ACOUSTICS CENTRAL

Bolston House, Cardiff

Planning Noise Report

2022021-0 R1

Executive Summary

As part of the construction of Bolston House, a new residential development in Bonvilston, Cardiff, the local planning authority has requested that a planning noise assessment be undertaken.

Acoustics Central has therefore been instructed to carry out the required planning noise assessment. The assessment essentially involves quantifying the noise climate by way of an environmental noise survey, carrying out calculations of noise across the site and within future residences, and comparing these with relevant criteria from the local authority and national guidance and standards.

The Local Planning Authority - Vale of Glamorgan Council – have expressed that the site would ideally fall into Category A or B as detailed within Technical Advice Note 11. Based on the criteria for a road traffic source, this would mean noise levels determined in accordance with TAN11 would be at most 63 dB $L_{Aeq,16h}$ during the day, and 57 $L_{Aeq,8h}$ during the night.

Road traffic on the A48, a relatively busy single carriageway, is the predominant environmental noise source at the site. The site benefits however from being screened from the road by an existing masonry wall.

Noise levels in accordance with the procedure set out in TAN11 were determined to be 61.1 dB $L_{Aeq,16h}$ during the day and 55.1 $L_{Aeq,8h}$ during the night. As such, the noise levels fall within Noise Exposure Category B, and are in-line with the requirements of the Local Planning Authority.

BS 8233 provides target daytime and night-time noise levels expected to provide a noise climate with good conditions for resting and sleeping. In order to determine the sound insulation performance requirements of the glazing and vents necessary to meet the targets, a noise break-in assessment was undertaken.

The assessment concluded that with double glazing in the order of 6/6-16/6, and an acoustic trickle vent, the internal targets are capable of being met.

Taking the above into consideration, the site and proposed layout are expected to meet the Local Authority requirements on external noise levels, as well as being capable of providing an internal noise climate in-line with the targets in BS 8233.

ACOUSTICS CENTRAL

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1 Introduction

1.1 As part of the construction of Bolston House, a new residential development in Bonvilston, Cardiff, the local planning authority has requested that a planning noise assessment be undertaken.

1.2 Acoustics Central has therefore been instructed to carry out the required planning noise assessment. The assessment essentially involves quantifying the noise climate by way of an environmental noise survey, carrying out calculations of noise across the site and within future residences, and comparing these with relevant criteria from the local authority and national guidance and standards.

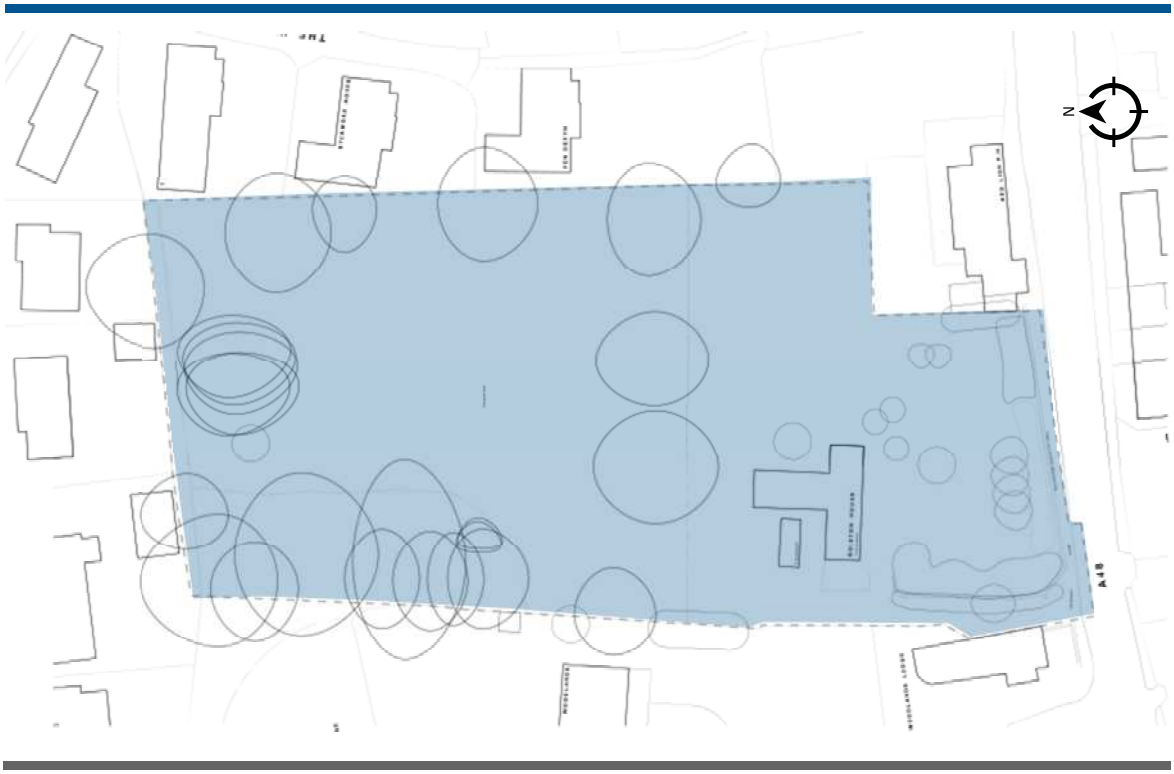
1.3 This report sets out the methodology and results of an environmental noise survey carried out at the development site, the assessments undertaken using the survey data as a basis, and any conclusion and recommendations arising from the assessments.

