



Commission for
Communications Regulation

Report

Programme of Measurement of Non-Ionising Radiation emissions

Fourth Interim Report

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An Coimisiún um Rialáil Cumarsáide

Commission for Communications Regulation

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Contents

1 Foreword..... 3

2 Executive Summary 5

3 Introduction..... 6

4 Background 8

 4.1 WHAT IS NIR? 8

 4.2 ROLE OF THE COMMISSION FOR COMMUNICATIONS REGULATION 8

 4.3 THE ROLE OF MASON COMMUNICATIONS LTD..... 8

5 Mason Communications summary report on the site measurement programme 9

 5.1 INTRODUCTION 9

 5.2 SUMMARY OF SITE REPORT RESULTS..... 10

Conclusion..... 59

Annex 1 60

Annex 2 64

1 Foreword

The use of radio technology has played and will continue to play a significant role in the development and growth of this country. Advances in mobile radio technology with the convenience it can bring to business and consumers alike are well documented. Today in Ireland over 3.17m people own mobile phone for instance.

This growth and development have raised the awareness of the public of the positive benefits mobile radio technology can bring to individuals, industry and commerce. This can be particularly important in an increasingly knowledge based economy like Ireland's where access to information and the tools to support and enhance competitiveness are key to our future progress and prosperity. To maintain this level of progress will however require continuing investment in the maintenance and upgrading of existing networks as well as the roll out of new infrastructure.

Recognising the need for this ongoing investment in infrastructure, ComReg has required that in their respective licences that all operators are compliant with the international guidelines for general exposure to electromagnetic fields. In addition to this the Commission has over the past three years published three audit reports on their compliance with emission limits for non-ionising radiation. Each audit has focused on compliance with the general exposure limits specified in the guidelines published by the International Commission on Non Ionising Radiation Protection (ICNIRP). On the basis of the work carried out in each of the audits it has been possible to confirm that all of the companies audited have procedures and processes in place to ensure compliance with these international general exposure limits.

In 2003 an extensive programme was been put in place to measure non-ionising radiation levels at up to 400 antenna sites around the country. Undertaking this programme involves measuring the highest emission level associated with each site. This work is undertaken by Mason Communications and Radio Frequency Investigations on ComReg's behalf.

This data is then published as part of a process to seek to better inform the public about the compliance of radio installations with international guidelines for public exposure limits to non-ionising radiation.

This report on the fourth 100 sites, includes forty sites used for a variety of radio systems (Mixed use sites¹). The report concludes that on the basis of the audit undertaken all of the sites are significantly below the ICNIRP guideline levels. It is anticipated that the report on all 400 sites will be issued in October 2004.

Commission for Communications Regulation

¹ See Annex 1

2 Executive Summary

This report is the fourth and final report of four interim reports which outline the programme to measure Non-Ionising Radiation at 400 sites nationwide and covers the results of the fourth 100 sites measured under that programme. Each of the reports is available on the ComReg website². The programme has been implemented by ComReg as a result of co-operation with the Department of Communications, Marine and Natural Resources, and the Department of the Environment, Heritage and Local Government. It involves measurement of emission levels at the point of highest emission associated with antenna sites and is fully operated and funded by ComReg.

In May of 2003, following a competitive tender process, Mason Communications Ltd. in conjunction with Radio Frequency Investigations was contracted by ComReg to carry out Non-Ionising Radiation emission measurements at 400 sites throughout the country. On the basis of this work, Mason have concluded that the NIR emissions from all of the 100 sites measured in this report are significantly below the ICNIRP guideline limits³.

² www.comreg.ie Document ComReg 03/132 – 04/NN

³ See Annex 1

3 Introduction

The Commission for Communications Regulation (ComReg) is the licensing authority for the use of the radio frequency spectrum in Ireland. The frequency spectrum is a valuable national resource which has been used for communications purposes for over 100 years. Applications of radio spectrum, today, include the transmission of a wide range of services, including radio and television broadcasting, mobile telephony and other telecommunications services such as internet connection.

As the licensing authority for radio communications in Ireland, ComReg is responsible for ensuring that communications operators comply with their licence condition relating to non-ionising radiation. The radiation emissions from communications sites must be within the levels set down in the latest international guidelines.

This report represents the results of Non-Ionising Radiation measurements at the fourth 100 sites chosen as part of the Programme of Measurement of Non-Ionising Radiation emissions. The full programme consists of the measurement of Non-Ionising Radiation emissions at 400 sites throughout the country. The programme is being carried out by Mason Communications in conjunction with Radio Frequency Investigations on behalf of ComReg.

For each site, ComReg requires that the measured levels of non-ionising radiation emissions should not exceed the ICNIRP limits in any part of the site or surrounding area where the general public has access.

This report is arranged as follows:

The first section outlines the role of the ComReg in the area of NIR. It outlines Mason Communications appointment in the programme.

The second section is Mason Communications' report on the measurement programme. It contains the summary results for each of the sites. Each site report⁴ contains a conclusion by Mason Communications on the extent of its compliance of each site with the general public exposure limits of the ICNIRP Guidelines 1998.

The third section contains the overall conclusions.

The Annex section contains two elements which are as follows:

1. An explanation of Non-Ionising Radiation and an explanation of the International Commission for Non-Ionising Radiation Protection and the guideline limits associated with that body.
2. A guide to the methodology used in the site measurements.

⁴ See individual reports on www.comreg.ie

4 Background

4.1 What is NIR?

Non-ionising radiation is that part of the electromagnetic spectrum below 2420 million MHz. Radio waves, infrared radiation and visible light are examples of NIR.

4.2 Role of the Commission for Communications Regulation

In 2003/2004 measurements of Non-Ionising Radiation emissions are being taken at 400 sites throughout the country in a programme agreed with the Minister for Communications, Marine and Natural Resources, and the Minister for the Environment, Heritage and Local Government. The programme is being carried out by Mason Communications in conjunction with Radio Frequency Investigations (RFI) on behalf of ComReg.

The aim of the programme is to ensure that emissions from communications sites comply with the general public exposure limits set down by the International Commission for Non-Ionising Radiation Protection (ICNIRP). Some sites have been nominated by the public and the other sites are chosen by Mason/RFI, based on population coverage. Currently, radiation emissions from communications sites must be within the levels set down in the ICNIRP guidelines.

4.3 The Role of Mason Communications Ltd.

Following a competitive tender process held in early 2003, Mason Communications in conjunction with Radio Frequency Investigations Ltd. were chosen to carry out the site measurements. Mason Communications Ireland Ltd. is a wholly owned subsidiary of Mason Group Ltd. Mason advises many of the leading organisations in the Republic of Ireland on converging markets and converging technologies. The management of this programme by Mason Communications involved the services of Radio Frequency Investigations (RFI) Ltd. RFI has been performing Non-Ionising Radiation site surveys since its formation in 1987. RFI is accredited to ISO 17025, which ensures independence from other bodies that may be involved directly or indirectly in this programme.

5 Mason Communications summary report on the site measurement programme

5.1 Introduction

ComReg has commissioned Mason Communications, as an independent consultancy service to conduct a survey of 400 sites. Mason Communications and their measuring sub-contractor “Radio Frequency Investigation (RFI) Ltd” will work on the programme throughout 2003 and 2004.

