

RF FIELD SURVEY REPORT

MANLY NATIONAL BUILDING
22 CENTRAL AVE, MANLY, NSW

RFNSA #: 2095004

DATE OF SURVEY: 18TH NOVEMBER 2016

REPORT VERSION: R1



WORLD RECOGNISED
ACCREDITATION

Accredited for compliance with ISO/IEC 17025

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

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RF FIELD SURVEY REPORT – MANLY NATIONAL BUILDING - 22 CENTRAL AVE, MANLY, NSW

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While all reasonable care has been exercised by Kordia in preparing this document, the radiofrequency hazard areas reported are those observed on the day of the survey. If requested, Kordia is able to provide specific interpretations of these results. Kordia will not be liable in any event for any damages, losses, costs or expenses or injury of any kind which arises from the information contained in this document. Any individual working on or near transmission structures should ensure that they understand this report and limit self-exposure to allowable limits specified in the appropriate standards and regulations current at the time.

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1. EXECUTIVE SUMMARY

On the 18th November 2016, Kordia Solutions Pty Ltd conducted RF Field measurements at the Manly National Apartment Building at 22 Central Avenue, Manly NSW 2095.

It was requested that RF measurements be performed at the site due to the modifications of the Optus antennas located on the building lift well parapet.

The areas surveyed were areas on the building rooftop, rooftop balconies, the top floor South side apartment number 926. The measurements included RF levels from all RF sources present in the area, and include those sources located on other structures and buildings nearby. The results shown in this report are only applicable to those RF levels present on the day of the survey.

The RF measurements were performed by a suitably qualified measurer using calibrated RF measurement equipment.

In Australia, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) regulate and set the safe limits for human exposure to Radio Frequency (RF) fields. ARPANSA have published the Radiation Protection Standard RPS3 - Maximum Exposure Levels to Radiofrequency Fields - 3 kHz to 300 GHz. This RF Standard sets limits for human exposure to RF EMR in the frequency range 3 kHz to 300 GHz. The Standard includes requirements for protection of the general public and the management of risk in occupational exposure, together with additional information on measurement and assessment of compliance. The "*General Public Reference Levels*" are the appropriate limits for assessing RF fields in areas that are accessible by the general public.

All measurements taken were found to be well below the general public reference level¹. The maximum measured reading taken was 23% of the general public reference level specified in the ARPANSA RPS3 standard. This was taken at location 10 (refer section 5 for further details).

It is also documented that these measurements have not been adjusted to take into account full load traffic factors which would occur during peak times. If the full load traffic factors are taken into account it is expected that the RF levels measured at these locations would be higher.

¹ General Public Reference Level as specified by the ARPANSA RPS3 Radiation Protection Standard: Maximum Exposure Levels to Radiofrequency Fields – 3KHz to 300GHz, May 2002.

2. SITE IDENTIFICATION

Site name	MANLY NATIONAL BUILDING 22 CENTRAL AVE, MANLY, NSW
Address	MANLY NATIONAL BUILDING 22 CENTRAL AVE, MANLY, NSW
RF NSA Site ID	2095004
Latitude Longitude	-33.796353, 151.286252
Main Structure	10 level building – Manly National Building
Other Structures	Nil