1.4 The report is necessarily technical in nature, however every effort has been made to make it as clear as possible. In this regard, the Glossary of Acoustics Terms attached as Appendix A gives further explanation on relevant acoustics terminology used within the report

2 Site Layout

2.1 General

2.1.1 The site is located on the A48, in Cardiff, CF5 6TR, and is indicated in the following figure.



F1 Figures indicating the location and arrangement of the site

2.1.2 The site currently houses a single disused residence. This will be demolished to make way for the proposed residences which will comprise 10 houses and 4 flats.

2.2 Site Context

2.2.1 The site is bounded to the south by the A48, and a public house and associated car park to the east. The buildings within the vicinity of the site are predominantly residential in nature however, and the remaining site boundaries are to existing residences.

2.3 Noise Climate

2.3.1 Road traffic on the A48, a relatively busy single carriageway, is the predominant environmental noise source at the site. The site benefits from being screened from the road however by an existing masonry wall.

3 Relevant Guidance and Standards

3.1 Technical Advice Note 11

3.1.1 The Local Planning Authority - Vale of Glamorgan Council – have expressed that the site would ideally fall into Category A or B as detailed within Technical Advice Note 11. As such, the following table sets out the external noise levels that correspond to the categories described in TAN11.

RECOMMENDED NOISE EXPOSURE CATEGORIES FOR NEW DWELLINGS NEAR EXISTING NOISE SOURCES

Noise Levels (1) corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,T}$ dB

Noise Source		Noise Exposure Category			
		A	B	C	D
Road Traffic	0700-2300	<55	55-63	63-72	>72
	2300-0700(2)	<45	45-57	57-66	>66
Rail Traffic	0700-2300	<55	55-66	66-74	>74
	2300-0700(2)	<45	45-59	59-66	>66
Air Traffic	0700-2300	<55	57-66	66-72	>72
	2300-0700(2)	<48	48-57	57-66	>66
Mixed Sources	0700-2300	<55	55-63	63-72	>72
	2300-0700(2)	<45	45-57	57-66	>66

T1 Noise Exposure Categories as a consequence of noise levels from various sources

- (1) Noise levels: the noise level(s) (LAeq,T) used when deciding the NEC of a site should be representatives of typical conditions.
- (2) Night-time noise levels (2300-0700): sites where individual noise events regularly exceed 82dBLAmax (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the L Aeq,8H (except where the L Aeq,8H already puts the site in NEC D).
- (3) Aircraft noise: daytime values accord with the contour values adopted by the Department of Transport which relate to levels measured 1.2m above open ground. For the same amount of noise energy, contour values can be up to 2 dB(A) higher than those of other sources because of ground reflection effects.
- (4) Mixed sources: this refers to any combination of road, rail, air and industrial noise sources. The "mixed source" values are based on the lowest numerical values of the single source limits in the table. The "mixed source" NECs should only be used where no individual noise source is dominant.

