
6. PLANNING REQUIREMENTS

6.1 National Planning Policy

Local Authorities are encouraged by guidance issued by the Government to use their powers of development control to ensure that an appropriate noise environment exists depending on the type of development.

Since its publication on 27 March 2012, the National Planning Policy Framework (NPPF, ref 5) provides current national planning policies for England, including those related to noise. The NPPF supersedes Planning Policy Guidance PPG 24: Planning and Noise (ref 2).

The relevant advice in the NPPF is reproduced below:

123. Planning Policies and decisions should aim to:

- *Avoid noise from giving rise to significant adverse impact²⁷ on health and quality of life as a result of new development;*
- *Mitigate and reduce to a minimum other adverse impact²⁷ on health and quality of life arising from noise from new development, including through the use of conditions;*
- *Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established;²⁸ and*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

6.2 Local Planning Requirements

To assist with planning decisions in relation to noise, the London Borough of Hillingdon have published a Supplementary Planning Document (SPD, ref 1). This outlines the general policies of the Council with regards to planning and noise including defining Noise Exposure Categories (NECs) and Residential Noise Criteria.

NECs were originally specified in PPG24 (ref 2). Although this has now been superseded by the NPPF (see Section 6.1), some local authorities continue to use NECs to assist in decision making.

Table 1 of the SPD identifies four Noise Exposure Categories, in general accordance with the principles in PPG24. These are:

- NEC 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.*
- NEC 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 to meet the Council's recommended outdoor and indoor noise levels.*
- NEC 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 to meet the Council's recommended outdoor and indoor noise levels.*
- NEC D: *Planning permission should normally be refused.*

The noise level limits for the Noise Exposure Categories depends on the dominant noise source. It can be seen from Table 5 that aircraft sources typically dominate the environmental noise levels across the majority of the Manor Court site, although road traffic is likely to dominate near the northern site boundary (i.e. near Position 2).

For new dwellings near existing aircraft or road traffic noise sources, the following noise level limits apply:

Table 6 – Noise Level Limits for Noise Exposure Categories, $L_{Aeq,T}$

Dominant Noise Source	Period	NEC A	NEC B	NEC C	NEC D
Aircraft	Daytime (07:00 – 23:00)	< 57	57 - 66	66 – 72	> 72
	Night-time (23:00 – 07:00)	< 48	48 - 57	57 – 66	> 66
Road Traffic	Daytime (07:00 – 23:00)	< 55	55 - 63	63 – 72	> 72
	Night-time (23:00 – 07:00)	< 45	45 - 57	57 – 66	> 66

In addition, sites where night-time noise events regularly exceed 82 dB, L_{ASmax} several times in any hour should be treated as being in NEC C unless they are otherwise in NEC D.

The Supplementary Planning Document also specifies residential noise criteria to be achieved for inside and outside living areas. These are based on the values specified in British Standard BS 8233:1999 (ref 3) and by the World Health Organization (ref 4).

Table 7 – Residential Noise Criteria

Period	Location	Recommended Noise Level (dB)
Daytime (07:00 – 23:00)	Outdoor Living Areas	As low as practicable and < 50 dB, $L_{Aeq,T}$
	Indoor Living Areas	< 35 dB, $L_{Aeq,T}$
Night-time (23:00 – 07:00)	Outside Bedroom Windows	< 45 dB, $L_{Aeq,T}$ (facade) < 60 dB, L_{AFmax} (facade)
	Inside Bedrooms	< 30 dB, $L_{Aeq,T}$ < 45 dB, L_{AFmax}

The SPD states that the time base ' T ' should be "appropriate for the circumstances". BS 8233:1999 and the updated BS 8233:2014 (ref 6), as well as the WHO document, all consider the overall day or night-time levels (i.e. $L_{Aeq,16h}$ for

the daytime and $L_{Aeq,8h}$ at night) and so these values will be used in this assessment.

