



# Electromagnetic Field (EMF) measurements in carriage ways around the towns and villages across the Islands of Malta and Gozo

Summary of results  
July 2021

MCA/R/21-4211

## Disclaimer

The presentation of the material in this publication includes the EMF measurements as present at the time of the measurement activity, as well as the interpolation of the EMF measurements to cover the entire geographic areas of the Maltese Islands.

All reasonable precautions have been taken by MCA to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. In no event shall the MCA be liable for damages arising from the use of this publication.

## Copyright notice



<https://creativecommons.org/licenses/by/4.0/>

With the exception of logos, emblems, images, other third-party material or devices protected by a trademark, this content is made available under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) licence.

We request attribution as © Malta Communications Authority 2021.

All other rights are reserved.

Written enquiries may be sent to:

Chief Spectrum Management and Technology, Valletta Waterfront, Pinto Wharf, Floriana FRN1913.

Email: [emf@mca.org.mt](mailto:emf@mca.org.mt)

# Contents

<b>Executive Summary</b> .....	<b>1</b>
What we found.....	2
<b>Background</b> .....	<b>3</b>
<b>Methodology</b> .....	<b>4</b>
Sampling method.....	4
Measurement method.....	5
<b>Measurement Results</b> .....	<b>7</b>
<b>Summary of the Measurement Results</b> .....	<b>10</b>

# Executive Summary

The Malta Communications Authority (MCA) is the national regulatory authority responsible for electronic communication networks and services. One of its tasks is to ensure that the levels of non-ionising radiation from radio transmitting apparatus are within the predefined levels. These levels are determined by the relevant competent authorities and refer to those published in the Guidelines of ICNIRP, the International Commission on Non-Ionising Radiation Protection.

To provide further assurance on undertakings' compliance to EMF obligations, in 2020 the MCA undertook a detailed assessment of the public exposure to the levels of electromagnetic field (EMF) by taking measurements at the carriage ways around the towns and villages across the Maltese Islands.

The purpose of the nationwide EMF measurement campaign was two fold. It helped to assess the compliance of radio transmitting apparatus with the regulatory obligations towards EMF. It also served to provide assurance to the general public that EMF levels in accessible areas are within the safe EMF reference levels as applicable at law. The nationwide EMF measurement campaign demonstrated that, the levels of EMF emissions in publicly accessible areas are very low (with a mean value less than 1%) when compared to the safe EMF reference levels currently in force.

During the past years, the MCA has undertaken a number of compliance activities to ensure that operators of radio transmitting apparatus are meeting their obligations with regard to EMF emissions. With an expansion of the current mobile communication networks together with the earmarked deployment of 5G technology, the MCA identified the nationwide EMF exposure measurement campaign as one of its EMF compliance and safety assurance priorities for 2020 and the years to follow.

## What we found

- For all of the approximate four hundred and fourteen thousand (414,000) real-time EMF measurements carried out across two thousand and five hundred kilometres (2500 Km) of carriage ways across the Maltese Islands, the EMF levels were, in general found to be at a small percentage of the EMF reference level for exposure to the general public in the ICNIRP Guidelines.
- Almost all real-time EMF measurements were recorded at well below 1% of the ICNIRP Guidelines reference exposure limit for the general public. The mean EMF exposure level recorded was 0.076% (Malta) and 0.03% (Gozo) of the ICNIRP Guidelines reference exposure limit for the general public.

The highest EMF level recorded at specific points was 19.9% (Malta) and 3.64% (Gozo) of the ICNIRP Guidelines reference exposure limit for the general public.

- The EMF levels for 75% of the real-time EMF measurements (third inter quartile) were below 0.061% (Malta) and 0.019% (Gozo) of the ICNIRP Guidelines reference exposure limit for the general public.
- All of the measurements were taken in publicly accessible carriage ways across the towns and villages of Malta and Gozo. The measurements were extrapolated to publicly accessible areas demonstrating that the public exposure levels attributed to emissions from the radio transmitting apparatus were well within the EMF reference level for exposure to the general public established in the ICNIRP Guidelines.

