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Proposed Residential Development 61-63 Moor Lane, Gomersal, BD19 4LF

Noise Impact Assessment

For:
Den Architecture

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Contents

1 Introduction

1.1 Overview

Environmental Noise Solutions Ltd (ENS) has been commissioned by Den Architecture (hereafter referred to as 'the client') to undertake a noise impact assessment for a proposed residential development at 61-63 Moor Lane, Gomersal, BD19 4LF (hereafter referred to as 'the site').

This report details:

- The methodology and results of a noise survey conducted at the site
- The assessment of potential impact with regard to existing local noise sources that may affect the proposed residential units
- Recommendations for the building envelope (fenestration and ventilation)

The report has been prepared on behalf of the client for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties referring to the report should consult the client and ENS as to the extent to which the findings may be appropriate for their use.

A glossary of acoustic terms used in the main body of the text is contained in Appendix A.

1.2 Site Description and Proposals

The site is located at the junction of Moor Lane and Dewsbury Road (A652), in Gomersal, Cleckheaton with the approximate site boundary indicated in red on Figure 1.1 below. The site is presently occupied by The Dancing House, a former mill building in multiple occupation offering various activity and entertainment spaces as well as a café at ground floor.

Figure 1.1: Location of Proposed Development

The site is bounded to the north-west by residential dwellings along Summerdale, and to the north-east by Dewsbury Road, with a single residential dwelling approximately 25m beyond the site boundary. To the south the site is bounded by Moor Lane, with residential dwellings approximately 15m beyond, whilst the western boundary is adjoined by a residential dwelling at 59B Moor Lane

The area surrounding the site to the north, west and south is primarily residential in nature, whilst the land to the east is a mixture of public open space, woodland and land associated with Gomersal Park Hotel. The M62 runs east to west, approximately 375m north of the development.

The proposals are for the redevelopment of the existing three storey building and construction of a two-storey extension to form new residential dwelling apartments, plus associated car parking and access works.

2 Noise Criteria

2.1 Assessment Guidance

British Standard 8233:2014

British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS8233)[1] provides recommendations for the control of noise both in and around buildings and suggests criteria and limits appropriate to their function. For residential dwellings, the main considerations are:

- Bedrooms - the effect of noise upon sleep
- Other habitable rooms - the effect of noise upon resting, listening and communicating

It is desirable that the internal ambient noise level does not exceed the guideline values as replicated in Table 2.1.

Table 2.1: Indoor Ambient Noise Levels for Dwellings – BS 8233:2014

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

BS8233 states:

'If relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.'

[1] British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings. BSI

ProPG Planning and Noise: New Residential Development

ProPG Planning and Noise: New Residential Development (ProPG)[2] recommends compliance with indoor noise level targets in residential dwellings based on the guidance contained in BS 8233 (see Table 2.1). Additionally, with regard to individual noise events, ProPG states:

'Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night.'

ProPG acknowledges that the internal target noise levels may only be practically achieved with windows closed in certain areas (e.g. in urban areas or sites adjacent to transportation noise sources) and states that:

'In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide 'whole dwelling ventilation' in accordance with Building Regulations Approved Document F (e.g. trickle ventilators in the open position).

It should also be noted that the internal noise level guidelines are generally not applicable under 'purge ventilation' conditions as defined by Building Regulations Approved Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).'

Approved Document F: 2021

Approved Document F (ADF) supports Part F of Schedule 1 to the Building Regulations 2010. This document took effect on 15 June 2022 for use in England. It does not apply to work subject to a building notice, full plans application or initial notice submitted before that date, provided the work for each building is started before 15 June 2023. Full detail of the transitional arrangements can be found in Circular Letter 01/2021 published on gov.uk.

Minimum ventilation areas are defined for habitable rooms of dwellings. Table 1.7 (of ADF) gives the minimum equivalent area for passive background ventilators for habitable rooms of dwellings as 8000 mm^2.

Where continuous mechanical extract ventilation is provided, background ventilators should provide a minimum equivalent area of 4000m^2 per habitable room.

[2] 'ProPG Planning and Noise: New Residential Development (ProPG)', 2017. Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH)

3 Noise Survey and Results

3.1 Overview

To assess noise levels affecting the proposed development, a noise survey was undertaken between Wednesday 3rd and Thursday 4th August 2022. At the time of the survey, the Dancing House was open, offering a café service during the early portion of the daytime measurements.

Noise measurements were made at two positions, at a height of approximately 4m above ground level during both the day and night time periods.

The selected noise monitoring positions are illustrated on the site plan presented as Appendix B, and described below:

- Position 1 – approximately 10m from the A652 to the north-east, representative of the easterly façade of the proposed new dwellings
- Position 2 – at the site boundary adjacent to Moor Lane to the south, representative of the southern façade of the development.

The sound level meter was connected to a windshield covered microphone in free-field conditions. The calibration of each measurement system was verified immediately before and after the survey period using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration levels greater than 0.5 dB was noted.

Measurements consisted of A–weighted broadband parameters including L_{Aeq}, L_{A10}, L_{A90} and L_{AFmax} together with linear octave and third octave band data.

Weather conditions were considered appropriate for noise monitoring, being warm and dry with average wind speeds < 5ms^{-1}.

3.2 Summary of Results

Table 3.1 presents a summary of the noise data for each measurement session, rounded to the nearest decibel.

