AIRO

Report No. DLW/7205 Page 1 of 11

for
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ACOUSTIC DESIGN STATEMENT

29 BROADWATER ROAD

WELWYN GARDEN CITY

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ACOUSTIC DESIGN STATEMENT

29 BROADWATER ROAD

WELWYN GARDEN CITY

1. INTRODUCTION

The environmental noise effects of proposals to redevelop 29 Broadwater Road, Welwyn Garden City have been assessed.

The proposals are to convert the existing office block to provide residential units.

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).

2. 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."***

The application site is exposed to sound from road traffic on Broadwater Road. There are vehicle hire and tyre repair units adjacent to the site along the northern side but these were not considered dominant in comparison with road traffic.

Therefore, AIRO has applied the ProPG guidance to the site.

3. INITIAL SITE NOISE RISK ASSESSMENT

An environmental sound measurement survey has been conducted at the site over the period 22 to 23 October 2018 and is reported in Appendix A.

From this measurement survey, daytime and night-time period noise levels have been calculated for comparison with Figure 1 in ProPG. Table 1 sets out the period noise levels and the noise risk assessment (negligible, low, medium or high) guided by ProPG.

Table 1 – Initial Noise Risk Assessment (ProPG)

Position	Period	Noise Level $L_{Aeq,T}$ (dB)	Noise Risk Assessment
Position 1 (Broad Court elevation)	Daytime	62	Low to Medium
	Night-time	57	Medium
Position 2 (Broadwater Road elevation)	Daytime	65	Low to Medium
	Night-time	59	Medium to High

The relevant advice from Figure 1 in ProPG for 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."***

4. FULL PROPG ASSESSMENT

The four elements of assessment are set out below.

4.1 Element 1 – Good Acoustic Design Process

ProPG sets out a checklist of 7 items for consideration as part of Element 1. Table 2 below 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 sources cannot be relocated.
(b)	Consider options for planning the site or building layout.	The options are constrained by the building that is to be converted to provide dwellings.
(c)	Consider the orientation of proposed buildings.	See (b) above.
(d)	Select construction types and methods for meeting building performance requirements.	See Section 4.2 for windows and ventilator performance requirements.
(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 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.	Not applicable.

4.2 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 Noise 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

From the measured period noise levels (see Table 1), the required minimum reductions in noise level from outside to inside are shown below in Table 4.

Table 4 – Minimum Outside to Inside Period Noise Level Reductions				
Position	Period	Noise Level $L_{Aeq,T}$ (dB)		Minimum Reduction (dB)
		Outside	Inside	
Position 1 (Broad Court elevation)	Daytime	62	35	27
	Night-time	57	30	27
Position 2 (Broadwater Road elevation)	Daytime	65	35	30
	Night-time	59	30	29

The maximum noise level exceeded by 10 events (i.e. the maximum noise level of the eleventh noisiest event) has been identified from the time history noise level data at the measurement positions. Table 5 identifies the minimum noise level reduction from outside to inside based on these data.

Table 5 – Minimum Outside to Inside Night-time Maximum Noise Level Reductions			
Position	Night-time Maximum Noise Level L_{AFmax} (dB)		Minimum Reduction (dB)
	Outside	Inside	
Position 1	75	45	30
Position 2	75	45	30

It may be seen that, during the daytime, the minimum reductions from outside to inside vary from 27 to 30 dB depending on location.

At night, the minimum reduction required is 30 dB at the measurement positions.

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 at the measurement locations (see Tables 4 and 5) exceed the reduction provided through a partially open window.

A typical window when closed (for example with 4 mm glass either side of a 6-16 mm airspace) in combination with open ordinary ventilators to provide background ventilation in accordance with Building Regulations Approved Document F, would be expected to reduce noise levels from outside to inside by about 25 dB. This assumes the window is adequately sealed when closed, of typical size, and inset in a typical masonry façade.

Referring to McBains Architecture drawing Conversion Option SK01, ordinary closed windows and open ordinary trickle ventilators would be expected to provide sufficient sound insulation to meet the internal noise level targets during the daytime for units along the eastern and south eastern elevations and during the night-time for units along the south eastern elevation.

