

# Invisible Forces (a tour of Finsbury Park hotspots)

Part of the "Invisible Forces" exhibition, Furtherfield Pavilion, London  
(<http://www.furtherfield.org/programmes/exhibition/invisible-forces>)

## 1. What's the project about?

On 21 July, between 2-5pm, a public exploratory walk around Finsbury Park, measuring the radiation that we are exposed to on a daily basis. The walk lasts roughly 1.5 hours. The story of each mast will be told, along with technical data and known medical effects of the radiation. Participants will be encouraged to measure radiation levels and draw on a large map, to contribute to a collaborative artwork - a poster sized map of local radiation, which will afterwards be shown as part of the exhibition. During the walk any locations that we find with high radiation levels will be marked with "Danger" warning stickers, to make the public aware.

## 2. What are the aims of this project?

### On the day:

- a. To map the mobile phone radiation in the Finsbury Park area, around the park
- b. To measure levels near the masts, near schools, public buildings and areas of high density housing.

### Long term aims:

- a. To raise awareness, to create discussion on the subject
- b. To act as a catalyst for further investigations
- c. To unravel parallel, hidden stories of invisible forces affecting the local area.

### 3. What the project will measure

Finsbury park is a highly populated area of north London and has a high density and variety of mobile masts and technology. For this project I'm going to be making measurements using an Electrosmog Detector:



#### **Some tech info:**

This detector exposes and converts the electromagnetic impulses it encounters into a collection of sounds (buzzing, screeching, pulsing) that is far more varied and illuminating than the 'click' of a Geiger counter.

You can hear the amount, type, amplitude, and quality of the pulsed electronic pollution created by local transmitters/emitters operating between 50MHz and 3000 MHz, and enjoy the silence when the environment is clear. Hearing is believing!

This detector will measure both mobile phone and wireless radiation, but the sounds are very different. For these walks I'll be concerned with measuring mobile phone radiation only.