Mason/RFI engineers measure the power density of transmissions in the various radio bands to be surveyed⁵. The results, derived from electric field voltage measurements, are referenced to and presented alongside the relevant International Commission on Non-Ionising Radiation Protection (ICNIRP) recommended public maximum exposure levels.

A full site report for each site is available in the Non-Ionising Radiation section of the ComReg website.

⁵ See Annex 2 for the site measurement methodology

5.2 Summary of site report results⁶

5.2.1 County Cavan

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Ballyjamesduff	300MHz – 1GHz	0.000031308	4.7635
	GSM 900	0.000036279	4.7421
	GSM 1800	0.000000010	9.345
	1GHz – 2GHz	0.000000008	9.815
Belturbet	300MHz – 1GHz	0.000387845	4.746
	GSM 900	0.000349670	4.7361
	GSM 1800	0.000000007	9.06
	1GHz – 2GHz	0.000000007	6.015
Cavan Town	300MHz – 1GHz	0.000147455	4.8075
	GSM 900	0.000154760	4.7939
	GSM 1800	0.000010906	9.24
	1GHz – 2GHz	0.000008844	9.19
Kilnaleck	300MHz – 1GHz	0.000854395	4.755
	GSM 900	0.000892604	4.7319
	GSM 1800	0.000000008	9.395
	1GHz – 2GHz	0.000000013	6.015
Swanlinbar	300MHz – 1GHz	0.000195280	4.7985
	GSM 900	0.000189086	4.78325
	GSM 1800	0.000000533	9.17
	1GHz – 2GHz	0.000000405	9.19

⁶ See each individual site report for the full set of measurement results

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Lough An Leagh	30MHz – 85MHz	0.000063483	2
	85MHz – 95MHz	0.000034092	2
	95MHz – 105MHz	0.000012435	2
	105MHz – 115MHz	0.000002739	2
	115MHz – 170MHz	0.000379017	2
	170MHz – 230MHz	0.000000193	2
	230MHz – 470MHz	0.000001822	2.266
	470MHz – 670MHz	0.000001717	3.125
	670MHz – 870MHz	0.000019845	3.7625
	870MHz – 1GHz	0.002186043	4.735
	GSM 900	0.002206270	4.73375
	GSM 1800	0.000000033	9.165
	1GHz – 2GHz	0.000000049	9.19
	2GHz – 10GHz	0.000000529	10
	10GHz – 18GHz	0.000033393	10
18GHz – 40GHz	0.001055987	10	
Virginia	300MHz – 1GHz	0.000175250	4.781
	GSM 900	0.000188651	4.762
	GSM 1800	0.000007107	9.23
	1GHz – 2GHz	0.000005089	9.25

5.2.2 County Carlow

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Mount Leinster	30MHz – 85MHz	0.000954242	2
	85MHz – 95MHz	0.185634482	2
	95MHz – 105MHz	0.311643914	2
	105MHz – 115MHz	0.000732249	2
	115MHz – 170MHz	0.001594625	2
	170MHz – 230MHz	0.045567862	2
	230MHz – 470MHz	0.000639232	2
	470MHz – 670MHz	0.000076676	2.4075
	670MHz – 870MHz	0.000011848	3.3575
	870MHz – 1GHz	0.000093252	4.701
	GSM 900	0.000085243	4.6991
	GSM 1800	0.000000029	9.165
	1GHz – 2GHz	0.000026586	7.565
	2GHz – 10GHz	0.000000666	10
	10GHz – 18GHz	0.000029762	10
18GHz – 40GHz	0.001609380	10	

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Rossmore	30MHz – 85MHz	0.000000015	2
	85MHz – 95MHz	0.000005580	2
	95MHz – 105MHz	0.017933235	2
	105MHz – 115MHz	0.000000001	2
	115MHz – 170MHz	0.000000014	2
	170MHz – 230MHz	0.000000954	2
	230MHz – 470MHz	0.000000033	2
	470MHz – 670MHz	0.000027331	2.56
	670MHz – 870MHz	0.000001674	4.0025
	870MHz – 1GHz	0.002331625	4.7235
	GSM 900	0.002538976	4.72265
	GSM 1800	0.000000018	9.16
	1GHz – 2GHz	0.000000568	6.19
	2GHz – 10GHz	0.000000529	10
	10GHz – 18GHz	0.000036030	10
18GHz – 40GHz	0.000941150	10	

5.2.3 County Clare

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Moveen East	300MHz – 1GHz	0.000025743	4.7725
	GSM 900	0.000024025	4.75135
	GSM 1800	0.000000036	9.17
	1GHz – 2GHz	0.000000030	9.19
Woodcock Hill	30MHz – 300MHz	0.010248461	2
	300MHz – 1GHz	0.000118484	4.7725
	GSM 900	0.000130514	4.75135
	GSM 1800	0.000088646	9.23
	1GHz – 2GHz	0.000368688	5.15
	2GHz – 10GHz	0.000024584	10
	10GHz – 18GHz	0.000034726	10
	18GHz – 40GHz	0.001877840	10
Sixmilebridge	30MHz – 300MHz	0.000383406	2
	300MHz – 1GHz	0.000096086	4.7635
	GSM 900	0.000081971	4.7407
	GSM 1800	0.000000004	9.355
	1GHz – 2GHz	0.000005089	6.825
	2GHz – 10GHz	0.000000571	10
	10GHz – 18GHz	0.000034726	10
	18GHz – 40GHz	0.000905021	10

5.2.4 County Cork

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Kanturk	30MHz – 300MHz	0.000001580	2
	300MHz – 1GHz	0.000000992	4.755
	GSM 900	0.000000926	4.74115
	GSM 1800	0.000000122	9.305
	1GHz – 2GHz	0.000000133	9.325
	2GHz – 10GHz	0.000000550	10
	10GHz – 18GHz	0.000034726	10
	18GHz – 40GHz	0.001139354	10
Kilmurry	300MHz – 1GHz	0.000001856	2.769
	GSM 900	0.000000114	4.78465
	GSM 1800	0.000000009	9.395
	1GHz – 2GHz	0.000000007	9.89

5.2.5 County Donegal

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Ardara	300MHz – 1GHz	0.000237497	4.7725
	GSM 900	0.000228907	4.7467
	GSM 1800	0.000000009	9.365
	1GHz – 2GHz	0.000000662	9.49
Ballintra	300MHz – 1GHz	0.00142771	4.7725
	GSM 900	0.001338624	4.7504
	GSM 1800	0.000000058	9.17
	1GHz – 2GHz	0.000000041	9.19
Ballyshannon	300MHz – 1GHz	0.004184645	4.746
	GSM 900	0.003772755	4.7347
	GSM 1800	0.000000007	9.19
	1GHz – 2GHz	0.000000077	9.5
Buncrana	300MHz – 1GHz	0.000005019	4.5975
	GSM 900	0.000008197	4.74535
	GSM 1800	0.000458837	9.17
	1GHz – 2GHz	0.000584331	9.2

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Bundoran	300MHz – 1GHz	0.000047825	4.79
	GSM 900	0.000047715	4.731
	GSM 1800	0.000222156	9.215
	1GHz – 2GHz	0.000229963	9.24
Falcarragh	300MHz – 1GHz	0.000878332	4.816
	GSM 900	0.000866281	4.7481
	GSM 1800	0.000000010	9.075
	1GHz – 2GHz	0.000000010	9.115
Glenties	300MHz – 1GHz	0.001464396	4.781
	GSM 900	0.001093097	4.76245
	GSM 1800	0.000000011	9.35
	1GHz – 2GHz	0.000000029	5.725
Killybegs	300MHz – 1GHz	0.002369511	4.7985
	GSM 900	0.002040134	4.7837
	GSM 1800	0.000000007	9.07
	1GHz – 2GHz	0.000000016	9.515