Noise index and measurement positions

3.1.2 With regards to noise indices, time periods and measurement position, TAN11 states the following:

"A7. Different indices have been used to describe noise from different sources, and limits have been set over different time periods. This has caused confusion, and this advice follows the move towards consistency advocated in BS 7445: 1991 by expressing all noises in terms of L Aeq,T . The recommended time periods are 0700-2300 and 2300-0700.

A8. Values in Table 2 refer to noise levels measured on an open site at the position of the proposed dwellings, well away from any existing buildings, and 1.2m to 1.5m above the ground. Where the arithmetic average of recorded readings falls on the boundary between NECs B and C it will be for the local planning authority to determine which is the more appropriate NEC for the proposal."

3.2 BS 8233

3.2.1 With regards to internal noise levels within sensitive rooms of residences (i.e. living rooms during the day and bedrooms during the night) BS 8233 sets out the levels given in the table below.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB L_{Aeq}	-
Dining	Dining room/ area	40 dB L_{Aeq}	-
Sleeping (daytime resting)	Bedroom	35 dB L_{Aeq}	30 dB L_{Aeq}

T2 Indoor ambient noise levels for dwellings

3.2.2 Note 7 to the above table states:

"Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.".

3.2.3 As such, facades with noise levels incident in excess of WHO values (55dB $L_{Aeq,16h}$ during the daytime, 45dB $L_{Aeq,8h}$ during the night-time) designed to achieve internal levels of 40dB in living Room during the daytime and 35dB in Bedrooms during the night-time will still provide reasonable internal conditions for resting and sleeping.

4 Environmental Noise Survey

4.1 General

4.1.1 In order to quantify the noise levels incident on the various facades of the building, a 48 hour environmental noise survey was carried out at the site commencing at 11h00 on Monday 7th March and concluding at 11h00 on Wednesday 9th March 2022.

4.2 Guidance and Standards

4.2.1 The survey instrumentation, methodology and reporting of results will be carried out following guidance contained within British Standard 7445-1:2003 - *'Description and measurement of environmental noise - Part 1: Guide to quantities and procedures'*,

4.3 Measurement Positions

4.3.1 Measurements were made for 48 hours close to the southern boundary (MP1) using a microphone fixed to the top of a pole approximately 2.8m above site level. In addition, attended measurements were slightly further into the site (MP2) with the sound level meter fixed to the top of a tripod 1.2m above site level. These positions are indicated on the following figure.

F2 Figure Indicating Noise Survey Measurement Positions

4.3.2 The attached Appendix C presents photographs of the noise monitoring positions, and a description of each is given below.

MP1 The sound level meter microphone was fixed to the top of an upright pole to a height of 2.8m above site level in a free-standing position 0.8m back from the wall on the site boundary. Measurements were therefore made under free-field conditions. This position was intended to measure noise levels from the road with an unscreened view of the source.

MP2 The sound level meter was fixed to the top of a tripod at a height of 1.2m above site level 7.5m back from the wall on the site boundary. Measurements were made under free-field conditions, and were intended to quantify noise levels experienced on the site.

4.4 Noise Monitoring Equipment

4.4.1 All noise measurements were made with the equipment detailed in the following table.

Item	Manufacturer	Type
Sound Level Analyser	NTi	XL2-TA
Acoustic Calibrator	NTi	CAL200

T3 Equipment used during internal noise measurements

4.4.2 The sound level analyser presented in the above table conforms to the Type 1 specification as given in BS EN 61672-1:2003 - *'Electroacoustics - Sound level meters - Part 1: Specifications'*. The calibrator presented in the above table conforms to the Class 1 specification as specified in IEC 60942:2003 – *'Electroacoustics - Sound calibrators'*.

