



LANSSETT CONSULTING

**Former Fox and Hounds London Road, Gravesend – Noise Report
LC-12-0091-RP1 / March 2013**

Project Sheet

Issue

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EXECUTIVE SUMMARY

Lansett Consulting was commissioned by Synergy Planning & Property Consultants Ltd on behalf of Mr Lashman Singh Dosanjh to undertake a noise assessment for the redevelopment of the Former Fox and Hounds Site London Road, Northfleet, Gravesend, DA11 9JH.

Relevant local and national guidelines and standards have been considered, including British Standard BS8233: 1999, Sound Insulation and Noise Reduction for Buildings - Code of Practice, World Health Organisation (WHO) 'Guidelines for Community Noise', and British Standard BS4142: 1997, Method for Rating Industrial Noise affecting Mixed Residential and Industrial Areas.

Site specific external sound insulation and ventilation scheme has been considered to ensure that future residents of the proposed development are protected from existing road traffic sources. Mitigation measures considered includes wall build up, glazing, and ventilation.

No item of plant likely to cause noise disturbance is proposed at the site. Nevertheless, plant noise design limits have been recommended to ensure that risk of noise nuisance to surrounding communities and occupiers of the proposed development is minimised if it is decided to incorporate mechanical plants at a later stage of the development.

1. INTRODUCTION

1.1 CONTEXT

Lansett Consulting Limited was commissioned by Synergy Planning & Property Consultants Ltd to undertake a noise impact assessment in support of the planning application for the redevelopment of the former Fox and Hounds Site London Road, Northfleet, Gravesend, DA11 9JH for residential use.

The proposal includes the construction of two to four storey residential blocks and associated parking.

The noise climate at the site is dominated by noise from London Road with contributions from Rural Vale.

An assessment of the existing noise levels on site and appropriate mitigation required to protect future residents of the proposed development is detailed within this report. This report will use appropriate guidance to assess existing noise in the area surrounding the application site.

In particular, the assessment methodology that has been applied and reported in this document considers the guidance detailed in National Planning Policy Framework March 2012 (Which Supersedes PPG 24), BS 8233: 1999, Sound Insulation and Noise Reductions in Buildings –Code of Practice, and World Health Organisation' Guidelines for Community Noise', British Standard BS4142: 1997, Method for Rating Industrial Noise affecting Mixed Residential and Industrial Areas.

1.2 SITE DESCRIPTION

The site is bounded to the north by industrial and residential properties on London Road; to the southeast by residential properties on Rural Vale; and west by mixed use properties on Rosherville Way.

Figure 1 shows the proposed site.

2. GUIDANCE AND METHODOLOGY

National Planning Policy Guidance published in March 2012 sets out the Government's policies on noise related planning issues. Paragraph 109 and 123 states as follows;

109. The planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution; and,

123. Planning policies and decisions should aim to:

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts 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; 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.*

This section considers the appropriate guidance on the assessment of noise for a residential development and sets out suitable objective criteria which are to be considered for the application site at London Road, Gravesend.

Reference is made to well established and recognized national standards and guidelines as well as any relevant local authority guidance, standards or policies including;

- British Standard BS8233: 1999, Sound Insulation and Noise Reduction for Buildings - Code of Practice which provides general guidance on acceptable noise levels within buildings;
- World Health Organisation (WHO) 'Guidelines for Community Noise'; and,
- British Standard BS4142: 1997, Method for Rating Industrial Noise affecting Mixed Residential and Industrial Areas.

British Standard BS 8233:1999 – Sound Insulation and Noise Reduction for Buildings – Code of Practice

The scope of BS8233 is the provision of recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the external noise climate.

BS8233 suggests suitable internal noise levels within different types of buildings, including residential dwellings. It suggests that an internal noise level of $30\text{dB}_{\text{LAeq,T}}$ within bedrooms is a 'good' standard, whilst $35\text{dB}_{\text{LAeq,T}}$ is a 'reasonable' standard. For living areas in the daytime, the standard recommends $30\text{dB}_{\text{LAeq,T}}$ as a good standard and $40\text{dB}_{\text{LAeq,T}}$ as being a reasonable standard. BS8223 also states that individual noise events should not exceed $45\text{dB}_{\text{LAmax}}$ in bedrooms at night.