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Meenalig	300MHz – 1GHz	0.000394147	4.7985
	GSM 900	0.000332398	4.7763
	GSM 1800	0.000000008	9.07
	1GHz – 2GHz	0.000000011	6.015
Mount Charles	300MHz – 1GHz	0.001171274	4.781
	GSM 900	0.000739024	4.7666
	GSM 1800	0.000000010	9.16
	1GHz – 2GHz	0.000002510	9.515
Portsalon	300MHz – 1GHz	0.000010536	4.746
	GSM 900	0.000009390	4.7287
	GSM 1800	0.000000011	9.16
	1GHz – 2GHz	0.000000014	6.015
Stranolar	300MHz – 1GHz	0.000090711	4.09
	GSM 900	0.000086230	4.7282
	GSM 1800	0.000000052	9.37
	1GHz – 2GHz	0.000000018	9.39
Termon	300MHz – 1GHz	0.000050659	4.79
	GSM 900	0.000051364	4.76985
	GSM 1800	0.000000008	9.05
	1GHz – 2GHz	0.000000009	6.015

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Holywell Hill	30MHz – 85MHz	0.002364061	2
	85MHz – 95MHz	0.060208617	2
	95MHz – 105MHz	0.027205621	2
	105MHz – 115MHz	0.000024471	2
	115MHz – 170MHz	0.000253314	2
	170MHz – 230MHz	0.000001142	2
	230MHz – 470MHz	0.000001948	2
	470MHz – 670MHz	0.000578973	2.68
	670MHz – 870MHz	0.000004985	3.9225
	870MHz – 1GHz	0.000032334	4.74
	GSM 900	0.000032859	4.7384
	GSM 1800	0.000000296	9.29
	1GHz – 2GHz	0.000003738	6.89
	2GHz – 10GHz	0.000000693	10
	10GHz – 18GHz	0.000032111	10
18GHz – 40GHz	0.000941150	10	

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Barnesmore	30MHz – 85MHz	0.001818271	2
	85MHz – 95MHz	0.000002247	2
	95MHz – 105MHz	0.000001305	2
	105MHz – 115MHz	0.000000019	2
	115MHz – 170MHz	0.001616809	2
	170MHz – 230MHz	0.000000048	2
	230MHz – 470MHz	0.0000000214	2
	470MHz – 670MHz	0.000000626	3.085
	670MHz – 870MHz	0.000002263	4.0025
	870MHz – 1GHz	0.000372957	4.743
	GSM 900	0.000414628	4.74255
	GSM 1800	0.000000068	9.32
	1GHz – 2GHz	0.000119856	7.6
	2GHz – 10GHz	0.000001015	10
	10GHz – 18GHz	0.000033393	10
18GHz – 40GHz	0.000941150	10	

5.2.6 Dublin City

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Clonskeagh (Muslim National School)	300MHz – 1GHz	0.000664750	4.755
	GSM 900	0.000651116	4.73655
	GSM 1800	0.000316708	9.21
	1GHz – 2GHz	0.000270806	9.225
Clontarf Bay	300MHz – 1GHz	0.000000035	2.935
	GSM 900	0.000000033	4.75645
	GSM 1800	0.000000026	9.185
	1GHz – 2GHz	0.000000040	9.215
Milltown Cedar Hall	300MHz – 1GHz	0.000315979	3.7315
	GSM 900	0.000101779	4.76105
	GSM 1800	0.045463059	9.335
	1GHz – 2GHz	0.031092715	9.34
R & H Hall	300MHz – 1GHz	0.000052925	4.8075
	GSM 900	0.000069448	4.77865
	GSM 1800	0.000335474	9.165
	1GHz – 2GHz	0.000290174	9.19

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Donnybrook (RTE)	30MHz – 85MHz	0.000000186	2
	85MHz – 95MHz	0.000011903	2
	95MHz – 105MHz	0.000009282	2
	105MHz – 115MHz	0.000005671	2
	115MHz – 170MHz	0.000000045	2
	170MHz – 230MHz	0.000000093	2
	230MHz – 470MHz	0.000002758	2.323
	470MHz – 670MHz	0.000016698	2.68
	670MHz – 870MHz	0.000018478	3.72
	870MHz – 1GHz	0.000838800	4.701
	GSM 900	0.000814064	4.77725
	GSM 1800	0.000065866	9.355
	1GHz – 2GHz	0.000075973	9.39
	2GHz – 10GHz	0.000002273	10
	10GHz – 18GHz	0.000032111	10
18GHz – 40GHz	0.000941150	10	

5.2.7 *Dublin Fingal*

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Claremont Court	300MHz – 1GHz	0.000019573	4.781
	GSM 900	0.000023263	4.76985
	GSM 1800	0.000030596	9.24
	1GHz – 2GHz	0.000017851	9.265
High Street, Balbriggan	300MHz – 1GHz	0.004291989	4.711
	GSM 900	0.005776418	4.69075
	GSM 1800	0.001179393	9.17
	1GHz – 2GHz	0.000947673	9.19

5.2.8 *Dublin Dunlaoghaire Rathdown*

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Kiltipper Road	300MHz – 1GHz	0.000790057	4.781
	GSM 900	0.000985505	4.7768
	GSM 1800	0.000549109	9.24
	1GHz – 2GHz	0.000529247	9.29

5.2.9 Dublin South

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Three Rock Mountain	30MHz – 85MHz	0.000099921	2
	85MHz – 95MHz	0.004361729	2
	95MHz – 105MHz	0.002646419	2
	105MHz – 115MHz	0.014409823	2
	115MHz – 170MHz	0.000194831	2
	170MHz – 230MHz	0.000000063	2
	230MHz – 470MHz	0.000031890	2
	470MHz – 670MHz	0.000096307	2.9225
	670MHz – 870MHz	0.000259214	3.72
	870MHz – 1GHz	0.000021760	4.7365
	GSM 900	0.000019438	4.7361
	GSM 1800	0.000000065	9.33
	1GHz – 2GHz	0.000000454	6.915
	2GHz – 10GHz	0.000008723	10
	10GHz – 18GHz	0.000040426	10
18GHz – 40GHz	0.001015450	10	

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Saggart Hill	30MHz – 85MHz	0.003790170	2
	85MHz – 95MHz	0.019663402	2
	95MHz – 105MHz	0.019349006	2
	105MHz – 115MHz	0.000000112	2
	115MHz – 170MHz	0.000298304	2
	170MHz – 230MHz	0.000006021	2
	230MHz – 470MHz	0.000493922	2
	470MHz – 670MHz	0.000000105	3.125
	670MHz – 870MHz	0.000001471	4.005
	870MHz – 1GHz	0.003393584	4.6995
	GSM 900	0.004108267	4.6991
	GSM 1800	0.000000004	9.25
	1GHz – 2GHz	0.000002908	7.165
	2GHz – 10GHz	0.000006929	10
	10GHz – 18GHz	0.000042040	10
18GHz – 40GHz	0.000941150	10	