#### **The next question is how accurately can we measure it?**

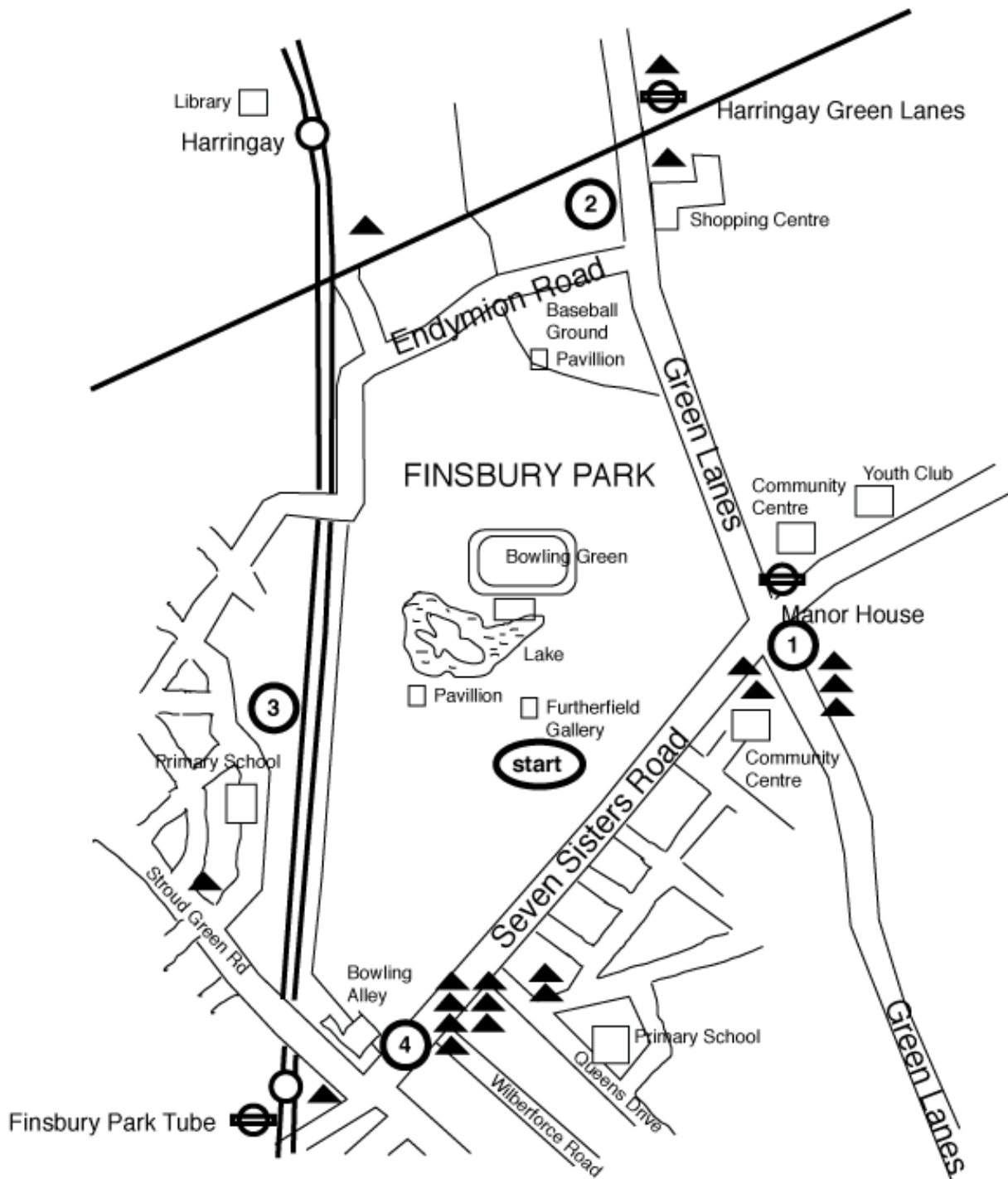
Basically - using this device, the louder the sound the more intense the radiation. I intend to separate the intensities into 4 categories: none(hardly any), low, medium, high. This is obviously subjective, but the purpose of this project is to give an indication of the levels, not make exact scientific measurements (in fact the intensities we measure will also depend on the amount of call-traffic at different times of the day). Our tests are imprecise, but I want to generate awareness on the subject, and encourage debate.

### 4. What we plan to do on the walks

The idea is to follow a clockwise route around the park, and map the mobile radiation levels. The area will centre around the park, and I want to take in areas of interest - primary schools, community centres, high density housing, and places with many masts. We'll be carrying a large map of the route, and will stick coloured dots on the map to show the intensities at each point measured.

## 5. Where the walks go

This is the map of the route with the main points of interest we will follow:



### Key to Invisible Forces

▲ = Mobile Mast/ Base Station

The mobile phone masts marked on this map are taken from the Ofcom "Sitefinder" website: <http://www.sitefinder.ofcom.org.uk/>.

Ofcom are the mobile phone company regulators. This website is useful, and a good starting point, but not kept up to date due to legal disputes between the mobile phone companies and Ofcom.

Some text from Sitefinder:

*"Sitefinder is the Government's data base of mobile phone base stations operated by Ofcom on behalf of central government. Establishing a national database of base stations was a recommendation from the Independent Expert Group on Mobile Phones (IEGMP) - also known as the Stewart Group because it was chaired by Sir William Stewart.*

*Ofcom hosts the Sitefinder tool on behalf of Government. It is a general resource for people wishing to inform themselves about the location and operating characteristics of mobile phone base station sites around specific locations.*

*Operational transmitters and sites that are in the process of being built are included on the database, however sites at an earlier stage in the planning process may not yet be included. Mobile network operators (except Airwave and Everything Everywhere, the combination of T-Mobile and Orange) update their information on a voluntary basis every 3 months or so. Ofcom cannot accept liability for any inaccuracies or omissions in the data provided within Sitefinder, or its currency.*

*Base stations may be located on or in buildings, street furniture (lamp-posts / cabinets), roof-tops, individual or shared masts or may be hosted by other masts such as broadcast radio or TV masts. A Sitefinder entry does not therefore imply the presence of a mast, only a base station transmitter."*

As we walk around the area we are likely to discover many masts and transmitters not included in this database. I hope these walks will have an exploratory nature, and let's see what we can find out!

