

Network Standard

Document No.
NS102

Title:
Working on or near poles with telecommunication transmitters

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| Designation | Senior Engineer | Designation | Head of Asset Risk & Performance | | |

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| 1 | 11/09/2015 | Replace existing compliance checklist in Annexure B | Lal Gunatilleke | Chief Engineer |
| 2 | 20/07/2021 | New template applied, inclusion of small cell antenna and planned interruption requirements | Duminda Thenuwara | Mark Ragusa |
| 3 | 7/02/2022 | Amendment to voltage detector application subclause 2.3.2 | Duminda Thenuwara | Mark Ragusa |

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Table of Contents

| | |
|--|----------|
| Scope | 3 |
| Reference Documents | 3 |
| Ausgrid Documents | 3 |
| Other Standards and Documents | 3 |
| Acts and Regulations | 3 |
| 1 General | 4 |
| 2 Hazards | 4 |
| 3 Emergency / Urgent Work | 5 |
| 4 Routine Work | 5 |
| 5 Information requirements | 5 |

List of Annexures

| | |
|---|---|
| Annexure A: Antenna Information | 1 |
| Annexure B: EME Information Available on Ausgrid's GIS | 4 |
| Annexure C: Radiofrequency Electromagnetic Energy (RF EME) Fact Sheet | 6 |

Scope

This Standard details the procedure to follow so that work may be completed safely and efficiently on Ausgrid poles or street lighting columns where telecommunication transmitter installations are installed. This standard applies to all Ausgrid staff, contractors and ASPs.

Reference Documents

All work covered in this document shall conform to all relevant Legislation, Standards, Codes of Practice and Network Standards.

Ausgrid Documents

NS001 Glossary of Terms

Customer Installation Safety Plan

Electrical Safety Rules

Electricity Network Safety Management System Manual

NS181 Approval of Materials and Equipment and Network Standard Variations

NS183 Installation of Private Attachments on Ausgrid Poles

NS212 Integrated Support Requirements for Ausgrid Network Assets

Public Electrical Safety Awareness Plan

Public Lighting Management Plan

T0032 Safety Equipment – Care Use and Inspection – Low Voltage Instruments

Work Instruction NW000-W0147

Other Standards and Documents

ENA Doc 001-2019 National Electricity Network Safety Code

Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields – 3kHz to 300GHz (2002)

Acts and Regulations

Electricity Supply (General) Regulation 2014 (NSW)

Electricity Supply (Safety and Network Management) Regulation 2014 (NSW)

Work Health and Safety Act 2011 (NSW)

Work Health and Safety Regulation 2017 (NSW)

Clause Standard Requirements

1 General

- 1.1 Where telecommunication transmitter installations are installed on Ausgrid poles or street lighting columns, anyone required to climb or work near these installations must follow correct procedures.
- 1.2 Antennas have been broken up into two categories; macrocells and small cell installations. For both installation types, when working in close proximity, the antennas shall be de-energised.
- 1.3 For macrocell installations, this involves de-energising the dc supply to the antenna installation at a panel in the base station kiosk.
- 1.4 For small cell installations, the disconnection procedure will involve de-energising the ac supply to the transmitter.
- 1.5 Once an antenna is de-energised, it shall be tested and proved that there are no hazardous Electromagnetic Energy (EME) radiating from the cell.
- 1.6 Telecommunication transmitters may also be installed on other structures (e.g. buildings, Telecommunications poles) where the EME plume may extend to Ausgrid network assets (e.g. overhead lines and poles). In such situations, the safety precautions of this standard must be followed.
- 1.7 When an antenna needs to be de-energised, the asset owner must be notified (except for in emergencies).

2 Hazards

2.1 Electromagnetic Energy (EME)

- 2.1.1 Working near energised mobile phone antennas can involve exposure to EME. Therefore, all mobile phone antennas shall be de-energised prior to working within proximity.

Refer to Annexure C for more information on the risks of EME.

- 2.1.2 Mandatory warning signs are installed by the antenna owner to indicate the presence of EME above. The EME reduces with distance from the antenna and although the exclusion zones are documented by the antenna owner, workers shall:

- remain below the signage when the antenna is energised;
- work above the signage but at a horizontal distance of at least 15m from the antenna (closer distances may be achieved following a review of the exclusion zone documents, known as 'plume' diagrams provided by the antenna owner); or
- work above the signage but isolate the antenna in accordance with work procedures.

2.2 Electrical

Electrical hazards may exist on a pole due to defects of conductors, insulators, low ground clearance of conductors, broken earth wires, tree branches touching live conductors etc. Precautions must be taken in accordance with Ausgrid's Electrical Safety Rules (ESR).

