



MACH
RESIDENTIAL

NYTON HOUSE CARE HOME - DEMENTIA WARD

Noise Assessment - BS 8233: 2014

MH Architects



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1.0 INTRODUCTION

MACH have been appointed by MH Architects to carry out an environmental noise survey and subsequent assessment for the proposed dementia ward at Nyton House care home, Chichester.

The purpose of the assessment is to determine any appropriate noise control measures to protect the occupants against noise ingress from the local environment. To undertake this assessment, an environmental noise survey was carried out on-site between 07/09/2018 and 10/09/2018.

A review of the requirements of the proposed building façades has been provided, in order to enable compliance with guidance given within BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings.

This report describes the noise survey and its results, with a graphical representation of the noise measurements taken on site presented within the results section, and a subsequent assessment in accordance with guidelines set out in BS8233.

3.0 NOISE SURVEY

3.1 Methodology

In order to establish environmental noise levels on site, continuous 5-minute samples of the acoustic parameters $L_{Aeq,T}$, $L_{A90,T}$, and $L_{Amax,T}$ were measured between 17:00 on 07/09/2018 and 10:45 on 10/09/2018, at a fixed microphone position (location (F1)) on site. Data has been gathered over an approximate 24-hour period, in order to provide L_{Aeq} and L_{Amax} levels for both day and night.

As stated in Section 2.0, traffic along Nyton Road form the primary contribution to ambient noise levels. The microphone was placed at the boundary of the property in free field conditions, approximately 2m above ground. The long-term meter was set to measure consecutive 'A' weighted 5-minute time samples.

Additional spot measurements (locations S1 & S2) were carried out at two other locations around the site, in order to quantify variance in noise levels across the site.

3.2 Measurement Equipment

The measurement equipment illustrated in Table 3.1 was used during the survey, all equipment complies with BS EN 60942:2003 i.e. a class 1 device.

Name	Serial Number	Last Calibrated	Certificate number	Calibration Due
Norsonic Precision Sound Analyser Type 140	1403249	Oct-17	26727	Oct-19
Norsonic Type 1209 Pre-amplifier	12563	Oct-17	26727	Oct-19
Norsonic Type 1225 Microphone	68830	Oct-17	26726	Oct-19
Svantek Acoustic Calibrator SV33A	64138	Nov-17	manufacturer calibration	Nov-18

Table 3.1: Noise Measurement Equipment

3.3 Weather Conditions

The following climate conditions were recorded for the site:

Wind: 2 m/s.

Humidity: 82 %

Temperature: 12 °C - 18°C.

The above weather conditions are suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise.

4.0 NOISE SURVEY RESULTS

4.1 Fixed Measurement Results

The following graph and table show the measured noise levels at fixed measurement location F1. All measurements are shown in dB(A). The complete set of measurement data is available on request. The graph in Figure 4-1 below provides the L_{Amax} , L_{Aeq} and L_{A90} levels measured during the noise survey.