The WHO document also states that the maximum level in a bedroom should not exceed 45 dB, L_{AFmax} more than 10 to 15 times per night. It is therefore assumed that the L_{AFmax} requirements in the SPD (and in Table 7) are also based on the level exceeded 10 – 15 times per night.

7. NOISE EXPOSURE CATEGORY

Based on the noise levels measured at Positions 1 to 3, the Noise Exposure Categories (NECs) at various locations across the site can be determined. Comparing the day and night-time noise levels in Tables 1 to 3 with the NEC level limits in Table 6, it can be seen that any dwellings located near to each of the measurement positions would be classified as:

- Position 1 – NEC 'B' during the day and night
- Position 2 – NEC 'B' during the day and on the boundary of NEC 'B' and NEC 'C' at night
- Position 3 – NEC 'A' during the day and NEC 'B' at night.

Therefore, the majority of the site is likely to be within NEC 'B' at all times, with noise levels at the top of this range particularly affecting the northern areas of the site (nearest the M4 motorway). Some more protected areas of the site are in NEC 'A' at times.

It is therefore recommended that noise be taken into account and appropriate Conditions imposed to ensure the internal residential noise criteria in Table 7 can be achieved.

8. ASSESSMENT

8.1 Ground Absorption

The noise levels in Tables 1 to 3 were all measured at a height of 1.5 metres above local ground level. Since the ground between the aircraft/road traffic and the microphone in each case was of an absorbent nature (i.e. grassland and bushes etc), these measured levels would include some degree of absorption of the sound energy by the ground cover itself. The amount of absorption is dependent on the

distance between the source and receiver and the height of the receiver. It is also dependent on the type and height of the source that dominates at each position.

At Position 1, which is dominated by aircraft noise, the sample measurement data given in Table 4 shows that on average the L_{Aeq} at first floor level is 2 dB higher than the level at ground floor. The effect of ground absorption at Position 3 is unknown but is likely to be very similar to Position 1.

For Position 2, where road traffic is more dominant, this ground absorption effect can be calculated using methods contained in Calculation of Road Traffic Noise (CRTN, ref 7). It can be shown that at a distance of around 250 metres between source and receiver, this can lead to an increase in noise level of around 1 dB(A) at a height of 4 metres (i.e. first floor level) compared to at 1.5 to 2 metres.

8.2 Required Facade Mitigation to achieve Internal Noise Guidelines

The difference between the measured noise levels for day and night given in Tables 1, 2 and 3 and the internal noise guidelines in Table 7 gives the required level of mitigation to be provided to any dwellings located at each of the measurement positions.

Table 8 – Required Mitigation to meet Residential Noise Criteria			
Location	Time Period	Room Type	Required Mitigation (dB(A))
Position 1 (nr W boundary of site, direct line of sight to aircraft)	Day (07:00 – 23:00)	Indoor Living Areas	≥ 23
	Night (23:00 – 07:00)	Bedrooms	≥ 24
Position 2 (N site boundary)	Day (07:00 – 23:00)	Indoor Living Areas	≥ 23
	Night (23:00 – 07:00)	Bedrooms	≥ 27
Position 3 (within courtyard, nr N facade of Manor Lodge)	Day (07:00 – 23:00)	Indoor Living Areas	≥ 21
	Night (23:00 – 07:00)	Bedrooms	≥ 22

The required mitigation values for indoor living areas and bedrooms given in Table 8 are the minimum sound insulation required of a ground floor facade for any dwellings located at or near each of the measurement positions in order to satisfy the internal residential noise criteria specified by the Local Authority (ref 1). First

floor facades are likely to require 1 dB(A) higher for Position 2 and 2 dB(A) higher values for Positions 1 and 3 (see Section 8.1).

