AIRO

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ACOUSTIC DESIGN STATEMENT

LAND TO THE NORTH OF BRADMORE WAY

THE BROOKMANS ESTATE

BROOKMANS PARK

HERTFORDSHIRE

(BrP12a)

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1. INTRODUCTION

The effects of environmental noise mainly arising from the railway lying to the west of Land to the north of Bradmore Way, the Brookmans Estate, Brookmans Park, Hertfordshire (BrP12a) have been assessed in relation to proposals to develop the site.

The assessment has been based on a measurement survey at the site and the guidance given in ProPG: Planning & Noise, Professional Practice Guidance on Planning & Noise, New Residential Development (ref 1).

It may be noted that the assessment provided in this report is an initial assessment to determine whether the proposed site is viable for residential development and that the assessment should be revised as proposals develop.

2. DESCRIPTION OF THE SITE AND PROPOSALS

The land proposed for development lies to the north of Brookmans Park and adjacent to Peplins Way and Bradmore Way residential areas. Immediately to the east lies Brookmans Park Golf Club, with Peplins Wood to the north. To the west of the site lies a small wooded area before the railway embankment starts.

The nearest existing residential properties are located along Bradmore Way and Peplins Way, with the latter also adjacent to the railway line that serves Brookmans Park Station with Great Northern Rail and Thameslink operating on the line.

Rail traffic noise is the dominant sound source in the area surveyed. There is housing adjacent to the railway line throughout the current limits of Brookmans Park.

Figure 1 in Section 5 of this report provides a site location plan.

3. PROPG: PLANNING & NOISE

The guidance in ProPG describes two sequential stages: Stage 1 – an initial noise risk assessment of the proposed development site and Stage 2 – a systematic consideration of four key elements, leading to an Acoustic Design Statement.

The four elements of the Stage 2 assessment are:

Element 1 – demonstrating a "Good Acoustic Design Process"

Element 2 – observing internal "Noise Level Guidelines"

Element 3 – undertaking an "External Amenity Area Noise Assessment"

Element 4 – consideration of "Other Relevant Issues"

ProPG indicates that the scope is restricted to sites that are exposed predominantly to noise from transportation sources.

ProPG indicates that:

> ***"Where industrial or commercial noise is present on the site and is considered to be "dominant" (i.e. where the impact would be rated as adverse or greater (subject to context) if a BS4142:2014 assessment was to be carried out), then the risk assessment should not be applied to the industrial or commercial noise component and regard should be had to the guidance in BS4142:2014."***

Rail transportation noise from the East Coast Main Line is the dominant noise source at the proposed development site. There are no commercial activities close to the proposed site that contribute significantly to the ambient sound levels. The golf course, the nearby residential area, the natural wooded areas and surrounding fields are all low level ambient sound environments.

4. NOISE MEASUREMENT UNITS

4.1 A-Weighted Equivalent Continuous Sound Level - $L_{Aeq,T}$

As its name suggests, the $L_{Aeq,T}$ is a measure of the acoustic energy of a fluctuating noise climate over a given period T expressed as the single continuous noise level having the same energy as the time varying signal.

The 'A' within the descriptor means A-weighted, an internationally agreed frequency response generally similar to that of the human ear so that A-weighted sound levels in dB correspond reasonably well with what is heard.

For assessment purposes, the day is typically divided into a 16-hour daytime period (07:00 to 23:00) and an 8-hour night-time period (23:00 to 07:00). The period values may be derived from the logarithmic average of the relevant hourly values.

4.2 Maximum Noise Level - L_{AFmax}, L_{ASmax}

In some circumstances it is useful to quantify the maximum level of fluctuating noise and a commonly used descriptor is L_{Amax}. The L_{Amax} represents the maximum reading given by a sound level meter for a given event or period of time and is usually qualified by F for 'Fast' or S for 'Slow' according to the response time setting of the meter.

4.3 A-Weighted Percentile Noise Levels - L_{An}

Percentile noise levels are a statistical representation of the time varying level. The value is the noise level L exceeded for n% of the period T.