The design range of indoor ambient noise levels in spaces when they are unoccupied are given as:

- Reasonable speech or telephone communications, for such room-spaces as kitchens, corridors and wash-rooms is $45 - 55\text{dB}_{\text{LAeq,T}}$ dB.

World Health Organisation (WHO) 'Guidelines for Community Noise'

This document states that, in dwellings, the critical effects of noise are on sleep, annoyance and speech interference. According to this document, to protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB L_{Aeq} for a steady, continuous noise.

To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50dB L_{Aeq} . To avoid any possibility of sleep disturbance, indoor guideline values for bedrooms are 30dB L_{Aeq} for continuous noise and 45dB L_{Amax} for single sound events. These indoor noise levels correspond to sound pressure levels at the outside façades of the living spaces of 45dB L_{Aeq} and 60dB L_{Amax} . These values have been obtained by assuming that the noise reduction from outside to inside with the window partly open is 15 dB.

British Standard BS4142: 1997, Method for Rating Industrial Noise affecting Mixed Residential and Industrial Areas

BS4142 is intended to be used for assessment of whether noise from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises is likely to give rise to complaints from people residing in nearby dwellings. The Standard states that:

'It (BS4142) may be found helpful in certain aspects of environmental planning and may be used in conjunction with recommendations on noise levels and methods of measurement published elsewhere.'

The procedure contained in BS4142 for assessing the likelihood of complaints is to compare the measured or predicted noise level from the source in question, the 'specific noise level', at the assessment position with the background noise level. Where the noise contains a 'distinguishable, discreet, continuous note (whine, hiss, screech, hum etc.) or if there are distinct impulses in the noise (bangs, clicks, clatters or humps), or if the noise is irregular enough to attract attention' then a correction of 5 dB is added to the specific noise level to obtain the 'rating level'.

British Standard, BS7445: Part 2: 1991: Description and measurement of environmental noise - Guide to the acquisition of data pertinent to land use contains a more objective method of assessing whether a sound is tonal. It states:

'In some practical cases, a prominent tonal component may be detected in one-third octave spectra if the level of a one-third octave band exceeds the level of the adjacent bands by 5dB or more.'

To assess the likelihood of complaints, the measured background noise level is subtracted from the rating noise level. BS4142 states:

'A difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance. At a difference below 5 dB, the lower the value the less likelihood there is that the complaints will occur. A difference of -10 dB is a positive indication that complaints are unlikely.'

However, in addressing the potential for noise intrusion the standard also states that:

'For the purposes of this standard, background noise levels below about 30 dB and rating levels below about 35 dB are considered to be very low.'

Gravesham Council

Lansett Consulting has discussed the assessment methodology employed in this report with Allan Glasson of Gravesham Council Environmental Health Team. The council has stated that the

proposed building should be designed to ensure that internal noise level within the proposed dwelling should comply with the good criteria detailed in BS8233:1999.

The assessment has considered the relevant national and local guidelines and standards in accordance with the discussions.

3. NOISE SURVEY RESULT

Prevalent noise levels at the site were measured on Tuesday 19th and Wednesday 20th February 2013. The monitoring positions are presented in Figure 1.

Attended monitoring was undertaken during the day, evening and night-time for robust assessment of the noise climate at the surrounding area.

The climatic condition during the survey was slightly cold and dry with light winds (< 2m/s). Conditions were therefore considered suitable for environmental noise measurement. Sound pressure levels were recorded at the monitoring locations to determine the equivalent continuous sound level, L_{Aeq} , the maximum noise level L_{Amax} and the percentile L_{A90} background noise level.

Noise measurements were made with a calibrated precision grade sound level meter which achieves the requirements of BS EN 61672:2003. The survey was carried out in accordance with the principles of BS 7445: Part 1 (2003) & Part 2-3 (1991), 'Description and Measurement of Environmental Noise', and BS 4142:1997.

3.1 ROAD TRAFFIC NOISE

Attended noise measurement was undertaken at 2 monitoring positions (MP1 & MP2) at the application site during the day, evening and night-time.

The microphone at all locations was located minimum 3m away from the nearside kerb of London Road and Rural Vale. The measured level is considered representative of levels that will be experienced at the façades of the proposed building.

The measurement survey comprises of consecutive measurement periods in terms of the most relevant standards and guidelines. Table 1 and Table 2 below shows the period noise levels measured at all monitoring positions. These have subsequently been used as a basis for the calculations of noise levels to the nearest proposed façade. Results from the survey are shown in Appendix 1.