Traceable Calibration

4.4.3 The measurement instrumentation, including sound level analyser, preamplifier and microphone has undergone traceable calibration by either a competent laboratory or the equipment manufacturer within the last two years.

4.4.4 The acoustic calibrator has undergone traceable calibration by either a competent laboratory or the equipment manufacturer within the last year. The calibration certificates for the above equipment can be provided on request.

4.4.5 The noise measurement equipment was calibrated before and after the survey to ensure a consistent and acceptable level of accuracy is maintained. No significant drift (greater than 0.2dB) was noted to have occurred.

4.5 Data Recorded

4.5.1 Noise data was recorded at the unattended positions over consecutive 15-minute periods in all relevant indices, including L_{Aeq}, L_{A90}, and $L_{AMax,F}$[1]. Noise data at the attended positions was

[1] Maximum A-weighted sound pressure level using time-weighting "F" and "S". As stated in BS EN 61672–1:2003 Design-goal time constants are 0,125 s for time-weighting F (Fast) and 1 s for time weighting S (Slow).

measured for single 15-minute periods in the same indices. See attached Appendix A for an explanation of noise units used.

4.5.2 Octave band data for each of the above indices was also recorded at all positions, the filters for which met the requirements of BS EN 61260:1996, Class 1. Audio recordings were also made at the unattended positions for the purposes of source identification when reviewing the unattended data.

4.6 Meteorological Conditions

4.6.1 During the survey temperatures were generally cold, and skies ranged from clear to overcast. Wind speeds were generally low at 5 m/s or less. Conditions were generally dry, however a period of a couple of hours of light precipitation was reported in the weather forecast on the afternoon of the 8th March. Given the duration, nature of sources, and objectives of the survey the precipitation noted is not expected to have had an impact on conclusions drawn using the survey data as a basis.

4.7 Results

4.7.1 The attached time-history figure TH1 presents the unattended noise levels measured at MP1. A summary of the attended noise levels measured at MP2 is presented in the following table.

Period	L_{Aeq}	L_{AMax}	L_{A10}	L_{A90}
11h00-12h00	61.4 dB	71.8 dB	64.2 dB	51.6 dB
12h00-13h00	61.0 dB	71.5 dB	64.3 dB	50.4 dB
13h00-14h00	61.7 dB	78.2 dB	65.0 dB	50.8 dB

T4 Summary of Attended Noise Survey Results

5 External Noise Levels

5.1 Condition Requirements

5.1.1 As set out in Section 3.1, the Local Planning Authority - Vale of Glamorgan Council – have expressed that the site would ideally fall into Category A or B as detailed within Technical Advice Note 11. Based on the criteria for a road traffic source, this would mean noise levels determined in accordance with TAN11 (i.e. measured on an open site at the position of the proposed dwellings, and 1.2m to 1.5m above the ground) would be at most 63 dB $L_{Aeq,16h}$ during the day, and 57 $L_{Aeq,8h}$ during the night.

5.1.2 The following table sets out the noise levels determined in accordance with TAN11 at the proposed façade locations for comparison with the criteria.

Period / Index	TAN11 Calculation Position	TAN11 NEC
Daytime Ambient, $L_{Aeq,16h}$	61.1 dB	B
Night-time Ambient, $L_{Aeq,8h}$	55.1 dB	B

T5 Free-Field Noise Levels

5.1.3 Looking at the above table, it can be seen that external noise levels fall within Noise Exposure Category B. As such, these are in-line with the requirements of the Local Planning Authority.

6 Internal Noise Levels

6.1 General

6.1.1 As set out in Section 3.2, according to BS8233 a good internal noise climate for resting and sleeping can be achieved by limiting internal levels to 35dB $L_{Aeq,16h}$ during the daytime and 30 dB $L_{Aeq,8h}$ during the night-time.

6.1.2 In order to determine the measures necessary to achieve this, a noise break-in assessment has been undertaken to various living rooms and bedrooms in closest proximity to the principle noise source – i.e. the A48. The procedure used to carry out the calculations is set out in Paragraph 2.1 of Annex G of BS 8233.

