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Proposed Care Home on Land North of Hatfield Avenue, Hatfield

Noise Impact Assessment
Planning Condition 8

For:
ADG Architects

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Ref: NIA/10068/21/10192/v1/Hatfield Avenue, Hatfield
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Contents

1 Introduction

1.1 Overview

Environmental Noise Solutions Ltd (ENS) has been commissioned by ADG Architects (hereafter referred to as 'the client') to undertake a noise impact assessment for a new 81-bed Care Home development on land north of Hatfield Avenue, Hatfield (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 of local noise which 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

The site is located north of Hatfield Avenue, and south of Manor Road, centred on grid reference: 521858,209510 within Hatfield Business Park in an area of mixed commercial and residential land uses. The site itself is understood to be a brownfield site, having previously been use as surface parking.

Figure 1.1 below indicates the approximate site boundary and surrounding properties.

Figure 1.1: Location of Proposed Development

The site is bounded to the north by Manor Road, with residential dwellings beyond. To the south east, the site is bounded by a car dealership (Porsche Centre Hatfield) whilst the western site boundary is adjoined by One Hatfield Hospital. The southern tip of the site is bounded by a shared access road used by both adjoining properties, and which will be used by the development following completion. Further south, Hadfield Avenue runs east west approximately 35m south.

2 Noise Criteria

2.1 Local Authority Requirements

Planning permission for the development was granted by Welwyn Hatfield Borough Council, subject to a number of conditions (Planning Application reference: 6/2019/2782/VAR). The following Planning Conditions are relevant to this report:

"8 No development above ground level shall take place until a glazing and ventilation scheme is submitted to and approved in writing by the Local Planning Authority. This scheme must meet the internal noise levels within BS8233:2014, the Lamax levels with the WHO Community Noise Guidelines and the Ventilation standards within the Noise Insulation Regulation 1975 (as amended). Outdoor amenity areas must not exceed the 55db WHO Community Noise Guideline Level."

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 - BS8233:2014

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

3 Noise Survey and Results

3.1 Overview

In order to assess external noise levels affecting the site, noise monitoring was undertaken between Wednesday 10th and Thursday 11th November 2021. Construction of the development was underway during the survey period, and as a result, it was not possible to undertake noise measurements within the site boundary. Representative noise measurement positions were selected to minimise the influence of on-site activity.

The adopted noise monitoring positions (illustrated in Appendix B) were as follows:

- 1 – On Hatfield Avenue, approximately 70m south-east of the site, 4m from the northern kerb;
- 2 – On Manor Road, north-east of the site, approximately 2m from the kerb; and
- 3 – On Manor Road, north west of the site approximately 0.5m from the kerb.

Noise measurements were undertaken using Bruel & Kjaer 2250 Type 1 integrating sound level meters. Each meter was connected to a windshield covered microphone. Measurements at all positions were taken at approximately 1.5m above ground level.

The calibration of the 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 band data.

Weather conditions were considered appropriate for noise monitoring throughout the survey period.

3.2 Summary of Results

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

Table 3.1: Summary of Noise Measurement Data

Position	Date	Time (hh:mm)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)	Comment
1	10/11/2021	16:10-16:25	68	-	72	60	Noise climate controlled by local road traffic
	11/11/2021	03:57-04:12	65	78	69	47	Noise climate controlled by local road traffic
		04:53-05:08	66	78	70	50	Noise climate controlled by local road traffic
		05:48-06:05	68	80	72	56	Noise climate controlled by local road traffic
		06:44-06:59	69	87	72	59	Noise climate controlled by local road traffic
		07:40-07:56	67	-	70	61	Noise climate controlled by local road traffic
		08:43-09:00	67	-	70	61	Noise climate controlled by local road traffic
		11:23-11:54	64	-	67	58	Noise climate controlled by local road traffic
2	10/11/2021	16:29-16:44	63	-	65	59	Noise climate controlled by distant and local traffic
	11/11/2021	04:16-04-32	51	71	52	46	Noise climate controlled by distant road traffic
		05:11-05:26	55	76	55	50	Noise climate controlled by distant road traffic
		06:08-06:24	59	75	60	56	Noise climate controlled by distant and local traffic
		07:02-07:17	60	-	62	56	Noise climate controlled by distant and local traffic
		07:58-08:20	61	-	64	55	Noise climate controlled by distant and local traffic
3	10/11/2021	16:45-17:07	61	-	63	51	Noise climate controlled by distant road traffic
	11/11/2021	04:33-04:49	46	61	48	44	Noise climate controlled by distant road traffic
		05:28-05:44	55	80	52	48	Noise climate controlled by distant road traffic
		06:25-06:40	56	78	56	50	Noise climate controlled by distant and local traffic