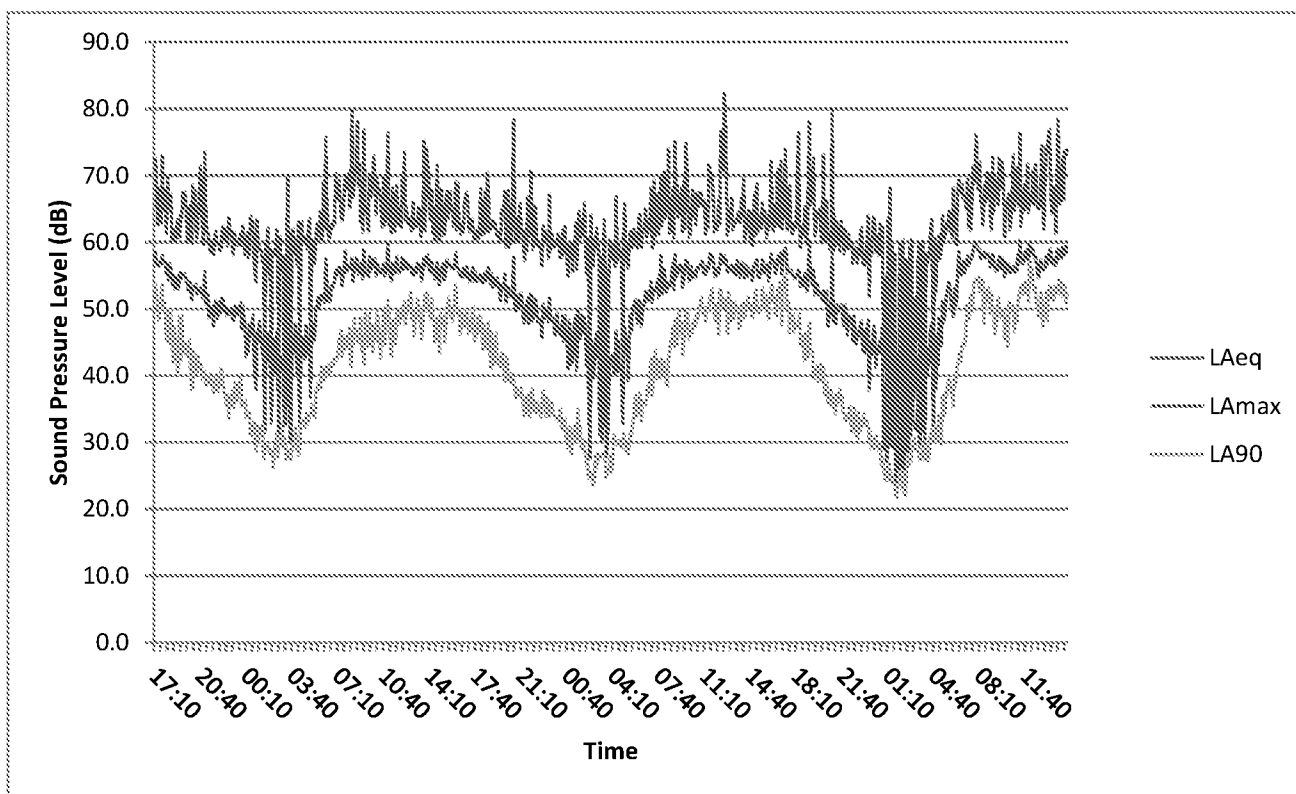


Figure 4-1: Graph of on-site environmental noise measurements (F1)

4.2 Spot Measurement Results

Spot measurements were carried out in order to help quantify existing noise levels. The L_{Amax} and L_{Aeq} levels measured from these spot measurements are shown in Table 4.1.

Position	Time	L_{Aeq} dB	L_{Amax} dB
S1	17:30	56	63
S2	17:40	55	63

Table 4.1: Spot Measurements

5.0 FAÇADE ASSESSMENT

To determine internal noise levels within the proposed dwellings, an indicative façade noise break-in assessment has been undertaken in accordance with the guidance given within BS8233. The calculations are shown within Appendix A and have been based on the noise levels presented in Section 5.1.

The Noise Policy Statement for England does not provide guidance on internal noise levels within residential buildings. As a result, the advised levels within BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings' have been adopted. BS8233 states that to achieve adequate sleeping and living conditions, background noise levels should be 30 dB L_{Aeq} or less within bedrooms at night, and 35 dB L_{Aeq} or less within Living rooms during the day. The advised levels are tabulated below.

Activity	Location	0700 - 2300	2300 - 0700
Resting	Living Room	35 dB L_{Aeq} , 16 Hour	-
Dining	Dining Room	40 dB L_{Aeq} , 16 Hour	-
Sleeping	Bedroom	35 dB L_{Aeq} , 16 Hour	30 dB L_{Aeq} , 8 Hour

Table 5.1: BS8233 Internal Noise Levels

BS 8233: 2014 provides no definitive methodology for assessment of L_{Amax} levels. The standard simply states that a guideline value for the internal level may be set depending on the character of the noise source and number of events occurring. Due to the proximity of the proposed site to sources of road traffic noise, assessment of L_{Amax} is critical to ensuring that disturbance is avoided.

In order to provide an assessment of L_{Amax} levels, the recommendations of the World Health Organisation have been employed. The WHO state that in order to avoid sleep disturbance within bedrooms during the night, the internal sound pressure level should not exceed 45 dB L_{Amax} .

5.1 Assessment Noise Levels

Based on the results of the environmental noise survey, MACH have created a noise map of the site (see Appendix A) the following assessment noise levels have been derived from this noise model.