5.2.10 County Galway

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Ballybrit	300MHz – 1GHz	0.000301758	4.711
	GSM 900	0.000314528	4.6949
	GSM 1800	0.000202143	9.215
	1GHz – 2GHz	0.000181409	9.24
Ballymorte Road	300MHz – 1GHz	0.000003620	4.755
	GSM 900	0.000002481	4.74165
	GSM 1800	0.000000200	9.16
	1GHz – 2GHz	0.000001441	9.49
Corrundulla	300MHz – 1GHz	0.000000385	4.1775
	GSM 900	0.000000026	4.7865
	GSM 1800	0.000000018	9.4
	1GHz – 2GHz	0.001284277	9.465
Galway Railway Station	300MHz – 1GHz	0.001139354	4.8075
	GSM 900	0.000952048	4.78695
	GSM 1800	0.000675552	9.18
	1GHz – 2GHz	0.000742435	9.2
Rahoon	300MHz – 1GHz	0.000443260	4.816
	GSM 900	0.000315979	4.7948
	GSM 1800	0.002848778	9.24
	1GHz – 2GHz	0.002733120	9.265

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Wellpark	300MHz – 1GHz	0.004024006	4.816
	GSM 900	0.003393584	4.79715
	GSM 1800	0.001512372	9.24
	1GHz – 2GHz	0.002040134	9.265
Knockroe	30MHz – 300MHz	0.043516970	2
	300MHz – 1GHz	0.000392336	4.755
	GSM 900	0.000558031	4.73425
	GSM 1800	0.000000049	9.225
	1GHz – 2GHz	0.000019937	6.825
	2GHz – 10GHz	0.000004043	10
	10GHz – 18GHz	0.000037468	10
	18GHz – 40GHz	0.001055987	10
Spinnaker Hotel	300MHz – 1GHz	0.001544040	4.7985
	GSM 900	0.001440982	4.7842
	GSM 1800	0.000000083	9.255
	1GHz – 2GHz	0.000000113	8.875

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Tonabrocky	30MHz – 85MHz	0.000030455	2
	85MHz – 95MHz	0.000001098	2
	95MHz – 105MHz	0.001395271	2
	105MHz – 115MHz	0.000000000	2
	115MHz – 170MHz	0.000240247	2
	170MHz – 230MHz	0.000000138	2
	230MHz – 470MHz	0.000000002	2.29
	470MHz – 670MHz	0.000000052	2.68
	670MHz – 870MHz	0.000000026	4.1625
	870MHz – 1GHz	0.000196182	4.6945
	GSM 900	0.000192601	4.69445
	GSM 1800	0.000011632	9.205
	1GHz – 2GHz	0.000015727	9.225
	2GHz – 10GHz	0.000000550	10
	10GHz – 18GHz	0.000033393	10
18GHz – 40GHz	0.000978720	10	

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Gregg Mountain	30MHz – 85MHz	0.001351010	2
	85MHz – 95MHz	0.016056787	2
	95MHz – 105MHz	0.000802895	2
	105MHz – 115MHz	0.000001632	2
	115MHz – 170MHz	0.000000001	2
	170MHz – 230MHz	0.000000071	2
	230MHz – 470MHz	0.0000003887	2.347
	470MHz – 670MHz	0.000368688	2.8
	670MHz – 870MHz	0.000000002	4.1625
	870MHz – 1GHz	0.000878332	4.6945
	GSM 900	0.000174044	4.6926
	GSM 1800	0.000000080	9.04
	1GHz – 2GHz	0.000000580	6.875
	2GHz – 10GHz	0.000001878	10
	10GHz – 18GHz	0.000037468	10
18GHz – 40GHz	0.000872285	10	

5.2.11 County Kildare

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Clane (CNG Ltd.)	300MHz – 1GHz	0.000000403	4.571
	GSM 900	0.000000055	4.7162
	GSM 1800	0.002161019	9.195
	1GHz – 2GHz	0.001398488	9.215

5.2.12 County Kilkenny

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Corbally Wood	30MHz – 85MHz	0.000396879	2
	85MHz – 95MHz	0.036530755	2
	95MHz – 105MHz	0.012754359	2
	105MHz – 115MHz	0.000012843	2
	115MHz – 170MHz	0.000000610	2
	170MHz – 230MHz	0.000000360	2
	230MHz – 470MHz	0.000142121	2.281
	470MHz – 670MHz	0.000000141	2.56
	670MHz – 870MHz	0.000079188	4.0425
	870MHz – 1GHz	0.000058568	4.7365
	GSM 900	0.000061611	4.7361
	GSM 1800	0.000000002	9.28
	1GHz – 2GHz	0.000000005	6.015
	2GHz – 10GHz	0.000000594	10
	10GHz – 18GHz	0.000032111	10
18GHz – 40GHz	0.000978720	10	

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Glenpipe Hill	30MHz – 85MHz	0.000000001	2
	85MHz – 95MHz	0.000006913	2
	95MHz – 105MHz	0.000004663	2
	105MHz – 115MHz	0.000000000	2
	115MHz – 170MHz	0.000574988	2
	170MHz – 230MHz	0.000008703	2
	230MHz – 470MHz	0.000000001	2.281
	470MHz – 670MHz	0.000029762	2.56
	670MHz – 870MHz	0.000000005	3.72
	870MHz – 1GHz	0.000086230	4.735
	GSM 900	0.000103433	4.73375
	GSM 1800	0.000000006	9.17
	1GHz – 2GHz	0.000000031	7.55
	2GHz – 10GHz	0.000000529	10
	10GHz – 18GHz	0.000034726	10
18GHz – 40GHz	0.001098142	10	

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Glencoum	30MHz – 85MHz	0.000000002	2
	85MHz – 95MHz	0.000093683	2
	95MHz – 105MHz	0.000024869	2
	105MHz – 115MHz	0.000000000	2
	115MHz – 170MHz	0.000019663	2
	170MHz – 230MHz	0.000024984	2
	230MHz – 470MHz	0.000000007	2.338
	470MHz – 670MHz	0.000015020	2.56
	670MHz – 870MHz	0.000000005	4.0025
	870MHz – 1GHz	0.000152988	4.7755
	GSM 900	0.000129318	4.7874
	GSM 1800	0.000000014	9.165
	1GHz – 2GHz	0.000005697	7.55
	2GHz – 10GHz	0.000055037	10
	10GHz – 18GHz	0.000033393	10
18GHz – 40GHz	0.000872285	10	

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Mount Nugent	30MHz – 85MHz	0.000000012	2
	85MHz – 95MHz	0.000006787	2
	95MHz – 105MHz	0.012293022	2
	105MHz – 115MHz	0.000000001	2
	115MHz – 170MHz	0.000000018	2
	170MHz – 230MHz	0.000001505	2
	230MHz – 470MHz	0.000000020	2.29
	470MHz – 670MHz	0.000023478	2.56
	670MHz – 870MHz	0.000001096	4.0025
	870MHz – 1GHz	0.000267091	4.74
	GSM 900	0.000291513	4.7509
	GSM 1800	0.000000045	9.23
	1GHz – 2GHz	0.000000048	9.29
	2GHz – 10GHz	0.000000550	10
	10GHz – 18GHz	0.000038964	10
18GHz – 40GHz	0.000941150	10	

