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RF EME ANALYSIS REPORT

TELSTRA CORPORATION LIMITED

SLIMLINE MR66 RAYDOME

CISCO ANT-10

December 2014

RF EME ANALYSIS REPORT

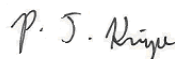
SLIMLINE MR66 RAYDOM

Cisco ANT-10

Assessment Date 9 December 2014

Reference No. 1370-4346

Authorised Signatory



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Total Radiation Solutions



NATA Accredited Inspection Body - Number: 15096

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1. Introduction

Telstra Corporation Limited (Telstra) requested Total Radiation Solutions Pty Ltd (TRS) to undertake a radio frequency (RF) electromagnetic energy (EME) assessment of the Slimline MR66 Raydome that contains a number of Cisco ANT-10 omni antennas.

The purpose of this assessment was to establish if the non-occupational boundaries for the antennas extend outside the cube shroud.

This report is based on information provided by Telstra and the manufacturer’s technical sheet for the Cisco ANT-10 omni antennas.

2. Regulatory Exposure Limits

ARPANSA, an agency of the Commonwealth Department of Health has established a Radiation Protection Standard (ARPANSA 2002) specifying limits for continuous exposure of the general public to RF EME transmissions (Table 1). Further information can be gained from the ARPANSA web site.

The Australian Communications and Media Authority (ACMA) mandates exposure limits for continuous exposure of the general public to RF EME. Further information can be found at the ACMA website at <http://www.acma.gov.au>

Table 1 Reference Levels for Time Averaged Exposure to RMS Electric and Magnetic Fields (Unperturbed) (ARPANSA 2002)

Exposure Category	Frequency Range	E-field (V/m)	H-field (A/m)	Power Flux Density (W/m ²)
Occupational (RF Worker)	100 kHz – 1 MHz	614	163/ <i>f</i>	–
	1 MHz – 10 MHz	614/ <i>f</i>	163/ <i>f</i>	1000/ <i>f</i> ²
	10MHz – 400 MHz	61.4	163	10
	400 MHz – 2 GHz	3.07 x <i>f</i> ^{0.5}	0.00814 x <i>f</i> ^{0.5}	<i>f</i> /40
	2 GHz – 300 GHz	137	0.364	50
Non-Occupational (General Public)	100 kHz – 150 kHz	86.8	4.86	–
	150 kHz – 1 MHz	86.8	0.729/ <i>f</i>	–
	1 MHz – 10 MHz	86.8/ <i>f</i> ^{0.5}	0.729/ <i>f</i>	–
	10MHz – 400 MHz	27.4	0.729	2
	400 MHz – 2 GHz	1.37 x <i>f</i> ^{0.5}	0.00364 x <i>f</i> ^{0.5}	<i>f</i> /200
	2 GHz – 300 GHz	61.4	0.163	10

f is frequency in MHz

3. Modelling Methodology

Using the IXUS modelling software in conjunction with the NATA accredited inspection body process, the occupational and non-occupation exclusion zones for the antennas listed in Table 2 were calculated.

Table 2 Slimline MR66 Antennas

Number of Antennas	Manufacturer	Model	Frequency	Type
2	Cisco	ANT-10	2.4 GHz	Omni
2	Cisco	ANT-10	5 GHz	Omni

Table 3 Antenna Configuration

Straight Alignment – 26dBm

Diagram Ref	Mech. Tilt (°)	Elec. Tilt (°)	Pol	Cable Loss (dB)	System/Function/Sector	Port Power (dBm)
A01, A02	0	0	V	0.36	2.4 GHz	26
A03, A04	0	0	V	0.65	5 GHz	26

Staggered Alignment – 26 dBm

Diagram Ref	Mech. Tilt (°)	Elec. Tilt (°)	Pol	Cable Loss (dB)	System/Function/Sector	Port Power (dBm)
A01, A02	0	0	V	0.36	2.4 GHz	26
A03, A04	0	0	V	0.65	5 GHz	26

Straight Alignment – 24.5dBm

Diagram Ref	Mech. Tilt (°)	Elec. Tilt (°)	Pol	Cable Loss (dB)	System/Function/Sector	Port Power (dBm)
A01, A02	0	0	V	0.36	2.4 GHz	24.5
A03, A04	0	0	V	0.65	5 GHz	24.5

4. Calculation Results

Table 4 Exclusion Zones Distances Outside Raydome

Antenna Configuration	Distance of General Public Exclusion Zone Outside Raydome (cm)
Straight Alignment - 26 dBm	6.7
Staggered Alignment – 26 dBm	7.5
Straight Alignment – 24.5 dBm	0

Notes:

1. RF EME exclusion zones have been calculated based on the formulae specified in AS2772.2 using the specified parameters for the system by the IXUS software
2. Assessment was conducted within the specified limits of the IXUS software