TABLE 1: DAY AND NIGHT-TIME MEASUREMENT AT MP1

Period	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Day (10.05 – 13.05 hrs)	69.0	91.0	73.0	50.0
Evening (19.03 – 22.05 hrs)	67.0	88.0	71.0	35.0
Night (23.00 – 00.30 hrs)	63.0	87.0	67.0	36.0

TABLE 2: ATTENDED NOISE MEASUREMENTS RESULT DURING THE DAYTIME AT MP2

Location	Period	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
MP2	Day (14.00 – 14.15hrs)	60.0	73.0	64.0	50.0

4. ROAD TRAFFIC NOISE ASSESSMENT

The data obtained from the road traffic noise survey at MP1 has been used to calculate a reference $L_{Aeq,T}$ noise level for the 16-hour daytime period between 07:00hours and 23:00hours and 8-hour night-time period 23:00hours and 07:00hrs. CRTN provides a shortened measurement procedure for measuring the noise from an actual flow of traffic on a road.

According to CRTN, using $L_{A10,3h}$ as the arithmetic mean of the three hourly values of L_{A10} , the current value of $L_{A10,18h}$ can be calculated from the relationship:

$$L_{A10,18h} = L_{A10,3h} - 1 \text{ dB.}$$

The daytime $L_{Aeq,16h}$ has been derived based on the 'Method for converting the UK road traffic noise index $L_{A10,18h}$ to the EU noise indices for road noise mapping' (Defra 2006) Equation 3 as below.

For non-motorway roads:

$$L_{Aeq16hour} = 10\log (1/16) [12 \times 10L_{day}/10 + 4 \times 10L_{evening}/10] \text{ dB}$$

$$\text{Where } L_{day} = 0.95 \times L_{A10,18h} + 1.44 \text{ \& } L_{evening} = 0.97 \times L_{A10,18h} - 2.87$$

$$L_{Aeq8hour} = 0.90 \times L_{A10,18h} - 3.77 \text{ dB}$$

The measured noise levels are considered representative of noise levels that will be experienced at the worst affected façades of the proposed development. Daytime and night-time noise level at the façade closest to London Road which is considered worst affected has been calculated using the above formulae and are presented in Table 3.

TABLE 3: ATTENDED NOISE MEASUREMENTS RESULT DURING THE DAYTIME

Period	L_{Aeq} dB
Daytime L_{Aeq} (07.00 – 23.00hrs)	68.0
Nighttime L_{Aeq} (23.00 – 07.00hrs)	61.0

Façade recommendations will be based on the worst case level measured during the day and night-time to ensure that robust level of protection is provided to occupants of the proposed development.

TABLE 4: PREDICTED DAY AND NIGHT ROAD TRAFFIC NOISE LEVEL AT WORST AFFECTED FACADES

Period	63 Hz	125 Hz	250Hz	500 Hz	1 kHz	2 kHz	4 kHz
Daytime L_{Aeq} (07.00 – 23.00hrs)	74.3	70.6	65.4	65.4	61.2	63.0	67.9
Nighttime L_{Aeq} (23.00 – 07.00hrs)	66.7	64.7	60.1	60.1	56.7	57.2	62.4
Nighttime L_{AFmax} (23.00 – 07.00hrs)	91.7	88.8	82.6	75.7	74.3	82.3	80.9

5. SOUND INSULATION REQUIREMENT

The minimum composite airborne sound insulation to be provided by the building envelope of the north facades have been derived based on typical road traffic spectrum and detailed in Table 5 below.

TABLE 5: MINIMUM ENVELOPE REQUIREMENT NW FACADE OF PROPOSED FLATS CLOSEST TO LONDON ROAD

Parameter	63 Hz	125 Hz	250Hz	500 Hz	1 kHz	2 kHz	4 kHz
Living Room L_{AeqT}	27.3	30.5	32.9	45.6	53.4	52.2	55.3
Nighttime Bedroom L_{AeqT} & L_{AFmax}	28.7	32.0	38.7	48.6	53.0	55.9	65.6

All proprietary glazing of the external building fabric should be tested in accordance with BS EN ISO 140-3:1995 in a UKAS accredited laboratory to prove compliance with the performance specifications provided. This includes the framing and all gaskets used within the system on offer. Constructions should not be accepted without such data.