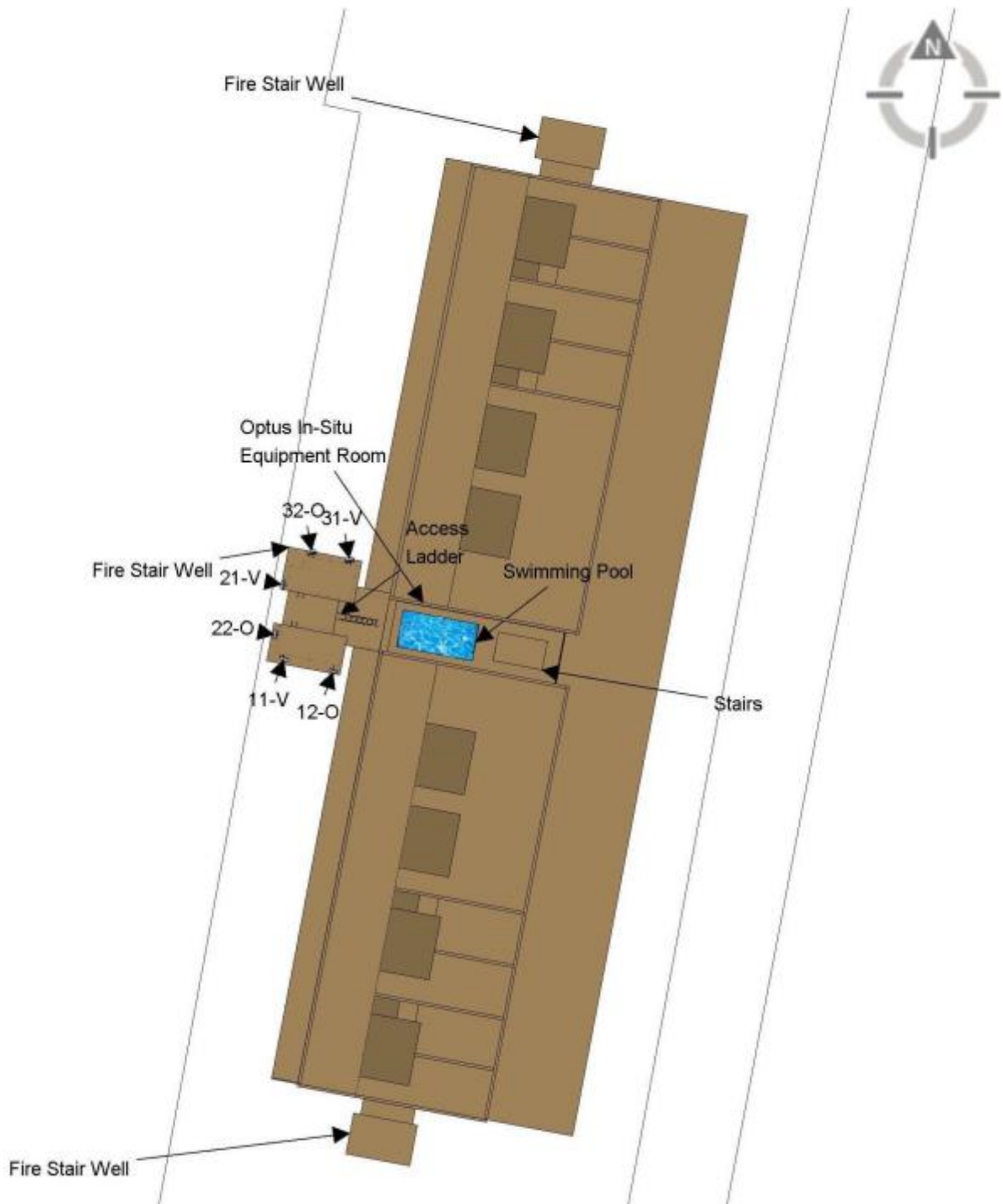
3. SITE MANAGER

Manager	Mr Tony Strati
Address	MANLY NATIONAL BUILDING 22 CENTRAL AVE, MANLY, NSW
Telephone	(02) 9976-0647
Email	manly.national@bigpond.com

4. RF SOURCES ON SITE

Notify the site manager of any **updates/changes** to antenna or transmitter configurations at this site.

Antenna and Transmitter Details					
Ant No.	Antenna Height	Antenna Bearing	Antenna Location	Antenna Type	Services
11-V	55.3m	200°T	SW Corner	Argus R2VPX310R Panel	Vodafone WCDMA 900 Vodafone WCDMA 2100 Vodafone LTE 850 Vodafone LTE 1800
21-V	55.3m	280°T	NW Corner	Argus R2VPX310R Panel	Vodafone WCDMA 900 Vodafone WCDMA 2100 Vodafone LTE 850 Vodafone LTE 1800
31-V	55.3m	350°T	NE Corner	Argus R2VPX310R Panel	Vodafone WCDMA 900 Vodafone WCDMA 2100 Vodafone LTE 850 Vodafone LTE 1800
12-O	55.3m	200°T	SE Corner	Argus R2VPX310R Panel	Optus GSM 900 Optus WCDMA 900 Optus WCDMA 2100 Optus LTE 700 Optus LTE 1800
22-O	55.3m	280°T	SW Corner	Argus R2VPX310R Panel	Optus GSM 900 Optus WCDMA 900 Optus WCDMA 2100 Optus LTE 700 Optus LTE 1800
32-O	55.3m	350°T	NW Corner	Argus R2VPX310R Panel	Optus GSM 900 Optus WCDMA 900 Optus WCDMA 2100 Optus LTE 700 Optus LTE 1800



