UPNA Ltd

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106 Bexley Road
Erith, Kent

Noise Assessment Report

June 2021

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1. INTRODUCTION

At the request of Dave Kang of UPNA Ltd, an assessment of noise impact was carried out at 106 Bexley Road, Erith, Kent DA8 3SP in August 2017, in connection with the proposed re-development of the existing building to apartments. Since that time the scheme has been amended to include additional apartments. These are located to the rear of the building and have limited exposure to noise from Bexley Road as the bedroom windows have been designed to protrude from the eastern side of the building but facing the rear. The living room windows face the rear of the rear of the building.

The building is located on Bexley Road, the A220, a busy bus route. The assessment has been carried out according to the national planning policy recommendations and the guidelines of BS8233:2014.

The measurements and assessment have been carried out by John Hyde, a Chartered Physicist and Member of the Institute of Acoustics who has over 30 years' experience as a noise and acoustics consultant.

2. TERMINOLOGY

It has become practice to measure sound levels in decibels (dB). The decibel scale is logarithmic rather than linear. It is helpful to remember that a noise level change of 3dB on a sound meter reading would be just perceptible, and that an increase of 10 dB is perceived, subjectively, as a doubling of loudness. The human ear responds differently to sounds of different frequencies. The ear "hears" high frequency sound of a given level more loudly than low frequency sound of the same level. The A-weighted sound level, dB(A), takes this response into consideration and is commonly used for measurement of environmental noise in UK. It indicates the subjective human response to sound.

Environmental noise levels vary continuously from second to second. It is clearly impractical to specify the sound level for each second thus time averaging is required. In practice human response has been related to various units which include allowance for the fluctuating nature of sound with time. For the purpose of this report these include:

$L_{Aeq,T}$: the equivalent A-weighted continuous sound level over period T. This unit relates to the equivalent level of continuous sound for a specific time period T, for example 16 hr for daytime noise. It contains all the sound energy of the varying sound levels over the same time period, and expresses it as a continuous sound level over that period. The unit is used for assessing traffic, transportation and industrial noise for planning purposes.

$L_{A90,T}$: the A-weighted level of sound exceeded for 90% of the time period T. This latter unit is commonly used to represent the background noise, and is used in assessing the effects of industrial noise in UK.

L_{Amax} : the maximum A-weighted sound level over a period of measurement.

3 NOISE CRITERIA

Planning guidance on noise is set out in the 'Noise Policy Statement for England' (NPSE) which reinforces the three policy aims of the 'National Planning Policy Framework' as follows:

- *Avoid significant adverse impacts on health and quality of life*
- *Mitigate and minimise adverse impacts on health and quality of life*
- *Where possible, contribute to the improvement of health and quality of life*

In order to apply objective standards to the assessment of noise which uphold these policy aims, the effect of introducing a particular noise source may be determined by several methods, as follows:

- The effect may be determined by reference to guideline noise values. BS8233:1999 and WHO 'Guidelines for Community Noise' contain such guidelines
- The effect may be determined by considering the change in noise level that would result from the proposal in an appropriate noise index for the characteristic of the noise in question.
- Another method is to compare the resultant noise level against the background noise level of the area, as used in BS4142:1997 to determine the likelihood of complaints from noise of an industrial nature.

This assessment has used these methods to determine appropriate mitigation to meet the internal noise requirements of BS8233:2014 which are summarised as follows:

Criterion	*Situation*	$L_{Aeq,T}$
Reasonable resting or sleeping conditions	Living Rooms	35dB Day (16hrs)
	Bedrooms	30dB Night (8hrs)

In addition to internal noise level criteria, WHO Guidelines recommend that noise levels in amenity areas, such as gardens, should not exceed $L_{Aeq,16hr}$ of 55dB.

4 NOISE MEASUREMENTS

Measurements of noise were carried out on 21-22 August 2017 at the property. The microphone was located at 1m from the facade outside a first floor window and was protected by an outdoor weatherproof system. The building is located at 25m from Bexley Road and the measurement position is shown on Figure 1. Weather conditions throughout were dry and mild with a light south easterly wind.