Assuming a conventional external wall construction consisting of at least one masonry or blockwork leaf, windows and ventilators generally represent the main transmission path for sound outside to inside dwellings. Windows should therefore be chosen that achieve $R_w + C_{tr}$ values at least equal to the required mitigation values in Table 8 (or 1 to 2 dB above for first floor windows). R_w is the Weighted Sound Reduction Index and C_{tr} is a spectral correction term. Both are laboratory measured units and should be available from glazing manufacturers.

Ventilator performances are usually expressed in terms of $D_{n,e,w} + C_{tr}$ in decibels. We would recommend that ventilators are selected that are capable of at least 10 dB higher $D_{n,e,w} + C_{tr}$ values than the required glazing specification to ensure ventilation is provided without compromising sound insulation.

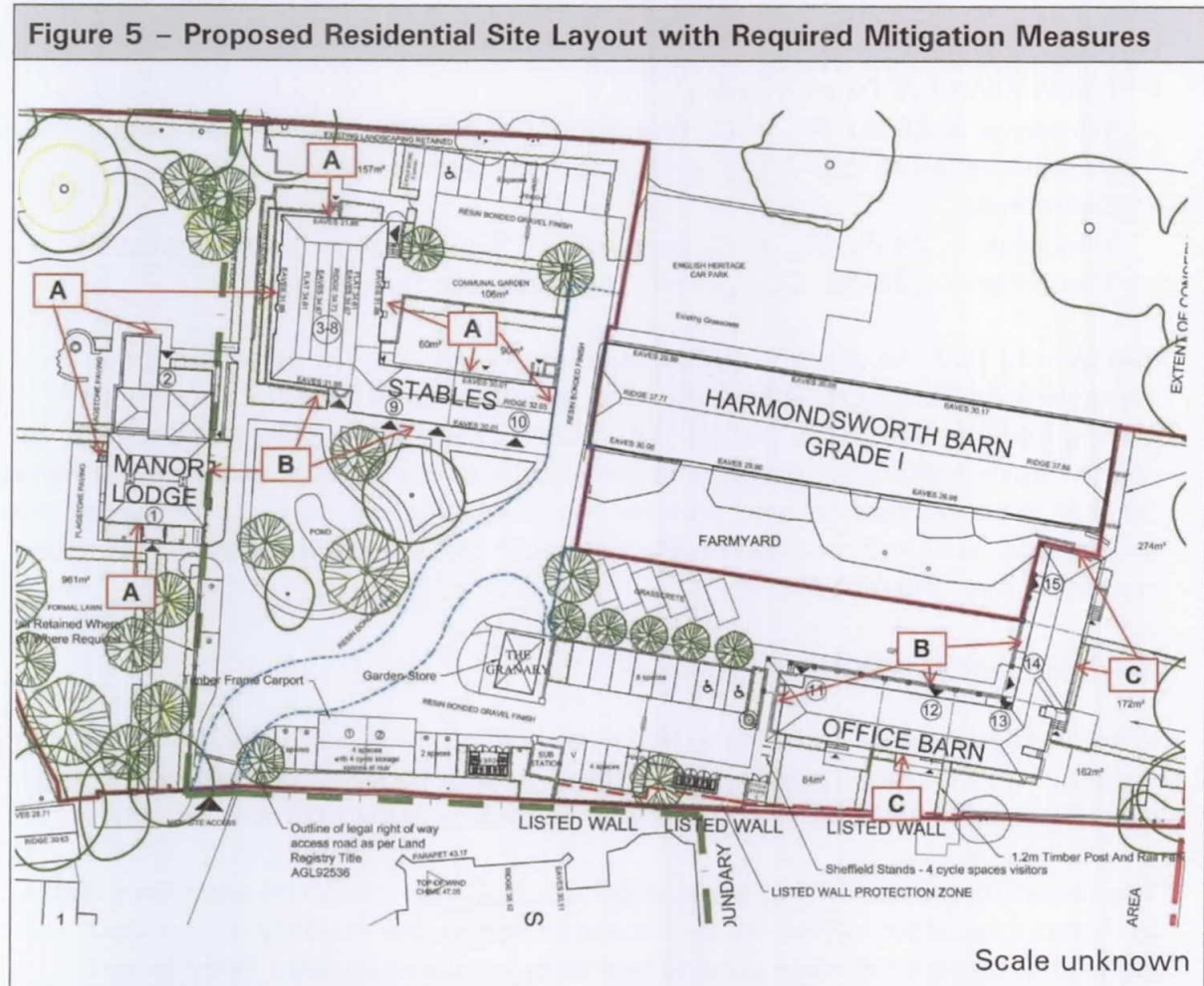
A typical proprietary double-glazed window in a masonry façade, with 4 mm glass either side of a 6 to 16 mm sealed cavity is capable of providing up to 28 dB, $R_w + C_{tr}$ attenuation against typical external noise sources. This assumes that any trickle vents are closed or omitted and that all units have effective seals, that is airtight when compressed without distortion to any framing. With conventional trickle vents open the performance would be expected to reduce to a maximum attenuation of around 25 dB(A).