To measure background environmental noise levels the statistical index L_{A90} is commonly preferred. The L_{A90} is the Sound Pressure Level that is exceeded for 90% of the measurement period. The L_{A90} therefore discriminates against short duration peaks of noise and is consequently considered to provide a better representation of typical minimum noise levels compared with, for example, the L_{Aeq}.

5. PROPG STAGE 1 - INITIAL SITE NOISE RISK ASSESSMENT

An Initial Site Noise Risk Assessment has been made based on a sound measurement survey at two locations within the proposed site.

5.1 Measurement Survey

Sound level measurements were made for 24 hours at the site between 13:00 hours on Monday 7 March and 14:00 hours on Tuesday 8 March 2022.

Hourly noise level measurements were made over the period using automatic data logging sound level meters at two positions.

Position 1 was located in the woods by the railway line close to the field fence (51°43'38"N, 0°12'15"W). The microphone was located at a height of approximately 1.5 metres above local ground level in otherwise free-field conditions.

Position 2 was located in the field close to the golf club boundary (51°43'37"N, 0°11'58"W). The microphone was located at a height of approximately 1.5 metres above local ground level in otherwise free-field conditions.

Figure 1 provides a site location plan on which the approximate measurement locations are shown. Details of the measurement equipment, recorded weather conditions and hourly noise levels for the full survey period are given in Appendix A.

Graphical representations of the noise levels measured during the survey period are presented in Figures 2 and 3.

Figure 1 – Existing Site Plan indicating Measurement Positions

Table 1 – Summary of Period Noise Levels at BrP12a

Period	Free-Field Noise Levels in dB	
	Position 1	Position 2
	L_{Aeq}	L_{Aeq}
Daytime	56	45
Night-time	52	45