Position	Date	Time (hh:mm)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)	Comment
		07:18-07:37	62	-	65	50	Noise climate controlled by distant and local traffic
		08:21-08:40	64	-	68	51	Noise climate controlled by distant and local traffic
		12:34-13:05	58	-	60	47	Noise climate controlled by distant and local traffic

3.3 Analysis

Noise Modelling

To assess noise levels across the façade of the proposed care home, a three-dimensional noise model has been developed based on ordnance survey mapping and terrain data, and on drawings provided by the client.

Octave band spectral noise emission has been calculated from both Manor Road to the north and Hatfield Avenue to the south. All buildings are assumed to be reflective, and ground absorption assumes mixed hard/soft ground.

Figures A1 and A2 in Appendix C present predicted façade noise levels, whilst Figure A3 presents a daytime noise contour plot.

Noise Exposed Façades

Noise levels at each of the most noise affected façades are presented in Table 3.2 below.

Table 3.2: Spectral Content of Ambient Noise at Position 1

Facade	Time Period	dB L_{eq} per Octave Band Centre Frequency (Hz)					dB L_{Aeq}
		125	250	500	1k	2k	
North	Day (07:00 – 23:00)	56	52	50	55	50	57
	Night (23:00 – 07:00)	53	46	45	51	45	53
East	Day (07:00 – 23:00)	53	48	46	51	47	54
	Night (23:00 – 07:00)	50	42	41	47	42	49
West	Day (07:00 – 23:00)	53	46	44	49	45	52
	Night (23:00 – 07:00)	50	46	45	49	46	52
South	Day (07:00 – 23:00)	55	51	49	54	49	56
	Night (23:00 – 07:00)	52	45	44	50	45	52

In respect of individual noise events, the WHO Guidelines states 'For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10 to 15 times per night (Vallet & Vernet 1991)'

In the case of the application site, consideration of the night time maximum noise levels does not have a material impact upon the glazing and ventilation specification (i.e. a greater reduction is required to achieve the internal $L_{Aeq,T}$ criteria than to achieve less than 10 to 15 exceedances of 45 L_{AFMax} internally).

4 Noise Impact Mitigation Strategy

4.1 Internal Noise Levels

It is understood that habitable areas within the development will be fully mechanically ventilated via heat recovery units, which obviates the need to open windows for normal ventilation rates.

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 set out in Section 2 with closed windows. The calculations have incorporated the measured and predicted external noise level data and the noise ingress calculation methodology outlined in Annex G.2 of BS8233:2014.

The following has been assumed for assessment purposes:

- Room and façade element dimensions are based on typical bedroom dimensions from the general arrangement drawings supplied by the client (approximately 20m² floor area/24m³ volume)
- Reverberation time of 0.5 seconds for habitable areas
- Rendered blockwork external wall construction with minimum 50mm cavity and CP board inner leaf, with 75mm rigid high density rockwool. Internal façade lined with 2 no. 15mm Gyproc Soundbloc boards on 100mm C studs with 100mm clear cavity.
- A total of 2m² of glazing per bedroom

Based on the build up above, the overall sound insulation performance of the façade will be dictated by the glazing. Minimum sound reduction values are presented in Table 4.1, based on commonly available ventilation and glazing products.

Table 4.1: Required Sound Reduction of Glazing Elements

Element	Required Sound Reduction (dB)						Indicative Specification
	125 Hz	250 Hz	500 Hz	1kHz	2kHz	Weighted R_w ($R_w + C_{tr}$)	
All Façades – all habitable rooms							
Glazing	20	20	30	39	35	**33 (28)**	6/16/6 standard thermal double glazing

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 minimum sound insulation performance requirements set out in Table 4.1 are considered sufficient to achieve the BS 8233 indoor ambient noise levels set out in Section 2.