6.2 Building Envelope

6.2.1 With masonry external walls, the internal noise levels will generally be dictated by the sound insulation performance of the glazing, and any openings for ventilation.

6.2.2 In order to determine the acoustic specification for the glazed and ventilation elements, various configurations have been assessed. This exercise results in a large number of calculations, and the attached Noise Break-In Calculation sheets BI1 – BI4 present a sample of these. We are happy to provide a complete set on request.

6.2.3 Based on the calculations, sound insulation requirements for a single type of glazing and vent have been established.

Glazing

6.2.4 The following table presents the sound reduction indices for the glazing type.

	Sound Reduction Index (dB) at Octave band with Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	R_W
Glazing Type 1	18	20	18	28	38	34	38	40	31

T6 Sound reduction performance of façade elements used to facilitate break-in calculations.

6.2.5 The sound reduction performance figures quoted above are valid for the building glazing elements taken as a whole and in their installed condition. The specification therefore applies to the glass, the frames or mullions, all seals on any openable part of the system and any openings in the frames required for ventilation purposes. This list is not exhaustive: no part of the glazed element shall cause the above figures not to be achieved.

6.2.6 Based on available manufacturer's data, the following glazing and airspace configurations are expected to be capable of providing the required sound reduction indices for the indicated glazing types:

- Glazing Type 1 - 6/6-16/6: 6mm pane, 6mm – 16mm air space, 6mm pane.

6.2.7 These configurations are given for illustrative purposes only, and any glazing which achieves the sound reduction performance set out in Table T6 may be used.

6.2.8 Ultimately, the Tenderer will be expected to prove, by means of certified test results or supporting information, that the actual sound reduction figures can be achieved. If in advance of such tests the tenderer has any sound reduction data relating specifically to the configurations identified above, this shall be submitted to us for checking.

Ventilation

6.2.9 On the assumption that at most one vent per glazed element is required to habitable rooms within the development, the following table presents the octave band element normalised level differences required of the vent.

	Element Normalised Level Difference (D_{ne}, dB) at Octave band with Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	$D_{n,e,w}$
Vent Type A	30	34	38	43	42	34	34	34	39

T7 Acoustic performance of vents to habitable rooms

6.2.10 Based on data presented in the draft version of Approved Document E, the following trickle vents are expected to be capable of providing the required element normalised level differences:

- Vent Type A – Acoustic Trickle Vent. An example of this would be a Passivent Acoustic Window Vent ALdB. Ultimately any vent capable of meeting the above performance requirements may be used.

6.3 Resultant Levels

6.3.1 Using façade elements with acoustic performance set out above, internal noise levels are calculated to be within the limits of 35dBA in bedrooms and living rooms during the day, and 30dBA during the night.

7 Conclusions

7.1 The Local Planning Authority - Vale of Glamorgan Council – have expressed that the site would ideally fall into Category A or B as detailed within Technical Advice Note 11. Based on the criteria for a road traffic source, this would mean noise levels determined in accordance with TAN11 would be at most 63 dB $L_{Aeq,16h}$ during the day, and 57 $L_{Aeq,8h}$ during the night.

7.2 In this case, noise levels in accordance with the procedure set out in TAN11 were determined to be 61.1 dB $L_{Aeq,16h}$ during the day and 55.1 $L_{Aeq,8h}$ during the night. As such, the noise levels fall within Noise Exposure Category B, and are in-line with the requirements of the Local Planning Authority.

7.3 BS 8233 provides target daytime and night-time noise levels expected to provide a noise climate with good conditions for resting and sleeping. In order to determine the sound insulation performance requirements of the glazing and vents necessary to meet the targets, a noise break-in assessment was undertaken.

7.4 The assessment concluded that with double glazing in the order of 6/6-16/6, and an acoustic trickle vent, the internal targets are capable of being met.

7.5 Taking the above into consideration, the site and proposed layout are expected to meet the Local Authority requirements on external noise levels, as well as being capable of providing an internal noise climate in-line with the targets in BS 8233.

