RF HAZARD SURVEY REPORT

CHANNEL 9 STUDIOS

WILLOUGHBY

DATE OF SURVEY: 9TH NOVEMBER 2012

REPORT VERSION: R2

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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1. EXECUTIVE SUMMARY

On the 9th November 2012, Kordia Solutions Pty Ltd conducted an RF Field Survey in readily accessible areas at the Channel 9 Studios located in Willoughby NSW.

This survey was focused on RF measurements in areas readily accessible to personnel and public. This survey only documented the RF levels present on the day of the survey.

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

In 2002, ARPANSA (Australian Radiation Protection and Nuclear Safety Agency) published the RPS3 RF safety standard: Radiation Protection Standard - Maximum Exposure Levels to Radiofrequency Fields - 3 kHz to 300 GHz. The ARPANSA 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 and non RF workers (for example residential and office staff).

All measurements taken were found to be well below the general public reference level[1].

The maximum measured RF field on site was 0.56W/m^2, which equates to 28% of the general public reference level[1]. This measurement was taken at location 26, which is the west facing balcony off the studio building, and is directly in front of the Optus Mobile phone antenna (refer to Section 5 for more details).

[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	CHANNEL 9 STUDIOS - WILLOUGHBY
RFNSA site number	2068013
Address	24 Artarmon Road, Willoughby NSW 2068
Latitude	-33.811599
Longitude	151.195849
Main Structure	233 Freestanding Tower
Other Structures	Studio and Office buildings

3. SITE MANAGEMENT

Site Manager	Andrew Seale
Company	NINE NETWORK AUSTRALIA
Address	24 Artarmon Road, Willoughby NSW 2068
Telephone	T 02 9965 2706 | M 0413 927 808
Email	aseale@nine.com.au

4. RF SOURCES ON SITE

RF SERVICES ON ADJACENT BROADCAST TOWER:

Broadcast Antenna and Transmitter Details						
Antenna name	**Antenna height**	**Bearing**	**Antenna type**	**Service**	**Transmit Frequency (MHz)**	**Max Tx output power**
VHF TV	212-233m	0° T 90° T 180° T 270° T	RFS 653-LS24 6 tier, 4 sided, panel array (H-Pol)	Seven DTTB – Ch 6	177.50 MHz	0 kW
				Seven PAL – Ch 7	182.25 MHz	0 kW
				Nine DTTB – Ch 8	191.625 MHz	0 kW
				Nine PAL – Ch 9	196.25 MHz	13 kW
				Ten PAL – Ch 10	209.25 MHz	0 kW
				Ten DTTB – Ch 11	219.50 MHz	0 kW
VHF Radio	170-190M	S-W	RFS 618-14 14 tier, single sided Dipole array (V-Pol)	Digital Radio	204.64 MHz	0 kW

5. RF HAZARD SURVEY RESULTS

The level and location of the best estimate of the maximum RF exposure in accessible areas is summarised below. The percentage level is indicated as a percentage of the ARPANSA RPS3 general public limit for electric fields in units of equivalent plane wave power flux density. Refer to Appendix 1 of this report for drawings showing each measurement location.

MEASUREMENT LOCATION			RESULTS	
No.	**GPS (Google Maps)**	**Description**	**E Field Level (V/m)**	**% of ARPANSA General Public Reference Level[2]**
1	-33.810364,151.196693	Northwest corner of main Carpark (J. Brown)	0.0016	0.1%
2	-33.810211,151.195875	Sales Team Lunch Area, NW corner of property	0.0033	0.2%
3	-33.810435,151.195924	Car park in front of News camera Cottage	0.0420	2.1%
4	-33.810813,151.195741	Rear gate entrance near No 27 Richmond Avenue	0.0100	0.5%
5	-33.811154,151.195629	Front yard of No 23 Richmond Avenue	0.0026	0.1%
6	-33.811299,151.195850	Rear yard of No 21 Richmond Avenue	0.0061	0.3%
7	-33.811293,151.196171	In centre of carpark to the west of Helipad	0.0072	0.4%
8	-33.810985,151.196201	Driveway to engineering, below Optus cellphone panel antenna	0.2400	12.0%
9	-33.810822,151.195983	Walkway to engineering, below Optus cellphone panel antenna	0.2400	12.0%
10	N/A	General Area inside Engineering Services Workshop	0.0006	0.0%
11	N/A	General Area Inside Analog TV Transmitter room	0.0021	0.1%
12	-33.811767,151.195539	South West corner of TCN 9 Broadcast Tower	0.0042	0.2%
13	-33.811735,151.195935	South East corner of TCN 9 Broadcast Tower	0.0106	0.5%
14	-33.811210,151.196572	North East corner of helipad, On roadway	0.0161	0.8%
15	-33.811271,151.196895	At rear of west satellite dish, near fenceline	0.0068	0.3%

[2] The highest E field reading at each location was used to calculate the % of the General Public reference levelat 100MHz. The percentage values indicated have been calculated as equivalent plane wave power flux density. The results that are less than 0.048% are below the specified sensitivity of the measuring equipment, and are shown as grey text.

