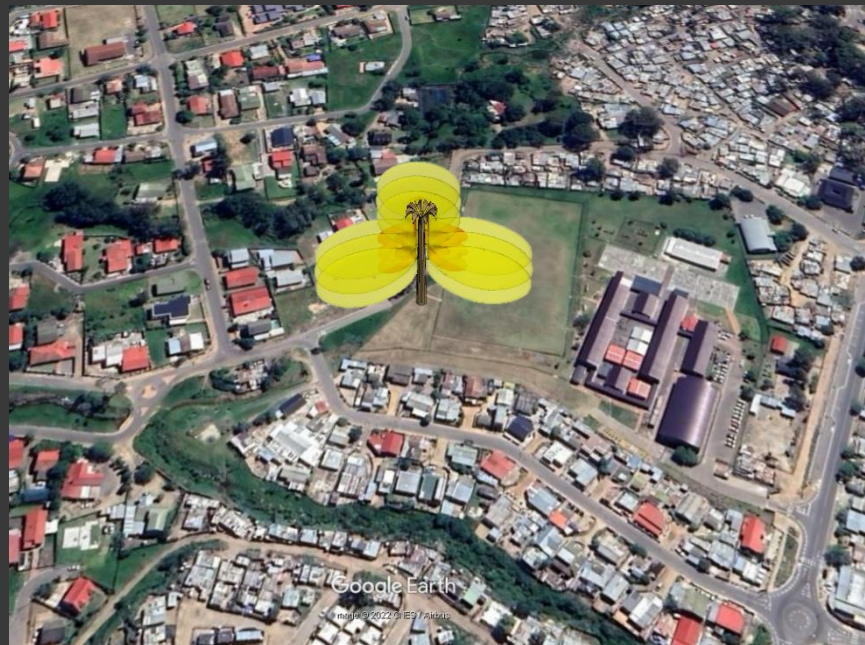




## Electromagnetic Field Predictive Report



\*Base station scale exaggerated for clarity.

**Site Number: 353463**  
**Site Name: Sir Lowry's Pass**

**Sir Lowry's Pass Primary School**  
**Corner Myrtle Crescent and Brinkhuis Road**  
**Sir Lowry's Pass Village**

**Report revision number: 1**  
**Site visit date: 29 April 2022**

# Executive Summary

Alphawave Mobile Network Services (Alphawave) has expertise in the field of human exposure assessment to electromagnetic fields (EMF). For more than a decade Alphawave has focused its efforts in this area on the assessment of human exposure to cellular technologies.

In this document, computer simulations of the EMF exposure are presented for the proposed ATC installation(s). The exposure is compared to the National and International guidelines for limiting exposure to EMF and the results are presented in terms of the ICNIRP guidelines. The ICNIRP (International Commission on Non-Ionizing Radiation Protection) guidelines [1] are used in many countries and also endorsed by the Directorate: Radiation Control at the South African Department of Health [2], [3].

The numerical technique employed for the predictions are based on the CENELEC EN 50383 (2008) [4] and IEC 62232 (2017) [5] international standards for human exposure assessment in the vicinity of base station antennas.

Exposure predictions in the area around the proposed installation were performed, using computer simulations based on the site information supplied by ATC.

The maximum expected EMF exposure was computed at ground level and at first floor level in a 500x500 meter area around the proposed installation. If applicable, the maximum expected EMF exposure was also computed at all the accessible levels of any multi-storey buildings in the immediate area around the proposed installation. **The results obtained show that the expected EMF exposure is at least 3 times below the ICNIRP general public guidelines. In other words, the EMF exposure from the proposed installation will be compliant in terms of the ICNIRP guidelines, as subscribed to by the South African Department of Health.**