TABLE 6: ENVELOPE CONSTRUCTION FOR NW FACADE OF FLATS FACING ONTO LONDON ROAD

Element	Envelope construction
Wall	Brick/block cavity ($R_w \geq 55\text{dB}$)
Window	Northwest facade Living 6/6/8.8 Laminate double glazing or equivalent well sealed when closed (R_{w+ctr} 34dB) and bedroom 8.8/6/12.8 laminate double glazing (R_{w+ctr} 40dB)
Ventilator	Acoustic window ventilations e.g. Passivent TVS4DB Living Room or Acoustic wall ventilators e.g. Fresh 90dB Wall vents Bedroom ($D_{n,e,w} \geq 38\text{dB}$) or equivalent

Suitable envelope construction for facades on the western boundary located further away from London Road on Rural Vale has been determined by distance attenuation calculation i.e. based on worst case levels measured at MP1.

TABLE 7: ENVELOPE CONSTRUCTION FOR W FACADE OF FLATS FACING ONTO RURAL VALE

Element	Envelope construction
Wall	Brick/block cavity ($R_w \geq 55\text{dB}$)
Window	Living Room and Bedroom 6/12/6 (R_{w+ctr} 27dB) double glazing well sealed when closed (R_{w+ctr} 30dB)
Ventilator	Acoustic window ventilations ($D_{n,e,w} \geq 30\text{dB}$).

By employing such attenuating measures it will be possible to attain an internal noise level of 35dB L_{AeqT} day and 30dB L_{AeqT} night-time; and 45dB L_{AFmax} (Night-time) Specified by Gravesham Council, British Standard BS8233: 1999, Sound Insulation and Noise Reduction for Buildings – Code of Practice, and the WHO criteria.

For bathrooms and kitchens and other non habitable rooms, employing standard double glazing coupled with ventilation will ensure that internal noise level is no more than $45\text{dB}_{\text{LeqT}}$.

Facades not facing the roads (back areas) will not require additional mitigation measures and employing standard double glazing coupled with ventilation will ensure compliance to applicable internal noise criteria.

Balcony structures facing the roads should be imperforate and as high as possible for optimum protection.

6. NOISE FROM PROPOSED DEVELOPMENT

Noise levels generated by mechanical plant and experienced by local receptors depends upon a number of variables, the most significant of which are considered to be as follows:

- Noise generated by plant or equipment used on site, generally expressed as Sound Power Levels (SWL);
- Distance between the noise source and the receptor;
- Attenuation due to ground absorption, atmospheric and barrier effects; and
- Periods of operation of the plant on the site, known as its “on-time”.

At this stage there is no information to suggest that any noisy item of plant is proposed as part of the development. Nevertheless, design criteria have been recommended should a case be made to introduce any items of plants likely to generate noise.

Noise emissions from such plants should not exceed -5dB below background noise level at the surrounding sensitive receptors in accordance to guidance of BS4142 to ensure that resultant impact is of marginal significance.

Therefore, in order to achieve this, plant should be designed to meet the following noise limits:

TABLE 8: NOISE LIMIT FOR FIXED INSTALLATIONS OF MECHANICAL PLANT, $L_{Ar,Tr}$ (dB)

Daytime	Evening	Night-time
45.0	30.0	30.0

If fixed installation(s) and mechanical plant(s) are designed to achieve the above mentioned noise limits, specific noise from proposed plants could be up to 15dB(A) within surrounding noise sensitive properties with windows open during the night-time. This is based on the assumption that an open window could provide up to 15dB attenuation.

Nevertheless, control of noise from proposed plants will be driven by the need to minimise resultant impact within proposed dwellings. It is recommended that plant rating level within proposed dwellings be limited to no more than Noise Rating NR25 with windows opened or closed (NR25 is equivalent to 30dB L_{AeqT}).

There are a number of measures that can be introduced to control noise from the mechanical and fixed plant installation associated with the proposed development. Consideration should be given to reducing noise at point of generation (e.g. by selecting quieter plant) or containment of noise generated (e.g. by insulating buildings which house machinery and/or providing purpose-built barriers around the site).

In general, plant noise levels should be limited such that any noise impact would be negligible. Limiting noise emission levels to comply with the criteria of BS4142 as recommended should be the preferred noise control strategy.