SITE LAYOUT / ANTENNA LOCATIONS

5. RF SURVEY RESULTS

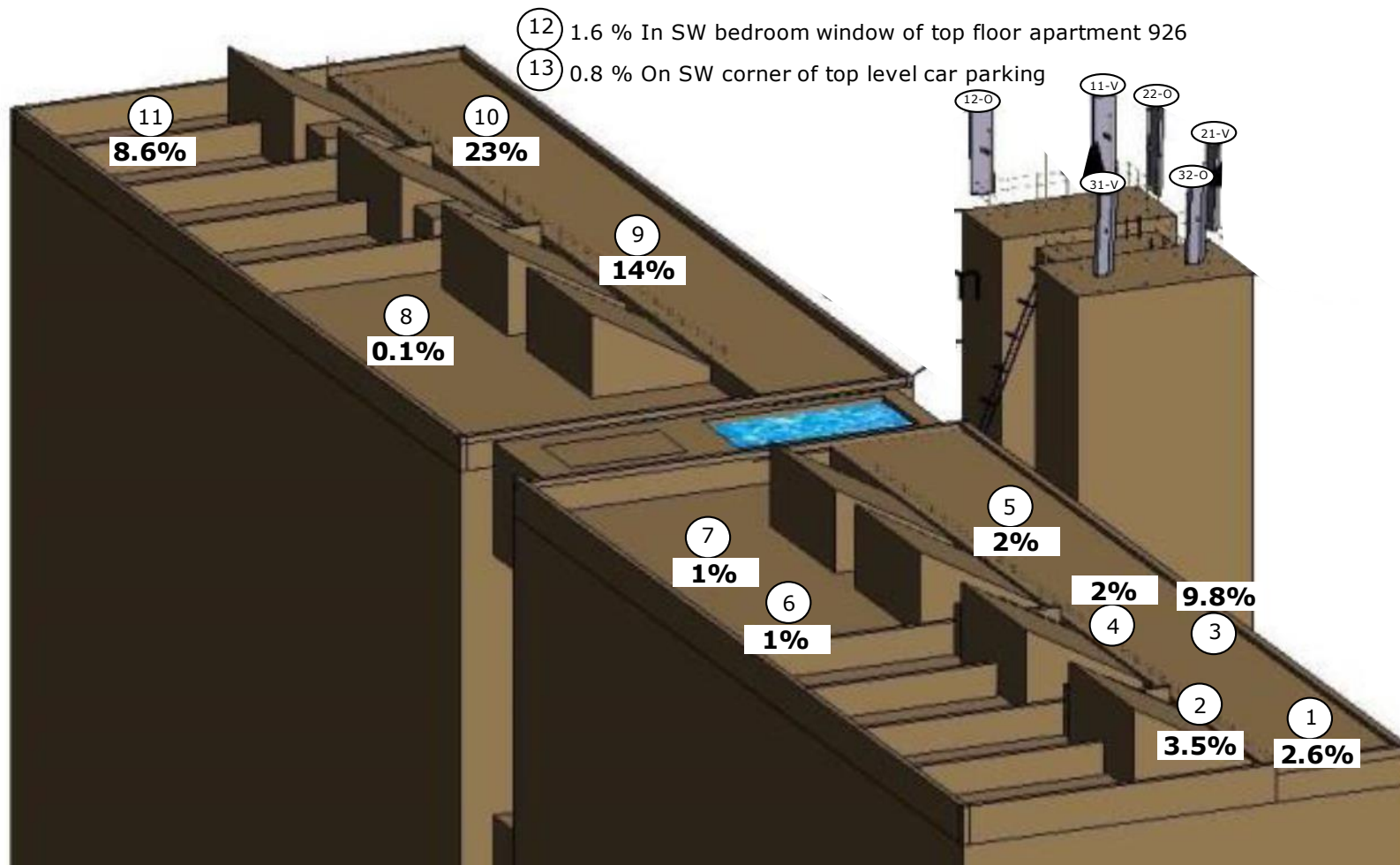
5.1 SURVEY MEASUREMENTS

The level and location of the best estimate of the maximum RF exposure in accessible areas is summarised below. The levels are indicated as a percentage of the ARPANSA RPS3 general public limit for electric fields in units of equivalent plane wave power flux density.

MEASUREMENT LOCATION		RESULTS	
No.	Description	E Field Level (W/m ²)	% of ARPANSA General Public reference level ²
1	NW corner of Building	0.099 W/m ²	2.6 %
2	Above northern stairwell roof	0.133 W/m ²	3.5 %
3	Northwest corner of Solar panel array	0.372 W/m ²	9.8 %
4	East Corner of Solar Panel array	0.076 W/m ²	2.0 %
5	Southern edge of solar panel array	0.076 W/m ²	2.0 %
6	North part of BBQ area	0.038 W/m ²	1.0 %
7	South part of BBQ area	0.038 W/m ²	1.0 %
8	South corner of common area	0.004 W/m ²	0.1 %
9	Near access ladder on upper roof	0.532 W/m ²	14.0 %
10	SW corner of Building	0.874 W/m²	23.0 %
11	Upper Terrace of apartment 926	0.327 W/m ²	8.6 %
12	SW bedroom window of top floor apartment 926	0.061 W/m ²	1.6 %
13	SW corner of top level car parking station	0.030 W/m ²	0.8 %

² The highest E field reading in each location was used to calculate the percentage of the General Public reference level at 750 MHz. The percentage values indicated have been calculated as equivalent plane wave power flux density, which is dependent on the SQUARES of the field values.

