

## **RF EME SURVEY REPORT**

Post-Commissioning Measurement in relation to the  
Telstra antenna installations at

22 Central Avenue  
Manly  
NSW 2095

**Manly 22 Central Ave (35627)**  
**NSA: 2095004**

Report No: 21660-8 (Issue A)  
04 September 2017

145 Fairbank Road  
Clayton South VIC 3169

P: +61 3 8569 5800  
F: +61 3 9937 6144

E: [jobrequest@radhaz.com.au](mailto:jobrequest@radhaz.com.au)  
W: [www.radhaz.com.au](http://www.radhaz.com.au)

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Report No. – 21660-8 (Issue A)  
Measurement date – 24 August 2017  
Report date – 04 September 2017

Measurement Officer  
&  
Report Prepared by – Nizam Khaja

Report issued under the authority of



Johnny Lim  
Technical Services Manager  
Radhaz Consulting Pty Ltd



Accredited for compliance with ISO/IEC 17025

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## 1. Introduction

Mr Eduardo Koeneke, Technical Officer at Service Stream Mobile Communications<sup>1</sup> engaged Radhaz Consulting Pty Ltd as an independent consultancy, to undertake post-commissioning Radio Frequency Electromagnetic Energy (RF EME) measurements at 22 Central Avenue, Manly, NSW 2095. Telstra has installed six panel antennas on the building walls. The antennas are used to provide LTE700, LTE1800 and WCDMA850 mobile phone services.

The post-commissioning measurements were a follow-up to the pre-commissioning measurements (conducted on 09 March 2017). The pre-commissioning measurement results were reported in Radhaz report no: 21660-6 (Issue A) dated 14 March 2017 and are attached in Appendix B of this report.

The purpose of the post-commissioning measurements was to measure the RF EME levels emitted by the new Telstra LTE700, LTE1800 and WCDMA850 installation. The measured RF EME levels in the report are compared to the General Public RF EME limits specified by ARPANSA<sup>2</sup> in their RPS3 document.

## 2. Summary

- All measured RF EME levels are below the ARPANSA RPS3 General Public Exposure Limit.
- The maximum cumulative RF EME (all services across 75MHz to 3GHz frequency band) level measured, across the specified measurement locations, was found to be 2.9% of the allowable ARPANSA RPS3 General Public Exposure Limit. This is more than 34 times below the ARPANSA RPS3 General Public Limit.
- There was no significant changes between pre and post measurements recorded at locations 5 to 10. These locations were located 5m above the Telstra antenna mounting heights, confirming the nature of mobile base station design where the highest concentration of EME energy propagates away from the building.

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<sup>1</sup> Level 1, 29 Christie Street, St Leonards, NSW 2065

<sup>2</sup> Australian Radiation Protection and Nuclear Safety Agency (619 Lower Plenty Road, Yallambie, Victoria 3085)

### 3. Federal Government Legal Requirements

The Australian Communications and Media Authority (ACMA) has conditions on the operation of radiocommunications transmitters. These conditions regulate the exposure of the general public to RF EME levels produced by all licensed RF transmitters.

Licensed RF transmitter operators are required to ensure that the general public is not exposed to RF EME levels from their service in excess of prescribed limits. The prescribed limits are the reference field strength levels from the ARPANSA Radiation Protection Standard RPS3: Maximum Exposure Levels to Radio Frequency Fields – 3 kHz to 300 GHz (2002).

Further information can be gained from the ACMA and ARPANSA web sites:

[http://www.acma.gov.au/ACMAINTER:STANDARD:pc=PC\\_2798](http://www.acma.gov.au/ACMAINTER:STANDARD:pc=PC_2798)

<http://www.arpansa.gov.au/pubs/rps/rps3.pdf>

### 4. Methodology

#### 4.1. Survey Equipment

Narda Selective Radiation Monitor (SRM-3000)

- Frequency Range 100 kHz – 3 GHz
- Serial No. L-0056
- Calibration Date 04/05/2015

Narda Isotropic E-field Probe (3AX 75M-3G)

- Frequency Range 75 MHz – 3 GHz
- Serial No. H-0127
- Calibration Date 04/05/2015

#### 4.2. Measurement Method

4.2.1. The RF EME measurements were performed at the same locations as the pre-commissioning measurement conducted in March 2017. The measurement locations were as follows.