It should be noted that the council might require a compliance statement i.e. to the design limit above if it is decided to introduce a potentially noisy item of plant at the site during the construction or completion phase of the project.

7. CONCLUSION

Noise survey and assessment has been carried out in support of the planning application for the redevelopment of the former Fox and Hounds site London Road, Northfleet, Gravesend, DA11 9JH for residential use.

Throughout, the assessment has been undertaken with reference to relevant British Standards and national guidance on noise impacts.

The level of airborne sound insulation to be provided by the proposed building envelope has been determined and where required, recommendation has been made to ensure that resultant internal ambient noise complies with the criteria recommended in British Standard BS8233: 1999, Sound Insulation and Noise Reduction for Buildings – Code of Practice, and World Health Organisation (WHO) 'Guidelines for Community Noise'.

To minimise risk of noise nuisance to the surrounding community after the completion of the proposed development, plant noise target design levels have also been recommended. These will aid the selection of appropriately quiet plant and where necessary enable design of mitigation measures, such that the existing background noise levels in the area should not be adversely affected.

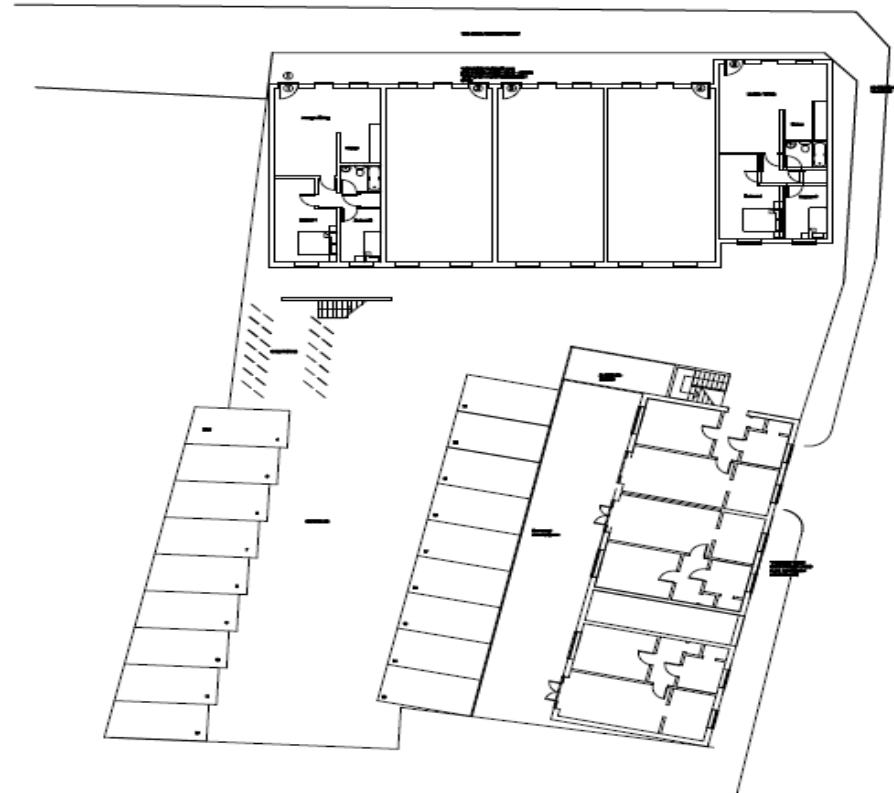
FIGURE 1: SITE LOCATION AND LAYOUT PLAN



Receptor Locations – Former Fox & Hound Site

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Figure No.1



SITE LAYOUT - FLATS

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Figure No.2

APPENDIX 1: NOISE SURVEY RESULT

EVENING MP1					
Date & Time	Duration	L _{Aeq} dB	L _{AFMax} dB	L _{A10} dB	L _{A90} dB
(2013/03/19 19:03:27.00)	(0:5:0.0)	68.5	81.2	72.7	52.4
(2013/03/19 19:08:29.00)	(0:5:0.0)	68.5	80.7	72.3	55