The noise measurements were carried out using the following equipment:

Rion NL-52 Sound Level Meter	S/N 00284527
Rion Type NH-25 pre-amp	S/N 64652
Rion UC-59 Microphone	S/N 09677
Rion NC-74 Calibrator	S/N 34167512

The meter was calibrated before and after the measurement and no significant drifting of the calibration signal was observed.

Measurements were undertaken for a two-day period and the following parameters were recorded:

- L_{Aeq} The equivalent continuous noise level over 15 minute periods
- L_{Amax} The maximum noise level during each period
- L_{A90} The level exceeded for 90% of the time, the background level

The dominant noise source was traffic on Bexley Road with occasional high aircraft.

Staff involved with noise measurements were fully competent, being Members of the Institute of Acoustics.

A summary of the results of the noise measurements is as follows:

Daytime	$L_{Aeq,16hr}$ 60dB (from 10:00 to 23:00 on 21st and 07:00 to 10:00 on 22nd)
Night time	$L_{Aeq,8hr}$ 54dB (from 23:00 on 21st to 07:00 on 22nd)
Night time	L_{Amax} 77dB (based on typical maximum noise levels over the 15 minute periods)

The detailed fifteen-minute period results are shown in Appendix 1.

Figure 1: Location of noise measurement position X

5 ASSESSMENT

Internal Noise Levels

From the above data, the noise level at the facade of the building was taken as $L_{Aeq,16hr}$ 60dB during the day and $L_{Aeq,8hr}$ 54dB(A) at night with a typical maximum level of L_{Amax} 77dB at night due to passing vehicles. The L_{Amax} value was derived from the WHO Guideline requirement of a maximum level not being regularly exceeded, on no more than a few occasions.

Based on the measured noise levels, the external noise level at the front facade of the building would thus be 60dB during the day and 54dB at night with L_{Amax} 77dB at night. According to planning guidance and BS8233:2014, the internal noise levels within the proposed apartments on the front façade, should not exceed $L_{Aeq.16hr}$ 35dB in living rooms and $L_{Aeq,8hr}$ 30dB in bedrooms at night.

This means that an overall sound reduction of 25dB would be required in order to meet the standard in living rooms on the front facade and 24dB reduction would be required for bedrooms. At night a reduction of 32dB would be needed to meet the L_{Amax} 45dB criterion. Thus a minimum attenuation of 25dB would be required for living rooms and 32dB for bedrooms to ensure that the standards are met.

The façade attenuation has been calculated using the rigorous method in BS8233:2014. The spectrum of the measured noise is used as a source sound and the attenuation of each façade element is deducted to determine the internal noise level. The calculations are shown in Appendix 2.

In living rooms of the ground floor Flats 6, 7 and 10 on the front facade it was found that standard double-glazed units 4-16-4, giving an attenuation R_w+C_{tr} 25dB, would be suitable, giving an overall attenuation of 32dB. The attenuation would only be achieved with the windows closed thus ventilation would need to be provided. This could be achieved by using MVHR whole house systems or by using Part F system1 intermittent ventilation requirements by installing acoustic ventilators either as trickle ventilators built into the window frames or as acoustic through-wall vents. The background ventilation extract being achieved through kitchen and bathroom extract fans. The ventilators would need to provide a sound attenuation of at least D_{new} 35dB when open and the number of ventilators should provide adequate equivalent open area, as advised by the H&V engineer. The same treatment would apply to Flats 11, 12 and 13 on the first floor and to the living rooms of Flats 15 and 16 on the second floor.

In bedrooms of ground floor Flats 6 and 10 on the front façade, the required attenuation could be achieved with acoustic double glazing 6-16-6.8 laminated, such as Optiphon, which gives an attenuation R_w+C_{tr} 33dB and a façade attenuation of 35dB. As with living rooms, the attenuation would only be achieved with the windows closed thus a similar ventilation system would need to be provided. The ventilators would need to provide adequate open area and a sound attenuation of at least D_{new} 39dB when open. The same would apply to the bedrooms of Flats 11 and 13 on the first floor.