APPENDIX A – Antenna RF EME Exclusion Zones

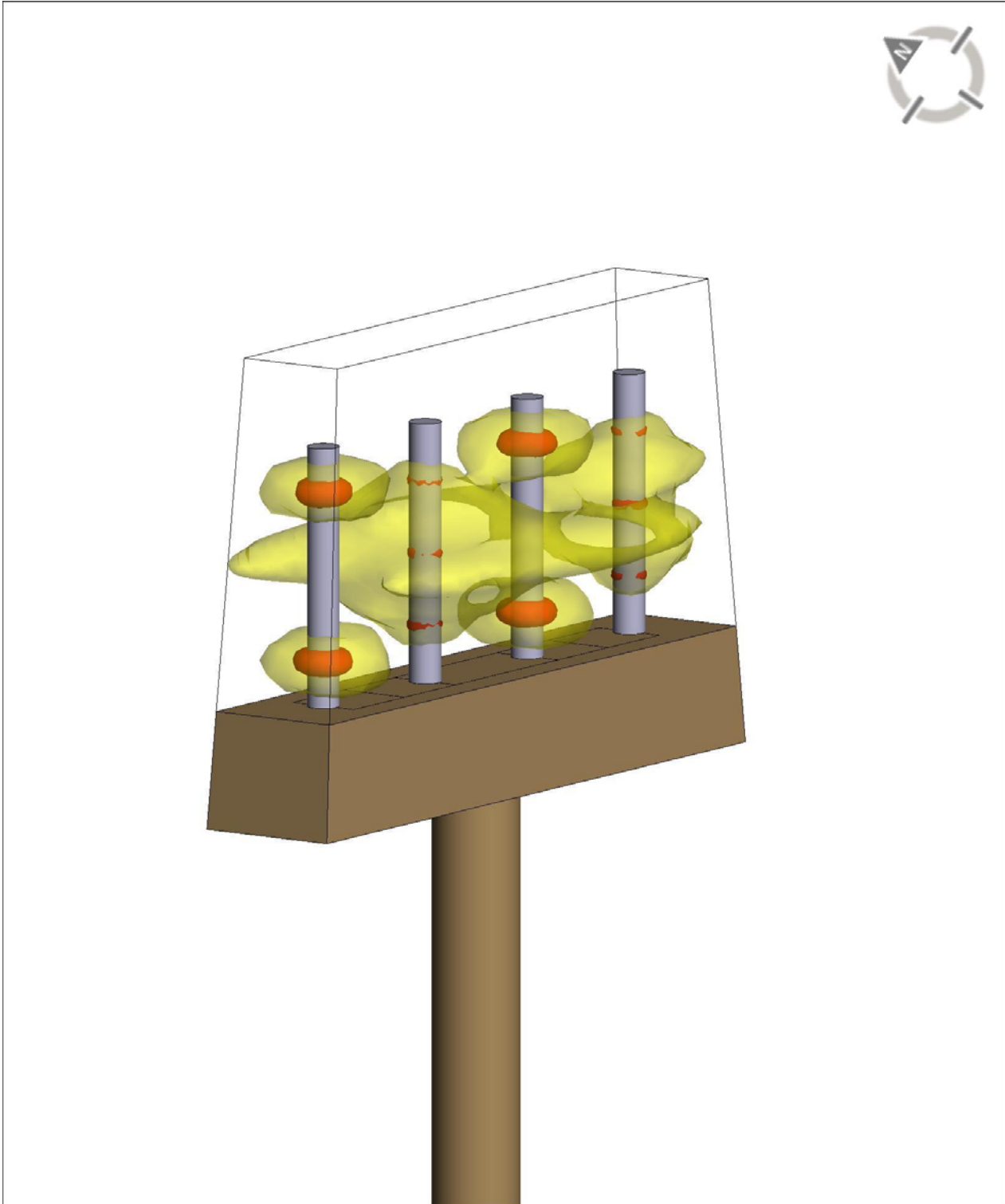
Exclusion zone Legend

 **Areas above RPS3 public limits**

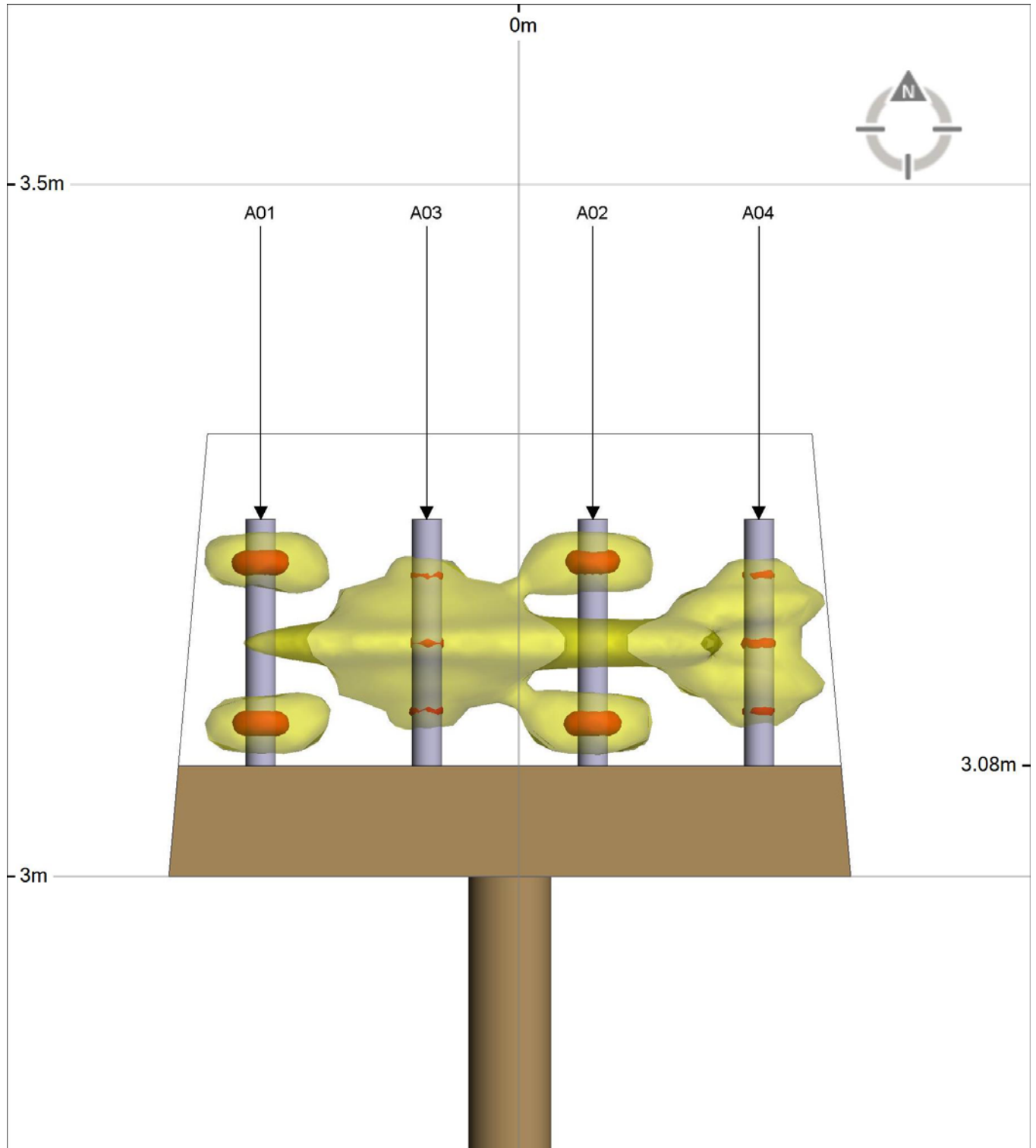
 **Areas above RPS3 occupational limits**

