General Background Information on Radio Network Development for Planning Applications

This document is designed to provide general background information on the development of the Vodafone network. It has been prepared for inclusion with our planning applications and supports our network development proposal with generic information *regarding;-*

1. Introduction
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Note - All references in this document refers to England only, appropriate amendments need to be made for Wales, Scotland and Northern Ireland.

1.0 INTRODUCTION

Nearly 25 years ago under the Telecommunications Act 1984, a licence was granted to Vodafone to provide a wireless (or mobile) phone service utilising unused radio frequencies adjacent to those transmitted for over 50 years by the television industry. Initially because this wireless technology was new and the number of potential customers unknown, a number of tall masts were used to provide basic radio coverage to the main populated areas. The design strategy used was similar to that used by local radio/television i.e. tall masts to cover large distances over all types of topography.

It is important to note that in recent years form has followed function and digital technology has resulted in the development of smaller equipment. In addition, smaller radio coverage areas have resulted in antenna/mast heights being generally reduced. The industry has also been able to develop low impact designs for use in sensitive planning areas such as in Conservation Areas, Listed Buildings, and National Parks etc. The wireless telegraph pole solution is just one example of a design which has minimised impact on visual amenity of the local neighbourhood.

2.0 DIGITAL NETWORKS – "2G/3G" OR SECOND/THIRD GENERATION

The Vodafone 2G digital network was developed in the early 1990s. This digital technology is often referred to as GSM (Global System for Mobile Communications) which is the common European operating standard enabling phones to inter-connect to other networks throughout Europe and Internationally.

In April 2000, Vodafone was successful in its bid for one of five licences available to provide a 'Third Generation' mobile telecommunications service known as '3G' or UMTS.

In addition to voice services, this technology enables Vodafone to offer high resolution video and multi-media applications. Among other things this enables office services, virtual banking, e-retailing, video conferencing and high quality broadband internet access to be provided to users on the move. This is all made possible by higher rates of data transfer allowing wireless broadband access to the Internet for mobile phones and laptop computer data card users.

The 3G radio base station is designed to provide a service via cells in a similar way as the GSM (2G) system but with a few differences. Due to the increased data transfer, the location of 3G base station sites is even more critical. Base stations must be located where the local demand exists in order to provide the required levels of service, otherwise the network will not function.

Whenever possible, Vodafone will ensure it complies with planning policy guidance (PPG8) by ensuring apparatus be installed on existing buildings and structures, including masts wherever possible. However, in spite of these efforts, there is likely to be a need to install additional base stations to provide contiguous service. This is largely due to the characteristics of radio propagation at this frequency, demands on the service and the high data transfer rates.

It is very important to note that mobiles can only work with a network of base stations in place where people want to use their phones (or other wireless devices). Without base stations, the mobile phones we rely on simply won't work.

2.1 How the cellular radio network works

The building blocks of the mobile telecommunications network are called radio base stations which transmit and receive calls to and from mobile phones using radio waves, similar to those used in domestic television and radio equipment. Radio base stations are often associated with free-standing masts, however they can be located on, or even inside, existing buildings and other structures. Approximately 66 per cent of Vodafone sites are located on existing structures or buildings. Vodafone uses "radio frequencies" to transmit and receive calls at 900 MHz or 1800 MHz for 2G whilst 3G uses slightly higher frequencies within the 2100 MHz range.

2.2 How radio signals are transmitted

The radio signals are transmitted from antennas which are part of the radio base station and cover an area known as a "cell", hence the term "cellular phone". The size of the cell is dependent on a number of factors including: the height at which the radio base station is positioned; the topography of the surrounding landscape; anticipated demand; and the population density in the area.

Radio signal transmission from a radio base station can be likened to water being distributed from a garden sprinkler. The area immediately adjacent to the sprinkler remains almost "dry". However the grass gets progressively wetter moving further away from the sprinkler, until a wettest point is reached. Then the further away from the centre, the ground becomes progressively drier. Radio base stations provide network services in a similar manner. The area immediately beneath the antennas receives limited or, occasionally, no signal. Moving further away, the signal steadily improves until it reaches an optimum level and then gets progressively weaker.

In order to use mobile phones whenever and wherever we are, a network of radio base stations is required to maintain a continuous signal or 'network service' across a geographical area. The network is designed so that the cells from each radio base station slightly overlap. Travelling even a short distance may take us through a number of cell areas. Mobile phones are designed to monitor the strength of signal from surrounding radio base stations and automatically select the clearest signal, which often comes from the nearest site. As you approach the edge of the cell area, the phone will automatically select the adjoining radio base station, to provide a continuous service. This process is known as 'call handover'.