2.3 Step and Touch Potential

- 2.3.1 Workers shall be aware of voltage gradients that can exist on or near a pole. Workers shall take precautions to safeguard themselves and others against inadvertent contact with step and touch voltages.

2.3.2 Testing shall be performed to confirm the absence of hazardous voltages prior to initial contact in accordance with the Ausgrid's Electrical Safety Rules (ESR).

3 Emergency / Urgent Work

Emergency / urgent work includes any situation where, due to the nature of the risks being addressed, there is insufficient time to arrange for a planned outage. This may include but is not limited to vehicle impacts, trees contacting conductors, wires down or damage to pole top construction requiring immediate rectification.

3.1 Macrocell Sites

The antenna installation shall be de-energised by contacting the carrier using the 24-hour phone number. The carrier may send one of their comms operators or if access is available to the base station, may instruct the Network worker to operate switches (ac and dc) to isolate power to the antennas.

3.2 Small Cell Sites

The antenna installation shall be de-energised immediately by switching OFF the PUMS switch and the carrier advised as soon as possible afterward using the 24-hour phone number.

4 Routine Work

Routine work includes all other non-emergency / urgent works.

4.1 Macrocell Sites

Routine work requiring de-energisation of a carrier's antenna shall be undertaken as a planned interruption to the carrier's electrical supply. Ausgrid workers and contractors shall follow the requirements contained within agreements between Ausgrid and the corresponding carriers.

4.2 Small Cells

Routine work requiring de-energisation of a carrier's antenna shall be undertaken as a planned interruption to the carrier's electrical supply. Ausgrid workers and contractors shall follow the requirements contained within agreements between Ausgrid and the corresponding carriers.

5 Information requirements

5.1 A layer of GIS shall show the locations of the small cells and macrocells installed in Ausgrid's franchise area.

Refer to Annexure B.

Annexure A: Antenna Information

Telecommunication antennas can be either small cell or macrocell.

A1 Macrocell

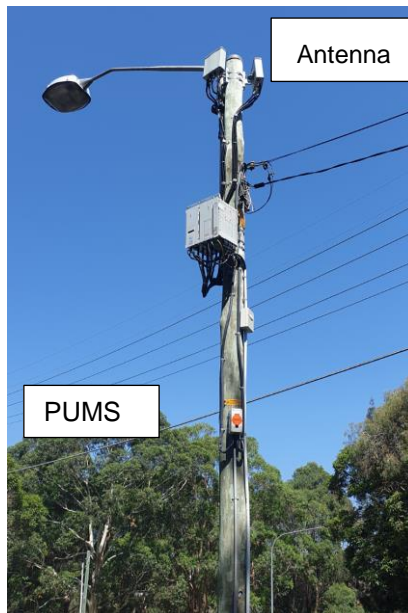


Figure 1 – Macrocell

A2 Small Cell



Omni Antenna



Small Cell Antenna



Small Cell Antenna with ground mounted equipment cabinet

Figure 2 - Small Cells

A3 Warning Signs



Figure 3 – Warning Sign Examples

A4 RADMAN Device and EME Tester

RADMAN device is one of the devices used in the field to measure the radio frequency electromagnetic energy. Ausgrid staff and contractors use this device.



Figure 4 – RADMAN Device and EME Tester

A5 PUMS Switch

PUMS switch is enclosed in a weatherproof enclosure and mounted on the power pole. De-energisation of small cell antenna is carried out by turning OFF the switch.