A.1 Slimline M66 Raydome – Straight Alignment – 26dBm

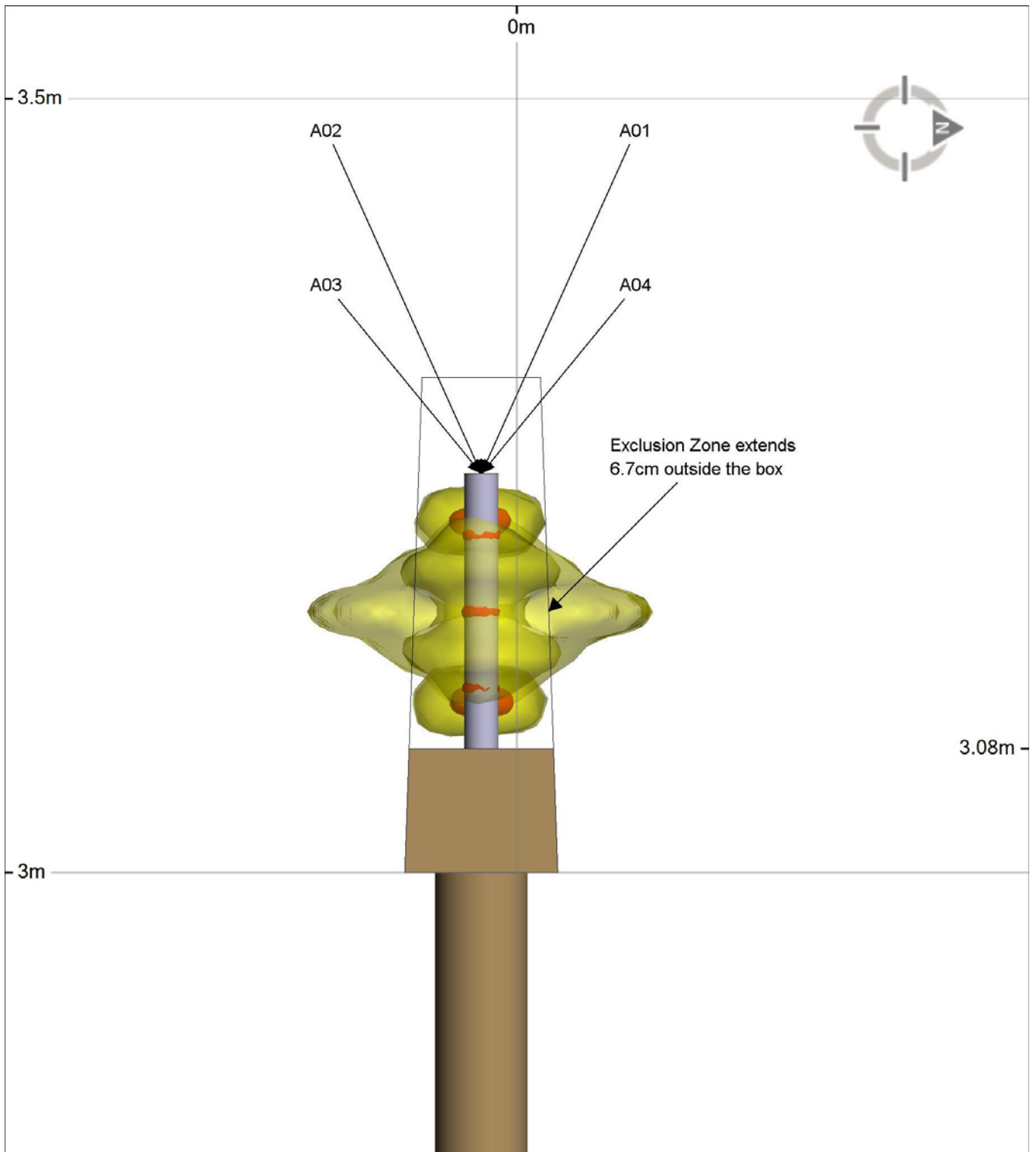
Perspective View



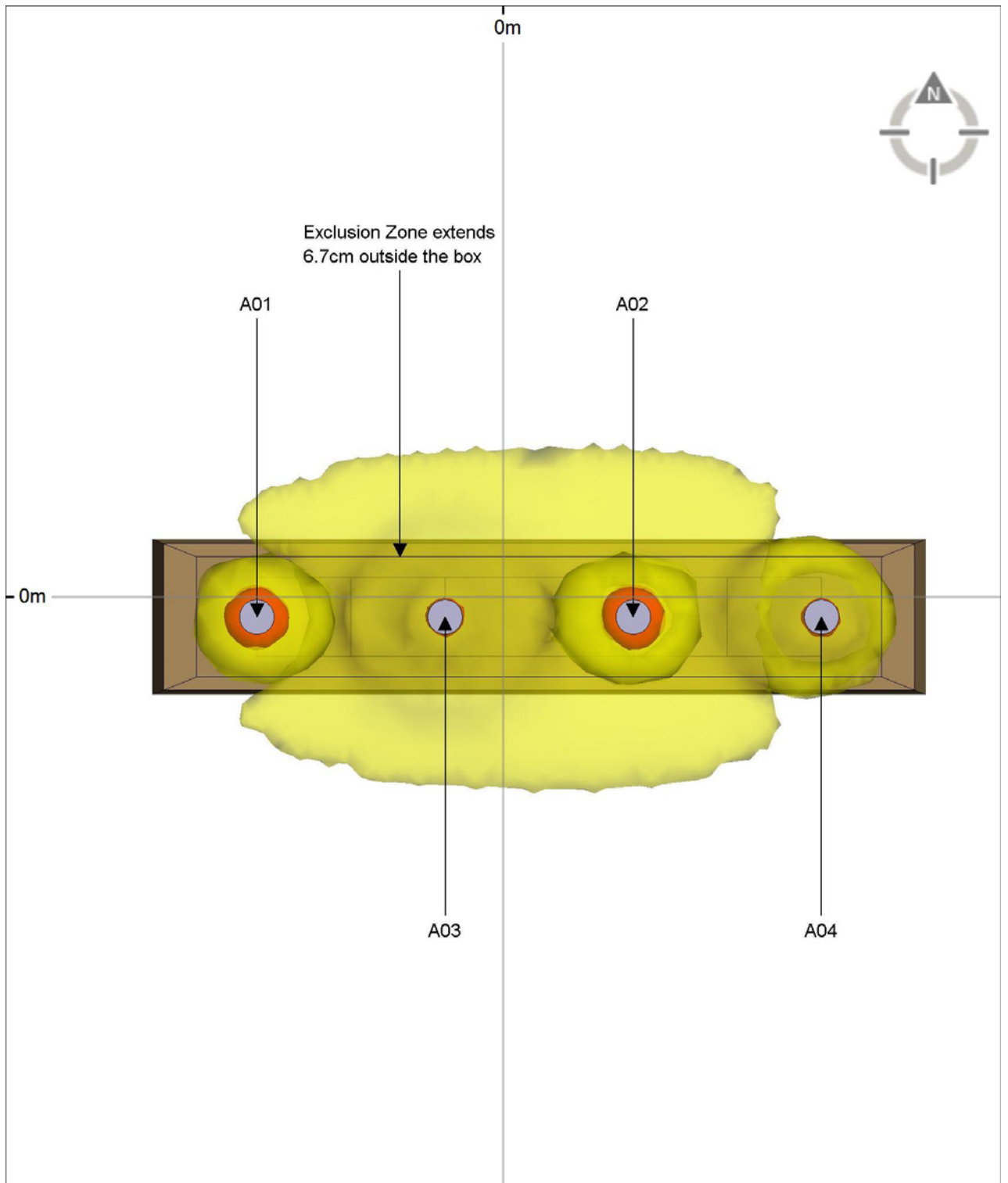
Elevation View 1



Elevation View 2