(2013/03/19 19:13:31.00)	(0:5:0.0)	68	82.4	72.2	49.5
(2013/03/19 19:18:34.00)	(0:5:0.0)	68.7	82	72.7	51.1
(2013/03/19 19:23:35.00)	(0:5:0.0)	67.3	84.9	71.7	48.1
(2013/03/19 19:28:38.00)	(0:5:0.0)	68.1	81.9	72.6	50.7
(2013/03/19 19:33:39.00)	(0:5:0.0)	67.2	86.4	71.2	48.8
(2013/03/19 19:38:41.00)	(0:5:0.0)	68.2	81.1	72.6	49.9
(2013/03/19 19:43:44.00)	(0:5:0.0)	67.6	83.4	71.8	48.6
(2013/03/19 19:48:46.00)	(0:5:0.0)	65.1	77.4	70.1	42.2
(2013/03/19 19:53:48.00)	(0:5:0.0)	68.1	81.4	72.4	49.9
(2013/03/19 19:58:50.00)	(0:5:0.0)	66.1	80.7	70.8	48.8
(2013/03/19 20:03:52.00)	(0:5:0.0)	66.9	79.7	71.6	44.3
(2013/03/19 20:08:54.00)	(0:5:0.0)	68.3	87.2	72.2	46.5
(2013/03/19 20:13:56.00)	(0:5:0.0)	66.5	79.1	71.2	47.8
(2013/03/19 20:18:58.00)	(0:5:0.0)	67.2	82.1	72	45.6
(2013/03/19 20:24:00.00)	(0:5:0.0)	67.5	81.1	71.7	49.3
(2013/03/19 20:29:02.00)	(0:5:0.0)	65.4	79.9	70.2	43.6
(2013/03/19 20:34:04.00)	(0:5:0.0)	65.4	77.8	70.2	47.3
(2013/03/19 20:39:06.00)	(0:5:0.0)	67.6	82	71.9	44.6
(2013/03/19 20:44:08.00)	(0:5:0.0)	71.8	0	72.8	46.2
(2013/03/19 20:49:10.00)	(0:5:0.0)	65.5	78.7	70.4	45.7
(2013/03/19 20:54:12.00)	(0:5:0.0)	66.7	78.2	71.6	47.3
(2013/03/19 20:59:14.00)	(0:5:0.0)	67.6	81.9	72.2	45.5
(2013/03/19 21:04:17.00)	(0:5:0.0)	65.5	79.4	70.5	44.6
(2013/03/19 21:09:19.00)	(0:5:0.0)	66.7	82.1	71.3	45.1
(2013/03/19 21:14:21.00)	(0:5:0.0)	67.3	79	71.9	47
(2013/03/19 21:19:23.00)	(0:5:0.0)	66.5	80.7	72	41
(2013/03/19 21:24:25.00)	(0:5:0.0)	66.7	81.9	71.3	44.4
(2013/03/19 21:29:27.00)	(0:5:0.0)	68.2	88.4	72	45.3
(2013/03/19 21:34:29.00)	(0:5:0.0)	67	80.4	72	47
(2013/03/19 21:39:31.00)	(0:5:0.0)	65.9	87.3	69.7	41.2
(2013/03/19 21:44:34.00)	(0:5:0.0)	65.7	78	71	47.7
(2013/03/19 21:49:36.00)	(0:5:0.0)	65.3	82.1	70.2	44.8
(2013/03/19 21:54:38.00)	(0:5:0.0)	67	81.7	71.6	47.6
(2013/03/19 21:59:40.00)	(0:5:0.0)	67	81.1	72.2	45
(2013/03/19 22:04:42.00)	(0:5:0.0)	63.4	77.9	68.2	37.1
(2013/03/19 22:09:44.00)	(0:5:0.0)	66.5	79.8	71.1	46.3