It can be seen from Table 8 that standard double-glazing alongside standard trickle ventilators (as described above) is likely to provide an adequate level of sound insulation to all indoor living areas near to Positions 1 or 2, except for any bedrooms near Position 2 and first floor bedrooms near Position 1. Furthermore, standard double-glazing and trickle vents are likely to provide sufficient sound insulation for any habitable room facades facing into the courtyard near Position 3 (i.e. the north facade of Manor Lodge or the east facade of the Stables).

Standard double-glazing with acoustically treated trickle ventilators is likely to be required for any bedrooms (first floor only) near to Position 1 and bedrooms (ground or first floor) near to Position 2.

Sound transmission should also be adequately controlled through the roof. It is likely that a standard roof/ceiling construction of tiles/slate with a minimum of 100 mm mineral wool installed above a ceiling of 12.5 mm plasterboard would provide sufficient sound insulation. However, further advice should be sought if an alternative roof construction is proposed.

Figure 5 shows the proposed layout for the site, which has been annotated with the likely required mitigation measures for each façade, depending on the room type, to ensure the internal noise criteria in Table 7 can be satisfied.



Notes on Figure 5:

Facades labelled 'A':

- Living Rooms, Dining Rooms & Ground Floor Bedrooms -
Windows ≥ 28 dB, $R_w + C_{tr}$ (e.g. 4/6-16/4 mm standard double-glazed)
Ventilators ≥ 35 dB, $D_{n,e,w} + C_{tr}$ (e.g. standard trickle vents)
- Bedrooms (First Floor) -
Windows ≥ 28 dB, $R_w + C_{tr}$ (e.g. 4/6-16/4 mm standard double-glazed)
Ventilators ≥ 36 dB, $D_{n,e,w} + C_{tr}$ (e.g. acoustic trickle vents)

Facades labelled 'B':

- All habitable rooms -
 Windows $\geq 28 \text{ dB}$, $R_w + C_{tr}$ (e.g. 4/6-16/4 mm standard double-glazed)
 Ventilators $\geq 35 \text{ dB}$, $D_{n,e,w} + C_{tr}$ (e.g. standard trickle vents)

Facades labelled 'C':

- Living Rooms & Dining Rooms -
 Windows $\geq 28 \text{ dB}$, $R_w + C_{tr}$ (e.g. 4/6-16/4 mm standard double-glazed)
 Ventilators $\geq 35 \text{ dB}$, $D_{n,e,w} + C_{tr}$ (e.g. standard trickle vents)
- Bedrooms -
 Windows $\geq 28 \text{ dB}$, $R_w + C_{tr}$ (e.g. 4/6-16/4 mm standard double-glazed)
 Ventilators $\geq 38 \text{ dB}$, $D_{n,e,w} + C_{tr}$ (e.g. acoustic trickle vents)

Please note that the overall sound insulation provided by an external façade is dependent on factors including type and relative area of the wall construction, glazing and ventilators, as well as the volume of the room. The guidance above and in Figure 5 assumes that rooms are of typical size and windows do not exceed 50% of the total external wall area for the room. Furthermore, it is assumed that the external wall and roof constructions would provide significantly higher sound insulation than the glazing.