4.2 External Noise Levels

The unmitigated noise levels in the proposed external amenity areas to the north and east of the development are predicted to exceed the WHO upper guideline noise level of ≤ 55 dB $L_{Aeq,16hour}$. In areas to the west and south which benefit from the acoustic screening provided by the building massing of the development, noise levels are generally < 55 dB $L_{Aeq,16hour}$.

Mitigation of noise levels in the most exposed western and northern external amenity would be required to achieve the Planning Condition 8 requirements for outdoor amenity areas.

Based on indicative noise modelling, it would be possible to reduce noise levels in the most exposed external amenity areas to the north and east through the use of noise barrier. A close boarded timber fence at 2m above ground level on the site boundary would be sufficient to reduce noise levels across the whole site to ≤ 55 dB $L_{Aeq,16\ hour}$.

5 Summary and Conclusions

A noise impact assessment has been performed for a new residential care home development on land north of Hatfield Avenue. Planning permission for the development was granted by Welwyn Hatfield Borough Council, subject to a number of conditions including a requirement for a Noise Impact Mitigation Strategy to be agreed in writing prior to occupation of the development.

Noise monitoring was undertaken between Wednesday 10th and Thursday 11th of November 2021 to assess external noise levels affecting the site.

Section 4 of this report provides recommendations for a noise mitigation strategy to satisfy Condition 8 of the planning permission granted for the development.

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.

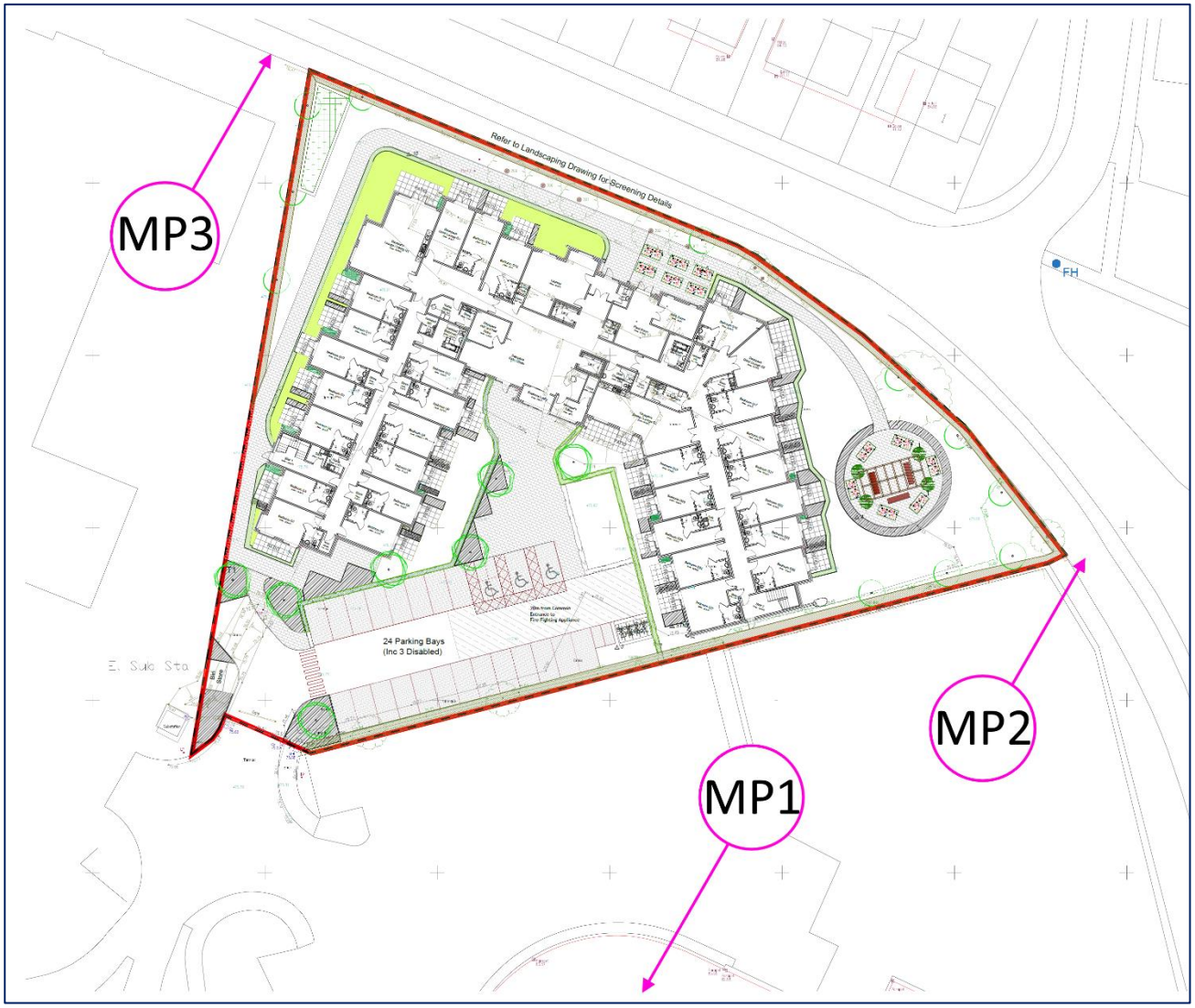
$L_{A90,\,T}$
The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