## Document Revision History

Revision No	Survey date	Reason for Amendment
1	29 April 2022	Initial Report

## Glossary of Terms and Abbreviations

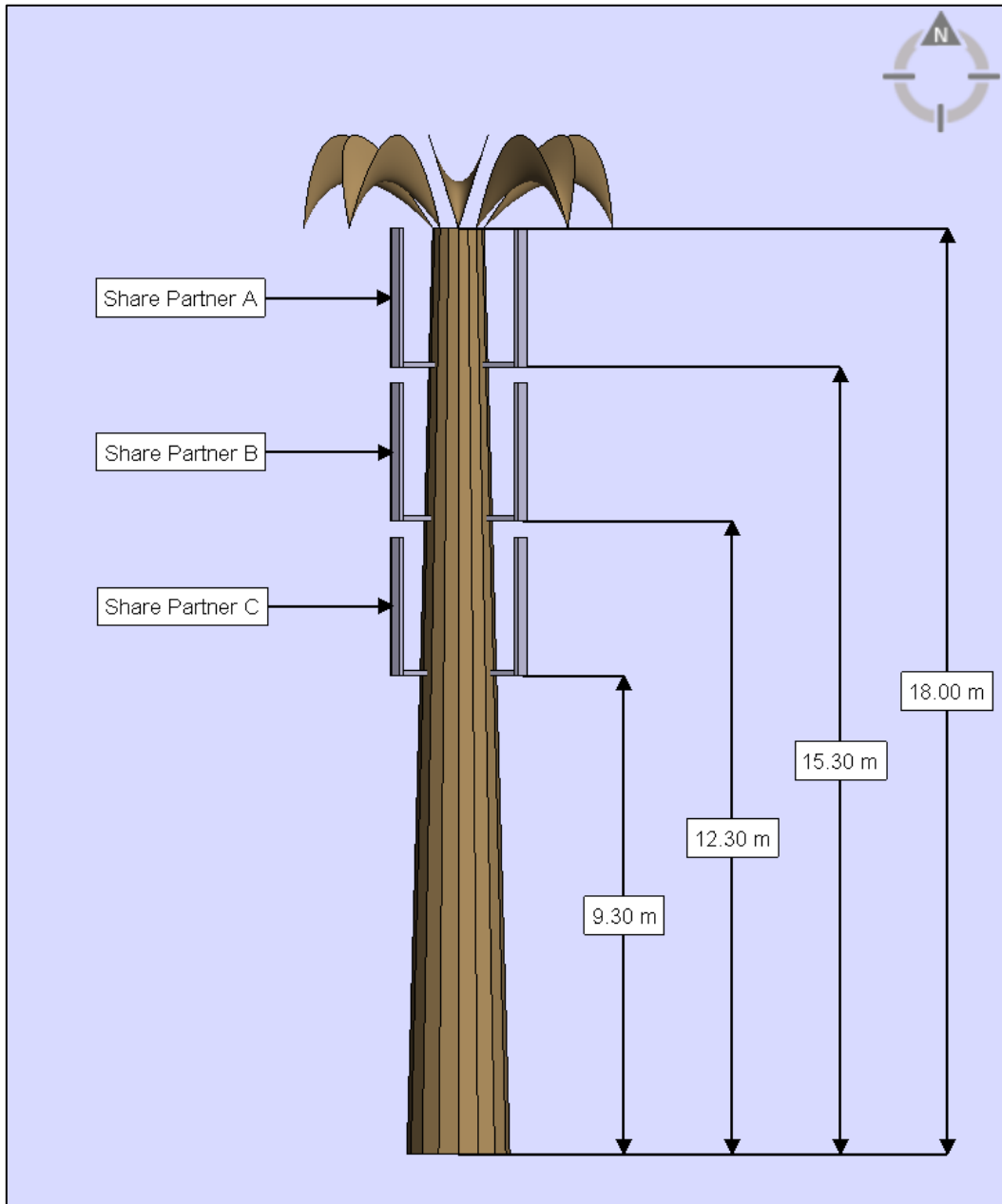
Term	
EMF	Electromagnetic Fields
Alphawave	Alphawave Mobile Network Services (Pty) Ltd
ICNIRP	International Commission on Non-Ionizing Radiation Protection

# Base-Station Details

The proposed site is a 18m high camouflaged tree mast with a planned capacity of three separate share partners. Three planned cellular antennas are included in this model for each of the three potential share partners.