8.3 Outdoor Living Areas

In addition to internal noise level guidelines, Hillingdon's Supplementary Planning Document (SPD, ref 1) provides noise level targets for outdoor living areas (e.g. gardens or balconies), as well as for immediately outside bedroom windows.

The target for outdoor living areas is 50 dB, $L_{Aeq, day}$. It can be seen from Tables 1 to 3 that this target is likely to be exceeded across the majority of the site. The night-time targets for noise outside bedroom windows are also likely to be exceeded across the site.

The SPD target for outdoor noise seems to come from guidance in BS 8233:1999 (ref 3), which states:

"In gardens and balconies etc it is desirable that the steady noise level does not exceed 50 $L_{Aeq,T}$ dB and 55 dB, $L_{Aeq,T}$ dB should be regarded as the upper limit."

Similar guidance is provided in the 2014 version of the Standard (ref 6). However, BS 8233:2014 goes on:

"It is also recognized that these guideline values are not achievable in all circumstances where development may be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors...might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited."

Therefore, although the noise criteria for outdoor living areas is unlikely to be satisfied in most areas of the site, this should not be a determining factor as to whether planning permission is granted.

The SPD targets for noise outside bedroom windows at night are likely based on the assumption that a partially open window can typically be expected to provide 10 to 15 dB(A) of sound insulation (ref 3). Therefore, the outdoor levels are 15 dB(A) above the indoor levels in order to satisfy the internal noise requirements even with an open bedroom window at night.

However, whilst this provides a good target in the ideal case, there are many examples of urban and suburban areas where this would be exceeded. Furthermore, whilst the building facade can be designed to maximise sound insulation from outside noise, there is little that can be done to reduce external noise levels, particularly from elevated sources such as aircraft.

Therefore, AIRO considers that noise levels outside bedroom windows should also not be a determining factor in relation to granting planning permission. After all, it can be shown that suitable background ventilation can be provided (e.g. by acoustically-treated trickle ventilators, see Section 8.2) such that the internal noise targets are satisfied and so sleep disturbance or other health effects would be minimised.

It may be possible to reduce external noise levels by installing a suitable fence or wall along the boundary of the site, particularly around the boundaries of the gardens. For maximum sound reduction, these should be at least 1.8 metres high (the higher the better), with a mass per unit area of at least 10 kg/m², no holes and well-sealed joints/junctions. A well-constructed noise barrier of this type would be expected to reduce road traffic noise by around 10 to 20 dB(A).

Barriers are likely to be particularly effective on the northern site boundary (i.e. to the rear of the Office Barn) where road traffic noise dominates and at other locations where noise from aircraft is already reduced by existing barriers such as buildings. In areas where aircraft noise dominates, the overall noise level may not

significantly reduce with the addition of a noise barrier. This is due to the elevated position of aircraft sources, meaning that even a high barrier would not obstruct the transmission path.

9. CONCLUSIONS

This report has presented the results of environmental noise measurements at Manor Court, High Street, Harmondsworth, London.

The measured noise levels, which were dominated by aircraft from Heathrow airport (nearest runway located 850 metres to the south) and road traffic from the M25 (500 metres to the west) and M4 (250 metres to the north) motorways, have been assessed in relation to guidelines published in London Borough of Hillingdon's Supplementary Planning Document (SPD, ref 1). This document sets out limits for Noise Exposure Categories (in general accordance with the now superseded PPG 24 (ref 2)), as well as indoor and outdoor residential noise criteria (in general accordance with British Standard BS 8233, ref 3 and ref 6).