Acoustically treated ventilators and windows with a minimum $R_w + C_{tr}$ of 27 dB are required for living rooms on the northern elevation and for some living rooms and bedrooms on the top floor.

Other living rooms and bedrooms require windows with a minimum $R_w + C_{tr}$ of 30 dB and a ventilator with a minimum $D_{n,e,w} + C_{tr}$ of 40 dB.

Data suggest windows with 10 mm glass, a 12 mm airspace and 6 mm glass can achieve this sound insulation. It is unlikely that a ventilator performance of 40 dB ($D_{n,e,w} + C_{tr}$) could be achieved by an acoustically treated though-the-frame style ventilator but might be achieved by a specialist through the wall passively attenuated ventilator or by using a carefully designed whole house (MEV or MVHR) system.

Table 6 indicates the minimum required sound insulation for different parts of the site using the plot numbering on the McBains Architecture drawing.

Table 6 – Summary of Sound Insulation Requirements			
Plots	Rooms Type	Minimum Sound Insulation	
		Windows	Ventilator
		$R_w + C_{tr}$ (dB)	$D_{n,e,w} + C_{tr}$ (dB)
1 to 4 15 to 17 29 to 34 46 to 51 63 and 72	All	30	40
5 to 10 18 to 24 35 to 41, 45 67 and 71	Bedrooms Only	30	40
4,5 18,19 35 to 37 52 to 54	Living Rooms	27	37
64 to 67, 71	Bedrooms	27	37
63 and 72	All	27	37
Everywhere Else		No Special Measures	

4.3 Element 3 – External Amenity Area Noise Assessment

There are no proposed external amenity areas.

4.4 Element 4 – Assessment of Other Relevant Issues

There are no other relevant issues.

5. CONCLUSIONS

This report has set out an Acoustic Design Statement according to the process described in ProPG for the proposed residential conversion of 29 Broadwater Road, Welwyn Garden City.

The initial site risk assessment shows the site to be generally low to medium risk but high risk along the frontage to Broadwater Road.

Overall in relation to the environmental noise exposure of the site, it is considered that noise should not be a reason for refusal of permission, subject to appropriate noise conditions to secure the measures described in this report.

Report Approved by: Report Author:

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Managing Director

Eur Ing D L Watts BEng CEng FIOA
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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

