PLOUGH LANE DEVELOPMENT – NOISE ASSESSMENT

Comments on the "Environmental Noise Assessment" report that accompanied the proposal for the development of a green-field site adjacent to Plough Lane and Binfield Rd, Wokingham

Planning Application Numbers O/2005/4085 and O/2005/4086

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1. SUMMARY

The Government's "Planning Policy Guidance 24: Planning and Noise" (PPG24) makes several recommendations concerning the siting of new developments near noise sources such as roads. The proposed development adjacent to Plough Lane and Binfield Rd fails to meet several of these recommendations. In particular, future expected increases in traffic density have not been taken into account.

The noise measurements contained in the applicant's environmental noise report were taken at an unrepresentative time and therefore paint a more favourable picture of expected noise levels than can be expected in practice.

If one estimates the effect of taking measurements at more representative times and adds the effect of possible future traffic increases, then the noise level in the proposed development is likely to be significantly higher and could approach a level at which planning permission should normally be refused (NEC C).

Therefore it would seem that the applicant's environmental noise assessment should not be relied on when considering the noise aspects of the proposed development.

In summary, based on the likely noise levels alone, this site would appear to be unsuitable for development and alternative sites should be sought if such additional houses are required in the vicinity.

2. BACKGROUND

So that everyone can understand the various reports, I thought that it would be worth starting with an explanation of the terms used, the factors that effect noise levels, the methods of measurement and some example noise levels. This should enable those unfamiliar with the subject to visualise the various noise levels under discussion and to understand the measurements and their implications.

2.1 Terms used

Sound levels are measured in decibels, abbreviated to **dB**. Strictly, this is a relative measurement, used to measure the difference between two sound levels; however it is accepted practice to measure relative to the **threshold of hearing**, which is the level that a person with good hearing can just detect at middle frequencies. So, 0 dB is the quietest level that a person with good hearing can hear. This level of quietness can only be achieved in the laboratory. Quieter sounds have negative dB values.

People are more sensitive to middle frequency sounds. To take account of this, a modified measurement is often used, namely the **dBA**, which adjusts the sensitivity of the measuring instruments at lower and higher frequencies to compensate (this adjustment is known as the "A" weighting). The dBA is the most common unit of measurement for environmental noise. Others do exist, in particular, **dBC** for traffic noise with a different weighting.

The dB and its derivatives are logarithmic measurements. What this means in practice is that if you double the sound level (i.e. the power), the number of decibels does not double. It only rises by 3 dB.

- So if the noise from 1 car is at a sound level of 50 dBA
- then 2 cars will give 53 dBA
- and 4 cars will give 56 dBA
- and 8 cars will give 59 dBA.

(Note that each time the number of cars doubles, the noise rises by 3 dB.)

Adding non-equal values is more complicated: you have to convert to a power figure, do the addition and then convert back, which is beyond the scope of this introduction.

The **minimum change** in sound level that a person can detect is 1 dB for low volume sounds under laboratory conditions. Under normal conditions, a 3dB change is the minimum typically perceptible, though smaller differences may be noticeable when the sounds are louder. An increase of 10 dB will subjectively sound like a **doubling** in sound volume. This corresponds to a tenfold increase in power; so ten cars will sound twice as loud as one car.

The **threshold of pain** is between 120 dBA and 130 dBA depending on the person, the sound and the duration. At these levels, a person becomes disorientated and will just want to escape from the sound. (Some domestic burglar alarms generate such high intensity sounds inside the building in order to drive the intruder out.)

The effect of a sound on a person depends not only on the sound level but also on its frequency and its duration. Short **duration** sounds like a gun being fired are much more tolerable than equi-loud sounds that last several minutes, which in turn are much more tolerable than sounds that last all day.

Noise levels are measured by a sound level meter. This is a small portable instrument with a microphone on the side and a meter on top. It is calibrated directly in dB and normally can switch between the different weightings to show dBA, dBC and other measurements. It can work out average levels over periods of time and do other simple calculations.

2.2 Factors Effecting Noise Levels

As one gets further from the sound source, the sound level of course drops. Under ideal conditions (without any obstructions etc), the sound level emanating from a single source will drop by 6 dB for each **doubling of the distance** from the source. In the case of a **road** rather than a single source, the sound level will drop by 3 dB as the distance from the road is doubled. In real life, the situation is more complicated as outlined below.