Figure 2 – L_{Aeq} Noise Level Time History at Position 1

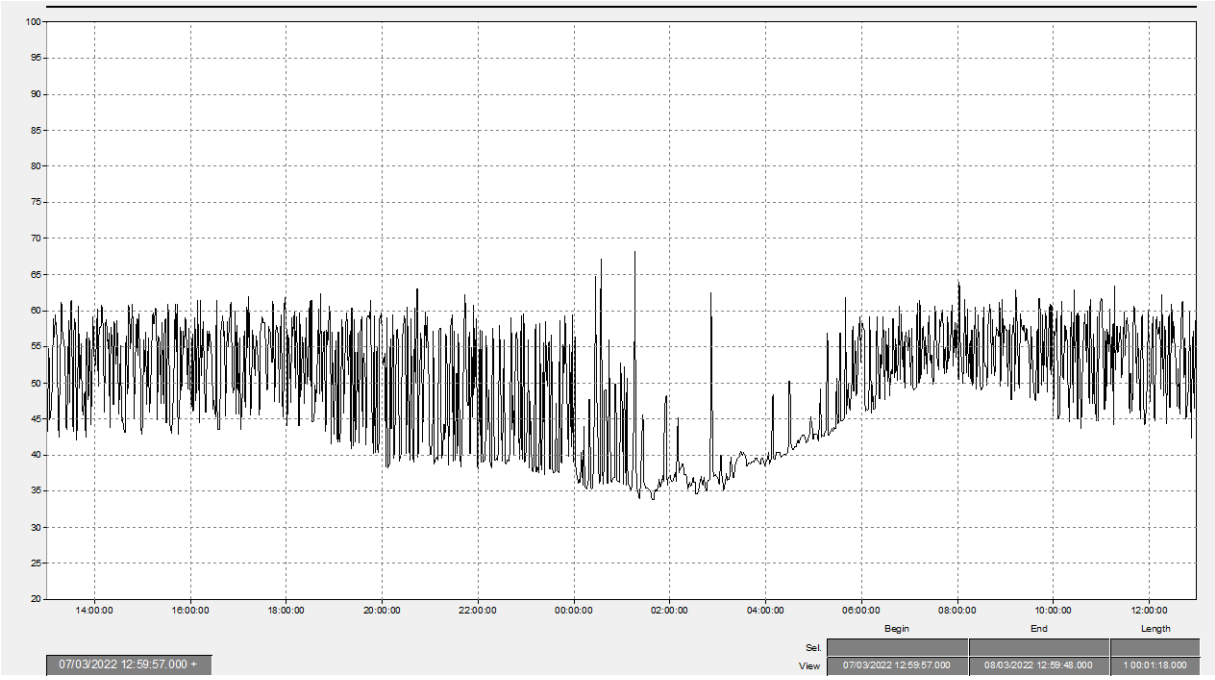
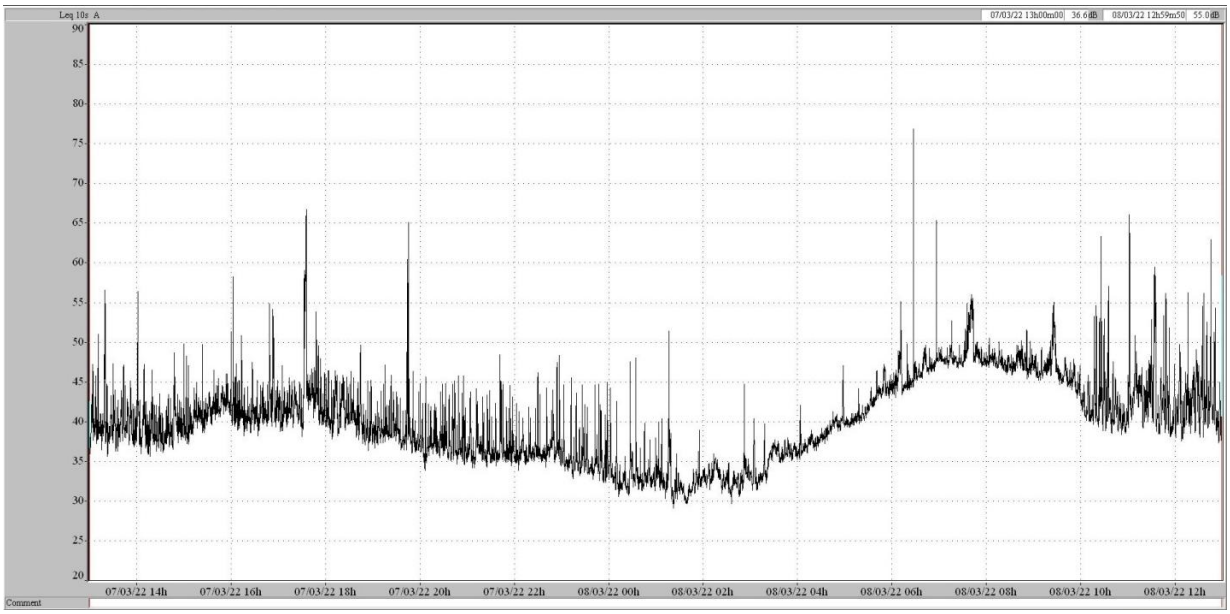


Figure 3 – L_{Aeq} Noise Level Time History at Position 2



5.2 Initial Site Noise Risk Assessment

Comparison of the noise levels across the site with those set out in Figure 1 of ProPG allows the site noise risk assessment to be carried out.

At Position 1, the daytime sound level of 56 dB would be classified as Low Risk, according to ProPG. The night-time sound level of 52 dB at Position 1 is equidistant between the Low and Medium Risk ProPG classifications.

At Position 2, the daytime and night-time ProPG classifications would be Negligible and Low respectively.

The relevant advice from Figure 1 in ProPG is reproduced below:

> ***"At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.***
>
> ***As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.***
>
> ***High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice."***

6. PROPG STAGE 2 - FULL ASSESSMENT

The four elements of ProPG Stage 2 assessment are set out below.

6.1 Element 1 – Good Acoustic Design Process

ProPG sets out a checklist of 7 items for consideration as part of Element 1.

