



## Environmental EME Report

### LOT 1 Mardan Road, MIRBOO NORTH VIC 3871

**This report provides a summary of Calculated RF EME Levels around the wireless base station**

**Date 22/5/2017**

**RFNSA Site No. 3871006**

### Introduction

The purpose of this report is to provide calculations of EME levels from the existing facilities at the site and any proposed additional facilities.

This report provides a summary of levels of radiofrequency (RF) electromagnetic energy (EME) around the wireless base station at LOT 1 Mardan Road MIRBOO NORTH VIC 3871. These levels have been calculated by Huawei using methodology developed by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).

The maximum EME level calculated for the proposed systems at this site is 0.26% of the public exposure limit.

### The ARPANSA Standard

ARPANSA, an Australian Government agency in the Health and Ageing portfolio, has established a Radiation Protection Standard specifying limits for general public exposure to RF transmissions at frequencies used by wireless base stations. The Australian Communications and Media Authority (ACMA) mandates the exposure limits of the ARPANSA Standard.

### How the EME is calculated in this report

The procedure used for these calculations is documented in the ARPANSA Technical Report "Radio Frequency EME Exposure Levels - Prediction Methodologies" which is available at <http://www.arpansa.gov.au>.

RF EME values are calculated at 1.5m above ground at various distances from the base station, assuming level ground.

The estimate is based on worst-case scenario, including:

- wireless base station transmitters for mobile and broadband data operating at maximum power
- simultaneous telephone calls and data transmission
- an unobstructed line of sight view to the antennas.

In practice, exposures are usually lower because:

- the presence of buildings, trees and other features of the environment reduces signal strength
- the base station automatically adjusts transmit power to the minimum required.

Maximum EME levels are estimated in 360° circular bands out to 500m from the base station.

These levels are cumulative and take into account emissions from all wireless base station antennas at this site.

The EME levels are presented in three different units:

- volts per metre (V/m) – the electric field component of the RF wave
- milliwatts per square metre (mW/m<sup>2</sup>) – the power density (or rate of flow of RF energy per unit area)
- percentage (%) of the ARPANSA Standard public exposure limit (the public exposure limit = 100%).

### Results

The maximum EME level calculated for the proposed systems at this site is 2.55 V/m; equivalent to 17.29 mW/m<sup>2</sup> or 0.26% of the public exposure limit.

## Radio Systems at the Site

There are currently no existing radio systems for this site.

It is proposed that this base station will have equipment for transmitting the following services:

| Carrier | Radio Systems  |
|---------|--|
| Optus   | LTE700 (proposed), WCDMA900 (proposed), WCDMA2100 (proposed), LTE1800 (proposed) |

## Calculated EME Levels

This table provides calculations of RF EME at different distances from the base station for emissions from existing equipment alone and for emissions from existing equipment and proposed equipment combined.

| Distance from the antennas at LOT 1 Mardan Road in 360° circular bands | Maximum Cumulative EME Level at 1.5m above ground – all carriers at this site |                                 |                           |                    |                                 |                           |
|--|---|---------------------------------|---------------------------|--------------------|---------------------------------|---------------------------|
|  | Existing Equipment  |                                 |                           | Proposed Equipment |                                 |                           |
|  | Electric Field V/m  | Power Density mW/m <sup>2</sup> | % ARPANSA exposure limits | Electric Field V/m | Power Density mW/m <sup>2</sup> | % ARPANSA exposure limits |
| 0m to 50m  |   |                                 |                           | 1.61               | 6.85                            | 0.16%                     |
| 50m to 100m  |   |                                 |                           | 1.25               | 4.12                            | 0.067%                    |
| 100m to 200m   |   |                                 |                           | 1.95               | 10.049                          | 0.17%                     |
| 200m to 300m   |   |                                 |                           | 2.55               | 17.29                           | 0.26%                     |
| 300m to 400m   |   |                                 |                           | 2.48               | 16.35                           | 0.25%                     |
| 400m to 500m   |   |                                 |                           | 1.99               | 10.48                           | 0.15%                     |
| <b>Maximum EME level</b>   |   |                                 |                           | 2.55               | 17.29                           | 0.26                      |
|  | 253.13 m from the antennas at LOT 1 Mardan Road                               |                                 |                           |                    |                                 |                           |

## Calculated EME levels at other areas of interest

This table contains calculations of the maximum EME levels at selected areas of interest that have been identified through the consultation requirements of the Communications Alliance Ltd Deployment Code C564:2011 or via any other means. The calculations are performed over the indicated height range and include all existing and any proposed radio systems for this site.