MEASUREMENT LOCATION			RESULTS	
No.	GPS (Google Maps)	Description	E Field Level (V/m)	% of ARPANSA General Public Reference Level[3]
16	-33.811314,151.197246	Near the bottom edge of Large satellite dish	0.0074	0.4%
17	-33.811500,151.197345	100mm from the waveguides to the Optus Uplink satellite dish	0.0180	0.9%
18	-33.811452,151.197379	General area at base of the Optus Uplink satellite dish	0.0094	0.5%
19	-33.810874,151.196993	Driveway to the east of main studio building	0.0020	0.1%
20	-33.810609,151.197255	Parking lot to the east of main entry gate	0.0036	0.2%
21	-33.810674,151.197822	North east driveway entrance to property	0.0015	0.1%
22	-33.811618,151.197718	South end of Scott Street, in from of transportable buildings	0.0055	0.3%
23	-33.811092,151.197205	Carpark at rear of numbers 8 and 10 Scott Street	0.0030	0.2%
24	-33.810596,151.196866	Centre of main visitor carpark in front of studio building	0.0027	0.1%
25	-33.810652,151.196527	At entrance to main foyer, beside CEO carpark	0.0060	0.3%
26	-33.810968,151.196319	On Studios cooking balcony, in front of Optus antenna	0.5600	28.0%
27	-33.810928,151.196575	Junction of walkways on roof of main Studio Building	0.0230	1.2%
28	-33.810509, 151.196231	On roof of Technical building at hatchway (at 2m above roof)	0.0600	3.0%
29	-33.810754,151.196071	On roof of Technical building In front of small 18GHz dish	0.0400	2.0%
30	-33.810757,151.196111	On roof of Technical building, near VHF antenna arrays	0.0200	1.0%
31	-33.811384,151.197047	Base of largest dish, On lower level, in front of small dish's	0.0060	0.3%

All measurements taken were found to be well below the general public reference level.

The maximum measured RF field on site was 0.56W/m^2, which equates to 28% of the general public reference level. This measurement was taken at location 26, which is the west facing balcony off the studio building, and is directly in front of the Optus Mobile phone antenna.

[3] The highest E field reading at each location was used to calculate the % of the General Public reference level at 100MHz. The percentage values indicated have been calculated as equivalent plane wave power flux density. The results that are less than 0.048% are below the specified sensitivity of the measuring equipment, and are shown as grey text.

6. RF HAZARD 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	1 June 2014	9/11/2012
Wandel & Goltermann – Type 8 Probe Isotropic E Field (100kHz – 3GHz)	AV-0035	1 June 2014	9/11/2012
Wandel & Goltermann – Type 9 Probe Isotropic E Field (10MHz – 18GHz)	O-0002	1 June 2014	9/11/2012
Wandel & Goltermann – Type 10 Probe Isotropic H Field (27MHz – 1GHz)	Z-0047	1 June 2014	9/11/2012

The post validation of the RF survey equipment was performed using a transverse electromagnetic (TEM) cell located in the Kordia laboratory at L3, 4 Drake Avenue, Macquarie Park NSW 2113.

6.2 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 ASSESSMENT 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/m2	10 W/m2
	E & H Field – Instantaneous	2,000 W/m2	10,000 W/m2
400 - 2000	E & H field – Time Averaged	2 W/m2	10 W/m2
	E & H field – Instantaneous	2,000 W/m2	10,000 W/m2
> 2000	E & H Field – Time Averaged	10 W/m2	50 W/m2
	E & H Field – Instantaneous	10,000 W/m2	50,000 W/m2

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 (400 MHz) refers to the lowest frequency operating in this range.

7.2 RF HAZARD ASSESSMENT METHODOLOGY

Time averaged E field exposures at this site were assessed by direct measurement.
The duty cycles of the RF sources on this site ensure that compliance with the time averaged E reference levels also implies compliance with the instantaneous E reference levels. The distances from the RF sources on this site infers that RF fields measured are in the far field region; therefor H field levels are inferred from E field measurements.

7.3 RF EXPOSURE REGULATIONS AND STANDARDS

In 2002, ARPANSA (Australian Radiation Protection and Nuclear Safety Agency) published the RPS3 RF safety standard: Radiation Protection Standard - Maximum Exposure Levels to Radiofrequency Fields - 3 kHz to 300 GHz. The ARPANSA 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 and non RF workers (for example residential and office staff).