Buildings can shield the listener from the noise by more than 10 dB, however, see the comment on temperature inversions below. **Reflections** from buildings and other solid structures can increase the noise level, but usually by no more than 3 dB.

Dense foliage of at least 30 ft thickness can reduce sound levels by up to 5 dB. However, since this is a seasonal effect, it is not normally taken into consideration for planning purposes. **Ground cover** has a significant effect. Sound travels much better across a lake or concrete than it does across a field. So concreting over parts of the development area could increase the noise level in the existing housing.

The **topology** can either increase or decrease the sound transmission. If the sound source is in a gully (as is the case here), the sound levels will be lowered. However, a funnelling effect can also take place and this has the opposite effect. (Two parallel rows of houses could for example do this.)

Wind has a dramatic effect. If it is blowing towards the sound, the noise levels drop and vice-versa.

Temperature is also very relevant. It is not the absolute temperature that counts, but the temperature gradient. The worst case arises when a **temperature inversion** occurs (higher air is warmer). This forms a sound reflector in the sky and sound that would normally disappear into space is reflected down onto nearby areas. The resultant sound level can be much higher than that normally experienced and the shielding effect of foliage and buildings etc. is lost since the sound travels in an arc higher up.

2.3 Measuring Conditions

The level of annoyance caused by a sound depends not only on how loud it is, but also on other factors. For this reason, environmental noise standards specify not just maximum levels, but also associated durations and times of day etc. A noise level that might be acceptable during the day might be totally unacceptable at night-time. Similarly, a very loud noise might be acceptable if it is infrequent. For example, the siren of a police car on a nearby motorway might be acceptable despite its high level.

Such factors are taken into account when considering planning applications and various standard measurement conditions have evolved governing different situations such as daytime / night time etc. The various conditions under which measurements are normally taken are indicated by a code. These specify the duration, averaging process used, time of day etc. PPG24 lists the following:

LA10,T : the A weighted level of noise exceeded for 10% of the specified measurement period (T). It gives an indication of the upper limit of fluctuating noise such as that from road traffic. LA10,18h is the arithmetic average of the 18 hourly LA10,1h values from 06.00 to 24.00.

LA90,T : the A weighted noise level exceeded for 90% of the specified measurement period (T). In BS 4142: 1990 it is used to define background noise level.

LAeq,T : the equivalent continuous sound level - the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). LAeq,T is used to describe many types of noise and can be measured directly with an integrating sound level meter.

LAmax: the highest A weighted noise level recorded during a noise event.

More detailed information can be found in PPG24, available on the Internet at:

www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_606912.hcsp

2.4 Typical Sound Levels

In order to give you a feeling for what typical dB levels mean, the following table shows some examples. Obviously, these are indications only and in practice some variation can be expected. However, if you read in the proposal that the sound level at a certain location and time etc. is expected to be 75 dBA, then by looking at the table, you can see that this would be like sitting at the location concerned with a vacuum cleaner running next to you. So you immediately have an idea what sort of noise level is being discussed. Bear in mind though that noises sound different outdoors than indoors. This is because indoors, sound is reflected off walls and different frequencies are reflected differently. (Think of the echo in a large building.)

Sound Level	Example	Comments
0 dBA	Threshold of hearing	Quietest sound anyone can hear
85 dBA	Safe max. for 8 hour exposure	Louder prolonged sounds damage hearing
120 – 130 dBA	Threshold of pain	Causes permanent hearing damage if prolonged
10 dBA	Sound of normal breathing	Barely detectable
10 dBA	Rustling of leaves	
30 dBA	Soft whisper at 15 ft	
30 dBA	Extremely quiet room	No fans or equipment turned on, no outside noise
30-40 dBA	Quiet home at night time	(Not near the proposed site , due to A329M)
40-50 dBA	Quiet home in daytime	
50 dBA	Typical desk computer	Noise comes mainly from the fans
50-55 dBA	Small office	
50-60 dBA	Light traffic at 100 ft	
60 dBA	Normal voice	Measured a few feet away from speaker
60-65 dBA	Large office	Several computers, telephones, air conditioning
70 dBA	Comfortable level for hi-fi	Too loud to talk over – not background music
70 dBA	Inside a quiet car	Travelling at 60 mph with windows up
75 dBA	Vacuum cleaner	
70-80 dBA	Car doing 65 mph at 25 ft	
70-80 dBA	Busy traffic (in town centre)	Standing in the “thick of it”
80 dBA	Loud hi-fi at home	Any louder and the neighbours complain
85 dBA	Conversation hard at 6 ft	Need to shout to make oneself heard
90 dBA	Conversation hard at 3 ft	Ear protection mandatory at work
90 dBA	Food blender at 1 ft	
100 dBA	Max. from musical instruments	Excluding drums and trombones
110 dBA	Circular saw on hardwood	As heard by user - painful for bystanders
110 dBA	On stage in a rock concert	Causes at least temporary damage to hearing
115 dBA	Loud rock concert	
120 dBA	Jet engine at 100 ft	Standing near runway during take-off
130 dBA	Formula 1 racing car at 15 ft	Full throttle
140 dBA	Jet engine or rocket close up	No one allowed that close
150 dBA	Magnum revolver at 1 ft	Lasts only for fraction of a second