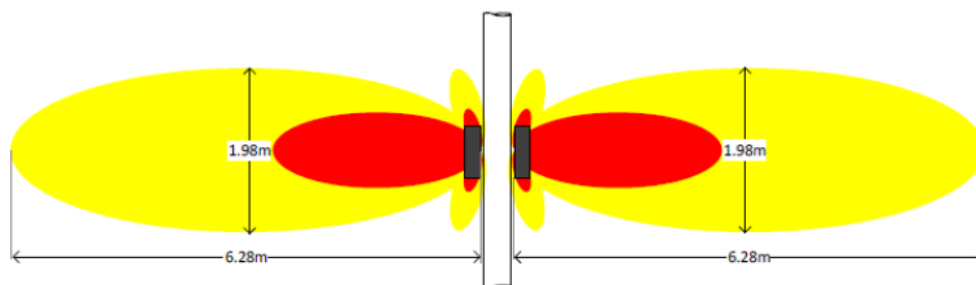


Figure 5 – PUMS Switch

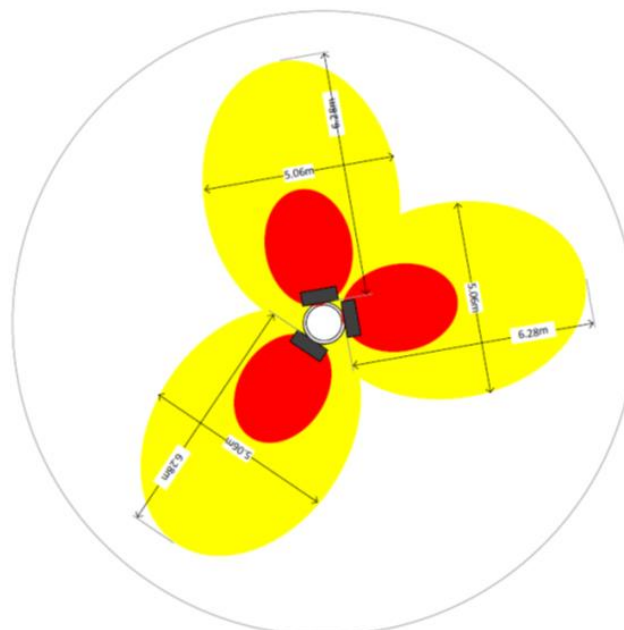
A6 Radio Frequency Plume Diagram

Radio antennas emit their signal in patterns away from the antenna. The signal density is stronger close to the antenna and gets weaker with distance from the antenna. These patterns are called Plume Diagrams. The example of a Plume Diagram below relate to Small Cell Antennas and in this case indicates an exclusion zone of 6.28m from the back of the antennas in the horizontal plane and 1.98m in the vertical plane. Ausgrid workers/ASPs/Contractors are to ensure they either remain outside of these clearances or ensure the antennas are isolated.

While many new Small Cell Antennas currently being erected on Ausgrid's poles have an exclusion zone of up to 6.28m, there still remain a small number of older units on Ausgrid's network which emit a higher level signal and have a horizontal exclusion zone of up to 15m. If any doubt exists about the exclusion zone for an antenna, the unit shall be turned off if workers are likely to be working within a 15m horizontal distance of the antenna.



ELEVATION – EME EXCLUSION ZONES



PLAN VIEW – EME EXCLUSION ZONES

Figure 6 – Examples of Antenna Plume Diagrams

Annexure B: EME Information Available on Ausgrid's GIS

B1 WebGIS Display

If any errors or omitted EME sites are identified, email details to GIS@ausgrid.com.au and FacilitiesAccess@ausgrid.com.au