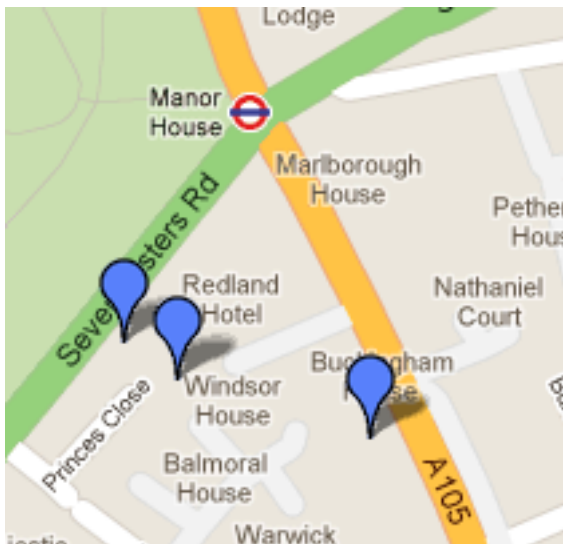
## 6. Sitefinder info

Here's a list of mobile base stations (mobile transmitters) given by sitefinder for each of the mast locations marked on the map.

### Notes:

I suspect that some of these transmitters seem are placed on the roof of residential blocks. The Mast HEIGHT is terribly important - the power and range of them increases dramatically with height and the operators are only given planning permission for one of certain heights... there have been many cases where this height has been contested - the mast itself may only be 15m, but it is then cleverly built on a plinth that is an additional 3m high.

### Site 1 - Manor House



### Transmitters found at Site 1:

#### Seven Sisters Road

Name of Operator	Orange
Operator Site Ref.	GLN3077
Station Type	Macrocell
Height of Antenna	15 Metres
Frequency Range	2100 MHz
Transmitter Power	30.7 dBW
Maximum licensed power	35 dBW
Type of Transmission	UMTS

## Windsor House

Name of Operator	Orange
Operator Site Ref.	ATN0910
Station Type	Macrocell
Height of Antenna	24 Metres
Frequency Range	2100 MHz
Transmitter Power	29.2 dBW
Maximum licensed power	35 dBW
Type of Transmission	UMTS

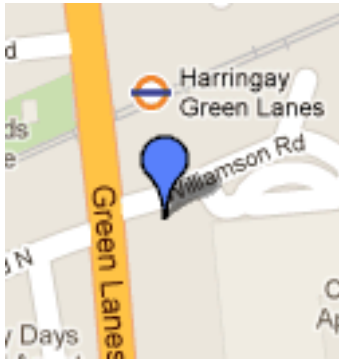
## Buckingham House

Name of Operator	Vodafone
Operator Site Ref.	1792
Station Type	Macrocell
Height of Antenna	25 Metres
Frequency Range	900 MHz
Transmitter Power	24.1 dBW
Maximum licensed power	32 dBW
Type of Transmission	GSM

Name of Operator	Vodafone
Operator Site Ref.	1792
Station Type	Macrocell
Height of Antenna	25 Metres
Frequency Range	1800 MHz
Transmitter Power	25.5 dBW
Maximum licensed power	32 dBW
Type of Transmission	GSM

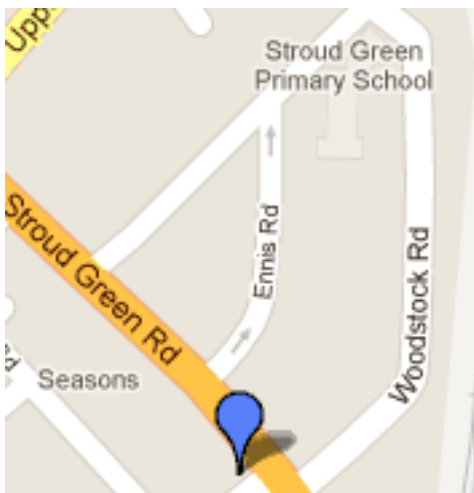
Name of Operator	Vodafone
Operator Site Ref.	1792
Station Type	Macrocell
Height of Antenna	25 Metres
Frequency Range	2100 MHz
Transmitter Power	30.2 dBW
Maximum licensed power	35 dBW
Type of Transmission	UMTS