Refer to Appendix A for measurement location details.

1. Carpark adjacent to parapet wall.
2. Carpark adjacent to parapet wall.
3. Carpark adjacent to parapet wall.
4. Carpark adjacent to parapet wall.
5. Rooftop adjacent to sun lounger.
6. Rooftop adjacent to parapet wall.
7. Rooftop adjacent to barbecue.
8. North balcony adjacent to solar panel.
9. South balcony.
10. South balcony adjacent to water tank.

- 4.2.2. Measurements were conducted at an approximate height of 1.5m above floor level.
- 4.2.3. The SRM-3000 meter was configured to measure the RF EME resulting from the Telstra LTE700, LTE1800 and WCDM850 services at each of the measurement locations.
- 4.2.4. The RF EME measurements were time averaged over a period of one minute with the result recorded as it existed at the time of the measurement. Measurements were conducted between 10:30am – 1:30pm. The measurement results are tabulated in Section 5 of this report.

RF EME measurements were taken as per Australian Standard AS/NZS 2772.2:2011 Radiofrequency Fields - Principles and Methods of Measurement and Computation – 3 kHz to 300 GHz.

Due to the changing exposure limit with frequency, cumulative exposure with respect to the ARPANSA RPS3 limit can only be expressed in terms of percentage of the exposure limits. A reported value of 100 per cent would indicate that the exposure level was at the allowable limit. The exposure limits are shown on Table 7 of RPS3, this can be viewed at: <http://www.arpansa.gov.au/pubs/rps/rps3.pdf>

Refer to Appendix C for additional technical analysis and details relating to the measurement process.