5.2.13 County Kerry

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Morleys Bridge	300MHz – 1GHz	0.000077030	4.781
	GSM 900	0.000072220	4.7028
	GSM 1800	0.000000008	9.375
	1GHz – 2GHz	0.000000007	9.55
Knockachur	30MHz – 85MHz	0.000000004	2
	85MHz – 95MHz	0.000000548	2
	95MHz – 105MHz	0.000000350	2
	105MHz – 115MHz	0.000000001	2
	115MHz – 170MHz	0.000000000	2
	170MHz – 230MHz	0.0000000123	2
	230MHz – 470MHz	0.000000000	2
	470MHz – 670MHz	0.000000064	2.6
	670MHz – 870MHz	0.000000000	3.64
	870MHz – 1GHz	0.000001339	4.6975
	GSM 900	0.000001732	4.6977
	GSM 1800	0.000000000	9.16
	1GHz – 2GHz	0.000000001	6.825
	2GHz – 10GHz	0.000000571	10
	10GHz – 18GHz	0.000037468	10
18GHz – 40GHz	0.000978720	10	

5.2.14 County Laois

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Wolftrap	30MHz – 300MHz	0.002764768	2
	300MHz – 1GHz	0.000288177	4.746
	GSM 900	0.000295569	4.72175
	GSM 1800	0.000000007	9.175
	1GHz – 2GHz	0.000019800	5.45
	2GHz – 10GHz	0.000006929	10
	10GHz – 18GHz	0.000032111	10
	18GHz – 40GHz	0.001673627	10

5.2.15 County Leitrim

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Manorhamilton	300MHz – 1GHz	0.000571030	4.8075
	GSM 900	0.000476057	4.7865
	GSM 1800	0.000000011	9.3
	1GHz – 2GHz	0.000000058	5.275
Drumshambo	300MHz – 1GHz	0.000037468	4.755
	GSM 900	0.000036869	4.7384
	GSM 1800	0.000000031	9.205
	1GHz – 2GHz	0.000000055	6.9
Carrick-on-Shannon	30MHz – 85MHz	0.000011289	2
	85MHz – 95MHz	0.000000011	2
	95MHz – 105MHz	0.000000007	2
	105MHz – 115MHz	0.000000005	2
	115MHz – 170MHz	0.000000006	2
	170MHz – 230MHz	0.000000001	2
	230MHz – 470MHz	0.000000001	2.296
	470MHz – 670MHz	0.000000091	3.245
	670MHz – 870MHz	0.000000065	3.3575
	870MHz – 1GHz	0.000030176	4.774
	GSM 900	0.000039415	4.7666
	GSM 1800	0.000000002	9.275

Programme of Measurement of Non-Ionising Radiation emissions

	1GHz – 2GHz	0.000000007	6.015
	2GHz – 10GHz	0.000000571	10
	10GHz – 18GHz	0.000037468	10
	18GHz – 40GHz	0.000905021	10

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Slievenakilla	30MHz – 85MHz	0.000000001	2
	85MHz – 95MHz	0.000000948	2
	95MHz – 105MHz	0.000000976	2
	105MHz – 115MHz	0.000000035	2
	115MHz – 170MHz	0.000000010	2
	170MHz – 230MHz	0.000000680	2
	230MHz – 470MHz	0.000000004	2.212
	470MHz – 670MHz	0.000048603	3.125
	670MHz – 870MHz	0.000027775	3.3575
	870MHz – 1GHz	0.000631915	4.7285
	GSM 900	0.000772074	4.72775
	GSM 1800	0.000000003	9.185
	1GHz – 2GHz	0.000000012	6.015
	2GHz – 10GHz	0.000003339	10
	10GHz – 18GHz	0.000029762	10
18GHz – 40GHz	0.000838800	10	

5.2.16 County Longford

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Ballymahon	300MHz – 1GHz	0.004272270	4.746
	GSM 900	0.004331703	4.72915
	GSM 1800	0.000000007	9.03
	1GHz – 2GHz	0.000000019	9.5
Dublin Road, Longford	300MHz – 1GHz	0.001290205	4.8075
	GSM 900	0.001344803	4.77495
	GSM 1800	0.000000922	9.165
	1GHz – 2GHz	0.000001229	9.19
Edgeworthstown	300MHz – 1GHz	0.007864274	4.755
	GSM 900	0.003017579	4.6963
	GSM 1800	0.000000010	9.385
	1GHz – 2GHz	0.000000013	6.015
Granard	300MHz – 1GHz	0.001587299	4.8075
	GSM 900	0.001351010	4.79345
	GSM 1800	0.000000008	9.095
	1GHz – 2GHz	0.000000043	9.44
Longford Industrial Park	300MHz – 1GHz	0.000643663	4.8075
	GSM 900	0.000501948	4.76335
	GSM 1800	0.000000159	9.295
	1GHz – 2GHz	0.000000101	9.265

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Carrickboy	30MHz – 85MHz	0.000000032	2
	85MHz – 95MHz	0.000000094	2
	95MHz – 105MHz	0.000000397	2
	105MHz – 115MHz	0.000000006	2
	115MHz – 170MHz	0.000842672	2
	170MHz – 230MHz	0.000000036	2
	230MHz – 470MHz	0.000000004	2
	470MHz – 670MHz	0.000098324	3.125
	670MHz – 870MHz	0.000133247	3.3575
	870MHz – 1GHz	0.001027209	4.7365
	GSM 900	0.000965292	4.7361
	GSM 1800	0.000000003	9.195
	1GHz – 2GHz	0.000012265	7.55
	2GHz – 10GHz	0.000013825	10
	10GHz – 18GHz	0.000038964	10
18GHz – 40GHz	0.001015450	10	

5.2.17 County Louth

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Collon Mt Oriel	30MHz – 85MHz	0.000725535	2
	85MHz – 95MHz	0.000016736	2
	95MHz – 105MHz	0.003712433	2
	105MHz – 115MHz	0.000001287	2
	115MHz – 170MHz	0.003052521	2
	170MHz – 230MHz	0.000042723	2
	230MHz – 470MHz	0.000085834	2.347
	470MHz – 670MHz	0.000004674	3.245
	670MHz – 870MHz	0.000036615	4.1575
	870MHz – 1GHz	0.000878332	4.758
	GSM 900	0.000742435	4.7629
	GSM 1800	0.000000248	9.165
	1GHz – 2GHz	0.000041463	5.465
	2GHz – 10GHz	0.000010155	10
	10GHz – 18GHz	0.000034726	10
18GHz – 40GHz	0.000838800	10	

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Clermont Cairn	30MHz – 85MHz	0.000096307	2
	85MHz – 95MHz	0.080104820	2
	95MHz – 105MHz	0.088442019	2
	105MHz – 115MHz	0.144430412	2
	115MHz – 170MHz	0.000210697	2
	170MHz – 230MHz	0.000000648	2
	230MHz – 470MHz	0.000094986	2.212
	470MHz – 670MHz	0.000015983	2.6
	670MHz – 870MHz	0.010084599	4.245
	870MHz – 1GHz	0.000723867	4.7725
	GSM 900	0.000773853	4.7717
	GSM 1800	0.000000180	9.345
	1GHz – 2GHz	0.000001177	6.84
	2GHz – 10GHz	0.000000641	10
	10GHz – 18GHz	0.000032111	10
18GHz – 40GHz	0.001952804	10	