# Background

The MCA has the responsibility to ensure that operators of radio transmitting apparatus comply with EMF limits established at law. To this end, the Authority undertakes a range of compliance activities.

At present, these activities include in-situ EMF audits at pre-set test points around the Maltese islands as well as EMF audits in specific locations following requests by the general public. The locations as identified by the general public vary from mostly residential places, to schools, churches, and playing fields to name just a few. To add even more weight to its compliance role, the Authority, decided to go one step forward and adopt additional measures providing better assurance to the general public on EMF exposure by focusing on areas of specific interest or concern to the public. This was deemed the most feasible and practical solution to date, considering the imminent rollouts of technology and infrastructure and the associated concerns typically emanating from people's lack of knowledge on EMF emissions and their resulting exposure levels.

During 2020, the Authority conducted a wideband EMF audit at street level in almost all the carriage and path ways found in Malta and Gozo. This audit was aimed to further warrant the compliance of the radio transmitting apparatus to their EMF obligations. No significant issues were reported during the exercise. The EMF exposure to the general public was well within the safe limits as prescribed at law.

The audit focused on the realtime levels of EMF emanating from all radio transmitting apparatus operating during the interval of the measurement activity. Measurements included transmissions from mobile base stations<sup>1</sup>, radio and TV broadcast, PMR and radars amongst other sources.

This report presents the results of these EMF measurements. The exercise was carried out the period June 2020 till January 2021

---

<sup>1</sup> At the time of the audit, mobile communication services encompassed 2G, 3G and 4G+ services only.

# Methodology

## Sampling method

The wideband EMF measurements were taken in real time, over two thousand and five hundred kilometres (2500Km) of carriageways and pathways. The measurement sample consisted of more than four hundred and fourteen thousand real time measurements (a total of 358,106 measurements in Malta and 56,109 measurements in Gozo). Every measurement covers the level of EMF present within the frequency range 100 KHz to 7 GHz.