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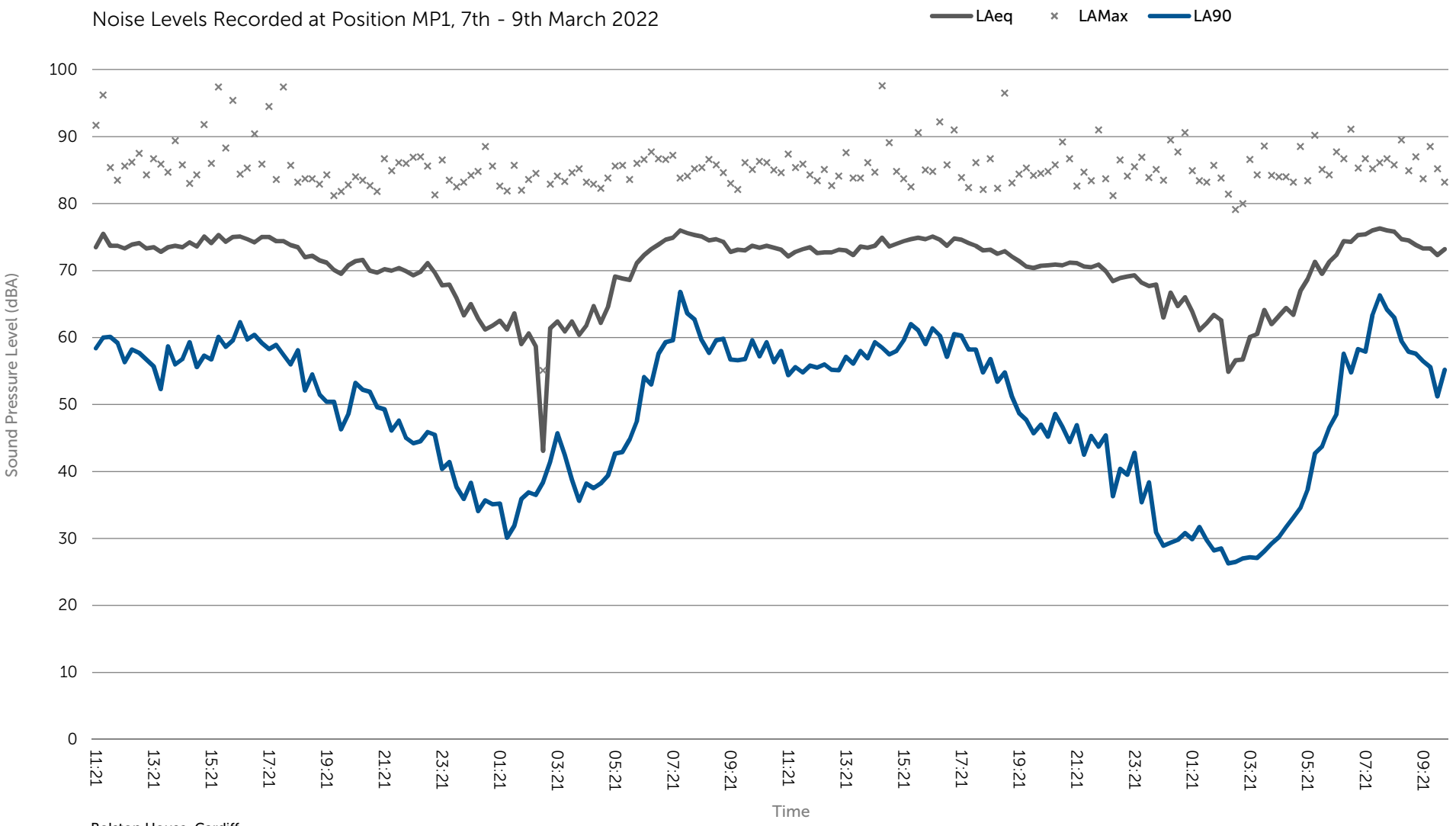
Figure 2022021-0 R1 TH1