## Site 2 - Harringay Green Lanes/ Shopping Centre



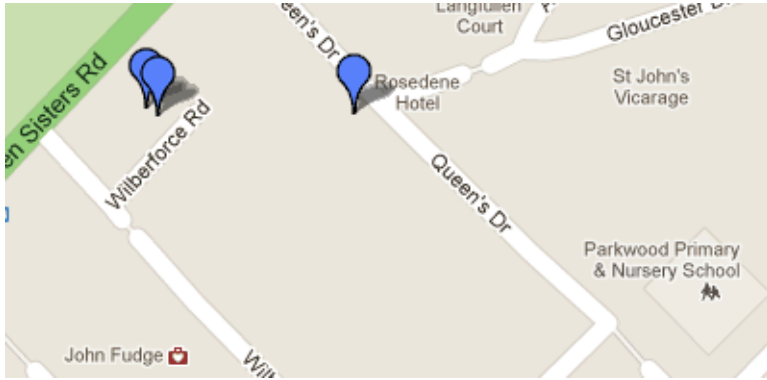
Name of Operator	3
Operator Site Ref.	N0307
Station Type	Macrocell
Height of Antenna	15.8 Metres
Frequency Range	2100 MHz
Transmitter Power	25.75 dBW
Maximum licensed power	35 dBW
Type of Transmission	UMTS

## Site 3 - Stroud Green Road/ Primary School



Name of Operator	O2
Operator Site Ref.	49058
Station Type	Microcell
Height of Antenna	7 Metres
Frequency Range	2100 MHz
Transmitter Power	16 dBW
Maximum licensed power	35 dBW
Type of Transmission	UMTS

## Site 4 - Park House/ Rosedene Hotel/ Parkwood Primary School



Name of Operator	3
Operator Site Ref.	N0248
Station Type	Macrocell
Height of Antenna	29.9 Metres
Frequency Range	2100 MHz
Transmitter Power	25.85 dBW
Maximum licensed power	35 dBW
Type of Transmission	UMTS

Name of Operator	T-MOBILE
Operator Site Ref.	90595
Station Type	Macrocell
Height of Antenna	27 Metres
Frequency Range	1800 MHz
Transmitter Power	27 dBW
Maximum licensed power	32 dBW
Type of Transmission	GSM

Name of Operator	T-MOBILE
Operator Site Ref.	90595
Station Type	Macrocell
Height of Antenna	29.9 Metres
Frequency Range	2100 MHz
Transmitter Power	18 dBW
Maximum licensed power	35 dBW
Type of Transmission	UMTS

Name of Operator	O2
Operator Site Ref.	9087
Station Type	Macrocell
Height of Antenna	31 Metres
Frequency Range	900 MHz
Transmitter Power	24 dBW
Maximum licensed power	32 dBW
Type of Transmission	GSM



Name of Operator	O2
Operator Site Ref.	9087
Station Type	Macrocell
Height of Antenna	31 Metres
Frequency Range	1800 MHz
Transmitter Power	23 dBW
Maximum licensed power	32 dBW
Type of Transmission	GSM

Name of Operator	O2
Operator Site Ref.	9087
Station Type	Macrocell
Height of Antenna	31 Metres
Frequency Range	900 MHz
Transmitter Power	25 dBW
Maximum licensed power	32 dBW
Type of Transmission	UMTS

Name of Operator	O2
Operator Site Ref.	9087
Station Type	Macrocell
Height of Antenna	30 Metres
Frequency Range	2100 MHz
Transmitter Power	29.39 dBW
Maximum licensed power	35 dBW
Type of Transmission	UMTS

### Rosedene Hotel

Name of Operator	Orange
Operator Site Ref.	GLN0330
Station Type	Macrocell
Height of Antenna	34 Metres
Frequency Range	1800 MHz
Transmitter Power	29.7 dBW
Maximum licensed power	32 dBW
Type of Transmission	GSM

Name of Operator	Orange
Operator Site Ref.	GLN0330
Station Type	Macrocell
Height of Antenna	34 Metres
Frequency Range	2100 MHz
Transmitter Power	28 dBW
Maximum licensed power	35 dBW
Type of Transmission	UMTS

## 7. Some info on mobile transmitter types

There are two main types of base stations: macrocells and microcells.