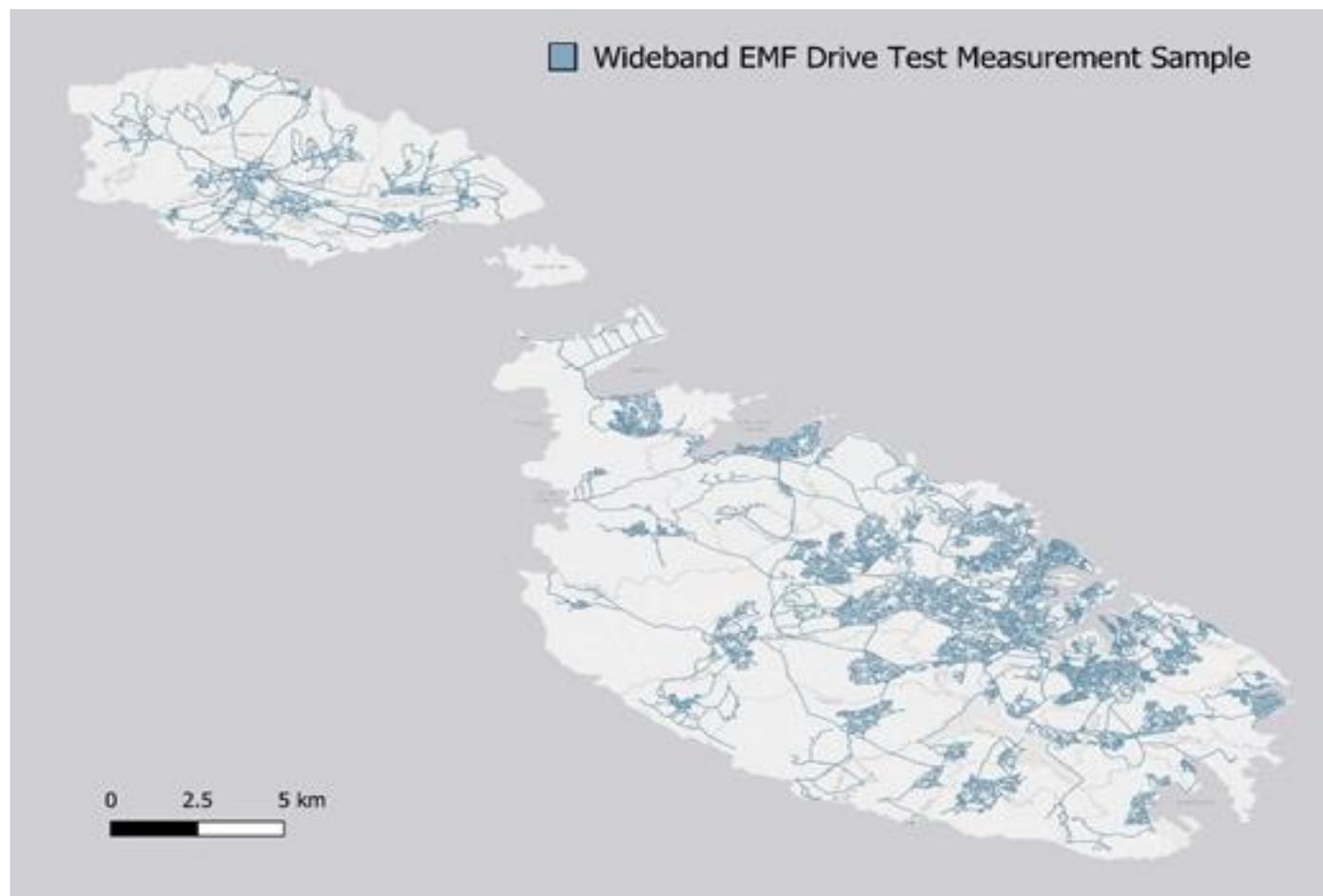


Figure1: Carriage ways encompassed in the nationwide wideband EMF measurements

## Measurement method

The nationwide wideband EMF measurement program was conducted in accordance with the ITU-T K.113 Recommendation and the IEC 62232 Standard.

Recommendation ITU-T K.113 provides guidance on how to make radio-frequency electromagnetic field (RF-EMF) maps for assessing existing exposure levels over large areas of cities or territories and for an appropriate public disclosure of the results, in a simple and understandable way.

The Measurement method employed was the drive test measurement method as identified in Section 6.1 of the ITU-T K.113 Recommendation. The drive test method consists of continuously collecting the cumulative E-Field strength values in Volts per metre (V/m) from a moving vehicle. This method requires the installation of the measuring instruments equipped with a global positioning system on a vehicle. Measurements are completed within a distance of 5m for urban areas and within 10m for non-urban areas.

The movement of the vehicle does not permit measurements to be taken over an average time of six minutes, as recommended by the ICNIRP 2020 Guidelines and IEC Standards. However, it does give an approximation of the RF-EMF levels over large areas that otherwise would be impossible to cover. To overcome this limitation, static measurements were taken as reference to ensure that the order of magnitude of the static and in motion measurements were similar.

Measurements were carried out using a Narda AMB – 8059 Multi-band EMF area monitor. This instrument is equipped with a calibrated wide band measurement probe (Narda EP-1B-03) covering the radio frequency spectrum from 100KHz to 7GHz; the radio frequency spectrum in which all radio transmitting equipment deployed in Malta operates. The measurement equipment provided an overall E Field exposure level in



Figure 2: Wideband EMF Measurement Setup

V/m; the total EMF exposure level may then be expressed as a relative value in terms of percentage of the permitted reference levels established in the 2020 ICNIRP Guidelines<sup>2</sup>.

The recorded EMF exposure levels reflect the emissions of the combined signals present at the measurement location at that point in time. It is important to acknowledge that the values present at the time of measurement may not have been the maximum EMF levels from the radio transmitting sources present in the vicinity.

All EMF measurements were taken during daylight hours.

---

<sup>2</sup> All values of EMF exposure as measured by the MCA are relative to the lowest permitted reference levels for EMF exposure at 27.7V/m or 2W/m<sup>2</sup> as identified in Table 5 of the ICNIRP Guidelines - <https://www.icnirp.org/cms/upload/publications/ICNIRPrfgdl2020.pdf>

# Measurement Results

This section provides a summary of the EMF measurements collated during the nationwide drive tests. The full set of the real-time EMF measurement data is made available to the public as open data on the MCA website.

