WORLD HEALTH ORGANISATION (WHO) GUIDELINES FOR COMMUNITY NOISE – A HELP OR A HINDERANCE TO SUSTAINABLE DEVELOPMENT?

Dani Fiumicelli Technical Director Environmental Noise and Vibration – Faber Maunsell
Nigel Triner Principal Environmental Scientist – Faber Maunsell

1 INTRODUCTION

This paper discusses the WHO Guidelines for Community Noise[1] in the context of noise sensitive development and uses a case study to illustrate how a stringent and non-flexible application of the guidelines can be unhelpful in the context of sustainable development

2 WHO GUIDELINES FOR COMMUNITY NOISE

The foreword to the WHO Guidelines for Community Noise states that the advice previously contained in WHO Environmental Health Criteria 12 was revised "At a WHO/EURO Task Force Meeting in Düsseldorf, Germany, in 1992, the health criteria and guideline values were revised and it was agreed upon updated guidelines in consensus. The essentials of the deliberations of the Task Force were published by Stockholm University and Karolinska Institute in 1995. In a recent Expert Task Force Meeting convened in April 1999 in London, United Kingdom, the Guidelines for Community Noise were extended to provide global coverage and applicability, and the issues of noise assessment and control were addressed in more detail".

The executive summary to the WHO Guidelines for community noise provides a comprehensive table of recommended guideline noise levels, reproduced below are those of interest to the discussion in this paper:

Table 1: WHO 1999 Guideline values for community noise in specific environments.

Specific environment	Critical health effect(s)	L_{Aeq} [dB(A)]	Time base [hours]	L_{Amax} fast [dB]
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, indoors	Speech intelligibility & moderate annoyance, daytime & evening	35	16	45
Inside bedrooms	Sleep disturbance, night-time	30	8	
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

The WHO Guidelines for Community Noise clearly influenced the British Standard 8233:1999 Sound Insulation and Noise Reduction for Buildings – Code of Practice; and PPG 24 is explicit in stating that The Noise Exposure Categories in PPG24 are based on a desirable night-time bedroom noise level of 35 dB(A) from the 1980 WHO Environmental Health Criteria 12[2].

The guideline noise levels of the current WHO Guidelines for community noise are different from the original Environmental Health Criteria 12 and it is important to understand why the current WHO community noise guidelines are different from the original 1980 WHO Environmental Health Criteria 12 values that informed the drafting of PPG 24.

In 1998 The UK Department of Environment (DETR) requested the National Physical Laboratory (NPL) together with the Institute of Sound and Vibration Research (ISVR) at Southampton University, review noise standards used for assessing the health impact of environmental noise. The outcomes of this research[2] confirmed that two critical areas of difference were sleep disturbance and reported annoyance. The 1980 guideline value was described as aimed at avoiding '*interference with the restorative process of sleep*' by continuous noise and was specified as 35 dB L_{Aeq} in bedrooms. The 1999 guideline value for continuous noise '*if negative effects on sleep are to be avoided*' is specified as 30 dB L_{Aeq}, i.e. 5 dB lower than in 1980. An additional L_{Amax} guideline of 45 dBA is specified in the 1999 document to avoid sleep disturbance caused by individual noise events. For reported annoyance, the 1980 guideline value was '*that daytime noise levels of less than 50 dBA L_{eq} cause little or no serious annoyance in the community'. 'Taking into account other factors such as transport needs, ..., daytime noise limits in the region of 55 dBA L_{eq} might be considered as a general environmental health goal for outdoor noise levels in residential areas*'. By 1999 this has changed so that the WHO document states that '*the threshold of annoyance for steady-state, continuous noise is around 50 dB L_{Aeq}. Few people are seriously annoyed during the day time at noise levels below around 55 dB $_{LAeq}$*'. For reported annoyance, close comparison of the precise specifications given in the 1980 and 1999 documents suggests that the guideline values have actually been relaxed. In 1980, 55 L_{Aeq} was suggested as a general environmental health goal, whereas in 1999, 55 L_{Aeq} is being suggested as the threshold value below which few people are seriously annoyed.