### Macrocells

The antennas for macrocells are mounted on ground-based masts, rooftops and other existing structures, at a height that provides a clear view over the surrounding buildings and terrain. A macrocell is normally a mast or other structure supporting a large antenna designed to give coverage over a large area. They look like this:



### Microcell

Microcells provide infill radio coverage and additional capacity where there are high numbers of users within urban and suburban macrocells. The antennas for microcells are mounted at street level (i.e. below the surrounding buildings and terrain) typically on the external walls of existing structures, lamp-posts and other street furniture. Microcell antennas are smaller than macrocell antennas and when mounted on existing structures can often be disguised as building features:



## 8. Some info on mobile transmitter technologies

### Technologies

The cellular technologies in operation are: GSM and UMTS/3G (otherwise called 3G) and Tetra. They use the following frequencies:

GSM- Vodafone and O2: 900MHz

GSM - Orange & T-mobile: 1800MHz

3G: 2100-2400 MHz

Tetra: 410 - 430 MHz

### GSM (or 2G)

This stands for 'Global system for Mobile Communications' and is the international, operating standard for the current generation of digital cellular mobile communications. Enables mobile phones to be used across national boundaries. GSM systems are operated by O2 and Vodafone at 900 and 1800 MHz, and by T-mobile and Orange at 1800 MHz.



### UMTS/3G

Universal Mobile Telecommunication System

This is the next evolution of mobile phone technology (3G) and expected to result in widespread use of video phones and access to multimedia information. The UK govt wants all the 3G systems in place by end of 2007.



Foto: Jan E Carlsson Pressens Bild

## **Tetra**

TETRA is a mobile radio technology that is being used for a new emergency services comms system, for police, fire, ambulance, installed throughout the UK by the Home Office. The system is called Airwave, and in England and Wales the network of masts is being installed by a part of O2.



TETRA, like mobile phone systems, uses masts (or 'base stations') and handsets that look very like a chunky mobile phone. The masts usually have three poles, and each pole usually has four flattened loops. Some antennae are straight.

TETRA is a microwave system, like ordinary mobile phones, but the masts 'talk' to each other directly. Unlike mobile phone masts, they transmit constantly, 24 hours a day.

## **9. Some health studies on mobile transmitter radiation**

### **How far away from a mobile phone mast is safe?**

As with substations and powerlines, this is an impossible question to answer simply. Each situation is different from another; there may be one or more operators on a mast; they are likely to be at different heights; have different signal strengths and different antenna design and angle of tilt. The geography of the surrounding area will be unique with hills and / or buildings in the immediate environment. Different building materials can absorb and reflect the microwaves, as can metal structures like lamp posts.

There has been very little research into the health effects of microwave exposure. Most of it has been to do with mobile phones. Frequent phone use is being increasingly linked to brain tumours and other cancers. The sort of radiation you get from mobile phone masts or base stations has not been scientifically investigated, but nearby residents are increasingly reporting a variety of health effects, including serious illnesses. As with low frequency radiation, the only way to find out the level of exposure in a particular place, such as a house, school, or workplace is to measure the microwave radiation.

### **How far away do you need to be from a mobile phone mast to be safe?**

Base stations are very variable, in height and equipment, as is the local geography. There are 'hot spots' of radiation near to the mast, as well as the main beam pointing

outwards. Microwaves are absorbed by and reflect off buildings, and metal objects. The new 3G systems (with photos and videos) and the TETRA system (used by the police) seem to be more biologically active than the old 2G networks, and more people experience symptoms of ill-health, sleep disturbance, headaches, tiredness, etc. The only way of finding out what the exposure level is likely to be in any one spot is to measure it.