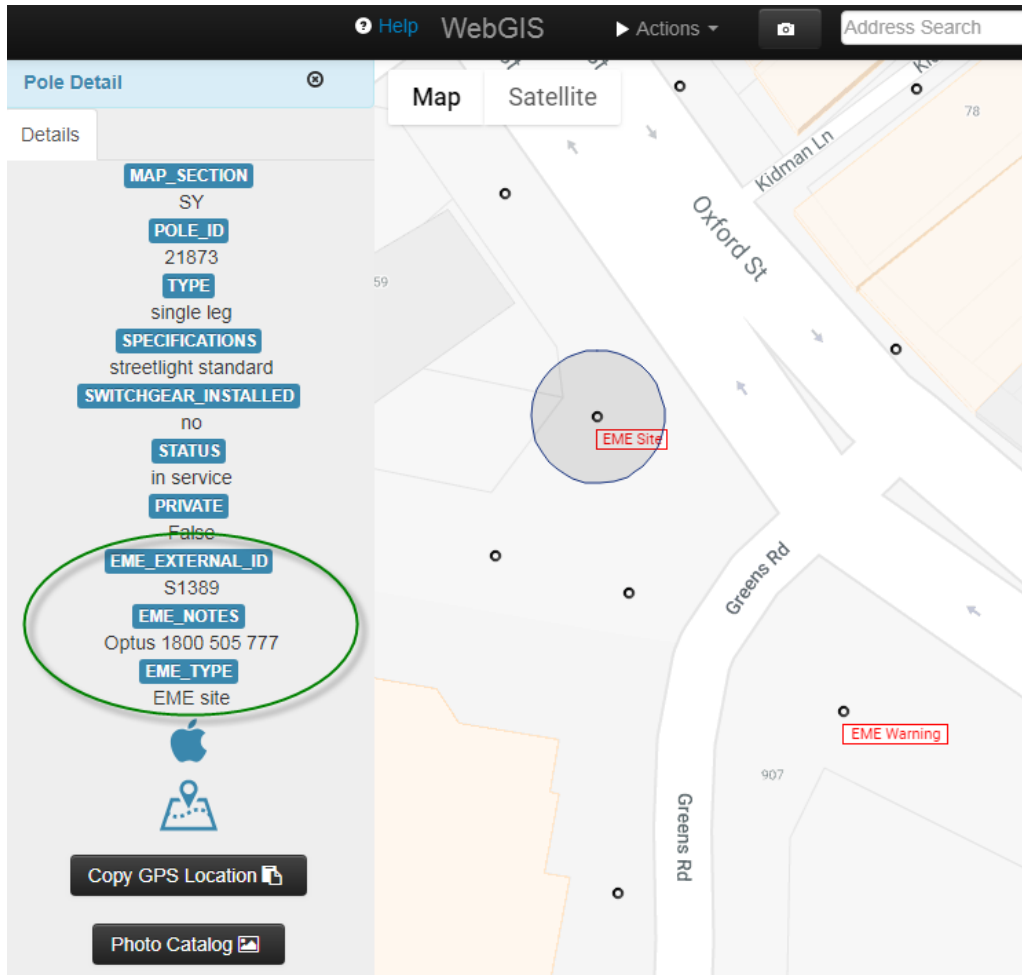


Figure 7 - WebGIS Display

B2 Network Viewer Display

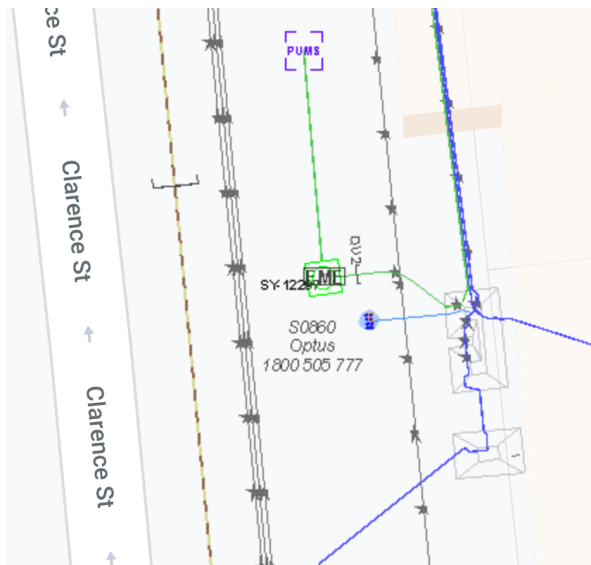


Figure 8 – EME Site (Telco Cell on Ausgrid Pole)

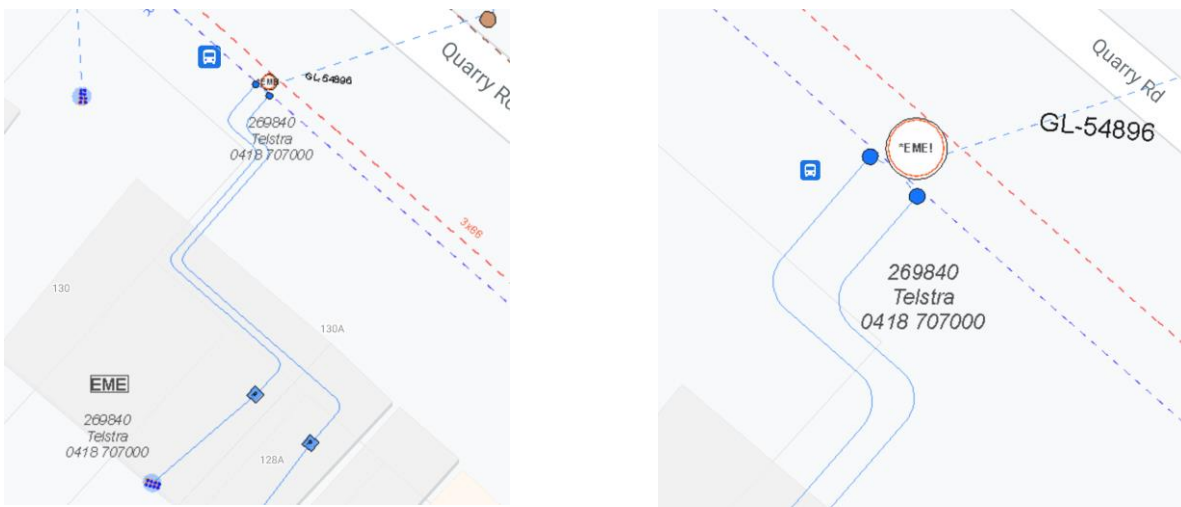


Figure 9 – EME Encroachment Warning (Telco Cell in Vicinity of Ausgrid Pole)

Annexure C: Radiofrequency Electromagnetic Energy (RF EME) Fact Sheet

C1 What is RF EME?

