site licence, at any time when community activity regarding the installation of the devices on its structures threatens Endeavour Energy's reputation; and
- reject a new or augmentation application where the volume and type of communication equipment is considered excessive.

4.12.2 Network records

Details of communications networks attached to Endeavour Energy poles are recorded on:

- Endeavour Energy's Intranet site - [Network & Assets/Communication Transmitters/List of sites](#); and,
- Endeavour Energy ASP website - under [Notices/Working on structures with communication transmitter installations/Procedure and list of sites](#).

4.12.3 Tree trimming

Endeavour Energy has no commercial arrangement with cell owners in respect to tree trimming and no allowance will be made for cells in regard to tree trimming activities.

4.12.4 Aesthetics

Cell owners may present the installation of cells as having no significant visual impact.

Endeavour Energy is aware that its overhead electricity network may be implicated (by association) in any adverse community reaction to the attachment of cells. Accordingly, Endeavour Energy representatives involved in this exercise should strive to make the completed network is as aesthetically acceptable as possible.

Endeavour Energy may influence this through prudence in the selection of the structure and assessment of make-ready requirements. Critical factors including the location and cell height are to be given prime importance during this assessment.

4.12.5 Identification of mobile phone cells

The carrier shall clearly identify the cell by a nameplate, attached to the pole or to hardware on the pole. The nameplate shall be readable from the ground with the following information included

- 1) The name of the carrier owner.
- 2) The carrier's Network Operations Centre (NOC) phone number.
- 3) The carrier's Site Reference Number
- 4) The carrier shall also install signs, below the antenna, warning of:
 - a. The dangers of radio emissions; and,
 - b. A pole with an antenna installed, shall not be climbed.



Figure 1: Typical safety signs placed on structures with communications transmitters attached

The carrier is responsible for safety and operational notices required in accordance with Communication Regulations and Standards.

4.12.6 Radio emission isolation

The carrier shall clearly identify the method to be used to isolate the radio emissions from the cell antenna and microwave dishes. This will include the isolation of batteries installed to power antenna and microwave dishes during power outages.

Endeavour Energy shall have access to antenna and microwave dish isolation devices, switches and indicators which positively indicate the state of all radio emissions.

Access to the isolation switches and indicators is to be provided by a D3 padlock.

4.12.7 Cell power supply

The power supply shall comply with the Service and Installation Rules of NSW.

The carrier shall clearly identify the method to be used to isolate the cell power supply and Endeavour Energy shall have access to the cell power supply isolation devices.

4.12.8 Agreement with landowners

The installation and ongoing access of mobile phone cells on Endeavour Energy's poles and/or towers will only be considered after the cell owner has obtained written permission from the landowner or persons/company with the delegated authority.

4.12.9 Ground mounted equipment

Where a separate ground mounted cubicle is required to house associated equipment of the mobile phone cells, this shall be installed outside the easement (exception for lattice towers – refer clause 4.8). This is to minimise the impact on Endeavour Energy's operational activities within the easement.

Mechanical protection is required on poles for cables forming part of a cell installation, as follows:

- Suitable mechanical protection (U guard) is required to be attached to the pole from a depth of 300mm below ground to 3000mm above ground level and shall not cover any other Endeavour Energy assets. This minimises disruption to Endeavour Energy's pole inspection procedure. Connection pits in the ground near a pole must be a minimum of 500mm from the pole.
- Mechanical protection (U guard) is required to protect telecommunications cables that run up the pole where a pole platform may be placed for work on the pole, its equipment or mains. This is required from 1000mm below the highest electricity mains on the pole to at least 1800mm below the lowest electricity mains on the pole.

4.13 Non-compliance to this standard

If any of the requirements detailed in this standard cannot be met, supporting information and alternative designs shall be submitted as detailed in Division Procedure GAM 0114 – Granting dispensation from Engineering Documents.

5 Responsibilities

General Manager Future Grid & Asset Management has the authority and responsibility for:

- Approving major changes to this instruction in accordance with GAM 0001.

Head of Asset Planning & Performance has the authority and responsibility for:

- Approving minor changes to this instruction in accordance with GAM 0001.
- Endorsing major changes to this instruction in accordance with GAM 0001.

Engineering Delivery Manager has the authority and responsibility for:

- Keeping the content of this instruction is kept up to date; and
- Reviewing and either approving or rejecting dispensation requests that do adhere to this standard.
- Making recommendations to the Strategic Property Manager when proposals impact zone and transmission substations.

Strategic Property Manager has the authority and responsibility for:

- Assessing and approving any proposals that are to be built adjacent to, or part of, zone and transmission substations;
- Working with **Equipment Delivery Manager** to assess the proposals.

Head of Customer Network Solutions has the authority and responsibility for:

- Assessing and approving any proposed modifications to existing Endeavour Energy connections;
- Updating internal systems with any changes to Endeavour Energy's network.

Manager Design has the authority and responsibility for:

- Overseeing that all designs submitted and carried out by design employees conform to the requirements of this instruction.

Customer Network & Facilities Engineer is responsible for coordinating enquiries and proposals for the attachment of cells to Endeavour Energy structure.