5.2.18 County Limerick

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Ballingarry	30MHz – 85MHz	0.000000014	2
	85MHz – 95MHz	0.000000709	2
	95MHz – 105MHz	0.000000431	2
	105MHz – 115MHz	0.000000062	2
	115MHz – 170MHz	0.000001428	2
	170MHz – 230MHz	0.000000256	2
	230MHz – 470MHz	0.000000019	2.335
	470MHz – 670MHz	0.000004805	2.6
	670MHz – 870MHz	0.000000852	4.1625
	870MHz – 1GHz	0.000744147	4.7415
	GSM 900	0.000732249	4.74165
	GSM 1800	0.000000019	9.165
	1GHz – 2GHz	0.000000038	9.19
	2GHz – 10GHz	0.000000594	10
	10GHz – 18GHz	0.000036030	10
18GHz – 40GHz	0.000978720	10	

5.2.19 County Mayo

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Crossmolina	300MHz – 1GHz	0.005183924	4.7725
	GSM 900	0.005077602	4.731
	GSM 1800	0.000000008	9.2
	1GHz – 2GHz	0.000000027	6.015
Corraun	30MHz – 85MHz	0.000000006	2
	85MHz – 95MHz	0.000001185	2
	95MHz – 105MHz	0.000000719	2
	105MHz – 115MHz	0.000000001	2
	115MHz – 170MHz	0.000000003	2
	170MHz – 230MHz	0.000000001	2
	230MHz – 470MHz	0.000000003	2.236
	470MHz – 670MHz	0.000000192	2.4375
	670MHz – 870MHz	0.000014610	4.1225
	870MHz – 1GHz	0.000324832	4.74
	GSM 900	0.000356992	4.7393
	GSM 1800	0.000000013	9.165
	1GHz – 2GHz	0.000000019	9.2
	2GHz – 10GHz	0.000027584	10
	10GHz – 18GHz	0.000040426	10
18GHz – 40GHz	0.001232136	10	

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Minaun Heights	30MHz – 85MHz	0.008702793	2
	85MHz – 95MHz	0.016168087	2
	95MHz – 105MHz	0.027584089	2
	105MHz – 115MHz	0.000001185	2
	115MHz – 170MHz	0.000000204	2
	170MHz – 230MHz	0.000000445	2
	230MHz – 470MHz	0.000589737	2.347
	470MHz – 670MHz	0.000143106	3.2425
	670MHz – 870MHz	0.000098550	3.52
	870MHz – 1GHz	0.000083495	4.743
	GSM 900	0.000119856	4.7726
	GSM 1800	0.000000021	9.35
	1GHz – 2GHz	0.000011579	7.6
	2GHz – 10GHz	0.000000641	10
	10GHz – 18GHz	0.000036030	10
18GHz – 40GHz	0.001139354	10	

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Croaghmoyle	30MHz – 85MHz	0.009992143	2
	85MHz – 95MHz	0.040147513	2
	95MHz – 105MHz	0.007846187	2
	105MHz – 115MHz	0.000014644	2
	115MHz – 170MHz	0.000000308	2
	170MHz – 230MHz	0.000000797	2
	230MHz – 470MHz	0.000406124	2.314
	470MHz – 670MHz	0.000229963	2.68
	670MHz – 870MHz	0.000002242	3.52
	870MHz – 1GHz	0.000593825	4.719
	GSM 900	0.001113419	4.7185
	GSM 1800	0.000000109	9.17
	1GHz – 2GHz	0.000008122	5.45
	2GHz – 10GHz	0.000195280	10
	10GHz – 18GHz	0.000034726	10
18GHz – 40GHz	0.000872285	10	

5.2.20 County Roscommon

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Frenchpark	300MHz – 1GHz	0.000413674	4.746
	GSM 900	0.000364467	4.7333
	GSM 1800	0.000000012	9.25
	1GHz – 2GHz	0.000000007	9.85
Elphin Mart	300MHz – 1GHz	0.000545329	4.8075
	GSM 900	0.000779217	4.79435
	GSM 1800	0.000000010	9.165
	1GHz – 2GHz	0.000000007	9.975
Roscommon Town	300MHz – 1GHz	0.001408182	4.7635
	GSM 900	0.002073283	4.74765
	GSM 1800	0.000000011	9.165
	1GHz – 2GHz	0.000000011	9.49
Strokestown	300MHz – 1GHz	0.010535585	4.7725
	GSM 900	0.007720735	4.75735
	GSM 1800	0.000000007	9.28
	1GHz – 2GHz	0.000000023	9.49
Tulsk	300MHz – 1GHz	0.000781014	4.755
	GSM 900	0.001126312	4.7421
	GSM 1800	0.000058838	9.31
	1GHz – 2GHz	0.000080105	9.34

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Boyle	30MHz – 85MHz	0.000125504	2
	85MHz – 95MHz	0.000001018	2
	95MHz – 105MHz	0.000000475	2
	105MHz – 115MHz	0.000000000	2
	115MHz – 170MHz	0.000000007	2
	170MHz – 230MHz	0.0000000533	2
	230MHz – 470MHz	0.000000004	2.296
	470MHz – 670MHz	0.000001471	3.245
	670MHz – 870MHz	0.000003695	3.9225
	870MHz – 1GHz	0.000019172	4.7885
	GSM 900	0.000018267	4.7885
	GSM 1800	0.000000002	9.205
	1GHz – 2GHz	0.000000010	6.015
	2GHz – 10GHz	0.000003473	10
	10GHz – 18GHz	0.000030950	10
18GHz – 40GHz	0.000941150	10	

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Slieve Bawn	30MHz – 85MHz	0.000797368	2
	85MHz – 95MHz	0.000001551	2
	95MHz – 105MHz	0.005593178	2
	105MHz – 115MHz	0.000000003	2
	115MHz – 170MHz	0.000000115	2
	170MHz – 230MHz	0.000000239	2
	230MHz – 470MHz	0.000000014	2.329
	470MHz – 670MHz	0.000010756	3.125
	670MHz – 870MHz	0.000457782	4.135
	870MHz – 1GHz	0.000212647	4.8
	GSM 900	0.000226808	4.79945
	GSM 1800	0.000000005	9.165
	1GHz – 2GHz	0.000245278	6.9
	2GHz – 10GHz	0.000024584	10
	10GHz – 18GHz	0.000040426	10
18GHz – 40GHz	0.000245843	10	

5.2.21 County Sligo

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Ballymorte	300MHz – 1GHz	0.000246410	4.755
	GSM 900	0.000258023	4.72775
	GSM 1800	0.000000032	9.23
	1GHz – 2GHz	0.000000055	9.265
Collooney	300MHz – 1GHz	0.000928237	4.7985
	GSM 900	0.000680234	4.7731
	GSM 1800	0.000000010	9.14
	1GHz – 2GHz	0.000007580	9.465
Tobercurry	300MHz – 1GHz	0.000435170	4.7635
	GSM 900	0.000417502	4.7467
	GSM 1800	0.000000012	9.13
	1GHz – 2GHz	0.000001402	9.44
Maugheraboy Estate	300MHz – 1GHz	0.000831110	4.816
	GSM 900	0.000868278	4.7939
	GSM 1800	0.000001124	9.23
	1GHz – 2GHz	0.000000822	9.19
Cairns Hill	300MHz – 1GHz	0.000852430	4.7985
	GSM 900	0.000844615	4.77495
	GSM 1800	0.000040894	9.22
	1GHz – 2GHz	0.000035291	9.25