5.2 MEASUREMENT LOCATIONS



6. RF SURVEY EQUIPMENT

6.1 DETAILS OF EQUIPMENT USED FOR ASSESSMENT

RF Hazard Survey Equipment			
Equipment type	Serial No.	Calibration Due Date	Post survey Validation Date
Wandel & Goltermann – EMR 300 meter	F-0047	27/11/2017	21/11/2016
Wandel & Goltermann – Type 8 Probe Isotropic E Field (100kHz – 3GHz)	AV-0035	27/11/2017	21/11/2016

The post validation of the RF survey equipment was performed using a transverse electromagnetic (TEM) cell located in the Kordia Solutions EME laboratory at Level 9, 5 Rider Blvd, Rhodes 2138 NSW Australia.

6.2 ENVIRONMENTAL DETAILS

ENVIRONMENTAL DETAILS	
Date and time of measurements	18/11/2016. 10am-11am
Temperature	29° C
Humidity	41% RH

6.3 UNCERTAINTY OF RF EXPOSURE ASSESSMENTS

Expanded uncertainty estimates for expected measurement situations encountered by Kordia technicians using the above measuring equipment has been calculated for a range of probe combinations and measurement scenarios. For all examined circumstances, the expanded uncertainty is less than 3 dB for a coverage factor of 2. Assuming a normal distribution for all combined uncertainties, this expanded uncertainty estimate spans a 95% confidence interval.