The heights to the bottom of the antennas of the share partners from ground level are 15.3m, 12.3m and 9.3m respectively.

**Figure 1** shows an overview of the model used in the simulations.



**Figure 1: Overview of the model used in the simulation**

## Calculated Results

The maximum expected EMF exposure was computed<sup>1</sup> at ground level and at first floor level in a 500x500 meter area around the proposed installation, using the parameters obtained from ATC listed in **Table 1**<sup>2</sup>.

**Figure 2** and **Figure 3** shows the predicted EMF exposure levels as a percentage of the ICNIRP general public guidelines at ground level (**Figure 2**) and at first floor level (**Figure 3**).

The position of the expected highest EMF exposure is indicated in each of the figures. For all the areas investigated, the predicted exposure is **at least 3 times** below the ICNIRP general public guidelines, or a maximum of 27.08% of these guidelines.

The natural contour of the area was approximated with best effort in the simulation.

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<sup>1</sup> Computations are performed 1.5m above the relevant height, as per standard procedure.

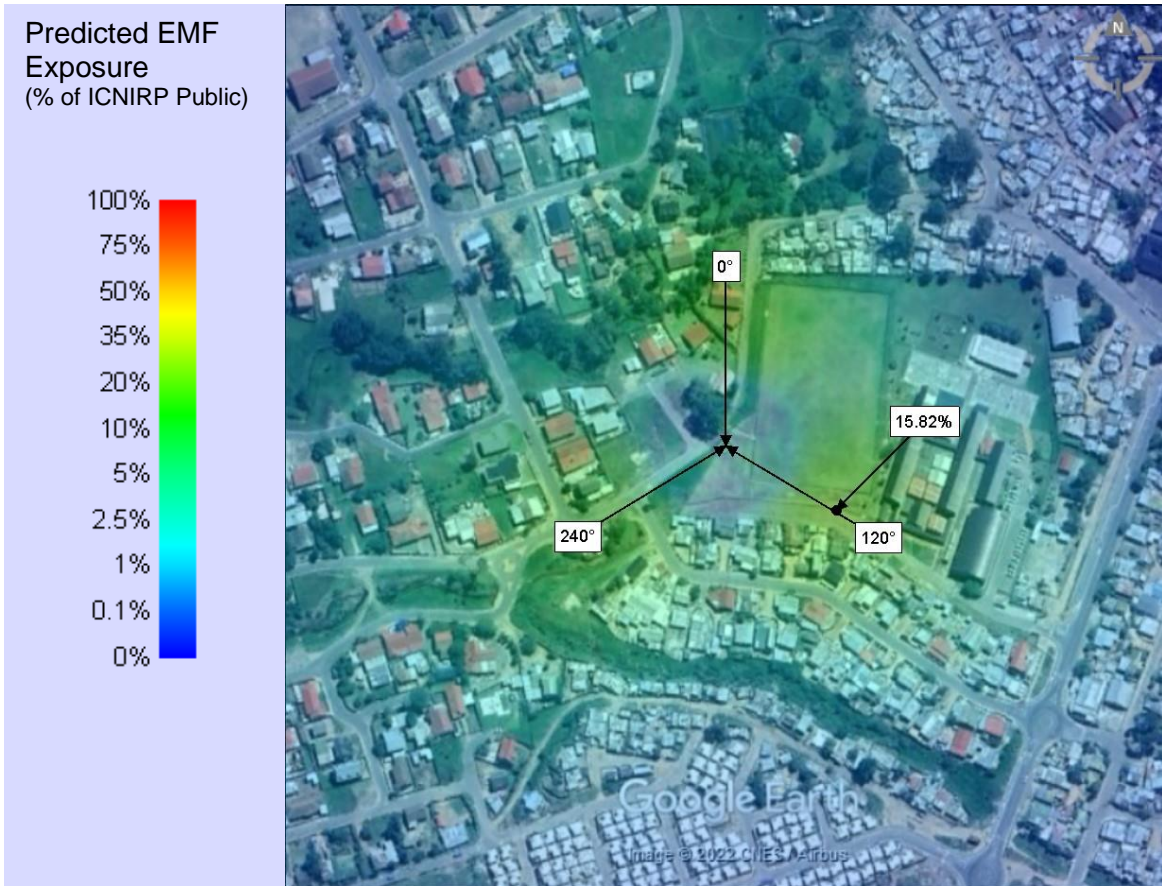
<sup>2</sup> Generic azimuth angles, electrical tilts, mechanical tilts, power levels and antenna models were used if the information was not provided.