The NPL/ISVR report also advises that scientific evidence suggests noise level thresholds below which it is unlikely that there is an impact on health, and that the 1995 WHO guideline criteria are interpreted as taking such a precautionary approach; and that social, political and historic factors are at least as important in setting noise criteria. The NPL/ISVR report concludes that this helps to explain the difference between the 1980 and 1999 WHO recommended noise levels; as such a precautionary approach is due to a more conservative approach in drafting the updated 1999 document rather than any underlying changes in human sensitivity to noise.

The NPL/ISVR report goes on to state that

"In essence, the WHO guidelines represent a consensus view of international expert opinion on the lowest threshold noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached. One difficulty here is the true importance of the different noise effects considered when placed in an overall context relating to quality of life, and the extent to which noise control might have excessive consequences in other areas of human experience."

And:

"As such, it would be unwise to use the WHO guidelines as targets for any form of strategic assessment, since, given the prevalence of existing noise exposure at higher noise levels, there might be little opportunity for and little real need for any across the board major improvements. On the other hand, the most constructive use for the WHO guidelines will be to set thresholds above which greater attention should be paid to the various possibilities for noise control action when planning new developments. It is important to make clear at this point that exceedances do not necessarily imply an over-riding need for noise control, merely that the relative advantages and disadvantages of noise control action should be weighed in the balance. It is all a question of balance, and mere exceedance of the WHO guidelines just starts to tip the scales."

Essentially the above extracts from the NPL/ISVR report can be interpreted as meaning that if given the freedom to only consider noise impacts on or from a proposed development in isolation, without consideration of other attractive planning, social and economic objectives; it may be desirable for none of the adverse effects of noise to occur. However, in the real world were other factors militate against such a purist approach; a degree of noise is inevitable. Therefore, significant drawbacks of the WHO guidelines include the failure to consider the practicability of achieving any of the

recommended noise levels or the consequences of achieving the recommended noise levels in terms of other planning, social or economic objectives.

For example, we know from the most recent national survey of noise exposure carried out in England and Wales (National Noise Incidence Study 2000)[3] that:

- Around 55% of the population are exposed to outdoor daytime noise levels exceeding 55 dB $L_{Aeq,t}$

  and

- Around 68% are exposed to night-time noise levels exceeding 45 dB $L_{Aeq,t}$ (as measured outside the house in each case)

  and

- That at 100 % of the 1160 measurement locations used in the National Noise Incidence Study, the measured $L_{Amax,t}$ exceeded 60 dBA outside the selected houses during the night.

The values of 45 dB $L_{Aeq,t}$ and 60 dB $L_{Amax,t}$ night-time outdoors are equivalent to the current WHO guideline values of 30 dB $L_{Aeq,t}$ and 45 dB $L_{Amax,t}$ night-time indoors, assuming 15 dBA attenuation from outdoors to indoors for a partially open window, as used in the WHO guidelines.

However, less than 55% of the population report significant day time noise associated annoyance[4]. This is not surprising as readily available information[5] advises that only approximately 10% and 9% of the population are annoyed at road and railway noise levels of 55 dBA $L_{Aeq,t}$.

Additionally, considerably less than 65% to 100% of the population in England and Wales report problems with noise disrupting their sleep[4].

Further difficulties with the WHO Guidelines arise when considering, as the NPL/ISVR report highlighted, that the percentages of the existing population exposed to noise levels above the WHO guideline values could not be significantly reduced without virtually eliminating all transportation noise (including public transport) from near to homes; or preventing any noise sensitive development where existing noise levels exceed 55 dB $L_{Aeq,t}$ during the day or 45 dB $L_{Aeq,t}$/60 dB $L_{Amax,t}$ during the night, which is wholly impracticable, and obviously not the intention of PPG 24. In regard to this course of action, the NPL/ISVR report also notes that the social and economic consequences of such action would be likely to be far greater than any advantages gained by reducing the proportion of the population annoyed by noise. In addition, there is no evidence that anything other than a small minority of the population exposed at the WHO guideline noise levels find them to be particularly onerous in the context of their daily lives.

The WHO Community noise Guidelines does consider what to do where existing ambient noise levels already exceed the WHO guideline values, and in the section on Noise Management states:

“In many cases monitoring may show that noise levels are considerably higher than established guidelines. This may be particularly true in developing countries, and the question has to be raised as to whether national standards should reflect the optimum levels needed to protect human health, when this objective is unlikely to be achieved in the short- or medium-term with available resources.”