(2013/03/19 22:14:47.00)	(0:5:0.0)	68.5	86.1	73	46.3
(2013/03/19 22:19:49.00)	(0:5:0.0)	64.8	79	69.7	42.7
(2013/03/19 22:24:51.00)	(0:5:0.0)	65.2	80.4	70.6	42
(2013/03/19 22:29:53.00)	(0:5:0.0)	66.6	78.4	71.6	41.4
(2013/03/19 22:34:55.00)	(0:5:0.0)	64.5	79.4	69.6	42.5
(2013/03/19 22:39:57.00)	(0:5:0.0)	63.9	82.2	67.4	38.5
(2013/03/19 22:44:59.00)	(0:5:0.0)	62.5	75.3	68.2	39.6
(2013/03/19 22:50:01.00)	(0:5:0.0)	63.5	77.6	68.7	35.2
(2013/03/19 22:55:03.00)	(0:5:0.0)	63.3	80.1	68.1	42.4
		67	88	71	35
NIGHT-TIME MP1					
(2013/03/19 23:00:06.00)	(0:5:0.0)	62.8	78.5	67.4	41.8
(2013/03/19 23:05:08.00)	(0:5:0.0)	64.2	80.7	69.5	42.1
(2013/03/19 23:10:10.00)	(0:5:0.0)	63.9	78.6	69.1	42.4
(2013/03/19 23:15:12.00)	(0:5:0.0)	65.2	83.1	69.5	41.9
(2013/03/19 23:20:14.00)	(0:5:0.0)	60	77.5	63	37.5
(2013/03/19 23:25:17.00)	(0:5:0.0)	64	80.6	68.6	38.2
(2013/03/19 23:30:19.00)	(0:5:0.0)	62.1	76.2	67.2	37.8
(2013/03/19 23:35:21.00)	(0:5:0.0)	64.2	79.6	68.8	40
(2013/03/19 23:40:23.00)	(0:5:0.0)	61.6	79.7	64.1	37.6
(2013/03/19 23:45:25.00)	(0:5:0.0)	61.1	79.8	61.2	36.8
(2013/03/19 23:50:27.00)	(0:5:0.0)	63	79.4	67.5	38.5
(2013/03/19 23:55:29.00)	(0:5:0.0)	63.2	77.4	67.3	37.9
(2013/03/20 00:00:31.00)	(0:5:0.0)	63.8	80.8	67.5	40
(2013/03/20 00:05:33.00)	(0:5:0.0)	65.6	81.7	69.3	40.4
(2013/03/20 00:10:35.00)	(0:5:0.0)	65.2	86.5	66.7	39.3
(2013/03/20 00:15:37.00)	(0:5:0.0)	62.5	80.5	63.1	36
(2013/03/20 00:20:40.00)	(0:5:0.0)	62.8	81.7	65	37.7
(2013/03/20 00:25:41.00)	(0:5:0.0)	64.1	82.8	66.5	39.4
(2013/03/20 00:30:43.00)	(0:5:0.0)	62.3	78.1	65.8	36.7

MP1 DAYTIME (20 TH March 2013)				
Time	L _{Aeq} dB	L _{Amax} dB	L _{A10} dB	L _{A90} dB
10.05	69.70	82.5	73.8	55.7
10.20	68.6	79.2	72.7	54.2
10.35	68.40	79.2	72.1	57
10.50	68.40	83.8	72.3	52.6
11.05	69.00	81.5	73	53.1
11.20	69.60	82.2	73.2	54
11.35	69.60	80.2	73.8	54.7
11.50	68.80	81.2	72.9	55

12.05	70.30	90.6	73	51.4
12.20	67.90	81.4	71.8	49.5
12.35	68.50	77.4	72.4	55.2
12.50	67.30	77.6	71.6	52.7

APPENDIX 2: NOISE BREAK-IN CALCULATION

Sound transmission by percentage view of different building elements										
	Project:	Fox & Hound				Date:	26-Mar-13			
	Building elements & Areas					Total M ²				
	solid brickwork (255mm)			81%		15.40				
	Glazing 6/6/8.8			18%		3.50				
	Fresh TVS4DB			1%		0.20				
	Door			0%		0.00				
			Total			19.10				
	Distance to source		3	Façade LAeq (Day)						
	Total distance to		3.00							
	receiver point									
			W	L	H	Rt (s)				
	Room Data	Volume	3.00	4.00	2.70	0.50	32.40			
		63.0	125.0	250.0	500.0	1K	2K	4K		
	Source Lp	74.30	70.60	65.40	65.40	61.20	63.00	67.90	71.5	
	solid brickwork (255mm)	33.0	37.0	42.0	52.0	60.0	63.0	68.0	54 (C: -1; Ctr: -6) dB	
	Glazing 6/6/8.8	21.0	24.0	26.0	40.0	48.0	46.0	54.0	41 (C: -3; Ctr: -7) dB	
	Fresh TVS4DB	38.0	42.0	40.0	34.0	41.0	40.0	37.0	39 (C: 0; Ctr: -1) dB	
	Door	23.0	26.0	27.0	34.0	40.0	38.0	46.0		
	Composite ®	27.3	30.5	32.9	45.6	53.4	52.2	55.3	47 (C: -3; Ctr: -7) dB	