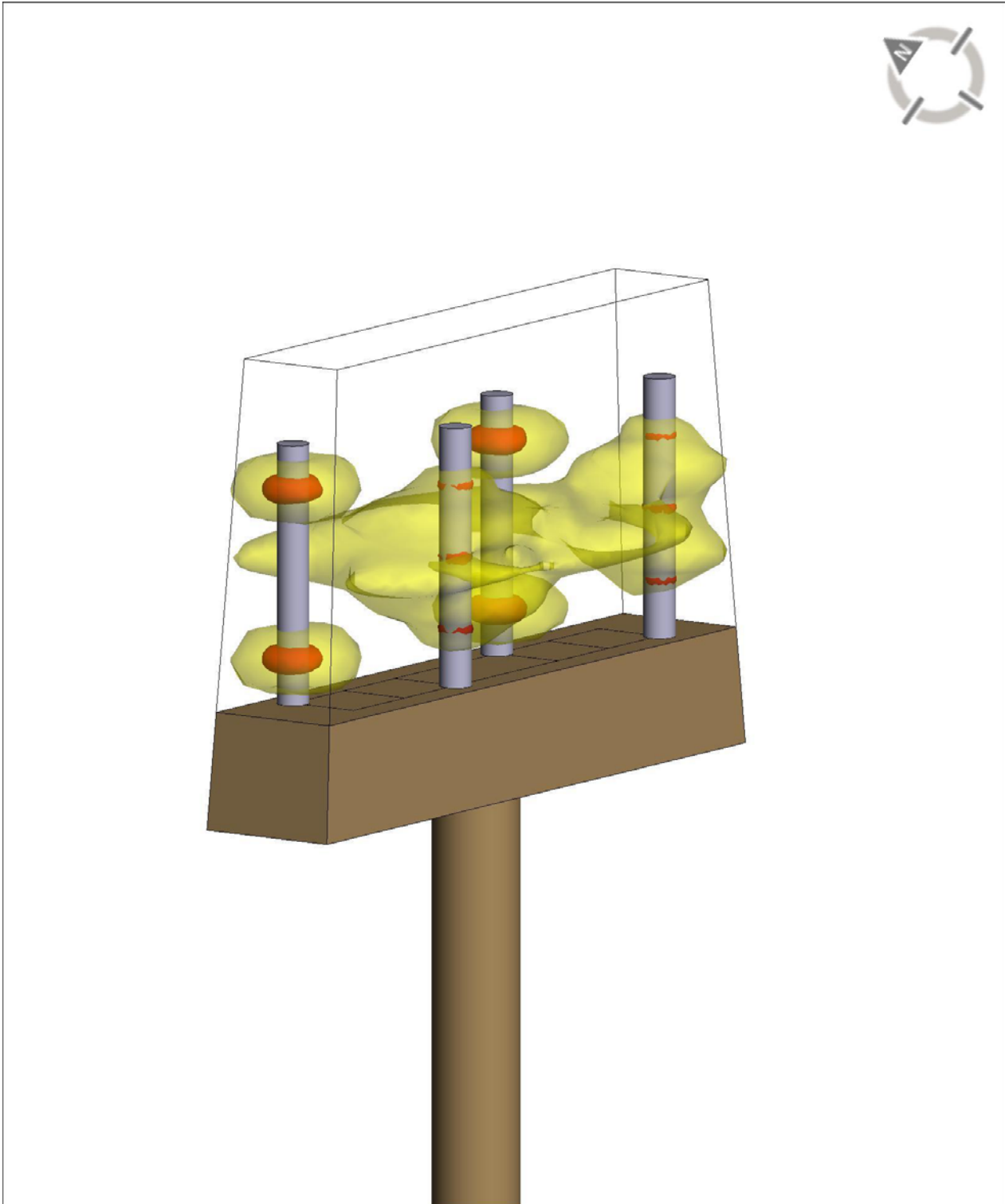


Plan View

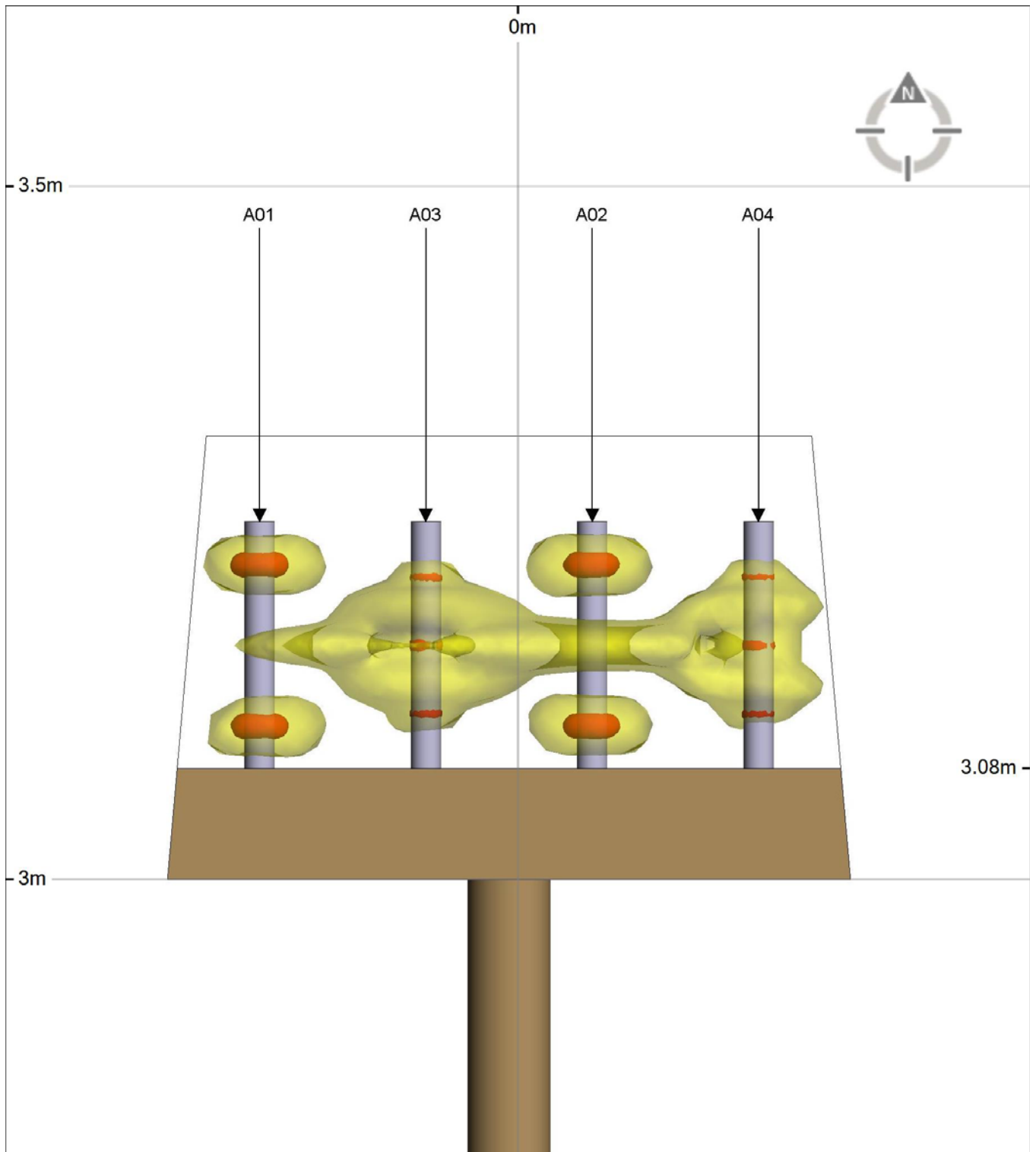


A.2 Slimline M66 Raydome – Staggered Alignment – 26dBm

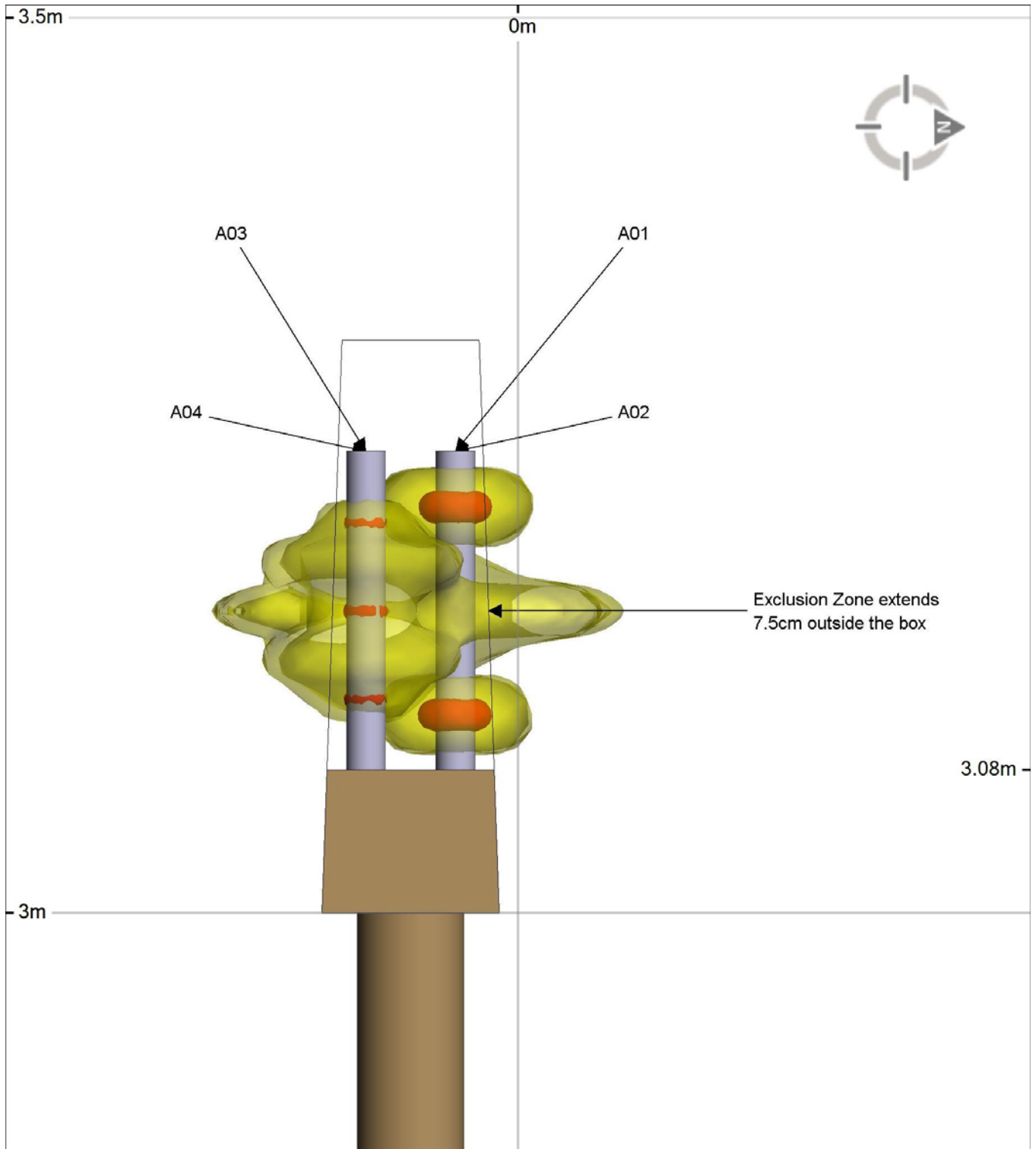