Not withstanding that the UK is not a developing country, this advice is especially prescient in the context of the National Noise Mapping project, the main outturn of which will be the production of action plans to reduce ambient noise levels.

3 SUSTAINABLE DEVELOPMENT

PPS 1[8] sets out the Government's advice on using the planning system to achieve sustainable development and states that sustainable development is the "core principle underpinning planning".

PPS 1 makes reference to the widely used definition of sustainable development drawn up by the World Commission on Environment and Development in 1987 as: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

The Government set out four aims for sustainable development in its 1999 strategy.- A Better Quality of Life these are:

- social progress which recognises the needs of everyone;
- effective protection of the environment;
- the prudent use of natural resources; and,
- the maintenance of high and stable levels of economic growth and employment.

PPS 1 goes on to state that "These aims should be pursued in an integrated way through a sustainable, innovative and productive economy that delivers high levels of employment, and a just society that promotes social inclusion, sustainable communities and personal well being, in ways that protect and enhance the physical environment and optimise resource and energy use."

In the circumstances of this discussion, not only is the planning system's emphasis on sustainable development important, the requirement for an integrated approach is equally significant. This suggests that planning decisions should take cognisance of all sources of planning policy and guidance having identified where conflicts and synergies might arise; and balanced the benefits and disadvantages of giving greater or less emphasis to any specific source of guidance. Otherwise, there is a risk that by giving one piece of guidance overriding priority over all others in the decision making process, then the risk that overall policy objectives of PPS 1 will be compromised unnecessarily is significantly increased.

In regard to noise sensitive development, the Government has set out the rationale for housing provision in England in PPG 3[9] – Housing.

The objectives of PPG 3 relevant to this discussion are:

- Providing wider housing opportunity and choice and a better mix in the size, type and location of housing than is currently available, and seek to create mixed communities;

- Providing sufficient housing land but give priority to re-using previously-developed land within urban areas, bringing empty homes back into use and converting existing buildings, in preference to the development of greenfield sites;

Annex 3 to PPG3 gives a flavour of the scale of the task facing Local Authorities, developers and the relevant professionals in meeting the objectives of PPG 3, for example

- Local Authorities in the south-east should plan to provide 43,000 additional dwellings a year outside London, subject to regular review no less than every 5 years.
- The benchmark of 43,000 a year is approximately 10% more than the current rate of construction in the South East.
- Based on the advice of the London Planning Advisory Committee, London should plan to provide 23,000 new homes a year, the vast majority of which will be on brownfield sites. That is a 22% increase on current build rates.
- In addition 60% of all new homes in the South East should be provided on brownfield sites. As the Government is determined that as little greenfield land as is necessary is taken to provide the new homes that will be needed.

Giving priority to brownfield land for residential development is likely to cause clashes with from existing transport infrastructure, industrial and commercial noise sources, as these noise sources are often close to brownfield land that may be otherwise suitable for residential development. On

this point it is interesting to note that in the March/April edition of the IoA bulletin Wendy Hartnell, Head of the Environmental Noise Branch at Defra, wrote that “Increasingly, there is a need to recognise that it is becoming difficult to reconcile brownfield development policies with the current guidance to separate noisy and noise-sensitive developments.”

4 NOISE SENSITIVE DEVELOPMENT

The following is a case study which illustrates issues relating to the use of the WHO guidelines to assess the suitability of sites for noise sensitive development.

Over 10 years ago land adjacent to a busy urban three lane dual carriageway was compulsorily purchased and cleared of existing housing in order to facilitate a road widening scheme. However, Central and Regional Government policy changed and the road scheme was cancelled. Consequently, the transport authority wished to re-develop the now vacant land, and as it had previously be used for residential purposes and as this would maximise the financial return, they wished to apply for planning permission for residential development.The site is subject to very high levels of road traffic noise and a preliminary noise survey estimated that the site fell within NEC D. The Local Planning Authority (LPA) refused to grant planning permission or even judge the merits of the specific application, on the basis that they had a policy of always refusing planning permission for residential development in NEC D. This being despite PPG 24 not ruling out all residential development in NEC D, and there being a fundamental principle in planning law that an LPA can not be fettered (either by external or internal policies) in reaching a decision on any planning application laid before it.