## 5. Results

**Table 1: Measured RF EME Levels**

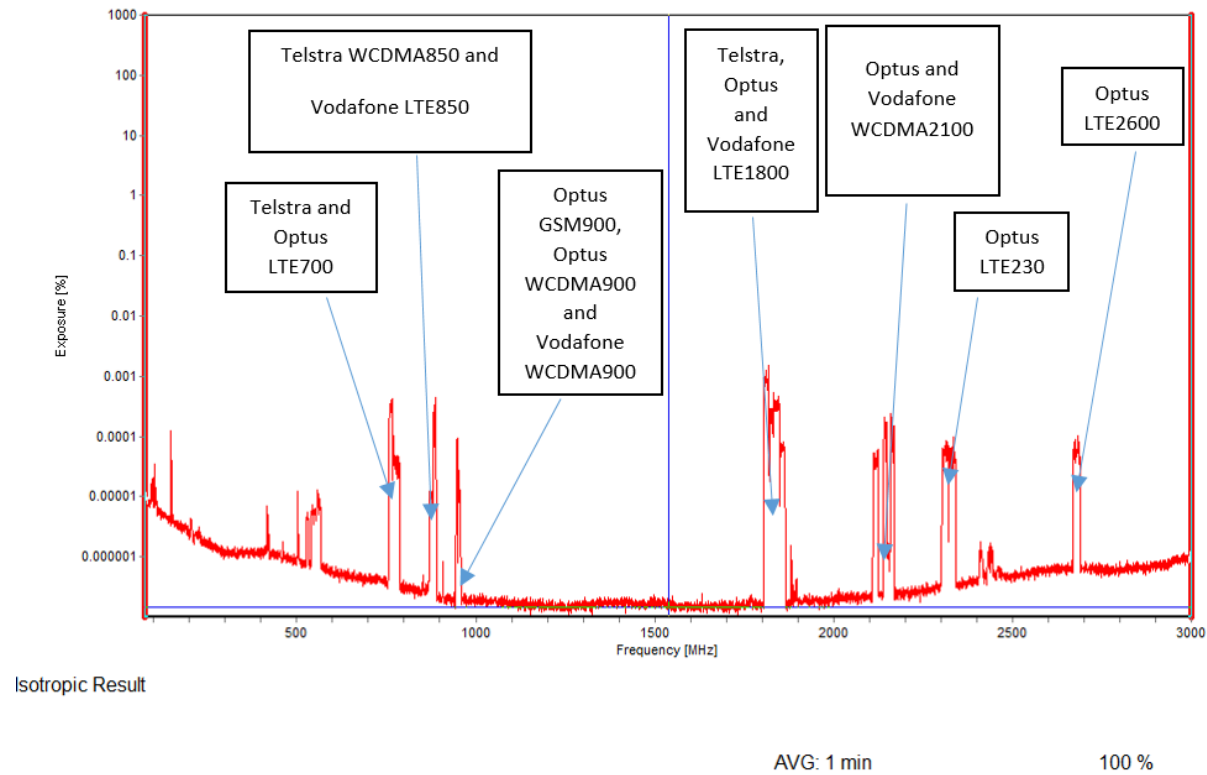
Measurement Location <sup>1</sup>	Pre-commissioning (09 March 2017) <sup>1</sup> Measured RF EME levels (75 MHz – 3 GHz)	Post-commissioning (24 August 2017) <sup>2</sup> Measured RF EME levels (Telstra LTE700)	Post-commissioning (24 August 2017) <sup>2</sup> Measured RF EME levels (Telstra WCDMA850)	Post-commissioning (24 August 2017) <sup>2</sup> Measured RF EME levels (Telstra LTE1800)	Total RF EME Levels (75 MHz – 3 GHz): (Pre-commissioning + Post commissioning) % of the RPS3 General Public Exposure Limit <sup>3</sup>
1. Carpark adjacent to parapet wall	0.0049	0.001	0.00064	0.015	<b>0.022</b>
2. Carpark adjacent to parapet wall	0.013	0.00054	0.00026	0.0029	<b>0.017</b>
3. Carpark adjacent to parapet wall	0.019	0.00073	0.0021	0.012	<b>0.034</b>
4. Carpark adjacent to parapet wall	0.0033	0.00045	0.0011	0.015	<b>0.02</b>
5. Rooftop adjacent to sun lounger	0.3	0.00029	0.0002	0.00026	<b>0.3</b>
6. Rooftop adjacent to parapet wall	0.43	0.00029	0.00012	0.00019	<b>0.43</b>
7. Rooftop adjacent to parapet wall	0.018	0.000059	0.000053	0.000018	<b>0.018</b>
8. North balcony adjacent to solar panel	1.4	0.00032	0.00017	0.000083	<b>1.4</b>
9. South balcony	2.9	0.0027	0.0012	0.0015	<b>2.9</b>
10. South balcony adjacent to water tank	0.41	0.00084	0.00085	0.0015	<b>0.41</b>

Note:

1. Pre-commissioning measurements conducted on 09 March 2017 includes all services within the 75 MHz to 3 GHz frequency band. Refer to Appendix B for pre-commissioning measurement results.
2. Post-commissioning measurements measures the RF EME contribution from Telstra LTE700 (768 MHz – 788 MHz), LTE1800 (1805 MHz – 1820 MHz) and WCDMA850 (880 MHz – 890 MHz) only.
3. The measured levels were rounded to 2 significant figures.

- 4. Percentages based on the measured power density at the respective locations with respect to the ARPANSA General Public exposure limits. A value of 100% indicates the RPS3 General Public Limit.