Perspective View



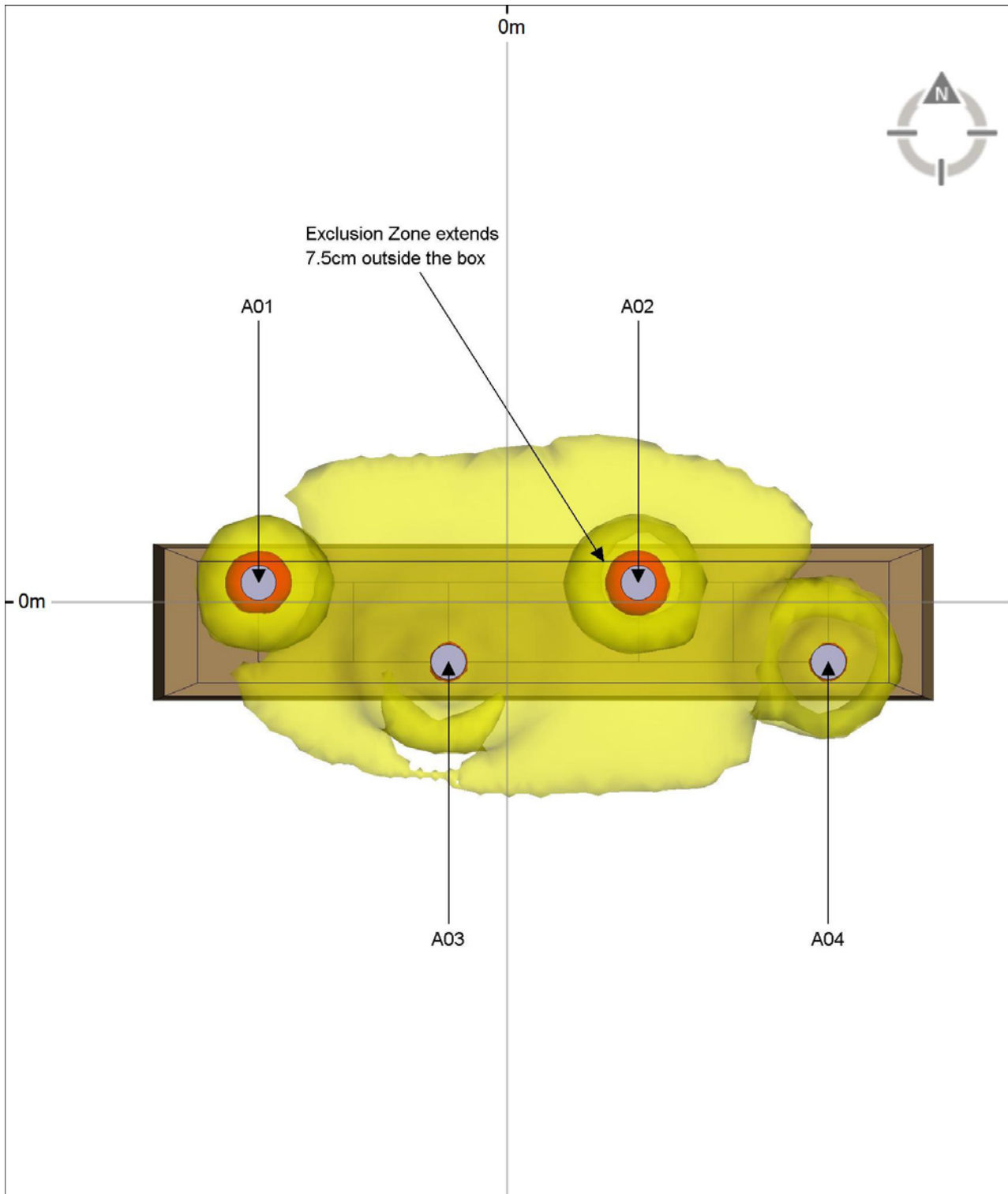
Elevation View 1



Elevation View 2

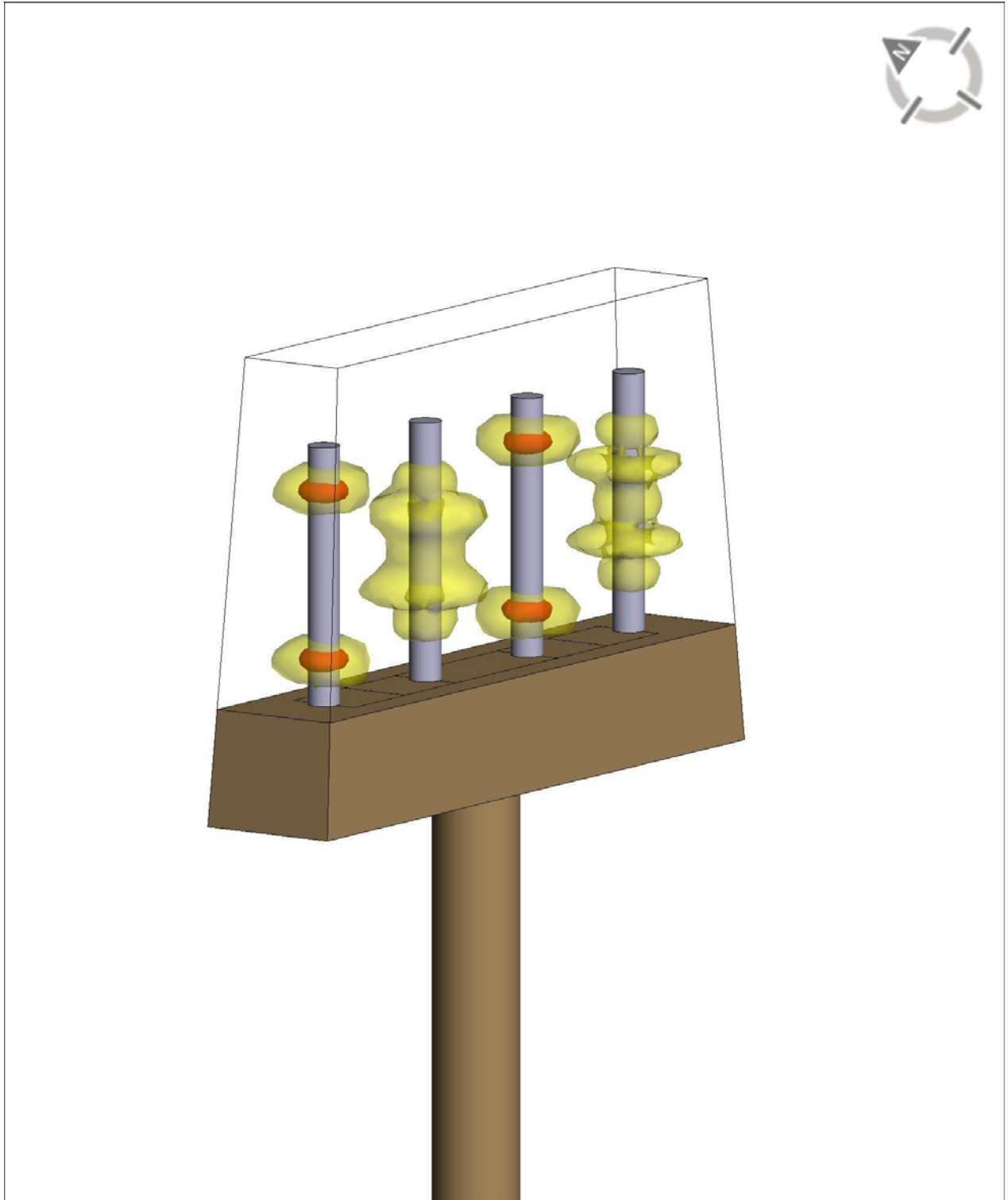


Plan View

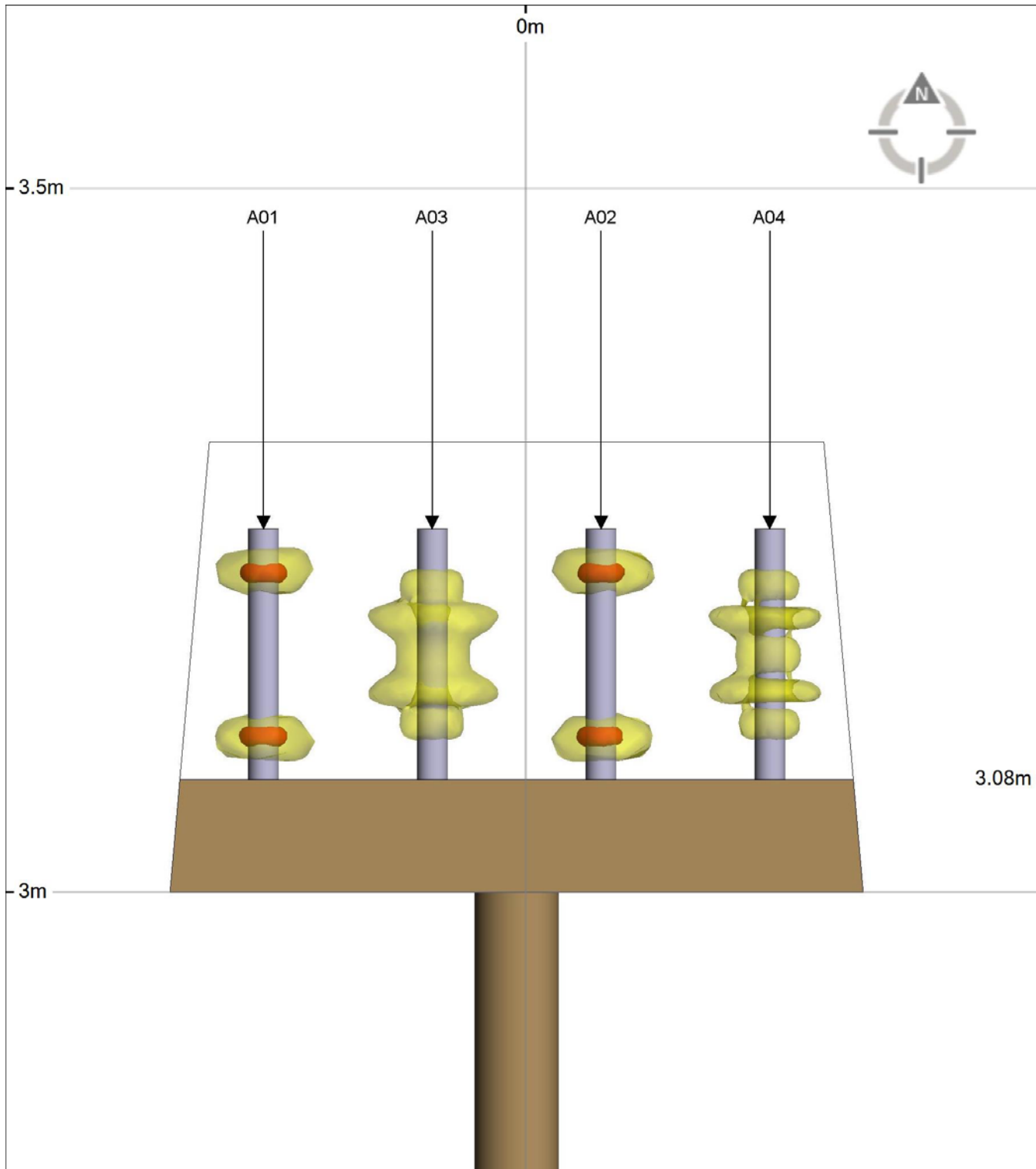