Consequently, an appeal against the refusal of planning permission was lodged and a date for public inquiry established. The LPA has developed a sophisticated Supplementary Planning Guidance policy on noise which is heavily influenced by the current WHO guidelines. In regard to new residential development this SPG provides the following table of noise limits:

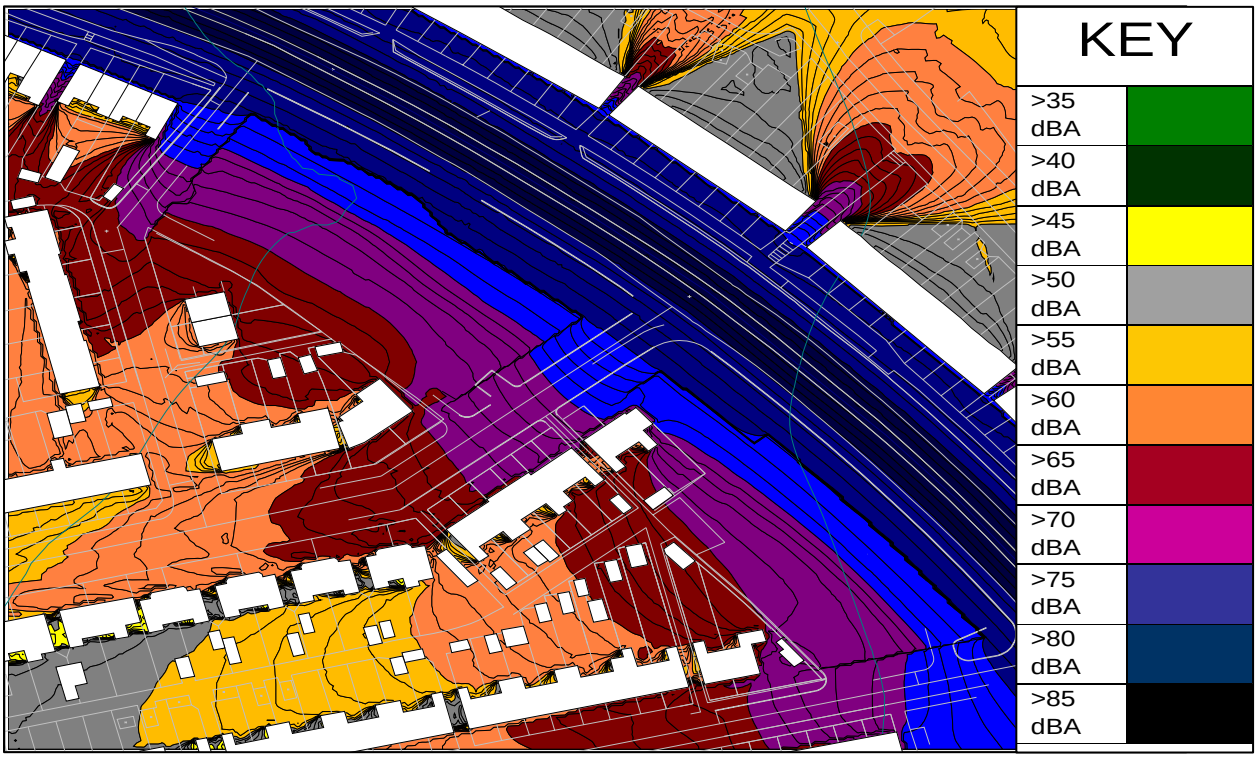
Table 2 A N Other LPA’s SPG on noise limits for new residential development

Externally Generated Noise Due to Transport Noise Sources, Affecting New Housing, Hostels and Hotels	
Area	Noise Criteria
Private and Communal Gardens	Levels should be as low as practicable and not greater than 50 dB $L_{Aeq,1hr}$ 0700-2300 hrs
Bedrooms	Not greater than 30 dB $L_{Aeq,1hr}$ 2300-0700hrs Not greater than 45 dB $L_{Amax,1hr(fast)}$ 2300-0700hrs
Living rooms and dining rooms	Not greater than 35 dB $L_{Aeq,1hr}$ 0700-2300 hrs
Kitchens/bathrooms/ utility rooms	Not greater than 45 dB $L_{Aeq,1hr}$ 0700-2300 hrs

Leaving aside the question of whether it is appropriate to shorten the measurement period to 1 hour, whereas the WHO Guidelines uses 16 hours during the day and 8 hours at night. We set out to demonstrate to the Public Inquiry that on the whole it was possible for residential development at the noisy location to comply with the above criteria and for any locations where compliance was not possible the impact of exceedance was not significant.