**Table 1. Antenna parameters used for the computer prediction**

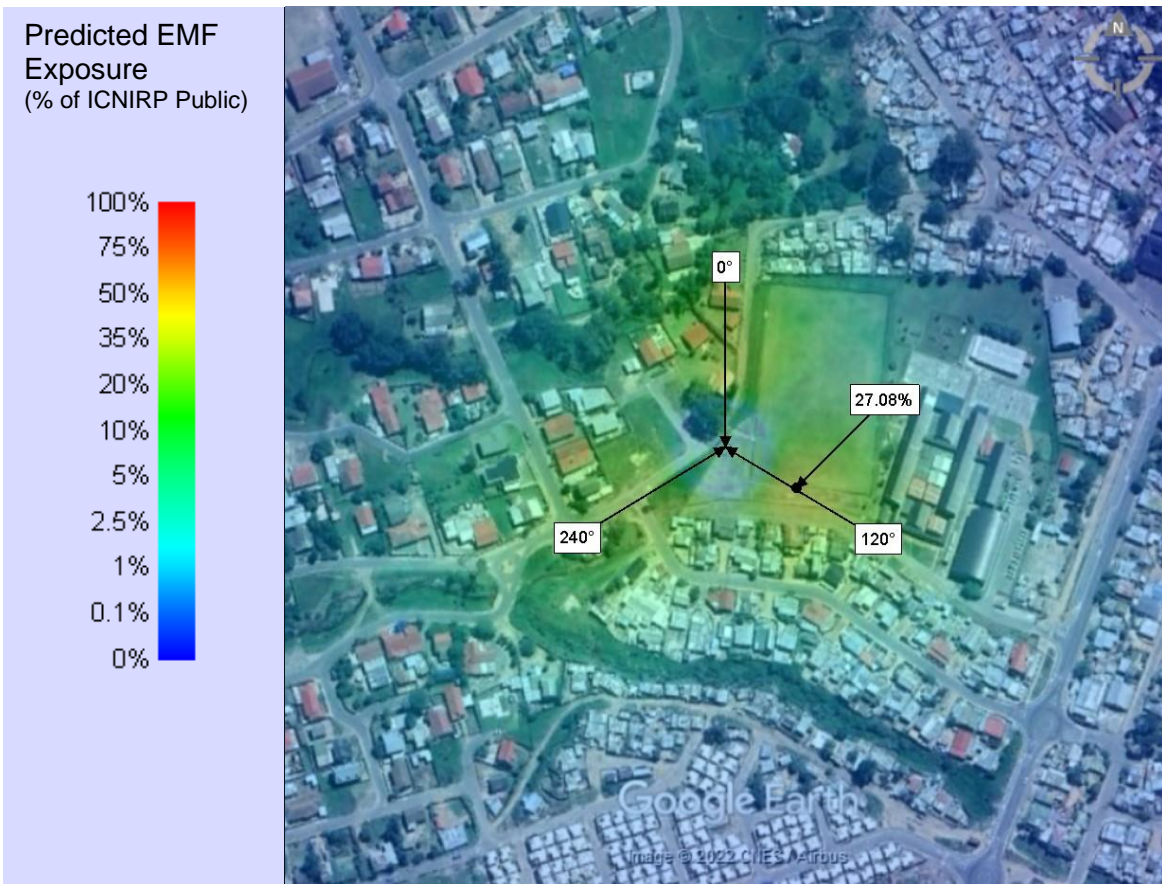
Owner	Antenna Name	Antenna Type	Azimuth (°)	Mechanical Tilt (°)	Frequency Band (MHz)	Electrical Tilt (°)	Power (Watt)
Unknown Mobile Operator A	A1	Generic PentaBand Panel	0	0	900	6	160
					1800	6	160
					2100	6	160
					2300	6	120
					2600	6	120
	A2	Generic PentaBand Panel	120	0	900	6	160
					1800	6	160
					2100	6	160
					2300	6	120
					2600	6	120
	A3	Generic PentaBand Panel	240	0	900	6	160
					1800	6	160
					2100	6	160
					2300	6	120
					2600	6	120
Unknown Mobile Operator B	B1	Generic PentaBand Panel	0	0	900	6	160
					1800	6	160
					2100	6	160
					2300	6	120
					2600	6	120
	B2	Generic PentaBand Panel	120	0	900	6	160
					1800	6	160
					2100	6	160
					2300	6	120
					2600	6	120
	B3	Generic PentaBand Panel	240	0	900	6	160
					1800	6	160
					2100	6	160
					2300	6	120
					2600	6	120