Calculation Sheet

MP1 Day to Flat 11 Bedroom Day

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Noise Source										
Noise Source - MP1 Day										
Noise Levels		69.3	66.3	68.1	68.0	71.5	64.7	53.3	44.5	73.5 dBA
Line Source Distance Loss										
Start Distance (m)	7.0									
End Distance (m)	14.4									
		-3.1	*-3.1*	*-3.1*	*-3.1*	*-3.1*	*-3.1*	*-3.1*	*-3.1*	
Maekawa Screening Loss										
Path Difference (m)	0.4									
		-7.8	*-9.5*	*-11.7*	*-14.3*	*-17.1*	*-19.9*	*-22.9*	*-25.9*	
Reflections										
		2.0	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	
CRTN Angle of View										
Measurement Angle (°)	180.0									
Receiver Angle (°)	90.0									
		-3.0	*-3.0*	*-3.0*	*-3.0*	*-3.0*	*-3.0*	*-3.0*	*-3.0*	
Composite SRI										
Facade Width (m)	3.5									
Facade Height (m)	2.3									
Main Element - EW-01										
SRI		35	41	45	48	56	58	60	67	Rw 54
Window Width (m)	1.0									
Window Height (m)	1.0									
No. of Windows (no)	2.0									
Glazed Element - GL-01										
SRI		18	20	18	28	38	34	38	40	Rw 31
No. of Vents (no)	2.0									
Vent - VE-01										
Dne		30	34	38	43	42	34	34	34	Dnew 39
		-21.8	*-24.5*	*-23.6*	*-32.8*	*-37.0*	*-29.6*	*-29.9*	*-29.9*	

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	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
10 log (S/A)									
Internal Receiver - Flat 11 Bedroom Day	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	
+3	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	
Internal Receiver Noise									
Internal Receiver Noise - Flat 11 Bedroom Day Reverberant Field, LPrev	39.1	31.6	32.1	20.3	16.7	14.5	-0.1	-12.0	26.2 dBA

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Calculation Sheet

MP1 Night to Flat 11 Bedroom Night

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Noise Source										
Noise Source - MP1 Night										
Noise Levels		62.1	59.4	60.9	61.8	65.4	58.8	48.3	40.3	67.4 dBA
Line Source Distance Loss										
Start Distance (m)	7.0									
End Distance (m)	14.4									
		-3.1	*-3.1*	*-3.1*	*-3.1*	*-3.1*	*-3.1*	*-3.1*	*-3.1*	
Maekawa Screening Loss										
Path Difference (m)	0.4									
		-7.8	*-9.5*	*-11.7*	*-14.3*	*-17.1*	*-19.9*	*-22.9*	*-25.9*	
Reflections										
		2.0	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	
CRTN Angle of View										
Measurement Angle (°)	180.0									
Receiver Angle (°)	90.0									
		-3.0	*-3.0*	*-3.0*	*-3.0*	*-3.0*	*-3.0*	*-3.0*	*-3.0*	
Composite SRI										
Facade Width (m)	3.5									
Facade Height (m)	2.3									
Main Element - EW-01										
SRI		35	41	45	48	56	58	60	67	Rw 54
Window Width (m)	1.0									
Window Height (m)	1.0									
No. of Windows (no)	2.0									
Glazed Element - GL-01										
SRI		18	20	18	28	38	34	38	40	Rw 31
No. of Vents (no)	2.0									
Vent - VE-01										
Dne		30	34	38	43	42	34	34	34	Dnew 39
		-21.8	*-24.5*	*-23.6*	*-32.8*	*-37.0*	*-29.6*	*-29.9*	*-29.9*	

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	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
10 log (S/A)									
Internal Receiver - Flat 11 Bedroom Night	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	
+3	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	
Internal Receiver Noise									
Internal Receiver Noise - Flat 11 Bedroom Night Reverberant Field, LPrev	31.9	24.7	24.9	14.1	10.6	8.6	-5.1	-16.2	19.4 dBA