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 Standard AS 2772.2 - 2011 Radiofrequency radiation, Part 2: Principles and methods of measurement—300 kHz to 100 GHz (available from www.standards.com.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

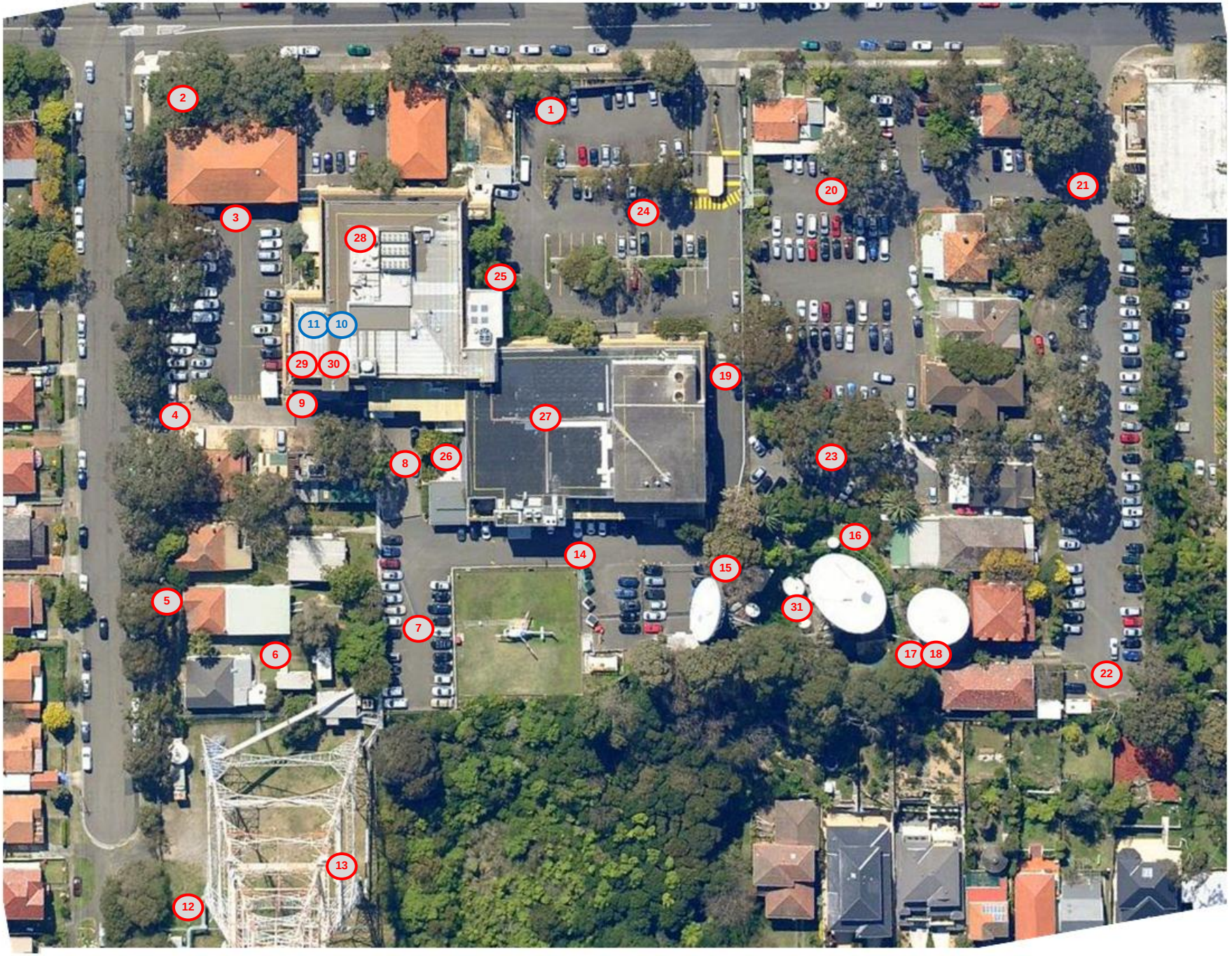
8. GLOSSARY

E	Electric field strength. For frequencies below 10 MHz, indicated in units of V/m; For frequencies above 10 MHz, indicated in the equivalent plane wave power flux density units of W/m².
H	Magnetic field strength. For frequencies below 10 MHz, indicated in units of A/m; For frequencies above 10 MHz, indicated in the equivalent plane wave power flux density units of W/m².
HF	High Frequency – 3 MHz to 30 MHz. In radio broadcasting, this frequency band is used by HF radio services
MF	Medium Frequency – 300 kHz to 3 MHz. In radio broadcasting, this frequency band is used by AM radio services.
RF hazard meter	An RF survey instrument for measuring ambient E or H fields.
RF personal monitor	An RF field monitoring device carried on a person that is designed to alert the user when ambient field exposures exceed allowable limits.
RF worker	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.
UHF	Ultra High Frequency – 300 MHz to 3 GHz. This frequency band is used by UHF TV and mobile telephony services.
VHF	Very High Frequency – 30 MHz to 300 MHz. This frequency band is used by FM radio and VHF TV services.

APPENDIX 1 - RF DRAWINGS

Persons viewing this document should ensure all drawings indicated here are present and viewed in full, rather than one in isolation.

Drawing No.	Drawing Issue	Drawing Title
Nine Network Australia- Willoughby	R1	RF Measurement Locations



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	SUBTITLE: RF Measurement Locations	LAST EDIT BY: JEAN-BAPTISTE SAUQUET	REVIEW DATE: 12/11/2012	NINE NETWORK-WILLOUGHBY STUDIOS_RFHSR_R1	1
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