Table 3.1: Summary of Noise Measurement Data

Position	Date	Time (hh:mm)	$L_{Aeq,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
1	03/08/2022	11:42-12:42	59	63	51
		13:45-14:53	60	63	51
		15:59-17:00	61	64	53
		19:00-23:00	61	66	48
	03/08/2022-04/08/2022	23:00-07:00	57	55	43
2	03/08/2022	12:44-13:44	57	60	51
		14:58-15:58	58	61	52
		17:01-18:01	59	61	53

Maximum noise levels measured during the night time period at monitoring position 1 ranged from 43 to 96 dB $L_{Amax,F}$, with typical levels not exceeding 76 dB $L_{Amax,F}$. Based on measurements made during the daytime period, maximum noise levels at position 2 are expected to be comparable to those measured at position 1.

3.3 Analysis

Noise levels at each of the monitoring positions were generally controlled by a combination of local and distant road traffic noise, with minor contributions from on-site activities.

The data acquired at the monitoring positions has been analysed to determine representative day and night noise spectrums affecting the most noise affected façades, with the results presented in Table 3.2.

Table 3.2: Spectral Content of Ambient Noise

Position	Time Period	dB L_{eq} per Octave Band Centre Frequency (Hz)					dB L_{Aeq}
		125	250	500	1k	2k	
1	Day (07:00 – 23:00)	62	58	56	58	50	60
	Night (23:00 – 07:00)	52	53	54	55	48	57
2	Day (07:00 – 23:00)	61	56	53	55	49	58

4 Assessment

4.1 Internal Noise Levels

Feasibility of Open Windows

With regard to internal noise levels when windows are open, the World Health Organisation (WHO) Guidelines for Community Noise (1999) states:

'the noise reduction from outside to inside with the window partly open is 15 decibels'.

Based on the noise levels summarised above in Table 3.2, noise levels at the development are above the level at which ventilation via partially open windows or closed standard double glazing would be suitable. On this basis, it is not recommended that permanently open windows or standard (non-acoustic) trickle events are relied upon as the primary means of ventilation for proposed habitable rooms in these areas.

A scheme of sound insulation will be required with ventilation provided by acoustically attenuated ventilation such that the minimum ventilation rates specified in Approved Document Part F can be achieved with windows closed. Typically, this would take the form of acoustic trickle ventilators in window frames.

The assessment has therefore assumed that windows will be closed, as part of the noise mitigation strategy for the site. Windows can be opened for temporary purge ventilation (to enable discretionary rapid air changing) with resultant internal levels exceeding the noise criteria; however, this would be on a temporary basis.

Closed Windows

Calculations have been performed to determine the configuration of glazing and ventilation required to satisfy the internal noise criteria with closed windows. Calculations incorporate the measured external noise level data and the noise ingress calculation methodology outlined in Annex G.2 of BS8233:2014. Room and façade dimensions are speculative, assuming a façade area of $3m^2$ with $2m^2$ of glazing and a total volume of $37m^3$.

A system of continuous mechanical extract ventilation has been assumed, with a single Greenwood acoustic ventilator per habitable room. Minimum sound reduction values for glazing and ventilation elements are presented in Table 4.1, based on commonly available ventilation and glazing products.

Table 4.1: Required Sound Reduction of Façade Elements

Element	Required Sound Reduction (dB)						Indicative Specification
	125 Hz	250 Hz	500 Hz	1kHz	2kHz	Weighted R_w ($R_w + C_{tr}$) / $D_{n,e,w}$ ($D_{n,e,w} + C_{tr}$)	
All Façades - Bedrooms							
Glazing	22	23	31	37	35	**34 (30)**	Acoustic double glazing (8/16/8)
Ventilation	40	38	32	47	53	**42 (40)**	Greenwood 5000EAW+AC1 acoustic trickle vent
All Façades – Living Rooms							
Glazing	20	20	30	40	35	**32 (27)**	Thermal double glazing (6/16/6)
Ventilation	40	37	36	32	31	**33 (33)**	Greenwood 5000EAW acoustic trickle vent

Alternative solutions, to the indicative specifications shown in Table 4.1, may be considered if sound reduction performances are equivalent to (or greater than) those stipulated. The glazing

recommendations apply to the window within a sealed unit. It is the responsibility of the window supplier to ensure that the window frame does not compromise the performance of the glazing.

The opening and free area of the ventilation unit should be checked by a mechanical services engineer before designs are finalised. If it is necessary to increase the number of ventilation openings, the required sound reduction of the ventilation units should be increased accordingly (3 dB per doubling of required no. of vent units).

5 Summary and Conclusions

A noise impact assessment has been performed for a proposed residential development at 61 to 63 Moor Lane, Gomersal.

Noise monitoring was undertaken between Wednesday 3rd and Thursday 4th August 2022 to assess external noise levels affecting the site.

Section 4 provides recommendations for a noise mitigation strategy to provide suitable indoor and outdoor ambient noise levels for future occupants.

The scheme of mitigation proposed includes acoustic glazing for habitable rooms and either window frame mounted acoustic trickle ventilators, or through wall acoustic ventilators in conjunction with a continuous mechanical extract ventilation system.

Based on the provision of the mitigation set out in this report, suitable residential amenity can be achieved for future residents.

Appendix A – Abbreviations and Definitions

Sound Pressure Level (L_p)
The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 μPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$L_p = 20 \log_{10}(p/p_o)$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_o = reference sound pressure (20 μPa).

A-weighting
A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,\,T}$
The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, *T*, has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq,\,16h}$ (07:00 to 23:00 hours) and $L_{Aeq,\,8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10,\,T}$
The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T. $L_{A10,\,18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90,\,T}$
The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

$L_{AF\,max}$
The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Single Event Level / Sound Exposure Level (SEL or L_{AE})
The energy produced by a discrete noise event averaged over one second, regardless of the event duration. This allows for comparison between different noise events which occur over different lengths of time.

Weighted Sound Reduction Index (R_W)
Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_W is used to characterise the insulation of a material or product that has been measured in a laboratory).

Appendix B – Measurement Positions