**Table 1. Antenna parameters used for the computer prediction (continued)**

Unknown Mobile Operator C	C1	Generic PentaBand Panel	0	0	900	6	160
					1800	6	160
					2100	6	160
					2300	6	120
					2600	6	120
	C2	Generic PentaBand Panel	120	0	900	6	160
					1800	6	160
					2100	6	160
					2300	6	120
					2600	6	120
	C3	Generic PentaBand Panel	240	0	900	6	160
					1800	6	160
					2100	6	160
					2300	6	120
					2600	6	120



**Figure 2: Predicted EMF Exposure levels at ground level, over a 500x500m area around the proposed installation**



**Figure 3: Predicted EMF Exposure levels at first floor level, over a 500x500m area around the proposed installation**



# Technical Background

The site parameters used for the numerical predictions in this report are based on documentation supplied by ATC.

Free-space propagation (emissions from the antennas into free-space, with no buildings, houses or any other structures included in the model) is also assumed. In reality, the EMF exposure levels would drop considerably inside the buildings and houses (see reference [6]). More complicated models could be developed to quantify this drop in EMF exposure levels. This would increase the accuracy of the predictions, but is beyond the scope of this document. The predictions assuming free-space propagation are conservative and should be sufficient for the investigation at hand.

It can be concluded with confidence that, unless the installation of the antennas at the installation is changed or the proposed construction is changed, the results in this document represent the expected “worst case” exposure conditions predicted at this installation.

## References

- [1] “*Guidelines for Limiting Exposure to Electromagnetic Fields (100 kHz to 300GHz)*,” ICNIRP (International Commission on Non-Ionizing Radiation Protection), March 2020.
- [2] “*Guidelines for Limiting Exposure to Time Varying Electric, Magnetic, and Electromagnetic Fields in the Frequency Range up to 300GHz*,” Tech. Report EMEL98NEW, Compiled by the Directorate: Radiation Control, Department of Health, South Africa, September 1998.
- [3] “*Health Effects of Cellular Base Stations and Handsets*”, Letter distributed by the Directorate: Radiation Control, Department of Health, Republic of South Africa, February 2021.
- [4] “*Basic standard for the calculation and measurement of human exposure to electromagnetic fields from radio base stations and fixed terminal stations for wireless telecommunication systems (110 MHz – 40 GHz)*,” CENELEC EN 50383, March 2008.
- [5] “*Determination of RF field strength, power density and SAR in the vicinity of radiocommunication base stations for the purpose of evaluating human exposure*,” IEC 62232, Edition 2.0, August 2017.
- [6] “*On the Propagation of RF into a Building Constructed of Cinder Block Over the Frequency Range 200 MHz to 3 GHz*,” C.D. Taylor, S.J. Gutierrez, S.L. Langdon, and K.L. Murphy. IEEE Trans. On Electromagnetic Compatibility, Vol. 41, No. 1, February 1999.