2.3 Factors affecting network services

The siting of a radio base station is largely dependent on the characteristics of the radio signals which they transmit. The signals are similar to noise or heat in that physical features such as buildings or landscape can obstruct them. In open rural areas one base station can typically cover several kilometres in radius. However in urban areas where surrounding buildings will obstruct the signal, this range can be reduced to as little as a few hundred metres.

2.4 Network Capacity

Radio base station sites can only receive and transmit a limited number of simultaneous calls to and from mobile phones. In areas where the use of phones is particularly high, such as major towns or cities, many sites will reach the maximum number of calls they can process. When a customer attempts to make a call in an area where the network has reached its full capacity, the 'network busy' message is displayed on their mobile phone. In order to continue to meet customer demand and improve the quality of services in these areas, there is a need to increase the capacity of the network to allow more calls to be made.

2.5 Technical Requirements

Vodafone's radio engineers identify the need for a new radio base station where the existing signal strength is insufficient to support network requirements, or where demand on the system is such that we need to increase capacity. The location of each radio base station is determined by the following factors:-

- The proximity of adjacent radio base stations and the signal coverage from them.
- The terrain height of the area and surrounding topography.
- The height and density of the buildings and structures within the area.
- The potential customer demand within the area.
- The service type that is required.

3.0 SITE SELECTION PROCESS

The following site selection procedures apply to each installation to identify and sequentially discount alternative site options:-

1. Following a technical review which identifies need, Vodafone's radio engineers undertake a desktop analysis to identify the best way of meeting the site requirement. This is completed by using Vodafone's computerised radio propagation modelling tool. This tool shows every site on our existing network and identifies those areas where insufficient signal level exists or where there is a need to increase capacity.

2. The desktop search also identifies other operators' existing telecommunications installations. This interrogation of databases ensures any mast-sharing opportunities are maximised. Where available the LPA's mast register is also reviewed.

3. The radio engineers define a search area, which is then issued to an acquisition agent who undertakes a detailed ground search with the radio engineer to identify suitable options.

4. The acquisition agent will obtain site-specific details to identify those sites that are viable options. The possible options are short-listed according to those that combine the following: location within or close to the search area, a willing landlord, adherence to planning and environmental policy, and sensitivity. These options are then returned to our radio engineers for a computer modelling assessment, taking into account the ground height, potential available antenna height and surrounding obstructions.

5. Discussions are offered to the local planning authority to consider local policies and any protected areas and to agree additional public consultation if required. These discussions are used to identify a 'preferred' option.

6. A plan for local consultation is drawn up, and where appropriate, a consultation exercise is undertaken with the local community. The issues associated with the proposal are discussed to obtain their views on the options under consideration. After this review the final preferred option is selected.

7. Finally a site survey provides a full structural analysis of site including identifying power routes and how the site will be linked into the network. Terms with the landlord are then finalised, detailed plans prepared and the application submitted.

Details of Vodafone's site selection procedures are as set out in our Facts about the Network Handbook which is used by all personnel involved in the acquisition process. Vodafone are committed to ensuring the number and visual impact of any additional sites is minimised. The company will continue to develop and utilise sympathetic and innovative design solutions.

4.0 PLANNING POLICY GUIDANCE ON TELECOMMUNICATIONS (PPG 8)

PPG 8 seeks to facilitate the growth of new and existing telecommunications systems whilst keeping the environmental impact to a minimum. It encourages local planning authorities to respond positively to telecommunications development proposals, whilst taking into account other planning policy.

PPG 8 states that fast, reliable and cost-effective communications can attract business to an area. PPG 8 states that good communications can enrich life at home and offer new choices in education, entertainment, shopping and banking.

4.1 Need for development

PPG 8 advises that operators are required to provide a high quality service, which includes the need to meet customer demand. It states that systems are demand-led, therefore operators are continually expanding their networks to accommodate customer requirements of service and quality.

PPG 8 advises that local planning authorities should have regard to any technical constraints on the location and proposed development. Material considerations include the significance of the proposed development as part of a national network.

4.2 Siting and design

PPG8 identifies that "protection from visual intrusion and the implications for subsequent network development will be important considerations in determining applications. Masts and antennas often require a particular operating height, which allows signals to clear trees and urban clutter. Telecommunications development may therefore need particular locations in order to work effectively." (Paragraph 64 – Appendix).