3. PLANNING POLICY GUIDANCE 24: PLANNING AND NOISE – PPG24

The "Planning Policy Guidance 24: Planning and Noise" document, known as PPG24, which is referred to in the Environmental Noise Assessment that accompanied the application for the development of the land near Plough Lane was published by the Office of the Deputy Prime Minister. It outlines the Government's policy on the considerations to be taken into account relating to noise in new developments.

PPG24 states:

"The planning system should ensure that, wherever practicable, noise-sensitive developments are separated from major sources of noise (such as road, rail and air transport and certain types of industrial development)."

The proposed site is adjacent to the A329M motorway. Is the Local Planning Authority aware of other sites in quieter locations away from motorways that are available?

PPG24 states:

"Where it is not possible to achieve such a separation of land uses, local planning authorities should consider whether it is practicable to control or reduce noise levels, or to mitigate the impact of noise, through the use of conditions or planning obligations."

If the development goes ahead, what measures will the Local Planning Authority stipulate to ensure that this condition is met and can the Local Planning Authority reassure existing residents that such measures will not increase the motorway noise levels in existing properties, by for example reflecting noise towards them?

PPG24 states:

"Plans should contain policies designed to ensure, as far as is practicable, that noise-sensitive developments are located away from existing sources of significant noise (or programmed development such as new roads)." Elsewhere in the document it states: *"The Secretary of State considers that housing, hospitals and schools should generally be regarded as noise-sensitive development."*

Does the Local Planning Authority accept that this directive requires the Local Planning Authority to ensure that other sites, away from noisy motorways should be developed in preference to the proposed Plough Lane site?

PPG24 states:

"Such development should not normally be permitted in areas, which are - or are expected to become - subject to unacceptably high levels of noise. When determining planning applications for development which will be exposed to an existing noise source, local planning authorities should consider both the likely level of noise exposure at the time of the application and any increase that may reasonably be expected in the foreseeable future." Elsewhere in the document it states: *"When considering potential new development near major new or recently improved roads, local planning authorities should ascertain forecast noise levels (e.g. over the next 15 years) with the assistance of the local highway authority."*

Traffic densities in the area have risen significantly over the past few years and there is no reason to believe that they will not continue to do so. If the traffic on the A329M motorway were to double, then the noise level nearby can be expected to rise by 3 dB. A fourfold increase in traffic would give rise to a 6 dB rise in noise levels. Has the Local Planning Authority consulted the local highway authority

and taken any expected increases in noise level from the proposed development over the next fifteen years into account as required in PPG24?

PPG24 states:

"The noise level measured at a monitoring point will be affected by wind speed and direction, and temperature gradients, particularly when the monitoring point is remote (>30m) from the source. The size of these effects is hard to predict, and so measurements (or predictions) should be made under reasonably stable conditions. A suitable condition is a light wind with a vector component up to 2 m/s from source to receiver; this will increase the noise level by about 2 dB(A) compared with the no wind case."

In the noise assessment report that accompanied the development application, this condition was not met and no correction appears to have been made to allow for it. Will the Local Planning Authority adjust the figures accordingly?

To simplify the planning application process, PPG24 defines four "Noise Exposure Categories" (NEC's) for road traffic as follows:

A	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.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

The noise levels that determine which category a dwelling falls into is determined by "equivalent continuous" sound levels as in the following table.