It has been shown that the majority of the site is within Noise Exposure Category (NEC) 'B' for both day and night-time periods. The highest noise levels are on the northern site boundary (nearest to the M4 motorway), where the site is on the boundary of NEC 'B' and NEC 'C' at night. Some more protected areas of the site are in NEC 'A'.

The residential noise criteria given in the SPD for outdoor living areas and outside bedroom windows are unlikely to be satisfied across the majority of the site. However, given the advice in British Standard BS 8233:2014 (see Section 8.3) and the fact that there are many other existing residential properties within the vicinity of the site, the guideline outdoor limits being exceeded should not in itself be considered a reason to refuse planning permission.

In areas where road traffic noise dominates, the noise level in gardens is likely to be reduced by installing a suitable close-board timber fence or brick wall along the boundaries of the gardens. It is unlikely that aircraft noise will be significantly reduced by the addition of a noise barrier.

Outline mitigation proposals (in terms of window and ventilation specifications) are discussed in Section 8.2. The highest façade sound insulation is required to bedrooms on the rear (north-facing) facades of the Office Barn, which would require a facade mitigation of at least 28 dB, $R_w + C_{tr}$. This could be achieved using 4/6-16/4 mm standard double-glazing with acoustically treated trickle

ventilation. Similar mitigation requirements are also required to first floor bedrooms on the south, east and west facades of Manor Lodge and to the south and west facades of the Stables. Standard double-glazed windows and trickle ventilators are likely to be sufficient for all other proposed facades on the site. Further details are presented in Figure 5.

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REFERENCES

1. Noise – Supplementary Planning Document
Hillingdon Local Development Framework
Planning and Transportation Group, London Borough of Hillingdon, April 2006
2. PPG24 Planning Policy Guidance: Planning and Noise
The Department of the Environment
HMSO, September 1994
3. British Standard BS 8233:1999
Sound Insulation and Noise Reduction for Buildings – Code of Practice
British Standards Institution, 1999
4. Guidelines for Community Noise
World Health Organization, 1999
5. National Planning Policy Framework
Department for Communities and Local Government, March 2012
6. British Standard BS 8233:2014
Guidance on sound insulation and noise reduction for buildings
British Standards Institution, 2014
7. Calculation of Road Traffic Noise
Department of Transport, Welsh Office
HMSO, 1988

APPENDIX A - Details of Measurement Instrumentation/Weather Conditions

Table A1 - Schedule of Noise Instrumentation			
Use	Type		Serial No.
Measuring System	Cirrus CRL 702	Unit D	012622
Microphone	Cirrus MK 224	Unit D	890259
Calibrator	Cirrus CRL511D	Unit T	014087
Measuring System	Cirrus CRL 704B	Unit G	011182
Microphone	Cirrus MK 224	Unit G	20040519
Calibrator	Cirrus CRL 511D	Unit G	011970
Measuring System	Cirrus CRL 703B	Unit X	43056
Microphone	Cirrus MK 226	Unit X	110792
Calibrator	Cirrus CR 511E	Unit X	43023
Sound Level Meter	B&K 2260		2234520
Microphone	B&K 4189		2198103
Calibrator	Cirrus CR 511E		41882
Sound Level Meter	Norsonic 140		1406786
Microphone	Norsonic 1225		264702
Calibrator	B&K 4230		543357

AIRO is accredited by the United Kingdom Accreditation Service as a UKAS testing laboratory No. 0483 and although the measurements carried out for this survey are not listed on our schedule of accreditation, all of AIRO's measurement equipment is routinely calibrated as part of the calibration regime in our Quality Manual and these calibrations are traceable to National Standards. In addition, the calibration level of the measuring equipment was checked at the start and the end of each survey period using the appropriate calibrator for the relevant meter.

Table A2 - Record of Weather Conditions		
	6 April 2017	7 April 2017
Temperature	18°C	17°C
Relative Humidity	56%	64%
Wind Speed	1 m/s	Negligible
Wind Direction	South	--