Rooms on the side facades of the building (east and west) would have a restricted angle of view of Bexley Road, resulting in a 4dB reduction to the façade noise levels, based on the methodology of the DoT publication 1988, 'Calculation of Road Traffic Noise'. This means that the same acoustic treatment as for the living rooms on the front façade, should be applied to rooms on the side facades in order to meet the required standards. This only applies to the bedrooms of Flats 8 and 13 and the living room of Flat 14.

Rooms on the rear façade of the building would not need acoustic treatment and standard openable double-glazed windows with standard trickle vents, would be suitable for sound attenuation and ventilation.

If MVHR whole house systems are not used, a summary of the recommended mitigation measures for Part F System 1 for the windows of each flat are shown in Table 1.

Table 1: Recommended acoustic mitigation for each flat

Summary of recommended mitigation measures			
Flat	**Living Room**	**Bedroom 1**	**Bedroom 2**
1	B	A	-
2	B	C	C
3	B	B	B
4	C	B	B
5	C	C	C
6	B	A	-
7	B	C	C
8	C	B	-
9	C	C	C
10	B	B	A

Summary of recommended mitigation measures			
Flat	**Living Room**	**Bedroom 1**	**Bedroom 2**
11	B	A	A
12	B	C	C
13	B	A	-
14	C	B	C (B3 C)
15	B	C	-
16	B	C	-

A	6-16-6.8 glazing with acoustic trickle/wall vent, Dne,w 39dB
B	4-16-4 glazing with acoustic trickle/wall vent Dne,w 35dB
C	4-16-4 glazing with standard trickle/wall vent

Noise in Amenity Areas

Noise levels in the rear garden of the building would be adequately screened from traffic noise on Bexley Road, resulting in noise levels of less than the day time $L_{Aeq,16hr}$ 50-55dB recommended in BS8233.

6 SUMMARY

It is concluded that the internal and external noise standards of BS8233:2014 would be met at the proposed re-development of 106 Bexley Road, Erith, as required by national planning policy.

The proposed additional apartments do not need significant noise mitigation as they are located to the rear of the building.

Based on measured noise levels, the internal noise guidelines of BS8233:2014 would be achieved in living rooms on the front and side facades with standard thermal double glazed units and acoustic ventilators. Bedrooms on the same facades would achieve the night time internal noise standards with acoustic double glazing and acoustic ventilators.

Existing noise levels in the amenity area at the rear of the property would meet the BS8233:2013 standard.

APPENDIX 1

Results of Noise Measurements

Date & time	LAFmax [dB]	LAeq [dB]	LA90 [dB]
21/08/2017 10:36	73.5	60.8	51.7
21/08/2017 10:51	69.4	60.3	51.2
21/08/2017 11:06	70.4	60.5	50.5
21/08/2017 11:21	70.9	60.7	51.9
21/08/2017 11:36	72.7	60.3	48.0
21/08/2017 11:51	71.5	60.7	52.7
21/08/2017 12:06	72.2	61.2	53.3
21/08/2017 12:21	70.4	60.7	51.0
21/08/2017 12:36	71.7	60.3	50.2
21/08/2017 12:51	71.0	59.8	51.3
21/08/2017 13:06	72.0	60.2	52.4
21/08/2017 13:21	71.3	60.5	51.5
21/08/2017 13:36	92.2	64.8	52.5
21/08/2017 13:51	72.7	60.2	51.6
21/08/2017 14:06	69.8	60.6	51.1
21/08/2017 14:21	77.8	60.5	48.8
21/08/2017 14:36	76.8	60.5	47.5
21/08/2017 14:51	74.2	60.3	51.9
21/08/2017 15:06	82.9	61.2	50.3
21/08/2017 15:21	68.3	60.1	51.4
21/08/2017 15:36	88.8	63.7	49.8
21/08/2017 15:51	68.8	60.4	51.1
21/08/2017 16:06	70.1	60.5	50.9
21/08/2017 16:21	72.0	60.8	52.4
21/08/2017 16:36	77.3	60.1	49.4
21/08/2017 16:51	70.8	59.8	51.9
21/08/2017 17:06	78.8	59.7	49.6
21/08/2017 17:21	79.6	60.8	51.3
21/08/2017 17:36	73.1	60.2	50.6
21/08/2017 17:51	83.4	61.4	50.5
21/08/2017 18:06	69.3	60.0	49.3
21/08/2017 18:21	69.2	59.6	48.4