Electromagnetic energy (EME), also known as electromagnetic radiation (EMR) or Electromagnetic Fields (EMF), is the energy stored in an electromagnetic field. It occurs naturally, with the earth, the sun, and the ionosphere are all-natural sources of EME in our everyday lives.

All forms of EME are collectively referred to as the electromagnetic spectrum. The properties of EME vary with wavelength or frequency and EME from different parts of the spectrum interacts with matter differently. For example, UV light interacts with matter differently to radiofrequency signals.

The electromagnetic spectrum has been harnessed to create a wide range of technologies including electric power, radio communications, television, radar, microwave ovens, magnetic resonance imaging, toasters, cameras, lasers and X-ray machines.

All radio communications systems use EME in the radiofrequency (RF) part of the electromagnetic spectrum between 3 kilohertz (kHz) and 300 gigahertz (GHz). These include TV, AM, and FM radio broadcasting, mobile phones and their base stations, paging services, cordless phones, baby monitors, and emergency and rural communications systems.

C2 How can RF EME affect the body?

RF EME can heat objects in the same way that microwave ovens heat food although microwave ovens use much higher power in a confined space compared to mobile phone antennas.

Harmful heating of body tissue is a possibility where there is exposure to RF fields above maximum recommended exposure levels. Damage may result because the human body is unable to cope with excessive heat generated by very high RF exposures and can result in whole body heating, localised heating (in limbs, torso, head), surface heating of the body and auditory clicks. Also, shocks, similar to electric shocks, due to touching or receiving arcs from RF transmitters are also possible from over-exposure to RF radiation. These possible effects are dependent on the frequency, duration or intensity of the exposure.

Heating is generally accepted as the main bioeffect although it is recognised that very high RF exposures, typically much higher than the exposure levels generated from mobile telecommunications transmitters, may lead to the formation of cataracts in the eyes.

C3 What level of RF EME is safe?

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) have set the recommended maximum exposure levels for RF field, being in the range of 3 kHz to 300 GHz.

The recommended RF exposure limits depend on whether the exposure is occupational (i.e. for person classified as 'RF Worker') or non-occupational (i.e. for the general public and persons who are not required to work within electromagnetic fields).

The basic restrictions for the general public have included a safety margin of 50-times the level of the first known adverse health effect (normally a 1°C rise in core body temperature).

C4 What about health effects below the Exposure Limits?

There are no known long term or cumulative effects associated with RF EME. Also, there are no known adverse health effects at levels below the limits in these guidelines.

In relation to adverse health effects the World Health Organisation has released a fact sheet (N0 304, May 2006) which states "no adverse short or long-term health effects have been shown to occur" and this includes cancer. This is for continuous exposures at or below the maximum safety limits.

Specifically, in relation to any cancer risk associated with base stations and wireless technologies, the World Health Organisation says:

"Over the past 15 years, studies examining a potential relationship between RF transmitters and cancer have been published. These studies have not provided evidence that RF exposure from the transmitters increases the risk of cancer. Likewise, long-term animal studies have not

established an increased risk of cancer from exposure to RF fields, even at levels that are much higher than produced by base stations and wireless networks.”

ARPANSA advises:

“Based on current research there are no established health effects that can be attributed to the low RF EME exposure from mobile phone base station antennas.”

C5 [How are you Protected Against RF EME?](#)

Ausgrid has processes in place to comply with the above standards and general public exposure limits (see NW000-W0147). Accredited Service Providers and external contractors should create their own processes prior to working on or near poles with telecommunication transmitters. Where work could come within an antenna’s general public exclusion zone these processes require notification, de-energisation, testing, confirmation and isolation of mobile phone transmitter antennas. The RF meters which form part of this process are calibrated to the general public exposure limits.

C6 [What if I have a Medical Implant or Hearing Aid?](#)

If you are fitted with active medical implant (such as pacemaker) and work near mobile phone antennas, you should discuss your work and working environment with your doctor and take necessary steps to control any risks.

Generally medical implants will not be affected by exposure levels below the general public exposure limits.

C7 [Where can I get More Information?](#)

Ausgrid’s communication Engineering on 8569 6900 or Environmental Services on 9394 6659.

WHO Fact Sheet

www.who.int/peh-emf/publications/facts/fs304/en/

ARPANSA Fact Sheet

www.arpansa.gov.au/sites/default/files/legacy/pubs/factsheets/MobileTelephoneBaseStations.pdf

Australian Communications and Media Authority information

www.acma.gov.au/Citizen/Spectrum/About-spectrum/EME-hub/the-acma-and-eme