"Conclusions and recommendations: Inhabitants living nearby mobile phone base stations are at risk for developing neuropsychiatric problems and some changes in the performance of neurobehavioral functions either by facilitation or inhibition. So, revision of standard guidelines for public exposure to RER from mobile phone base station antennas and using of NBTB for regular assessment and early detection of biological effects among inhabitants around the stations are recommended." (from: Subjective symptoms, sleeping problems, and cognitive performance in subjects living near mobile phone base stations (from "Neurobehaviorial effects among inhabitants around mobile base stations." G. Abdel-Rassoul et.al.– Wikipedia:  
[http://en.wikipedia.org/wiki/Mobile\\_phone\\_radiation\\_and\\_health#\\_note-27](http://en.wikipedia.org/wiki/Mobile_phone_radiation_and_health#_note-27))

### **GSM Health studies**

"A European cancer researcher has warned that we may not know whether there are any health risks in GSM mobile comms before the technology is obsolete. Prof Challis said that mobile phones are subjecting human beings daily to radiation that they have never been exposed to before. Headaches, blackouts, short memory and sleep disruption continue to feature among the claims of worried GSM users." June 12, 2001 ([http://www.mwee.com/mwee\\_news/showArticle.jhtml?articleID=17301134](http://www.mwee.com/mwee_news/showArticle.jhtml?articleID=17301134))

"Another area of worry about effects on the population's health have been the radiation emitted by base stations (the antennas on the surface which communicate with the phones), because, in contrast to mobile handsets, it is emitted continuously and is more powerful. Due to the attenuation of power with the square of distance, field intensities drop rapidly with distance away from the base of the antenna. A 2002 survey study by Santini et al. found a variety of self-reported health effects for people who reported that they were living within 1,000 feet (325 meters) of cell towers in rural areas; or within 300 feet (100 meters) of base stations in urban areas. Fatigue, headache, sleep disruption and loss of memory were among the effects found. Many measurements and experiments have shown that transmitter power levels are relatively low - in modern 2G antennas, in the range of 20 to 100 watts, with the 3G towers causing less radiation than the already present 2G network. An average radiation power output of 3 watt is used. 'Micro-cell geometries' inside cities have decreased the amount of radiated power even further. The radiation exposure from these antennas, while generally low level, is continuous. Some scientists believe that chronic, low-level radiation exposure may, over time, may be as harmful as higher-level, acute radiation exposures.  
(from Wikipedia - [http://en.wikipedia.org/wiki/Mobile\\_phone\\_radiation\\_and\\_health](http://en.wikipedia.org/wiki/Mobile_phone_radiation_and_health))

A 2004 study in Israel (see study), published in the International Journal of Cancer Prevention, found an **increased risk of women developing cancer was 10 times higher in the group of 622 people who lived within 350 metres of a 10 metre high GSM mobile phone mast**, compared with 1222 similar people who lived further away from the mast (with similar housing, lifestyles, etc). Other effects have also been reported,

### 3G health effects/ studies

"Exposure to radio signals from 3G cellphone base stations can cause headaches and nausea, finds new work from a Dutch research organisation. However, both independent and industry experts are sceptical about the results and the researchers themselves admit surprise at their findings. The government-backed research is the first to compare how current GSM phone signals and next generation, or 3G, signals may affect cognitive functions. The study involved exposing two sets of 36 volunteers to signals simulating those from base stations. One group consisted of people who had previously reported feeling effects from base stations, while the other group had no history of complaint. In both groups, they found a significant relationship between exposure to the 3G signal and detrimental effects on general "well-being", characterised by feelings of nausea, tingling and headaches. No such relationships were found for GSM exposure. Both 3G and GSM signals affected cognitive functions in some cases, including reaction times, memory and alertness." (From New Scientist 2003)