Date & time	LAFmax [dB]	LAeq [dB]	LA90 [dB]
21/08/2017 18:36	76.5	60.0	48.6
21/08/2017 18:51	75.3	59.4	48.4
21/08/2017 19:06	70.1	59.0	48.3
21/08/2017 19:21	83.2	61.3	46.0
21/08/2017 19:36	70.1	57.7	43.5
21/08/2017 19:51	78.3	58.8	42.8
21/08/2017 20:06	71.7	57.4	45.3
21/08/2017 20:21	66.3	57.8	43.1
21/08/2017 20:36	69.7	57.4	44.2
21/08/2017 20:51	69.0	57.4	42.8
21/08/2017 21:06	74.9	57.0	40.9
21/08/2017 21:21	72.6	55.5	39.8
21/08/2017 21:36	67.3	55.6	36.7
21/08/2017 21:51	80.2	57.6	38.1
21/08/2017 22:06	68.6	55.2	36.5
21/08/2017 22:21	71.3	55.9	39.1
21/08/2017 22:36	70.9	54.2	36.3
21/08/2017 22:51	76.7	58.7	37.0
21/08/2017 23:06	75.0	54.9	33.1
21/08/2017 23:21	68.3	53.1	34.0
21/08/2017 23:36	66.5	52.1	33.0
21/08/2017 23:51	68.7	52.6	32.8
22/08/2017 00:06	68.9	51.1	32.4
22/08/2017 00:21	77.1	55.3	32.2
22/08/2017 00:36	66.3	48.5	32.1
22/08/2017 00:51	66.2	49.1	31.7
22/08/2017 01:06	68.5	51.8	31.4
22/08/2017 01:21	66.1	46.8	31.0
22/08/2017 01:36	64.0	45.3	31.0
22/08/2017 01:51	68.3	49.2	31.3
22/08/2017 02:06	66.0	49.5	31.0
22/08/2017 02:21	66.1	49.6	31.2
22/08/2017 02:36	70.6	49.5	30.8
22/08/2017 02:51	65.3	48.2	31.1
22/08/2017 03:06	67.4	48.0	31.3
22/08/2017 03:21	69.7	48.6	31.4
22/08/2017 03:36	67.1	49.8	31.7
22/08/2017 03:51	66.4	48.3	32.1
22/08/2017 04:06	66.5	49.8	32.0

Date & time	LAFmax [dB]	LAeq [dB]	LA90 [dB]
22/08/2017 04:21	67.0	49.9	32.1
22/08/2017 04:36	67.2	50.4	32.8
22/08/2017 04:51	69.1	53.0	33.1
22/08/2017 05:06	68.0	54.0	35.0
22/08/2017 05:21	76.6	54.9	35.3
22/08/2017 05:36	67.9	54.6	36.6
22/08/2017 05:51	77.2	57.6	39.7
22/08/2017 06:06	76.8	57.8	40.7
22/08/2017 06:21	72.1	58.3	44.0
22/08/2017 06:36	70.3	58.6	45.3
22/08/2017 06:51	70.6	59.5	49.0
22/08/2017 07:06	75.3	60.1	49.2
22/08/2017 07:21	72.6	60.3	47.3
22/08/2017 07:36	73.6	59.9	46.8
22/08/2017 07:51	79.1	59.6	48.0
22/08/2017 08:06	70.5	60.0	49.4
22/08/2017 08:21	71.7	59.7	48.2
22/08/2017 08:36	72.9	60.1	50.4
22/08/2017 08:51	74.0	60.1	50.1
22/08/2017 09:06	73.5	59.6	48.3
22/08/2017 09:21	72.4	59.2	48.5
22/08/2017 09:36	67.2	57.9	44.3
22/08/2017 09:51	73.1	60.0	50.1