	10log-ST/0.163xV	2.6	2.6	2.6	2.6	2.6	2.6	2.6		
	Distance Loss	0	0	0	0	0	0	0		
	Factor	3	3	3	3	3	3	3		
		63.0	125.0	250.0	500.0	1K	2K	4K	dBA	
	Resultant	53	46	38	25	13	16	18	34.5	
	35.00	63	52	45	39	35	32	30		
	diff	-10	-7	-6	-13	-22	-16	-12		
	<u>Notes</u>									

Sound transmission by percentage view of different building elements										
	Project:	Fox & Hound					Date:	26-Mar-13		
	Building elements & Areas					Total M ²				
	solid brickwork (255mm)			80%		4.00				
	Glazing 6/6/8.8			20%		1.00				
	Fresh TVS4DB			0%		0.00				
	Door			0%		0.00				
				Total		5.00				
	Distance to source		3	Façade LAeq (Night)						
	Total distance to		3.00							
	receiver point									

			W	L	H	Rt (s)				
	Room Data	Volume	2.50	4.00	2.70	0.50	27.00			
		63.0	125.0	250.0	500.0	1K	2K	4K		
	Source Lp	66.7	64.7	60.1	60.1	56.7	57.2	62.4	66.1	
	solid brickwork (255mm)	33.0	37.0	42.0	52.0	60.0	63.0	68.0	54 (C: -1; Ctr: -6) dB	
	Glazing 6/6/8.8	21.0	24.0	26.0	40.0	48.0	46.0	54.0	41 (C: -3; Ctr: -7) dB	
	Fresh TVS4DB	38.0	42.0	40.0	34.0	41.0	40.0	37.0	39 (C: 0; Ctr: -1) dB	
	Door	23.0	26.0	27.0	34.0	40.0	38.0	46.0		
	Composite ®	27.0	30.2	32.6	46.0	54.0	52.7	60.3	47 (C: -3; Ctr: -7) dB	
	10log-ST/0.163xV	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5		
	Distance Loss	0	0	0	0	0	0	0		
	Factor	3	3	3	3	3	3	3		
		63.0	125.0	250.0	500.0	1K	2K	4K	dBA	
	Resultant	40	35	28	15	3	5	3	23.7	
	35.00	63	52	45	39	35	32	30		
	diff	-23	-17	-17	-24	-32	-27	-27		
	Notes									

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	10log-ST/0.163xV	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3		
	Distance Loss	0	0	0	0	0	0	0		
	Factor	3	3	3	3	3	3	3		
		63.0	125.0	250.0	500.0	1K	2K	4K	dBA	
	Resultant	64	58	45	28	22	27	16	44.4	
	35.00	63	52	45	39	35	32	30		
	diff	1	5	0	-11	-13	-5	-14		
	<u>Notes</u>									

APPENDIX 3: GLOSSARY AND ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The human ear responds to sound over the frequency range of about 20 Hz to 20 kHz and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude and is more responsive to mid-frequencies than to lower or higher frequencies.

To quantify noise in a manner that approximates to the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear. The most widely used weighting mechanism that corresponds to the response of the human ear is the A-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} , etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) of a steady source is generally regarded as the minimum difference needed to perceive a change.

Since environmental noise usually varies continuously from second to second it is impractical to specify the sound level of each second. As such human response has been related to various indices, which allow for the fluctuating nature of sound. These indices include;

$L_{Aeq, T}$ - The A-weighted equivalent continuous sound pressure level. A representation of a continuous sound level containing the same amount of sound energy as the measured varying noise over the measurement period, t .

$L_{A90, T}$ - The A-weighted sound pressure level that is exceeded for 90% of the measurement period, t . This is commonly used as the 'Background Noise Level' for assessing the effects of industrial noise in the UK.

$L_{A10, T}$ - The A-weighted sound pressure level that is exceeded for 10% of the measurement period, t . This is commonly used in the UK for describing traffic noise levels.

L_{Amax} - The highest A-weighted noise level recorded during a noise measurement period.

Common Sounds on the dB(A) Scale

dB(A)	Description
140	Threshold of pain
120	Jet take off at 50 metres
100	Maximum noise levels on an underground platform
80	Kerbside of a busy urban street
60	Busy general office
40	Residential area at night
20	Background in a TV and recording studio
0	Threshold of hearing