Categories For New Dwellings $L_{Aeq,T}$ dB				
	Noise Exposure Category			
Time	**A**	**B**	**C**	**D**
07.00 - 23.00	<55	55 - 63	63 - 72	>72
23.00 - 07.00	<45	45 - 57	57 - 66	>66

4. THE APPLICANT'S ENVIRONMENTAL NOISE REPORT

This report accompanies the development application. Problems identified in it include:

4.1. Page 11 - Daytime Levels

It states: BS 8233:1999 recommends the following daytime noise levels:

Gardens and balconies: L_{AeqT} = 50 – 55 dB.

All of the measured $L_{Aeq16hr}$ noise levels listed on page 16 of the report are 54 dB or above. However, since the measurement period did not include either of the two rush hours, it is unlikely that the recommendations of BS 8233:1999 would be met, had the measurements been done over the full 16 hours.

4.2. Page 12 - Guidelines for Community Noise

It states that the "WHO document "Guidelines for Community Noise" recommends noise levels…." not-to-exceed values:

Outdoors: $L_{Aeq\ 16hr}$ = 50 dB Moderate annoyance
$L_{Aeq\ 16hr}$ = 55 dB Serious annoyance

In view of the fact that the measurements were taken after the morning rush hour was over, their figures can be expected to be fairly typical for the rest of the non-rush hour period and higher figures can be expected during the rush hours. Therefore the 16-hour averages will be at least as high as the shorter period ones provided. The annoyance factor can therefore be expected to be between "moderate" and "serious". Furthermore the report states that it is generally accepted that the impact of a noise source is greater in a quiet location than in a noisy location. (In other words, what might be deemed acceptable in a town is less likely to be acceptable in a semi-rural location.) No allowance has been made for this and the residents of the proposed development are expected to live with noise levels that would be considered to be a serious annoyance even in a town centre.

4.3. Page 13 - Reasonable Noise Levels

This states that they consider it reasonable to have a continuous noise level of $L_{Aeq\ day}$ = 75 dB one metre from the properties. This corresponds to sitting next to a vacuum cleaner or standing in the middle of a busy town centre and is a ludicrous noise level to expect people to suffer in their back gardens all day. They go on to say that it is usual to permit higher noise levels for shorter periods with a maximum not to exceed 90 dBA. This is the level at which ear protection is mandatory by law at work and corresponds to a noise level that makes conversation difficult at three feet from the speaker! Again it is difficult to comprehend the value of having a garden if these levels are "reasonable".

4.4. Page 14 - Measurement Conditions

Their measurements were made on May 24th 2004 between 10:00 and 13:00 with a 4-5 m/s wind from the north / northwest. This is the week before the spring bank holiday, when traffic would have been lighter than average. It excluded the rush hour, so traffic would again have been lighter than a couple

of hours earlier and the wind was blowing along the A329M motorway rather than from it. These three facts each would have resulted in lower readings. It is difficult to estimate the amount of the effect, but PPG24 suggests 2 dB for the wind. If the traffic at the time were say half of the rush hour level on that day, which in turn were say half that of a non-bank-holiday weekday, then this would add a further 6 dB. So it is reasonable to assume that the noise levels given in the report could be 8 dB lower than they should have been. This pushes the average $L_{Aeq16hr}$ values up from 54-55 dB to 62-63 dB, which places the proposed development on the borderline between Noise Exposure Categories B and C. In other words, on the border between "conditions should be imposed to protect against noise" and "planning permission should not normally be granted". When future expected increases in traffic levels are taken into account, the development moves squarely into category C – planning permission should not normally be granted.

As far as taking measures to protect the residential areas from noise is concerned, this would in fact be difficult. The motorway is already in a gully at this point, so the usual measure, namely erecting a noise barrier fence is unlikely to have much effect. Indeed, such fences can sometimes make the noise levels further away from the road higher.

4.5. Page 17 - NEC A

Here it states that "For external facades in NEC A, PPG 24 states that "Noise need not be a determining factor in granting planning permission." This is true, however, the only reason that I can think of for putting this extract in the report is to cause confusion because the area is not in NEC A. At best the area falls into NEC B and as demonstrated in the previous section it really belongs in NEC C when everything is taken into consideration.