7. RF HAZARD SURVEY METHODOLOGY

7.1 REFERENCE LEVELS APPLICABLE AT THIS SITE

REFERENCE LEVELS FOR EQUIVALENT PLANE WAVE POWER FLUX DENSITY			
Applicable Frequency (MHz)	Reference level	General Public Level	Occupational Level
10 – 400	E & H Field – Time Averaged	2 W/m ²	10 W/m ²
	E & H Field – Instantaneous	2,000 W/m ²	10,000 W/m ²
750	E & H Field – Time Averaged	3.75 W/m ²	18.75 W/m ²
	E & H Field – Instantaneous	3,750 W/m ²	18,750 W/m ²
> 2000	E & H Field – Time Averaged	10 W/m ²	50 W/m ²
	E & H Field – Instantaneous	10,000 W/m ²	50,000 W/m ²

Transmitters operating between 400 MHz and 2 GHz at this site were surveyed according to the most stringent ARPANSA reference levels applicable. The applicable frequency detailed above refers to the lowest UHF frequency operating from the site

7.2 RF HAZARD ASSESSMENT METHODOLOGY

Time averaged E and H field exposures at this site were assessed by direct measurement. At frequencies above 1GHz, H field levels are inferred from E field measurements. The duty cycles of the RF sources on this site ensure that compliance with the time averaged E & H reference levels also implies compliance with the instantaneous E & H reference levels.

7.3 RF EXPOSURE REGULATIONS AND STANDARDS

This site has been assessed for compliance with the general public and occupational reference levels (except contact and limb currents) detailed in the Radiation Protection Standard - Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz, May 2002 (RPS3) of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). This standard is available from: www.arpansa.gov.au/rf_standard.htm

Spatial averaging of the time averaged reference levels specified in Table 7 of the ARPANSA RPS3 standard was performed (when required). Refer clause 2.7 of the exposure standard for details on spatial averaging.

The RF hazard survey measurements at this site were performed in accordance with Australian/New Zealand Standard AS/NZS 2772.2:2011 Radiofrequency fields, Part 2: Principles and methods of measurement and computation—3 kHz to 300 GHz (available from www.standards.org.au), and as per the Kordia Solutions RF Assessment Quality Manual.

Compliance with the radiofrequency (RF) field exposure limits prescribed in the Radiocommunications Licence Conditions (Apparatus Licence) Determination 2003 of the Australian Communications and Media Authority (ACMA) is automatically ensured by compliance with the ARPANSA E & H general public exposure reference levels. This determination is available from: www.acma.gov.au

8. GLOSSARY

<i>Controlled Area</i>	<p>An area or place in which exposure to RF fields may exceed the general public reference levels. Members of the general public may enter this area, so long as the following conditions are applied:</p> <ul style="list-style-type: none"> a) the entrant is made aware that these areas may incur RF exposures above the ARPANSA RPS3 general public reference levels, AND; b) the entrant is not allowed to enter areas above the occupational reference levels, AND; c) RF hazard warning signage or documentation is available.
<i>E</i>	<p>Electric field strength.</p> <p>For frequencies below 10 MHz, indicated in units of V/m;</p> <p>For frequencies above 10 MHz, indicated in the equivalent plane wave power flux density units of W/m².</p>
<i>H</i>	<p>Magnetic field strength.</p> <p>For frequencies below 10 MHz, indicated in units of A/m;</p> <p>For frequencies above 10 MHz, indicated in the equivalent plane wave power flux density units of W/m².</p>
<i>HF</i>	<p>High Frequency – 3 MHz to 30 MHz. In radio broadcasting, this frequency band is used by HF radio services</p>
<i>MF</i>	<p>Medium Frequency – 300 kHz to 3 MHz. In radio broadcasting, this frequency band is used by AM radio services.</p>
<i>RF hazard meter</i>	<p>An RF survey instrument for measuring ambient E or H fields.</p>
<i>RF personal monitor</i>	<p>An RF field monitoring device carried on a person that is designed to alert the user when ambient field exposures exceed allowable limits.</p>
<i>RF worker</i>	<p>A person who may be exposed to RF fields under controlled conditions, in the course of and intrinsic to the nature of their work. Such persons are subject to the requirements of Section 5.1 in the ARPANSA Standard.</p>
<i>UHF</i>	<p>Ultra High Frequency – 300 MHz to 3 GHz. This frequency band is used by UHF TV and mobile telephony services.</p>
<i>VHF</i>	<p>Very High Frequency – 30 MHz to 300 MHz. This frequency band is used by FM radio and VHF TV services.</p>