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Cashelgarran	30MHz – 85MHz	0.000000001	2
	85MHz – 95MHz	0.000000273	2
	95MHz – 105MHz	0.000000098	2
	105MHz – 115MHz	0.000000001	2
	115MHz – 170MHz	0.001218032	2
	170MHz – 230MHz	0.000000082	2
	230MHz – 470MHz	0.000000001	2.299
	470MHz – 670MHz	0.000000007	3.005
	670MHz – 870MHz	0.000001323	4.3025
	870MHz – 1GHz	0.000487145	4.748
	GSM 900	0.000544075	4.74765
	GSM 1800	0.000000002	9.215
	1GHz – 2GHz	0.000000047	7.6
	2GHz – 10GHz	0.000001056	10
	10GHz – 18GHz	0.000034726	10
18GHz – 40GHz	0.000905021	10	

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Truskmore	30MHz – 85MHz	0.003130824	2
	85MHz – 95MHz	0.943319147	2
	95MHz – 105MHz	0.827291667	2
	105MHz – 115MHz	0.003331644	2
	115MHz – 170MHz	0.0000196182	2
	170MHz – 230MHz	0.012040892	2
	230MHz – 470MHz	0.002181015	2.212
	470MHz – 670MHz	0.000025157	3.1725
	670MHz – 870MHz	0.000182246	4.045
	870MHz – 1GHz	0.000178920	4.709
	GSM 900	0.000107068	4.7065
	GSM 1800	0.000000002	9.06
	1GHz – 2GHz	0.000000535	7.55
	2GHz – 10GHz	0.000001492	10
	10GHz – 18GHz	0.000033393	10
18GHz – 40GHz	0.000838800	10	

5.2.22 County Tipperary

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Arra Mountain	30MHz – 300MHz	0.000045463	2
	300MHz – 1GHz	0.000039871	4.781
	GSM 900	0.000045463	4.7643
	GSM 1800	0.000004061	9.235
	1GHz – 2GHz	0.000005184	9.265
	2GHz – 10GHz	0.000000839	10
	10GHz – 18GHz	0.000030950	10
	18GHz – 40GHz	0.000978720	10
Curraghbristy	30MHz – 300MHz	0.004051899	2
	300MHz – 1GHz	0.001444304	4.7375
	GSM 900	0.001173974	4.7185
	GSM 1800	0.000000017	9.235
	1GHz – 2GHz	0.000000020	9.265
	2GHz – 10GHz	0.000000807	10
	10GHz – 18GHz	0.000033393	10
	18GHz – 40GHz	0.001952804	10
Carrigatoher	300MHz – 1GHz	0.000083303	4.72
	GSM 900	0.000087430	4.6954
	GSM 1800	0.000000081	9.23
	1GHz – 2GHz	0.000000054	9.265

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Pearse Street, Cahir	300MHz – 1GHz	0.000343288	4.755
	GSM 900	0.000348866	4.74535
	GSM 1800	0.000000007	9.265
	1GHz – 2GHz	0.000001116	9.475

5.2.23 County Waterford

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Checkpoint	300MHz – 1GHz	0.000636295	4.816
	GSM 900	0.000911294	4.7985
	GSM 1800	0.000000013	9.16
	1GHz – 2GHz	0.000000010	9.19
	2GHz – 10GHz	0.000000641	10
	10GHz – 18GHz	0.000034726	10
	18GHz – 40GHz	0.001952804	10
Carrick-on-Suir	300MHz – 1GHz	0.000134790	4.8075
	GSM 900	0.000158730	4.7953
	GSM 1800	0.000000008	9.145
	1GHz – 2GHz	0.000000011	6.015

5.2.24 County Westmeath

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Frewan Hill	30MHz – 85MHz	0.000079370	2
	85MHz – 95MHz	0.000000526	2
	95MHz – 105MHz	0.000000168	2
	105MHz – 115MHz	0.000000002	2
	115MHz – 170MHz	0.000000046	2
	170MHz – 230MHz	0.000000065	2
	230MHz – 470MHz	0.000558031	2.344
	470MHz – 670MHz	0.000025273	3.2425
	670MHz – 870MHz	0.000029353	3.3575
	870MHz – 1GHz	0.000122365	4.719
	GSM 900	0.000133555	4.7185
	GSM 1800	0.000000008	9.22
	1GHz – 2GHz	0.000000008	9.24
	2GHz – 10GHz	0.000000666	10
	10GHz – 18GHz	0.000034726	10
18GHz – 40GHz	0.001329409	10	
Baylough	300MHz – 1GHz	0.000001689	4.7375
	GSM 900	0.000001797	4.72175
	GSM 1800	0.000476057	9.195
	1GHz – 2GHz	0.000604865	9.215

5.2.25 County Wexford

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Slieveboy	30MHz – 85MHz	0.000000010	2
	85MHz – 95MHz	0.000023586	2
	95MHz – 105MHz	0.000006602	2
	105MHz – 115MHz	0.000000001	2
	115MHz – 170MHz	0.000000030	2
	170MHz – 230MHz	0.000005125	2
	230MHz – 470MHz	0.000000013	2.164
	470MHz – 670MHz	0.000012350	2.56
	670MHz – 870MHz	0.000000143	3.3575
	870MHz – 1GHz	0.001344803	4.7255
	GSM 900	0.001934901	4.7245
	GSM 1800	0.001372962	9.16
	1GHz – 2GHz	0.001732442	9.19
	2GHz – 10GHz	0.000004536	10
	10GHz – 18GHz	0.000032111	10
18GHz – 40GHz	0.000872285	10	

Programme of Measurement of Non-Ionising Radiation emissions

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Cousinstown	30MHz – 85MHz	0.000000001	2
	85MHz – 95MHz	0.000000006	2
	95MHz – 105MHz	0.000000047	2
	105MHz – 115MHz	0.000000000	2
	115MHz – 170MHz	0.000000007	2
	170MHz – 230MHz	0.000000023	2
	230MHz – 470MHz	0.000000004	2.299
	470MHz – 670MHz	0.000000088	2.56
	670MHz – 870MHz	0.000000001	4.3225
	870MHz – 1GHz	0.000000016	4.7385
	300MHz – 1GHz	0.000000003	4.781
	GSM 900	0.000000014	4.73795
	GSM 1800	0.000000003	9.19
	1GHz – 2GHz	0.000000005	10
	2GHz – 10GHz	0.000000618	10
	10GHz – 18GHz	0.000034726	10
18GHz – 40GHz	0.001055987	10	

5.2.26 County Wicklow

Site	Frequency Range	Highest reading W/m ²	ICNIRP guideline Limit W/m ²
Windgate	30MHz – 85MHz	0.001457668	2
	85MHz – 95MHz	0.000062901	2
	95MHz – 105MHz	0.003496702	2
	105MHz – 115MHz	0.000001139	2
	115MHz – 170MHz	0.000014814	2
	170MHz – 230MHz	0.000020781	2
	230MHz – 470MHz	0.000043217	2.209
	470MHz – 670MHz	0.000003196	2.9225
	670MHz – 870MHz	0.000029489	3.88
	870MHz – 1GHz	0.006556297	4.756
	GSM 900	0.015983013	4.7546
	GSM 1800	0.001031950	9.28
	1GHz – 2GHz	0.000983238	9.325
	2GHz – 10GHz	0.000001329	10
10GHz – 18GHz	0.000030950	10	
18GHz – 40GHz	0.001055987	10	
Arklow	300MHz – 1GHz	0.000085636	4.746
	GSM 900	0.000096529	4.72915
	GSM 1800	0.000396879	9.16
	1GHz – 2GHz	0.000468445	9.19

Conclusion

The conclusion of the site measurements undertaken is that emission levels at all the sites measured fall significantly below the International ICNIRP general exposure levels. In some cases the levels are in fact less than one ten-thousandth of the ICNIRP limits.