### Tetra health effects/ studies

1. TETRA has a rhythm of its own, its base station beat is 70.56Hz and its repetition frequency is 17.65Hz. Both are harmful frequencies, and are discernable not by fancy electronics, but by simple rectification of the microwave signal.
2. TETRA handsets have a sharp pulse at 17.65Hz, which is a key bio-frequency.
3. TETRA is persistent. Unlike mobile phone masts, TETRA masts are on full power 24/7. Phone masts are quieter at night, TETRA masts carry on the noisy party.
4. TETRA operates at 380MHz, which is more penetrative to buildings and tissues, than 900MHz GSM or up to 2.4GHz 3G (UMTS/3G).
5. TETRA is an elliptically polarised signal, which is indicated in studies to be have more pronounced biological effects.

## 10. Are UK Safety Guidelines set too high?

The UK guidelines are based on thermal effects, and this is irrelevant as the microwave radiation had biological effects.

The popular belief that adverse health effects can be induced only by the heating effect of *GSM* radiation is, however, a fallacy. *Firstly*, there is rather consistent empirical, anecdotal evidence from many countries that the health of some people is adversely affected in various ways when they are exposed to this kind of radiation, despite its intensity being **well below** existing safety limits based on *SAR* values. *Secondly*, whilst it is, of course, perfectly true that the occurrence of a non-thermal influence does not necessarily entail any adverse consequence for human health, there is, nevertheless, an undeniable consistency that cannot be ignored between the nature of many of these reported adverse health effects and the extensive portfolio of non-thermal effects that have been published in the peer reviewed, scientific literature during the last 30 years, which indicates that the kind of radiation now used in *GSM* telephony can and does affect alive organisms in various **non-thermal** ways, in accordance with the quite general (non-equilibrium) predictions of modern, non-linear biophysics. *Thirdly*, there is documented evidence. that long-term (involuntary) exposure to microwave radiation of an intensity intermediate between that realised near an active Handset and that found in the vicinity of a Base-station (but at slightly higher carrier frequencies than used in *GSM*) does causes serious illness, such as leukaemia and lymphoma, in certain exposed people. (<http://www.powerwatch.org.uk/tech/hyland.asp>)

## 11. Electrical Sensitivity

**Electrical Hypersensitivity (ES)** is an illness that is both highly controversial and little understood. The symptoms are varied between sufferers, but are normally comprised from some of the following: Sleep disturbance, tiredness, depression, headaches, restlessness, irritability, concentration problems, forgetfulness, learning difficulties, frequent infections, limb and joint pains, numbness or tingling sensations, tinnitus, hearing loss, impaired balance, giddiness and eye problems. In more extreme cases there have been reports of cardiovascular problems such as tachycardia, though these are relatively rare.

Many of the symptoms reported have a lot in common with multiple chemical sensitivity (MCS), and it is quite common for someone who suffers from one condition to suffer from the other. It seems quite sensible to theorise that both syndromes therefore may affect particularly susceptible members of the population only.

(from <http://www.powerwatch.org.uk/>)

## 12. Should we be concerned about ill health effects?

In May 2007 BBC Panorama aired a programme on wifi and mobile phone radiation, and Sir William Stewart (Chairman of the UK's Health Protection Agency) made the following statements:

PAUL KENYON: You'd think our government would base its decisions on the advice of their top man, the one it employed to protect our health, Sir William Stewart, but instead it seems to have turned to others. First the World Health Organisation. It's robust in its language saying there were no adverse health effects from low level long-term exposure. Is that an accurate reflection of the science do you think?

STEWART: I think they are wrong.

KENYON: How are they wrong?

STEWART: Because there is evidence, and the Stewart Report pointed out some of that evidence.

KENYON: So why do you think it is that the WHO, one of the most influential public health bodies in the world continues to put out that message?

STEWART: I think that they've got to review the statement that they're making.

KENYON: But in your view, not an accurate reflection of the science that's out there?

STEWART: I think it is not an accurate reflection.

The Panorama programme also noted that, "Switzerland, Italy, Russia, China, all have exposure limits thousands of times below ours. In Salzburg the government advises against WiFi in schools altogether.")