Table 1 – Overview of the nationwide EMF measurement Campaign 2020	Malta	Gozo
Total number of real-time measurements	358106	56109
Distance covered in km	2220 Km	350 Km
Duration of drive test in days	56 days	5 days
Mean EMF measured value in V/m	0.52 V/m	0.27 V/m
Median EMF measured value in V/m	0.37 V/m	0.19 V/m
Maximum EMF value registered in V/m	12.5 V/m	5.34 V/m
Q1 for EMF values at V/m	0.18V/m	~ 0 V/m
Q3 for EMF values at V/m	0.69V/m	0.39 V/m
Mean EMF exposure level as a % of ICNIRP Guidelines	0.076%	0.03%
Median EMF exposure level as a % of ICNIRP Guidelines	0.017%	0.004%
Maximum EMF exposure level as a % of ICNIRP Guidelines	19.9%	3.64%
Q1 for EMF exposure level as a % of ICNIRP Guidelines	0.004%	0%
Q3 for EMF exposure level as a % of ICNIRP Guidelines	0.061%	0.019%

Note 1 -The EMF exposure levels reported above are relative to the ICNIRP lowest public exposure limit of 2 W/m<sup>2</sup>

Note 2 - The results depicted in the table are based on the real-time EMF measurements

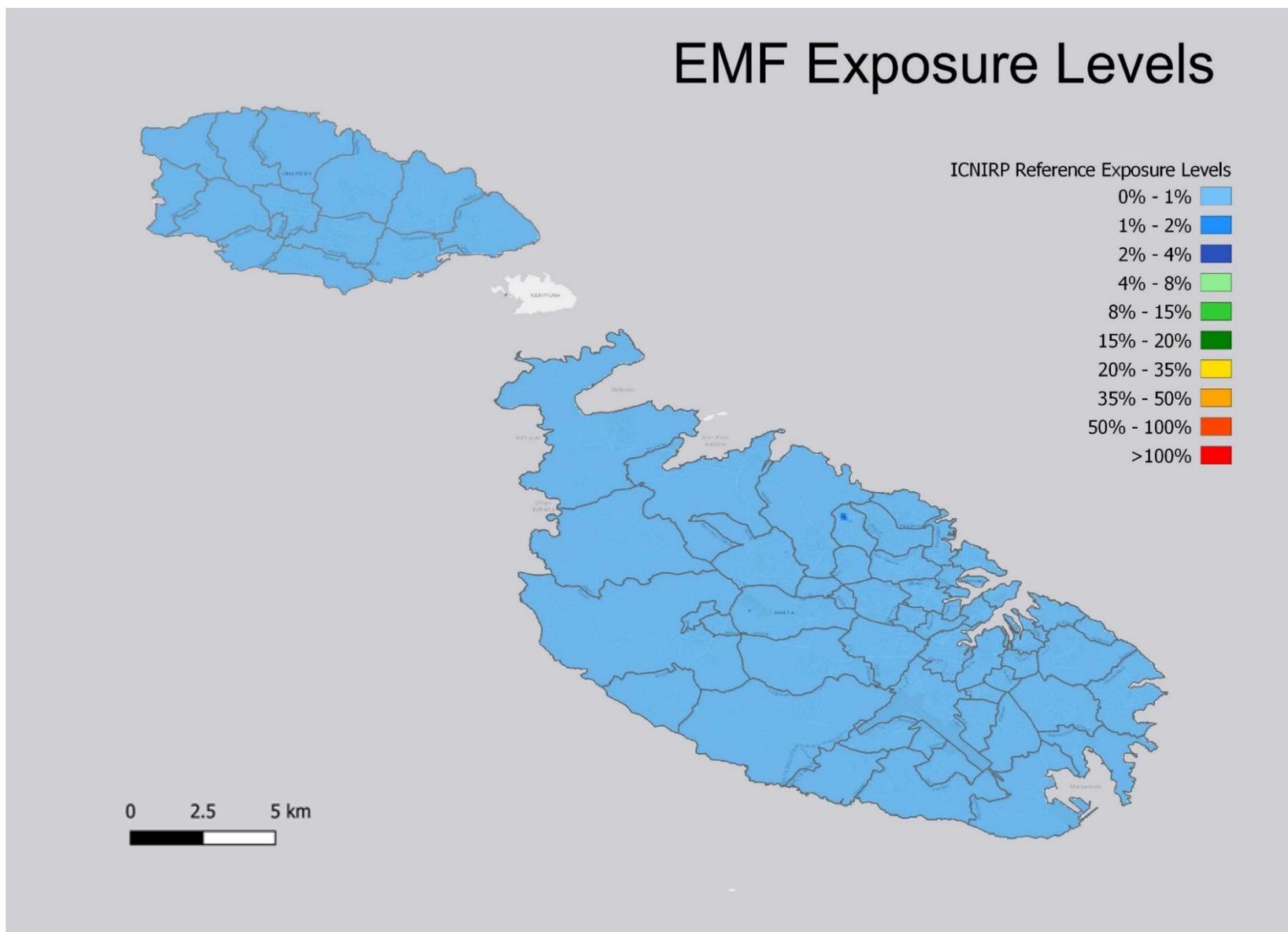


Figure 3: EMF Exposure Levels relative to the ICNIRP lowest public exposure limit of  $2W/m^2$