Table 2 sets out the checklist and the responses in relation to the proposed development.

Table 2 – Element 1 Checklist	
The Planning Application Must	Response
(a) Check the feasibility of relocating or reducing noise levels from relevant sources.	The existing dominant source cannot be relocated.
(b) Consider options for planning the site or building layout.	The site is set back from the railway. Within the site the proposed units are concentrated towards the east furthest from the railway. The care home provides a barrier block closest to the railway screening units behind.
(c) Consider the orientation of proposed buildings.	See (b) above.
(d) Select construction types and methods for meeting building performance requirements.	See Section 6.2.
(e) Examine the effects of noise control measures on ventilation fire regulations, health and safety, cost, CDM (Construction, design and management) etc.	Only conventional noise control measures are likely to be needed which are unlikely to significantly affect the areas cited.
(f) Assess viability of alternative solutions.	See (b) above.
(g) Assess external amenity area noise.	See Section 6.3

6.2 Element 2 – Internal Noise Level Guidelines

ProPG cites BS 8233 (ref 2) as suitable guidance for internal noise levels. ProPG provides additional guidance compared with BS 8233 in respect of maximum noise levels from regular individual noise events at night. Table 3 below summarizes the relevant internal noise level limits for environmental noise from these sources.

Table 3 – Internal Sound Level Design Limits			
Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Room	35 dB $L_{Aeq,16h}$	--
Dining	Dining Room/area	40 dB $L_{Aeq,16h}$	--
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$ Not normally exceed 45 dB L_{AFmax} more than 10 times a night

The closest residential (care home) block is approximately 34 metres further from the railway than measurement Position 1. At this increased distance sound levels may be expected to be at least 2 dB lower than at Position 1.

Table 4 sets out the minimum sound level reductions at the closest elevation of the care home to the railway for the daytime and night-time periods in order to achieve the internal sound level design limits of Table 3.

Table 4 – Minimum Outside to Inside Sound Level Reductions at Closest Elevation to the Railway			
Period	Free-Field Sound Level $L_{Aeq,T}$ (dB)		Minimum Reduction (dB)
	Outside	Inside	
Daytime	54	35	19
Night-time	50	30	20

In relation to maximum sound levels at night, the time history has been analyzed to identify the maximum sound level of the 11th noisiest event at Position 1. The L_{AFmax} of the 11th noisiest event at Position 1 has been determined to be 71 dB. At the closest care home elevation, the L_{AFmax} is unlikely to exceed 69 dB more than 10 times in a night-time period.

Accordingly, a minimum reduction of 69 – 45 = 24 dB is required from outside to inside.

Paragraphs 2.33 and 2.34 of ProPG say:

> ***"2.33 It should be noted that the acoustic performance of the building envelope will be reduced in the event windows are opened for ventilation or cooling purposes, typically reducing the insulation to no more than 10 to 15 dB(A). Most residents value the ability to open windows at will, for a variety of reasons, and LPAs should therefore normally request that designers principally aim through the use of good acoustic design, to achieve the internal noise level guidelines in noise sensitive rooms with windows open. Where internal noise levels are assessed with windows closed the justification for this should be included in the ADS.***
>
> ***2.34 Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment. 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 (see Supplementary Document 2). Furthermore in this scenario the internal L_{Aeq} target noise levels should not generally be exceeded."***

The minimum reductions necessary for the closest elevation to the railway exceed the reduction provided through a partially open window.

However, with windows closed and ordinary trickle ventilators open to provide continuous ventilation, a reduction in sound level from outside to inside of about 25 dB may be expected. Such a reduction exceeds the minimum requirements at the closest (worst case) elevation to the railway.

Therefore, ordinary windows fitted with trickle ventilators in the open position should provide sufficient sound level reductions to meet internal sound level criteria throughout the site.

It would also be expected that the vast majority of units would continue to meet internal sound level criteria with windows partially open.

6.3 Element 3 – External Amenity Area Noise Assessment

ProPG cites BS 8233 as suitable guidance for noise levels in external amenity areas.