A.3 Slimline M66 Raydome – Straight Alignment – 24.5dBm

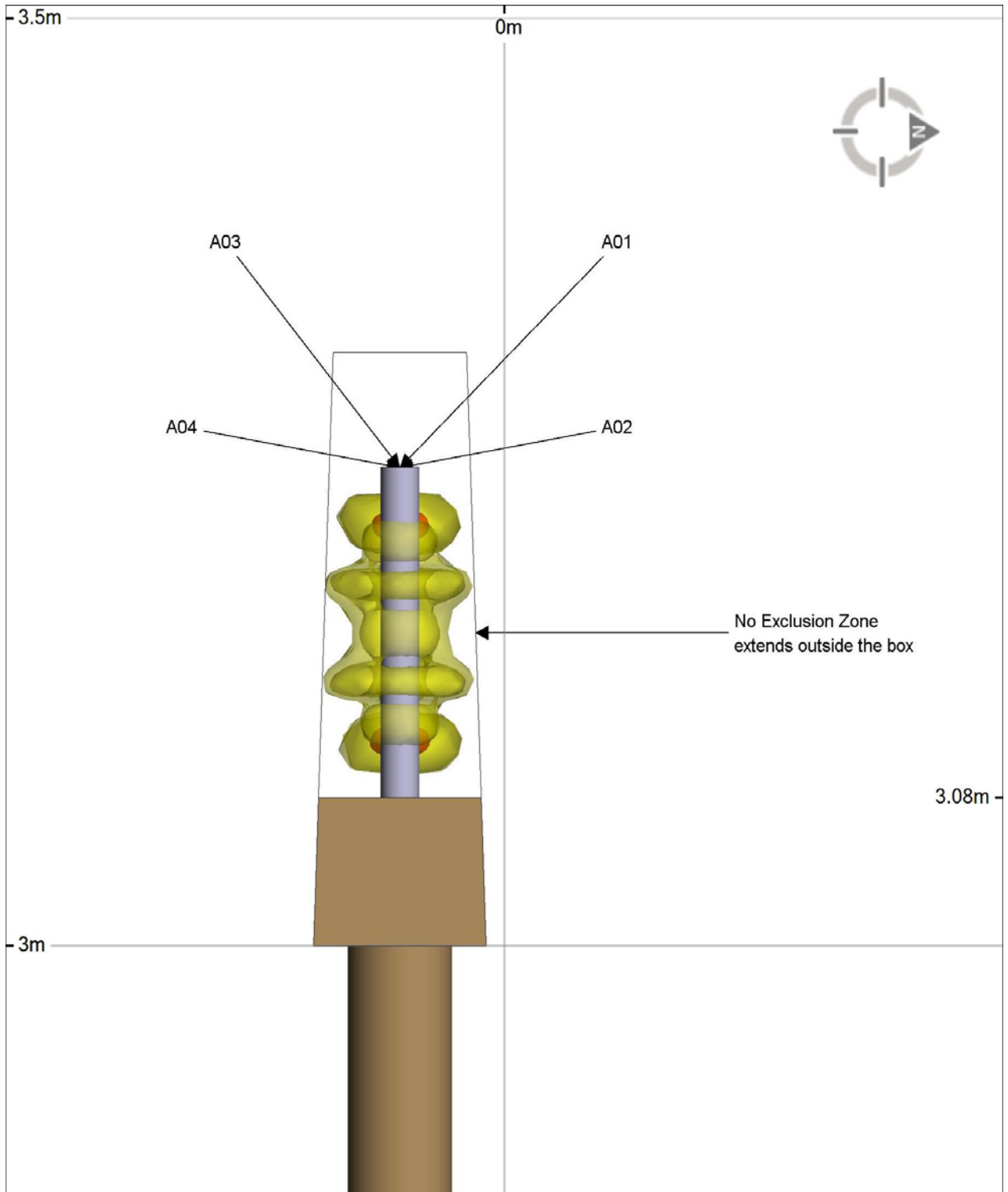
Perspective View



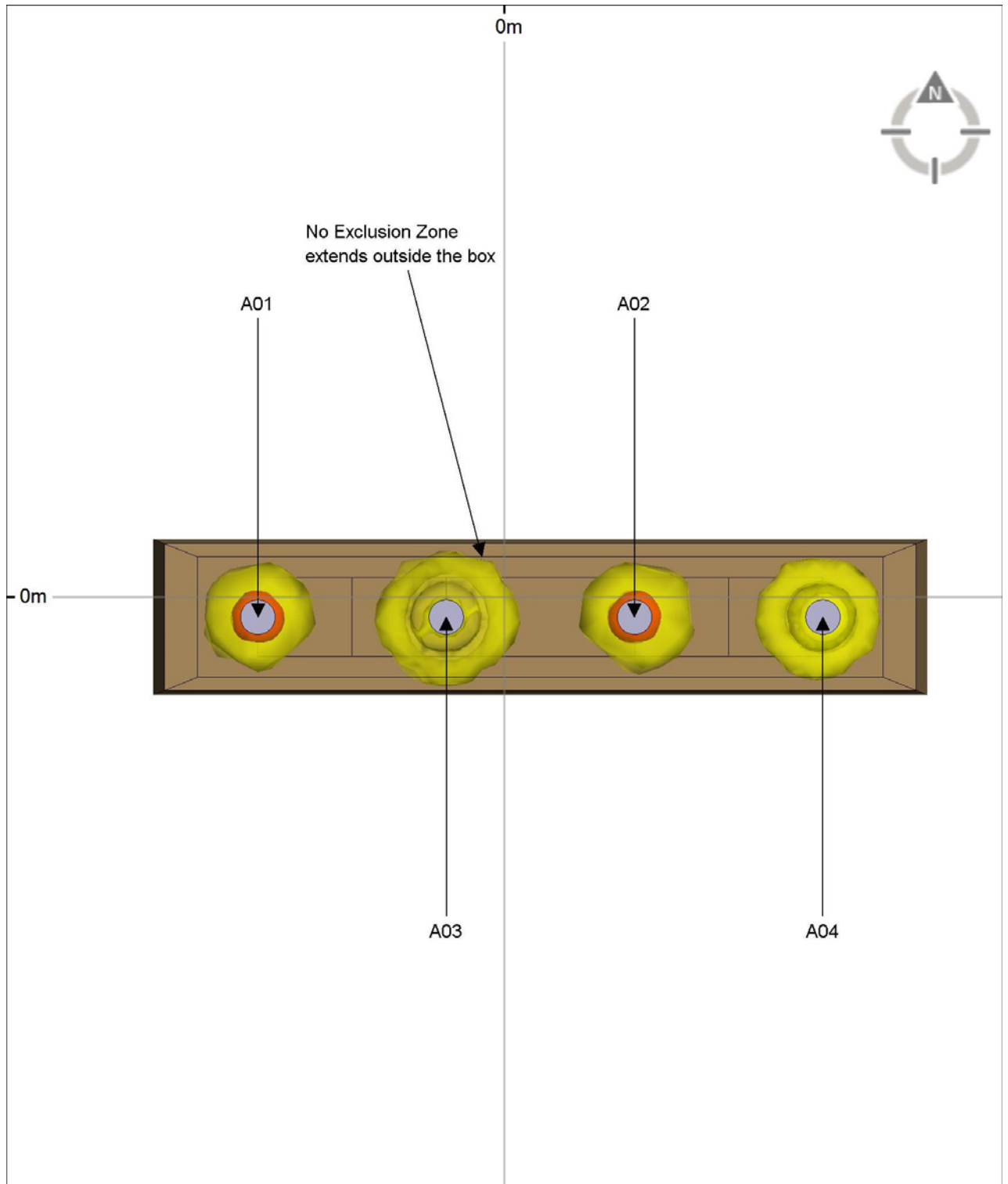
Elevation View 1



Elevation View 2



Plan View



APPENDIX B – References

ARPANSA (2002). Radiation Protection Standard - Maximum Exposure Levels to Radiofrequency Fields - 3 kHz to 300 GHz, Chief Executive Officer of ARPANSA.

AS/NZS (2011). Radiofrequency fields Part 2: Principles and methods of measurement and computation - 3 kHz to 300 GHz. AS/NZS 2772.2:2011. Australia, Standards Australia.