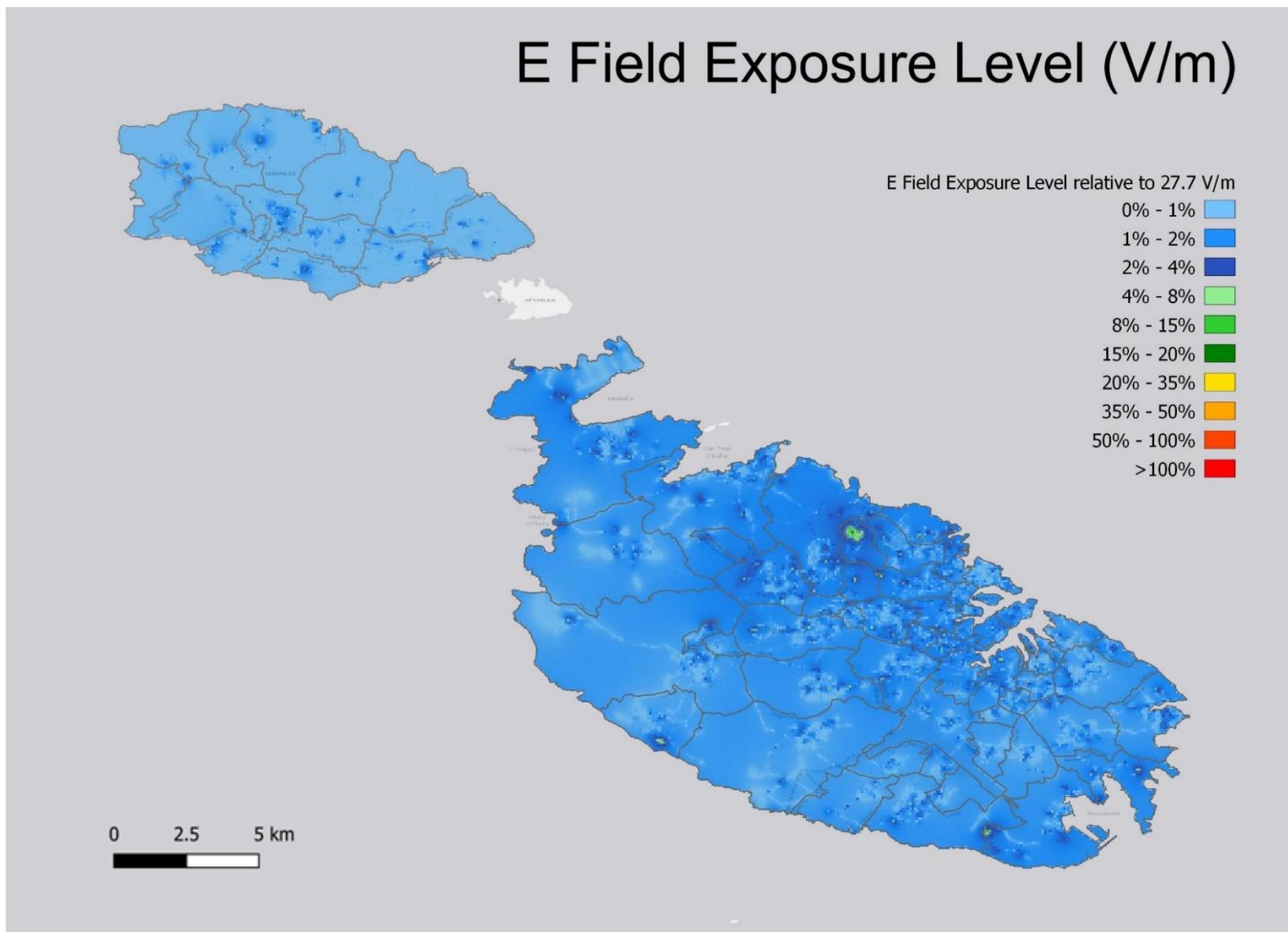


Figure 4: E Field Exposure Levels relative to the ICNIRP lowest public exposure limit of 27.7 V/m

## Summary of the Measurement Results

As depicted in Table 1 above, the vast majority of EMF exposure levels at street level across Malta and Gozo is less than 1% of the lowest reference exposure level as identified in the ICNIRP Guidelines. The ICNIRP general public reference exposure levels vary according to the radio transmission frequency: 27.7V/m or 2W/m<sup>2</sup> for radio transmission at frequencies between 30MHz to 400MHz (used primarily for radio broadcasting) and up to 61V/m or 10W/m<sup>2</sup> for radio transmissions at frequencies above 400MHz (used primarily for TV broadcasting and mobile services).

75% of the real-time EMF measurements fell below 0.061% (Malta) and 0.019% (Gozo) of the ICNIRP reference exposure level of 2W/m<sup>2</sup>. This resulted in a calculated mean EMF exposure level of 0.076% (Malta) and 0.03% (Gozo) of the ICNIRP reference exposure level of 2W/m<sup>2</sup>. The highest EMF level recorded at a specific point was 19.9% (Malta) and 3.64% (Gozo) of the ICNIRP reference exposure level of 2W/m<sup>2</sup>. The highest recorded EMF levels were present close to high power radio and TV broadcasting transmitters.