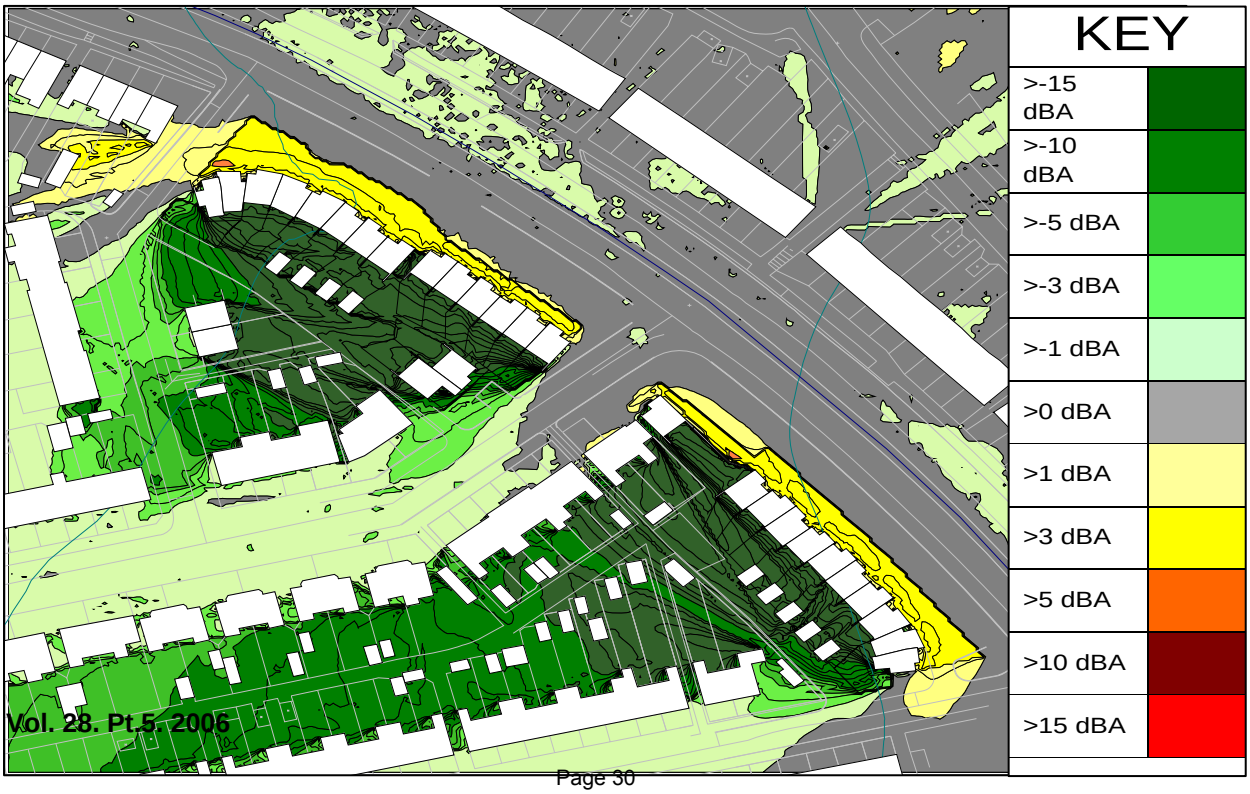
Detailed continuous noise monitoring at the site over a fortnight allowed the following day time noise contour map to be produced.