**Chart 1: Spectral chart of radio signals measured at Location 3**





## 5. Glossary and Abbreviations

<b>Radio Frequency Electromagnetic Energy (RF EME)</b>	RF EME is a measure of the radiofrequency energy at a particular location generated by transmitting sources such as antennas.
<b>ARPANSA RPS3 General Public Limit</b>	Existing Australian Radiation Protection Standard limits or reference levels for continuous exposure of the general public to radio frequency transmissions.
<b>Power Density</b>	The rate of or the amount of electromagnetic energy flowing through a given area.
<b>ACMA</b>	Australian Communications and Media Authority
<b>Cumulative RF EME</b>	The weighted sum of all RF EME that occurs in the bandwidth of the measuring instruments, it is expressed as a percentage of the relevant RPS3 limit.
<b>Broadcast</b>	Public transmission services such as radio and TV.
<b>LTE</b>	Long Term Evolution. A mobile communication technology commonly known as 4G.
<b>WCDMA</b>	Wideband Code Division Multiple Access. A mobile communication technology commonly known as 3G.
<b>GSM</b>	Global System for Mobile Communications. A mobile communication technology commonly known as 2G.
<b>ACMA</b>	Australian Communications and Media Authority

## 6. Appendices

### Appendix A – Measurement Location Photographs



1. Carpark adjacent to parapet wall



2. Carpark adjacent to parapet



3. Carpark adjacent to parapet wall



4. Carpark adjacent to parapet wall



5. Rooftop adjacent to sun lounger



6. Rooftop adjacent to parapet wall



7. Adjacent to barbecue



8. North balcony adjacent to solar panel



9. South balcony



10. South balcony adjacent to water tank

## Measurement Locations



## Appendix B – Pre-commissioning Measurement Results (09 March 2017)

**Table 1: Measured RF EME Levels**

<b>Measurement Location<sup>1</sup></b>	<b>Measured RF EME Levels<sup>4</sup> (75MHz-3GHz) % of the RPS3 General Public Exposure Limit<sup>2,3</sup></b>
1. Carpark adjacent to parapet wall	<b>0.0049</b>
2. Carpark adjacent to parapet wall	<b>0.013</b>
3. Carpark adjacent to parapet wall	<b>0.019</b>
4. Carpark adjacent to parapet wall	<b>0.0033</b>
5. Rooftop adjacent to sun lounger	<b>0.30</b>
6. Rooftop adjacent to parapet wall	<b>0.43</b>
7. Adjacent to barbecue	<b>0.018</b>
8. North balcony adjacent to solar panel	<b>1.4</b>
9. South balcony	<b>2.9</b>
10. South balcony adjacent to water tank	<b>0.41</b>

## Note:

1. Refer to Appendix A for measurement location details.
2. Total RF EME levels include all services operating within the 75MHz to 3GHz frequency band.
3. Percentages based on the measured power density from all existing mobile phone services, radio, TV services and 3<sup>rd</sup> Party services with respect to the ARPANSA General Public exposure limits. A value of 100% indicates the RPS3 General Public Limit.
4. The measured levels were rounded to 2 significant figures.

## Appendix C – Measurement Details

- The measured value includes the instrument noise. The actual RF EME level will be lower than the reported values.
- The SRM3000 meter measures the electric field strength and then converts the levels to the equivalent power density.
- The amplitude of mobile services signals varies with the traffic level and nature of the mobile phone call. The cumulative EME levels presented in this report do not have any factors added to account for worst case exposure situations. The measured levels were recorded as they existed at the time of the survey (10:30am – 1:30pm).
- By adhering to documented processes and implementing proven field techniques the estimated uncertainty budget can be minimized. Measurement expanded uncertainty has been calculated in accordance with the requirements of ISO/IEC 17025.
- The expanded measurement uncertainty for the SRM-3000 monitor/probe was calculated as,  $U = +5.7\text{dB}$ , with a coverage factor  $k = 2$ , and a level of confidence of 95%.
- All Narda SRM-3000 measurements were recorded as a percentage of the general public limit of the ARPANSA RPS3 Standard.
- RADHAZ Consulting permanently stores all measurement equipment calibration details, site maps and recorded measurement scans.