A total of 414,215 real-time EMF measurements covering 2,500km of carriage ways in Malta and Gozo provided an appropriate measurement sample. To predict the EMF exposure levels across the entire geographic area of the Islands of Malta and Gozo, the measurement sample was extrapolated using the Inverse Distance Weighting extrapolation technique. Such an algorithm was selected since it reflects the propagation characteristics of electromagnetic waves. Figure 3 above depicts the extrapolated EMF exposure levels in W/m<sup>2</sup>. The extrapolated EMF exposure levels are below 1% of the ICNIRP reference exposure level of 2W/m<sup>2</sup> albeit for the areas in close proximity to high power radio or TV broadcasting stations or mobile base stations installed relatively low to street level. Figure 4 above illustrates the extrapolated E Field real-time measurements. The extrapolated E Field exposure levels are below 20% of the ICNIRP reference exposure level of 27.7 V/m, with the majority of the extrapolated E Field exposure levels well within 2% of the ICNIRP reference exposure level of 27.7 V/m.

**The nationwide wideband EMF measurement campaign for 2020 therefore reconfirms and provides the necessary assurance that the EMF public exposure levels at street level are well within the EMF reference level for exposure to the general public as established in the ICNIRP Guidelines. As a result, any incremental emissions from new deployments of radio transmitting apparatus is unlikely to expose the general public to levels of EMF which are higher than the ICNIRP reference exposure levels for the general public.**