Figure 1: Existing road traffic noise $L_{Aeq,t}$ contours across the proposed development site



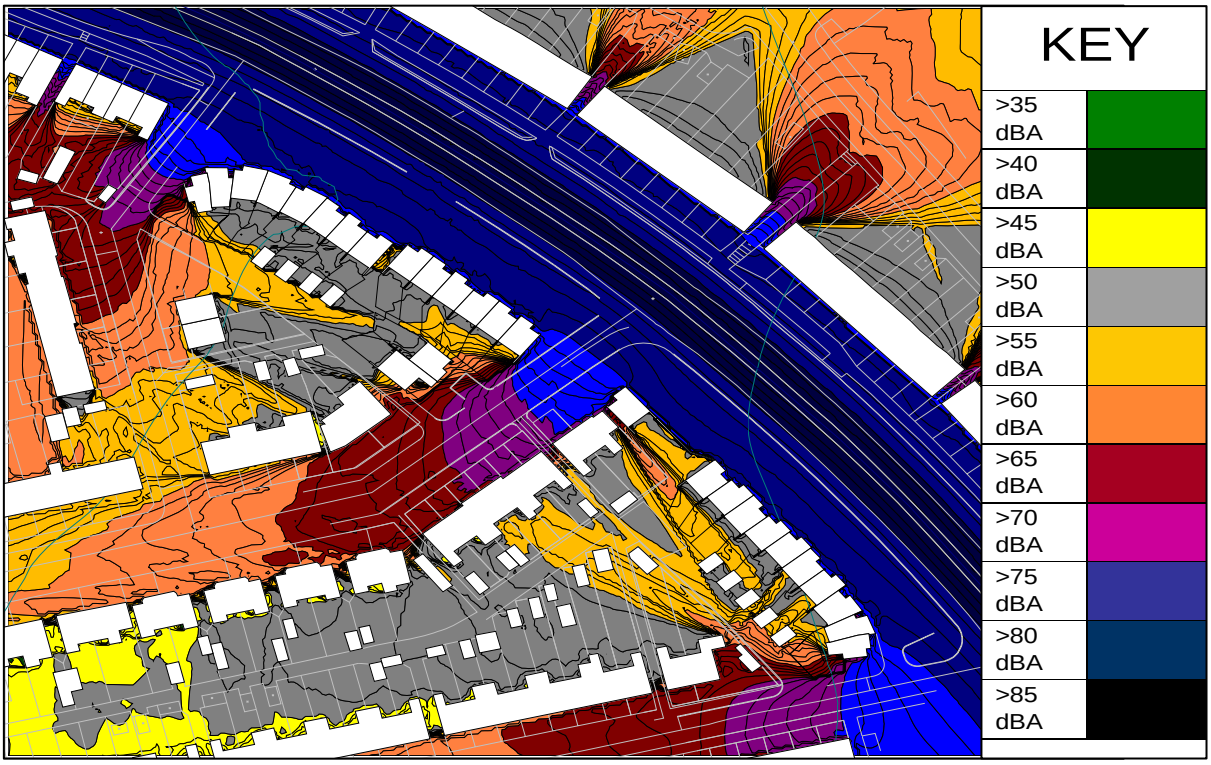
Clearly the development itself would have an impact on road traffic noise levels across the site, as shown in figure 2 below:

Figure 2: Difference in predicted road traffic noise $L_{Aeq,t}$ contours across the development site with the proposed development in place



The final predicted road traffic noise levels with the development in-situ were as follows:

Figure 3: Predicted road traffic noise $L_{Aeq,t}$ contours across the development site with the proposed development in place



Night time noise levels affecting the site are only 4 to 6 dBA less than during the day, and clearly the whole of the site is well into NEC D. The fact that the development site is in NEC D influenced the preliminary design screening process, which concluded that single aspect design would be needed with no habitable rooms or windows overlooking the busy dual carriageway in order to achieve acceptable noise conditions within the dwellings.

Whilst the predicted noise levels at the rear facade after attenuation by the building were still challenging, it proved possible to design a façade construction that would permit the predicted noise levels in the habitable rooms to comply with the criteria from the LPA's SPG, a point which the LPA conceded during the appeal and agreed a condition to that end.