$L_{AF\,max}$
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 – Site Plan Indicating Measurement Positions



Appendix C – Façade Noise Levels

Figure A1: Daytime façade noise levels (dB $L_{Aeq,16hour}$)

Figure A2: Night Time Façade Noise Levels (dB $L_{Aeq,8hour}$)

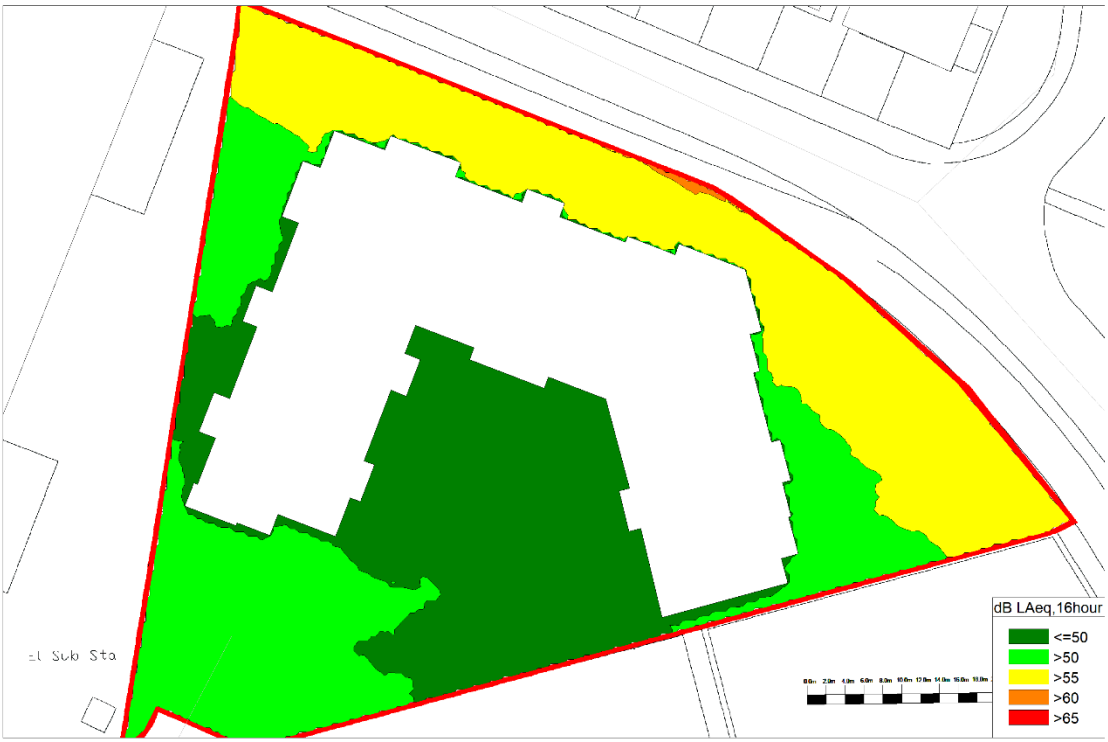


Figure A3: Daytime noise contour plot at 1.5m above ground level (dB $L_{Aeq,16hour}$)