APPENDIX 2 - Calculated façade noise attenuation

BS8233:2014 Annexe G2 - Rigorous Calculation of Façade Sound Insulation							
Flats 6/7/10/11/12/13/15/16 Living Room							
Wall area		11.3					
Window Area		1.1					
Ceiling/Roof		22.3					
Room Vol.		56					
Frequency (Hz)		125	250	500	1000	2000	LAeq
Measured Façade Leq		61.9	59.7	56.7	55.8	52.0	**59.9**
Ventilator Dne	GAV 2500EAW	38	37	30	49	54	
Window R	4/16/4	21	17	25	35	37	
Wall R	Masonry Cavity	40	44	45	51	56	
Ceiling/Roof R	Roof	33	39	45	50	54	
Absorption		11	14	16	16	15	
Vent		0.000047	0.000059	0.000298	0.000004	0.000001	
		-43.3	-42.3	-35.3	-54.3	-59.3	
Windows		0.000260	0.000653	0.000104	0.000010	0.000007	
		-35.8	-31.8	-39.8	-49.8	-51.8	
Ext. Wall		0.000030	0.000012	0.000010	0.000002	0.000001	
		-45.2	-49.2	-50.2	-56.2	-61.2	
Ceiling/roof		0.000333	0.000084	0.000021	0.000007	0.000003	
		-34.8	-40.8	-46.8	-51.8	-55.8	
Composite R		-31.7	-30.9	-33.6	-46.4	-49.5	
Abs. Correction		4.8	3.8	3.2	3.2	3.5	
Leq (int)		35.0	32.6	26.3	12.7	5.9	
A-Weighting		-16.1	-8.6	-3.2	0	1.2	
LAeq (internal)		18.9	24.0	23.1	12.7	7.1	**27.4**
Façade Atten.		**32.4**	**dB**				

BS8233:2014 Annexe G2+B3+B1:I32+B1:I34+B1:I35+B1:I34+B1:I33+B1:I32+B3+B1:I32+B1:I+B1:I32							
Flats 6/10/11/13 Bedroom							
Wall area		11.3					
Window Area		1.1					
Ceiling/Roof		22.3					
Room Vol.		56					
Frequency (Hz)		125	250	500	1000	2000	LAeq
Measured Façade Leq		61.9	59.7	56.7	55.8	52.0	**59.9**
Ventilator Dne	GAV 2500EAW	38	37	30	49	54	
Window R	6/16/6.8	21	28	37	48	48	
Wall R	Masonry Cavity	40	44	45	51	56	
Ceiling/Roof R	Roof	33	39	45	50	54	
Absorption		11	14	16	16	15	
Vent		0.000047	0.000059	0.000298	0.000004	0.000001	
		-43.3	-42.3	-35.3	-54.3	-59.3	
Windows		0.000260	0.000052	0.000007	0.000001	0.000001	
		-35.8	-42.8	-51.8	-62.8	-62.8	
Ext. Wall		0.000030	0.000012	0.000010	0.000002	0.000001	
		-45.2	-49.2	-50.2	-56.2	-61.2	
Ceiling/roof		0.000333	0.000084	0.000021	0.000007	0.000003	
		-34.8	-40.8	-46.8	-51.8	-55.8	
Composite R		-31.7	-36.8	-34.8	-48.8	-52.9	
Abs. Correction		4.8	3.8	3.2	3.2	3.5	
Leq (int)		35.0	26.7	25.1	10.3	2.5	
A-Weighting		-16.1	-8.6	-3.2	0	1.2	
LAeq (internal)		18.9	18.1	21.9	10.3	3.7	**24.9**
Façade Atten.		**34.9**	**dB**				