However, noise levels in all rear garden and rear balcony areas were predicted to exceed 50 dB $L_{Aeq,1hr}$ during the noisiest hour between 0700 and 2300, with three locations where the WHO's upper criterion for outdoor amenity spaces of 55 dB $L_{Aeq,}$ was predicted to be exceeded during the noisiest hour between 0700 and 2300. Despite this modest degree of exceedence the LPA stuck to their SPG and insisted that this demonstrated that they had been right to refuse planning permission and that the appeal should be dismissed. To counter this argument the appellant pointed out that there were virtually no sites available for residential development in the immediate or wider location where the ambient noise level fell below 50 dB $L_{Aeq,1hr}$ during the period 0700 to 2300 hrs; and that that across the city the ambient noise level at the majority of locations where residential development might be feasible exceeded this value, and that the impact of exceeding 50 dB $L_{Aeq,1hr}$ was t worst marginal and that by exceeding 55 dB $L_{Aeq,16hr}$ by less than 5 dBA only an additional 6 to 7 % of the population were predicted be likely to be annoyed (from a starting point of only 9% to 10 %)[5], and that the location was self-evidently noisy and those wishing to live in a quieter environment could choose to live elsewhere.

The Planning Inspector who heard the inquiry helpfully pointed out the LPA's criterion for outdoor amenity spaces of 50 dB $L_{Aeq,1hr}$ during the day time was 5 dBA below the boundary of NEC A and NEC B, and that PPG 24 describes NEC A sites as locations where "Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level."

Whilst the outcome of this appeal is not due until after this conference, it is clear that a rigid and inflexible application of the WHO guidelines can present significant problems in achieving the objectives of sustainable residential re-development of brownfield land.

5 CONCLUSSIONS

The Government has identified a pressing need for large numbers of new homes to be created and is committed to sustainable development, with the assumption that brownfield sites will be developed in preference to greenfield sites.

Clearly, sustainable communities require sufficient housing set in a robust local economy supported by a suitable infrastructure and an adequate and safe local environment. Thus, there is a balance to be struck between developing and maintaining the quality of life for a community and the economic advantages which that community enjoys.

This has led to tensions and conflicts between overall planning objectives and the advice contained in the WHO noise guidelines. As the urban and brownfield sites the planning system now prefers for housing development can be in acoustically challenging locations. Therefore rigidly enforcing the WHO noise guidelines, or going beyond their already precautionary values, at the expense of the overarching planning objectives of current government policy, can lead to an imbalance in the development of sustainable communities.

As noise is an inevitable consequence of a thriving and flourishing economy, the question arises whether it is unrealistic and counter to the principle of meeting the needs of future generations to set rigid and inflexible noise level criteria based on WHO guidelines, which represent levels below which impact is negligible. Instead, where it is impracticable to meet the WHO Guidelines there should not be blanket ban on noise sensitive development, as it should be possible to permit some noise sensitive development on a case by case judgment of the merits of each proposal, provided the final noise conditions are controlled so that significant negative impacts are unlikely.

Consequently, fundamental to achieving a balanced approach to sustainable development will be a more flexible and creative approach to using the WHO Guidelines when assessing the acoustic acceptability of development proposals, by both National and Regional Government, Local Planning Authorities and Developers.

Taking all the above into account the answer to the question "World Health Organisation (WHO) Guidelines for Community Noise – a Help or a Hinderance to Sustainable Development?" is, neither.

Instead the WHO Guidelines should be seen a starting point in the assessment of noise impacts, rather than the final word on the issue. With the WHO guidelines representing suitably aspirational targets we should strive to achieve or get close to, but not be afraid of moving away from where it is impracticable to achieve the recommended noise levels and resulting noise impacts are unlikely to be substantially adverse.

6 REFERENCES

1. *Guidelines for Community Noise,* 1999, World Health Organisation.
2. Planning Policy Guidance 24: *Planning and Noise*, 1994, Department of the Environment.
3. *Environmental Health Criteria 12,* 1980, World Health Organisation.
4. B Berry, I Flindell & N Porter - *Health Effect Based Noise Assessment Methods: A Review and Feasibility Study*, September 1998, Department for Environment, Food & Rural Affairs.
5. *National Noise Incidence Study 2000,* Department for Environment, Food & Rural Affairs.
6. *National Noise Attitude Study 2000,* Department for Environment, Food & Rural Affairs.
7. *Transport Analysis Guidance: The noise sub-objective* (www.webtag.org.uk), Department for Transport.
8. Planning Policy Statement 1: *Delivering Sustainable Development*, 2005, Office of the Deputy Prime Minister.
9. Planning Policy Guidance 3: *Housing*, 2000, Department of the Environment, transport and the Regions.