Time Period	Sound Pressure Level, dB (Octave Band Centre Frequency, Hz)							dB(A)
	63	125	250	500	1000	2000	4000	
L_{Aeq} , 16hour (day)	59	47	46	45	49	44	38	51
L_{Aeq} , 8hour (night)	51	39	38	37	41	37	31	44
L_{Amax} (10th highest)	76	60	61	60	60	57	53	65

Table 5.2: Assessment Noise Levels

5.2 Façade Construction

In order that the requirements of glazing and ventilation elements can be specified, MACH Residential have calculated the performance of the façade construction as a cavity brick wall, with 100 mm leaves and 56 mm void.

Element	Units	Sound Reduction Indices at Frequency (Hz)					
		125	250	500	1000	2000	4000
External Wall	R _w	34	34	40	55	55	55

Table 5.3: Façade, Sound Reduction Indices

5.3 Glazing and Ventilation Specification

Based on achieving the criteria set out in Table 5.1 above, calculations were carried out to determine the levels of attenuation required by the glazing and ventilation elements. Calculations show that to achieve an acceptable internal acoustic environment in habitable rooms, the building envelope constructions should meet the sound insulation performance values presented in the following sub section. Appendix A contains graphic representations of the spreadsheets used in the facade calculations.

Calculations based on providing background ventilation in the form of trickle vents. Acoustic requirements under purge ventilation have not been specified. BS8233 states that open windows may be relied upon for purge ventilation and places no acoustic restriction on this statement.

Element	Units	Sound Reduction Indices at Frequency (Hz)					
		125	250	500	1000	2000	4000
Glazing	R _w	21	17	25	35	37	31
Trickle Vents	D _{new}	33	29	28	24	25	30

Table 5.4: Minimum sound reduction indices (SRI) for façade elements

Note that the specifications are for guidance only. Similar systems to the ones used in calculations may achieve the same desired internal noise levels. All systems should be verified by the supplier against the sound reduction indices below.

Façade	Element	Construction Description
Exposure Level 1	Glazing	Double - 4/6-16/4
	Trickle Vents	Simon Acoustic TTF Frame Vent - Open

Table 5.5: Minimum sound reduction indices (SRI) for façade elements

6.0 OUTDOOR AMENITY

With regards to outdoor amenity areas, BS8233 states a lower exposure value of 50 dBA and a higher exposure value of 55 dBA (which would be acceptable in noisier environments). Due to the nature of the noise climate on site, MACH warrant that the Higher (55 dBA) exposure value will be applicable.

These values are specified as $L_{Aeq, T}$, where T refers to the activity period of the outdoor space. For this development, assessment is based on gardens during day time hours. Although L_{Amax} levels will exceed the upper value of 55 dBA, assessment must be based on an $L_{Aeq, 16 \text{ Hour}}$ value.

The measured noise levels on site have been seen to be within the guidelines stated in the WHO.

7.0 SUMMARY

MACH Acoustics have been appointed by MH Architects to carry out an environmental noise survey and subsequent assessment for the proposed residential development at Nyton House care home, Chichester.

To determine internal noise levels within the proposed dementia ward, an indicative façade noise break-in assessment has been undertaken in accordance with the method given within BS8233 for both day and night time noise levels.

Section 5.0 above indicates that to provide an acceptable acoustic environment within habitable spaces, façade elements should comply with the minimum sound reduction indices specified in this report. These are a recommendation to achieve the minimum, thus, higher performance glazing and trickle vents may be used.

Noise levels within outdoor amenity are seen to be 55 L_{Aeq} , which is compliant with World Health Organisation. No mitigation measures are required.