Figure A1 – Extract Drawing Indicating Measurement Locations

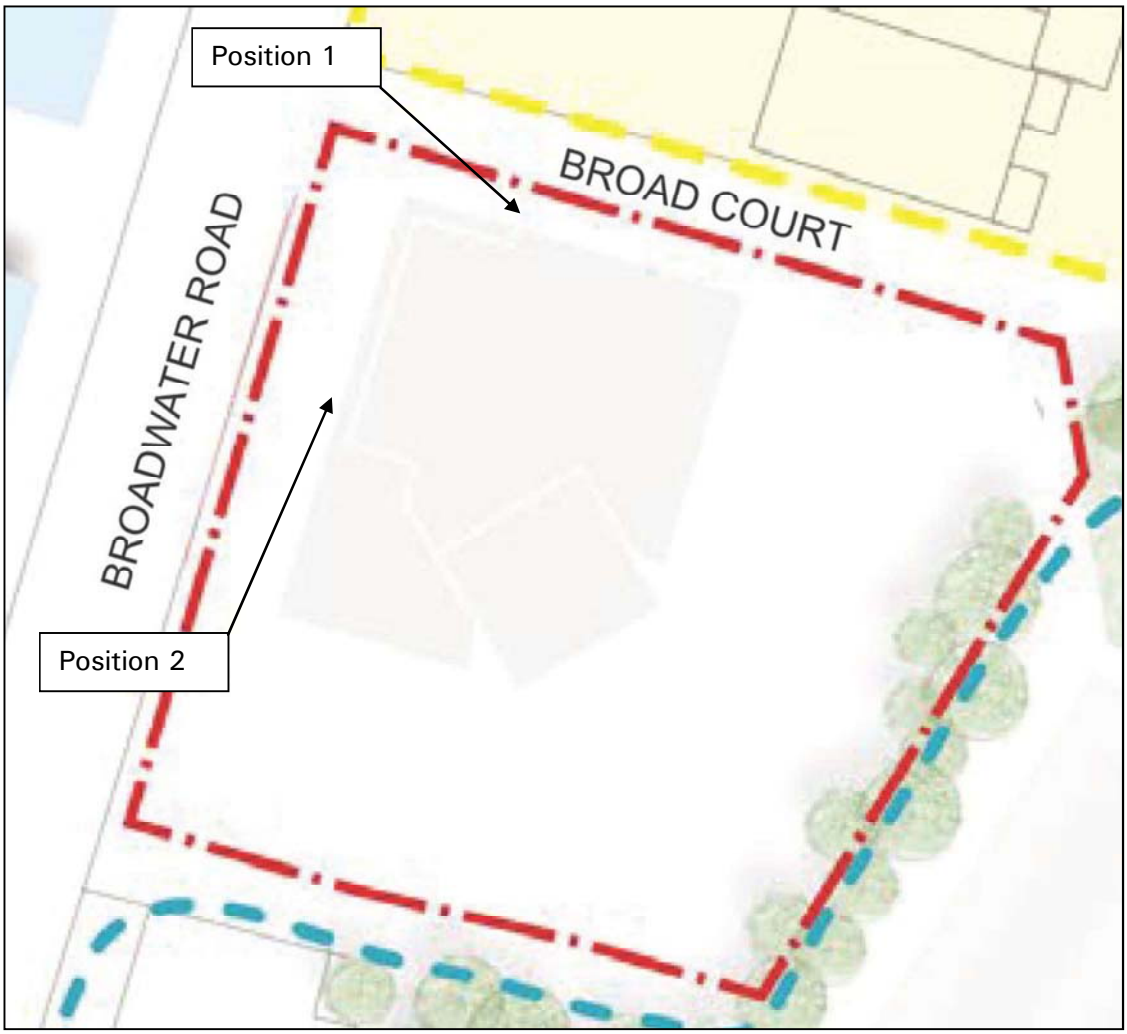

Table A1 – Noise Levels, 29 Broadwater Road, Welwyn Garden City, 22 to 23 October 2018

Start	Noise Level in dB			
	Position 1		Position 2	
	L_{AFmax}	L_{Aeq}	L_{AFmax}	L_{Aeq}
Monday 22 October 2018				
11:00	85.5	62.7	90.7	65.5
12:00	89.3	62.4	90.5	65.2
13:00	81.2	61.4	85.6	64.5
14:00	80.0	61.3	84.6	64.6
15:00	87.5	61.2	76.7	63.9
16:00	76.9	61.7	80.9	64.9
17:00	80.0	61.6	75.6	64.7
18:00	85.4	61.7	81.7	64.0
19:00	91.7	61.7	97.0	67.6
20:00	74.1	60.3	75.9	62.7
21:00	79.1	58.9	82.0	61.5
22:00	73.6	57.5	74.7	59.9
23:00	77.6	56.5	76.2	58.8
Tuesday 23 October 2018				
00:00	75.8	53.9	75.6	56.2
01:00	75.0	52.0	75.0	54.3
02:00	75.6	53.7	75.3	55.7
03:00	76.8	54.3	75.5	56.4
04:00	78.9	55.3	78.1	57.6
05:00	75.6	58.7	77.2	61.1
06:00	82.6	61.7	75.7	63.6
07:00	81.2	63.5	77.3	65.3
08:00	84.0	62.0	80.0	64.9
09:00	81.2	62.3	79.2	65.4
10:00	82.0	61.9	80.9	65.2

Table A2 - Schedule of Noise Instrumentation			
Use	Type		Serial No.
Measuring System	Cirrus CRL 703B	Position 1	43056
Microphone	Cirrus MK 226	Position 1	110792
Calibrator	Cirrus CRL 511E	Position 1	43023
Measuring System	Cirrus CRL 704B	Position 2	011182
Microphone	Cirrus MK 224	Position 2	20040519
Calibrator	Cirrus CRL 511D	Position 2	011970

CALIBRATION

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 A3 - Weather Conditions (based on 22/23 October 2018)	
Temperature ºC	4 to 14
Relative Humidity %	57 to 93
Wind Speed m/s	0 to 1
Wind Direction	Variable