Annex 1

Non-Ionising Radiation (NIR) and the International Commission for Non-Ionising Radiation Protection (ICNIRP)

Definition

Non-ionising radiation is that part of the electromagnetic spectrum below 2420 million MHz. Radio waves, infrared radiation and visible light are examples of NIR. Electromagnetic waves at frequencies above 2420 million MHz (2.4THz) are known as ionising radiation and this includes X-rays and Gamma rays.

Standards for emissions limits for non-ionising radiation

The International Commission for Non-Ionising Radiation Protection (ICNIRP) is an independent, scientific organisation established in 1992. The ICNIRP was established for the purpose of advancing Non-Ionising Radiation Protection for the benefit of people and the environment and in particular to provide guidance and recommendations on protection from NIR exposure. ICNIRP operates in co-operation with the Environmental Health Division of the World Health organisation and the United Nations Environment Programme. In 1998 ICNIRP issued a position paper on the health and safety aspects of NIR. This reviewed both thermal and athermal effects and its conclusion endorsed the 1988 guidelines produced by the International Radiation Protection Association (IRPA).

This programme required sites to be in compliance with the ICNIRP (1998) guidelines. A summary of the maximum public exposure levels in the ICNIRP Guidelines for the radio systems in this audit are shown in Table 1. It should be noted that in 1999 the European Commission issued a recommendation⁷ which proposed to limit exposure of the general public to electromagnetic fields 0Hz - 300GHz based on a set of basic restrictions and reference levels developed internationally under the advice of the International Commission on Non-Ionising Radiation Protection. In relation

⁷ Recommendation of the European Council 1999/519/EC of July 12, 1999

to emissions within the radio spectrum, these limits are equivalent to the ICNIRP guideline limits used by ComReg.

ICNIRP limits

In 1998 ICNIRP produced “Guideline for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (up to 300 GHz)”. ComReg and a large number of international regulators have adopted the 1998 ICNIRP document as the reference for ensuring that NIR levels do not cause an adverse health effect.

The main purpose of the “Guideline for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (up to 300 GHz)” is to provide guidelines for limiting Electromagnetic Field (EMF) exposure that will provide protection against known adverse health effects. An adverse health effect causes detectable impairment of the health of the exposed individual or his or her offspring.

Two classes of guidance are presented:

- Basic Restrictions
- Reference Levels

Basic Restrictions

Restrictions on exposure to time-varying electric, magnetic and electromagnetic fields that are based on health effects are termed “basic restrictions”. Depending upon the frequency of the field, the physical quantities used to specify these restrictions are current density (J), Specific Absorption Rate (SAR), and power density (S). However, only power density in air, outside the body, can be readily measured in exposed individuals.

Reference Levels

These levels are provided for practical exposure assessment purposes to determine whether the basic restrictions are likely to be exceeded. Some reference levels are derived from basic restrictions using measurement and/or computational techniques, and some address perception and adverse indirect effects of exposure to EMF.

Compliance with the reference levels will ensure compliance with the relevant basic restriction. If the measured or calculated value exceeds the reference level, it does not necessarily follow that the basic restriction will be exceeded. However, when a reference level is exceeded, it is necessary to test compliance with the relevant basic restriction and to determine whether additional protective measures are necessary.

The ICNIRP Guidelines: 1998 reference levels appropriate to the frequency range 100 kHz to 40GHz, covered by this report are given in the table on the following page.

**GUIDELINE LIMITS OF NIR FOR MEMBERS OF THE GENERAL
PUBLIC**

Frequency f (MHz)	Unperturbed RMS Electric Field Strength E (V/m)	Unperturbed RMS Magnetic Field Strength H (A/m)	Equivalent Plane Wave Power Density (mW/cm ²)	Radio Service
0.003-0.15	87	5	-	
0.15-1	87	0.73/f	-	LW and MW Radio Broadcasting
1-10	$87/f^{1/2}$	0.73/f	-	
10-400	28	0.073	0.2	VHF Radio and Television Broadcasting
400-2000	$1.375f^{1/2}$	$0.0037f^{1/2}$	f/2000	UHF Television Broadcasting and Mobile Telephony Systems
2000-300000	61	0.16	1	Microwave Links, and MMDS

The guideline levels are lowest in the 10 MHz to 400 MHz frequency range as at these wavelengths resonance in parts or all of the body may occur resulting in optimum coupling of the radio frequency energy. The ICNIRP guidelines require that in instances of simultaneous exposure to multiple sources, the sum of the exposure levels should be considered. In the case of the frequency range 30 MHz to 40 GHz, covered by the narrowband equipment used to generate this report, both the electric field strength and the magnetic field strength at each frequency should be expressed as a fraction of the limit at that frequency and both the sum of the electric field strength fractions squared and the sum of the magnetic field strength fractions squared should not exceed unity.

Annex 2

Methodology and measurements

Introduction

Measurements of the non-ionising radiation emissions from each site were conducted, in accordance with ECC Recommendation (02) 04. For the purposes of this programme, measurements were carried out at GSM sites and Mixed Use sites.

Cellular/GSM sites

Cellular/GSM Sites are sites and locations in Ireland at which electronic communications network transmission facilities and/or infrastructure are located, the primary purpose or sole use of such facilities/infrastructure being to facilitate the provision of mobile telephony services in Ireland.

Mixed use site

Mixed use sites are sites and locations in Ireland at which electronic communications network transmission facilities and/or infrastructure are located and where such facilities and or infrastructure is not primarily or solely used to facilitate the provision of mobile telephone services in Ireland.

Methodology

An initial survey of the area was conducted to determine the location(s) of highest non-ionising radiation emissions. At the GSM only site this was done by using a broadband probe and an engineering mobile phone, in conjunction with the appropriate software, to identify the position of maximum field strength. The engineering mobile phone provides an indication of the field strength levels from the GSM channels in use in the vicinity of the site.

Once the locations of the highest field strength emissions were identified, a series of narrowband measurements were taken at these locations. These measurements were taken using a spectrum analyser and associated antennas.

At GSM only sites, measurements were performed over the following frequency range from 300MHz – 2GHz. This range includes both the GSM900 and GSM1800 bands.

For mixed use sites, measurements were performed over the following frequency ranges 30MHz – 40GHz. These measurements included all radio services which are present at these sites. These services include, GSM, Broadcasting, fixed links, MMDS, FWA. Point to Point links, amongst others.

At both GSM only sites and Mixed Use sites, electric field strength measurements conducted in the frequency bands of interest, are recorded and converted to power density levels for direct comparison with the ICNIRP guideline levels. These power density levels are tabulated alongside the relevant ICNIRP limits. The tables present the highest emission level readings recorded within a band.