| Additional Locations      | Height / Scan relative to location ground level | Maximum Cumulative EME Level All Carriers at this site Existing and Proposed Equipment |                                 |                              |
|---------------------------|---|--|---------------------------------|------------------------------|
|                           |   | Electric Field V/m   | Power Density mW/m <sup>2</sup> | % of ARPANSA exposure limits |
| 1 No locations identified |   |  |                                 |                              |

## RF EME Exposure Standard

The calculated EME levels in this report have been expressed as percentages of the ARPANSA RF Standard and this table shows the actual RF EME limits used for the frequency bands available. At frequencies below 2000 MHz the limits vary across the band and the limit has been determined at the Assessment Frequency indicated. The four exposure limit figures quoted are equivalent values expressed in different units – volts per metre (V/m), watts per square metre (W/m<sup>2</sup>), microwatts per square centimetre (µW/cm<sup>2</sup>) and milliwatts per square metre (mW/m<sup>2</sup>). Note: 1 W/m<sup>2</sup> = 100 µW/cm<sup>2</sup> = 1000 mW/m<sup>2</sup>.

| Radio Systems            | Frequency Band  | Assessment Frequency | ARPANSA Exposure Limit (100% of Standard)   |
|--------------------------|-----------------|----------------------|---|
| LTE 700                  | 758 – 803 MHz   | 750 MHz              | 37.6 V/m = 3.75 W/m <sup>2</sup> = 375 µW/cm <sup>2</sup> = 3750 mW/m <sup>2</sup>    |
| WCDMA850                 | 870 – 890 MHz   | 900 MHz              | 41.1 V/m = 4.50 W/m <sup>2</sup> = 450 µW/cm <sup>2</sup> = 4500 mW/m <sup>2</sup>    |
| GSM900, LTE900, WCDMA900 | 935 – 960 MHz   | 900 MHz              | 41.1 V/m = 4.50 W/m <sup>2</sup> = 450 µW/cm <sup>2</sup> = 4500 mW/m <sup>2</sup>    |
| GSM1800, LTE1800         | 1805 – 1880 MHz | 1800 MHz             | 58.1 V/m = 9.00 W/m <sup>2</sup> = 900 µW/cm <sup>2</sup> = 9000 mW/m <sup>2</sup>    |
| LTE2100, WCDMA2100       | 2110 – 2170 MHz | 2100 MHz             | 61.4 V/m = 10.00 W/m <sup>2</sup> = 1000 µW/cm <sup>2</sup> = 10000 mW/m <sup>2</sup> |
| LTE2300                  | 2302 – 2400 MHz | 2300 MHz             | 61.4 V/m = 10.00 W/m <sup>2</sup> = 1000 µW/cm <sup>2</sup> = 10000 mW/m <sup>2</sup> |
| LTE2600                  | 2620 – 2690 MHz | 2600 MHz             | 61.4 V/m = 10.00 W/m <sup>2</sup> = 1000 µW/cm <sup>2</sup> = 10000 mW/m <sup>2</sup> |
| LTE3500                  | 3425 – 3575 MHz | 3500 MHz             | 61.4 V/m = 10.00 W/m <sup>2</sup> = 1000 µW/cm <sup>2</sup> = 10000 mW/m <sup>2</sup> |

## Further Information

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is a Federal Government agency incorporated under the Health and Ageing portfolio. ARPANSA is charged with responsibility for protecting the health and safety of people, and the environment, from the harmful effects of radiation (ionising and non-ionising).

Information about RF EME can be accessed at the ARPANSA website, <http://www.arpansa.gov.au>, including:

- Further explanation of this report in the document "Understanding the ARPANSA Environmental EME Report"
- The procedure used for the calculations in this report is documented in the ARPANSA Technical Report; "Radio Frequency EME Exposure Levels - Prediction Methodologies"
- the current RF EME exposure standard  
Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), 2002, 'Radiation Protection Standard: Maximum Exposure Levels to Radiofrequency Fields — 3 kHz to 300 GHz', Radiation Protection Series Publication No. 3, ARPANSA, Yallambie Australia.  
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The Australian Communications and Media Authority (ACMA) is responsible for the regulation of broadcasting, radiocommunications, telecommunications and online content. Information on EME is available at <http://emr.acma.gov.au>

The Communications Alliance Ltd Industry Code C564:2011 'Mobile Phone Base Station Deployment' is available from the Communications Alliance Ltd website, <http://commsalliance.com.au>.

Contact details for the Carriers (mobile phone companies) present at this site and the most recent version of this document are available online at the Radio Frequency National Site Archive, <http://www.rfnsa.com.au>.