PPG 8 states "Siting and design concerns may centre particularly on the type of mast and its impact... Its height, ancillary development and the scope for landscaping and screening will also be important considerations. But many of the antennas have special siting needs because they have a limited range or require line-of-sight. Authorities should take account of these needs." (Paragraph 74, Appendix)

In seeking to arrive at the best solution for an individual site, local planning authorities and operators should consider the use of sympathetic design to minimise the impact of development on the environment. It advises that depending upon their location, an appropriately designed single operator mast may have a smaller environmental impact than a shared one.

5.0 SITE / MAST SHARING

Vodafone actively encourages and supports site sharing for both commercial and environmental reasons. All operators are required to explore site-sharing opportunities under the terms of their licence. Vodafone has implemented a number of measures to identify site-sharing opportunities.

Where a new ground based radio base station site is required, every effort will be made to ensure that sufficient land is acquired to accommodate a second operator's equipment. Approximately two thirds of all Vodafone radio base stations are now located on existing structures, such as buildings, pylons or existing masts.

Site sharing with other operators on an existing mast may not always result in the most visually acceptable structure. Typically, only lattice masts can accommodate other operators' antennas. With each additional set of antennas, the height of the mast will increase by between four and six metres. This is because antennas of different operators have to be vertically separated by at least one metre in order to avoid potential interference.

The following key factors are considered when assessing sharing an existing mast structure:

- Is the structural capacity of the mast sufficient to accommodate the weight of additional antennas?
- Is there space at the right height on the mast for the additional operators to provide network coverage to their chosen area?
- Will the landlord allow further land to be released to accommodate the additional operator's equipment cabins.

6.0 COUNCILS

6.1 Moratoria

Government guidance on mobile telecom installations advises that local authorities should make suitable council owned property available to network operators for base station development. If suitable council sites are not made available, operators may have to look for alternative sites which the local community might find less acceptable.

Moratoria may also increase the number of new sites needed as council owned buildings are often better suited for base stations e.g. tall buildings. The operators believe it is preferable to deal with proposed developments on council property on a case by case basis.

6.2 Mast register

Guidance in the English Government's Code of Best Practice on Mobile Phone Network Development recommends that local authorities develop a register of local base stations based on a map. This is mirrored in the devolved administrations.

The code goes on to say, *"Ideally, all the information should be available to be viewed electronically and in hard copy. Local authorities should ensure that the mast register is kept up to date and may make a reasonable charge if anybody wishes to obtain a copy of any of the information."*

The MOA welcomes the provision of registers of base stations by local authorities in addition to Ofcom's public database of UK base stations. http://www.ofcom.org.uk/sitefinder/

Market research by Ipsos MORI indicates that approximately two thirds of UK local authorities have mast registers.

7.0 CONSULTATION WITH SCHOOLS

The operators fully comply with Government Guidance on pre application consultation with schools and colleges. They provide evidence to the local planning authority that they have consulted the relevant body of the school or college.

The English Government's Code of Best Practice on Mobile Phone Network Development gives guidance on the factors operators should consider when determining whether consultation is required, as each development is different. These factors are equally applicable for Local Planning Authorities who carry out their own consultation once the application has been submitted. A recent report stated there is no scientific basis for siting base stations away from schools (NRPB report, January 2005)

8.0 LEGAL CASES

The following legal cases may be helpful;-

8.1 Harrogate case November 2004

The Court of Appeal gave a judgment that Government Planning Guidance in PPG8 is perfectly clear in relation to compliance with the health and safety standards for mobile phone base stations. The Court of Appeal and the High Court both upheld Government policy in response to a planning inspector's decision that departed from that policy and failed to give adequate reasons for doing so.

8.2 Winchester case November 2004

The Court of Appeal decision upheld an earlier decision by Mr Justice Sullivan that a mobile phone network operator should not use its compulsory acquisition powers as part of its day to day radio base station siting processes.

The Court of Appeal agreed with Mr Justice Sullivan that these far-reaching statutory powers were never intended for use in day to day planning situations and should be used by an operator only as a last resort when there is no other siting alternative.The House of Lords on 16 March 2005 refused leave to appeal the Court of Appeal ruling.

8.3 Bardsey case January 2005

The Court of Appeal confirmed that the permitted development regime for mobile phone base stations is compliant with the Human Rights Act.

This was a case in which a local planning authority failed to comply with its obligations to act within the 56 day period provided under the permitted development regulations.

9.0 FURTHER INFORMATION

We trust the above answers your main queries regarding our planned installation.

The enclosed site-specific details will identify the alternative discounted options and reasons why they were rejected and how the proposed site complies with national and local planning policies.

The Local Government Ombudsman's Special Report on Telecommunication Masts gives some positive recommendations and advice to Local Planning Authorities in determining Prior Approval applications. A copy of the report is available at http://www.lgo.org.uk/pdf/phone-masts-sr.pdf