BS8233:2014 states that "*the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$*". The standard continues… "*These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited.*"

The daytime sound level at the closest elevation to the railway has been determined as 54 dB $L_{Aeq,16h}$. All of the gardens and amenity space are further from the railway and/or screened by intervening units and blocks.

Therefore, the guidance in respect of external amenity spaces may be expected to be met throughout the site.

6.4 Element 4 – Assessment of Other Relevant Issues

There are no other relevant issues at this time.

7. CONCLUSIONS

This report has set out an Acoustic Design Statement according to the process described in ProPG for the proposed residential redevelopment at Land to the North of Bradmore Way, The Brookmans Estate, Brookmans Park, Hertfordshire (BrP12a).

The initial site risk assessment shows the majority of the site to be Low to Medium risk closest to the railway and Negligible to Low risk at the eastern side of the site.

It has been indicated that no enhanced sound insulation measures need be put in place to achieve current design standards inside dwellings and that external amenity spaces (gardens) would have daytime noise levels below the threshold set out in ProPG.

Report Approved by:

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REFERENCES

1. ProPG: Planning & Noise,
Professional Practice Guidance on Planning and Noise,
New Residential Development
Association of Noise Consultants, Institute of Acoustics and Chartered Institute of Environmental Health
June 2017

2. British Standard BS 8233:2014
Guidance on sound insulation and noise reduction for buildings
British Standards Institution, 2014

APPENDIX A

Noise Survey Details

Table A1 - Schedule of Noise Instrumentation		
Use	**Type**	**Serial No.**
Measuring System	Nor 140 Sound Analyser	1406786
Microphone	Nor 1225	264702
Microphone Pre-amplifier	Nor 1209	21313
Sound Level Calibrator	Nor 1251	29213
Measuring System	Cirrus CRL 703B (Unit Y)	43057
Microphone	Cirrus MK 224 (Unit Y)	891199
Calibrator	Cirrus CRL 511E (Unit Y)	43024

CALIBRATION STATEMENT

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 noise and vibration 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 7 and 8 March 2022		
	7 March 2022	8 March 2022
Temperature, °C	9°C	13°C
Relative Humidity, %	66%	46%
Wind Speed, m/s	2-4 m/s	2 m/s
Direction	Easterly	Easterly

Table A3 – Hourly Sound Levels, Land ot the North of Bradmore Way, The Brookmans Estate, Brookmans Park, Hertfordshire (BrP12a)

Start	Sound Level in dB			
	Position 1		Position 2	
	L_{Aeq}	L_{AFmax}	L_{Aeq}	L_{AFmax}
Monday 7 March 2022				
13:00	55.3	74.1	41.4	63.4
14:00	55.8	77.3	40.8	59.9
15:00	56.3	73.0	41.7	59.7
16:00	56.1	74.5	43.6	63.1
17:00	56.0	73.3	49.1	79.3
18:00	56.3	73.8	41.5	56.1
19:00	56.4	76.7	44.0	81.4
20:00	55.7	74.6	38.2	51.8
21:00	55.7	75.0	37.6	54.5
22:00	54.3	73.6	37.4	53.5
23:00	52.8	72.1	36.2	50.4
Tuesday 8 March 2022				
00:00	53.7	78.8	34.4	51.4
01:00	52.6	78.4	33.9	53.5
02:00	46.8	76.3	33.3	47
03:00	38.7	46.3	35.5	43.3
04:00	42.8	62.3	38.6	57.4
05:00	51.7	72.4	42.4	57.1
06:00	54.9	73.9	52.9	91.5
07:00	56.5	72.8	49.4	70.2
08:00	57.2	78.6	47.6	62.4
09:00	57.0	76.9	47.0	68.0
10:00	56.5	75.7	45.7	71.5
11:00	57.0	77.8	48.4	71.8
12:00	56.3	77.1	46.1	68.8
13:00	56.8	77.7	46.9	70.7
14:00	53.7	78.8	44.8	62.4