APPENDIX A – FAÇADE BREAK-IN CALCULATIONS

A1 Exposure Level 1

BS8233 Façade Noise Break-in Calculations								LAeq,16hour (day)							LAeq,8hour (night)							LAmax (10th highest)						
								125	250	500	1000	2000	4000	dB(A)	125	250	500	1000	2000	4000	dB(A)	125	250	500	1000	2000	4000	dB(A)
Calculation Safety		Noise Level at Façade:						47	45	45	45	44	38	51	35	38	37	41	37	31	44	60	61	60	60	57	53	65
3 dB																												
Façade level type:		$A = 0.161V / RT$						0.8	0.8	0.8	0.8	0.8	0.8		0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5		
Lff		$10 \log(Si/N)$						29.4	29.4	29.4	29.4	29.4	29.4		10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0	10.0	10.0		
(Free field level)								1.7	1.7	1.7	1.7	1.7	1.7		2.8	2.8	2.8	2.8	2.8	2.8		2.8	2.8	2.8	2.8	2.8		
External Wall		SRI						34	34	40	55	55	55		34	34	40	55	55	55		34	34	40	55	55	55	
2x100mm block-55mm gsp/strp ties/plaster		$10 \log((Si/Stot)10^{(-R/10)})$						0	0	0	0	0	0		-35	-35	-41	-56	-56	-56		-35	-35	-41	-56	-56	-56	
		Predicted noise level in building						-99.0	-99.0	-99.0	-99.0	-99.0	-99.0	-99.0	9.8	8.3	1.7	-9.1	-13.4	-19.0	3.2	31.2	31.9	24.8	10.1	6.9	3.1	26.1
		$R = 10 \log(Si)$						10	10	10	10	10	10		10	10	10	10	10	10		10	10	10	10	10	10	
Glazing		SRI						21	17	25	35	37	31		21	17	25	35	37	31		21	17	25	35	37	31	
		$10 \log((Si/Stot)10^{(-R/10)})$						-21	-17	-25	-35	-37	-31		-28	-24	-32	-42	-44	-38		-28	-24	-32	-42	-44	-38	
Double - 4/6-16/4		Predicted noise level in building						30.9	33.5	24.9	18.2	11.9	11.9	27.7	17.1	19.6	11.0	5.2	-1.1	-0.8	14.0	38.4	43.1	34.0	24.3	19.1	21.3	36.8
		$R = 10 \log(Si)$						15	21	23	17	16	17		15	15	17	15	15	15		15	15	15	15	15	15	
Trickle Vents		Dne-10Log(h)						33	29	28	24	25	30		36	33	32	28	29	34		36	33	32	28	29	34	
		Aa/A						-39	-35	-34	-30	-31	-36		-39	-36	-35	-30	-32	-37		-39	-36	-35	-30	-32	-37	
Simon Acoustic TTF Frame V		Predicted noise level through trickle vent						13.0	15.2	15.4	23.1	17.5	6.7	24.9	5.6	7.7	7.9	16.5	10.8	0.3	18.1	26.9	31.2	30.9	35.6	31.0	22.4	38.0
		$R = 10 \log(Si)$						11	11	11	11	11	11		11	11	11	11	11	11		11	11	11	11	11	11	
								125	250	500	1000	2000	4000	dB(A)	125	250	500	1000	2000	4000	dB(A)	125	250	500	1000	2000	4000	dB(A)
Combined Noise Levels (including ventilation elements):								31	34	25	24	19	13	30	18	20	13	17	11	5	20	39	44	36	36	31	25	41
Target														35							30						45	
NR Difference								-14	-3	-5	-2	-4	-6	5	-21	-11	-11	-3	-6	-9	15	-15	-2	-4	-1	-3	-1	5
								125	250	500	1000	2000	4000	dB(A)	125	250	500	1000	2000	4000	dB(A)	125	250	500	1000	2000	4000	dB(A)

Table A1: Façade noise break-in

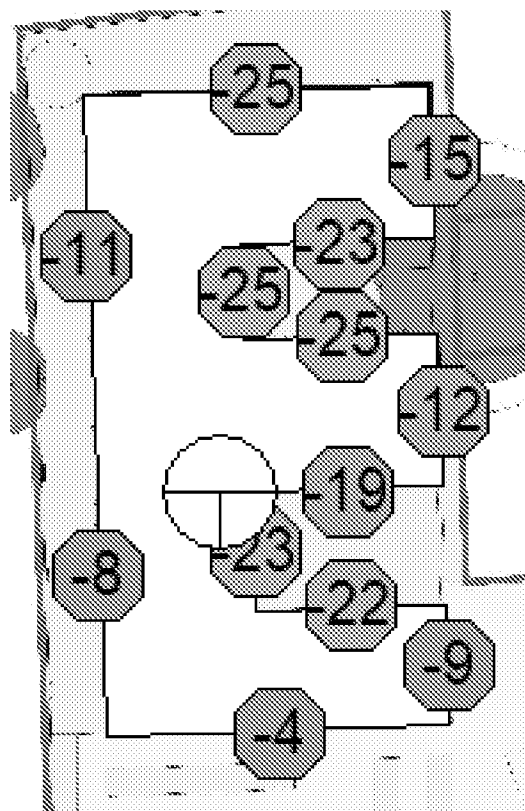


Figure A.2: CadnaA noise mapping of the site, showing levels relative to the fixed mic position