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Calculation Sheet

MP1 Day to Flat 11 Living

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Noise Source										
Noise Source - MP1 Day										
Noise Levels		69.3	66.3	68.1	68.0	71.5	64.7	53.3	44.5	73.5 dBA
Line Source Distance Loss										
Start Distance (m)	7.0									
End Distance (m)	11.7									
		-2.2	*-2.2*	*-2.2*	*-2.2*	*-2.2*	*-2.2*	*-2.2*	*-2.2*	
Maekawa Screening Loss										
Path Difference (m)	0.0									
		-5.0	*-5.2*	*-5.5*	*-6.2*	*-7.3*	*-8.8*	*-10.9*	*-13.4*	
Reflections										
		2.0	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	
CRTN Angle of View										
Measurement Angle (°)	180.0									
Receiver Angle (°)	80.0									
		-3.5	*-3.5*	*-3.5*	*-3.5*	*-3.5*	*-3.5*	*-3.5*	*-3.5*	
Composite SRI										
Facade Width (m)	3.5									
Facade Height (m)	2.3									
Main Element - EW-01										
SRI		35	41	45	48	56	58	60	67	Rw 54
Window Width (m)	1.0									
Window Height (m)	1.0									
No. of Windows (no)	1.0									
Glazed Element - GL-01										
SRI		18	20	18	28	38	34	38	40	Rw 31
No. of Vents (no)	2.0									
Vent - VE-01										
Dne		30	34	38	43	42	34	34	34	Dnew 39
		-23.3	*-26.4*	*-26.2*	*-34.7*	*-37.5*	*-29.8*	*-30.0*	*-30.0*	

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	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
10 log (S/A)									
Internal Receiver - Flat 11 Living									
	1.1	*1.1*	*1.1*	*1.1*	*1.1*	*1.1*	*1.1*	*1.1*	
+3									
	3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	
Internal Receiver Noise									
Internal Receiver Noise - Flat 11 Living Reverberant Field, LPrev	41.4	35.1	36.7	27.4	27.1	26.3	12.8	1.5	33.3 dBA

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Calculation Sheet

MP1 Night to Flat 12 Bedroom Night

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Noise Source										
Noise Source - MP1 Night										
Noise Levels		62.1	59.4	60.9	61.8	65.4	58.8	48.3	40.3	67.4 dBA
Line Source Distance Loss										
Start Distance (m)	7.0									
End Distance (m)	11.2									
		-2.0	*-2.0*	*-2.0*	*-2.0*	*-2.0*	*-2.0*	*-2.0*	*-2.0*	
Reflections										
		2.0	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	
CRTN Angle of View										
Measurement Angle (°)	180.0									
Receiver Angle (°)	70.0									
		-4.1	*-4.1*	*-4.1*	*-4.1*	*-4.1*	*-4.1*	*-4.1*	*-4.1*	
Composite SRI										
Facade Width (m)	3.5									
Facade Height (m)	2.3									
Main Element - EW-01										
SRI		35	41	45	48	56	58	60	67	Rw 54
Window Width (m)	0.5									
Window Height (m)	0.8									
No. of Windows (no)	1.0									
Glazed Element - GL-01										
SRI		18	20	18	28	38	34	38	40	Rw 31
No. of Vents (no)	1.0									
Vent - VE-01										
Dne		30	34	38	43	42	34	34	34	Dnew 39
		-26.1	*-29.4*	*-29.5*	*-37.8*	*-40.5*	*-32.8*	*-33.0*	*-33.0*	
10 log (S/A)										
Internal Receiver - Flat 12 Bedroom Night										
		-0.7	*-0.7*	*-0.7*	*-0.7*	*-0.7*	*-0.7*	*-0.7*	*-0.7*	

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	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
+3									
	3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	
Internal Receiver Noise									
Internal Receiver Noise - Flat 12 Bedroom Night Reverberant Field, LPrev	34.1	28.1	29.6	22.2	23.1	24.1	13.5	5.4	29 dBA

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2022021-0 R1 Appendix A

Glossary of Acoustics Terms – Noise Levels

Single Figures and Spectra

Generally speaking, the human ear is capable of hearing noise within the frequency range 20Hz to 20kHz. To make handling of data more meaningful and manageable, the range is often divided into 'bands', each of which covers a specific part.

For most acoustics applications, either octave or third-octave bands are used. Each band has a specific centre frequency which is used to identify it. When reported, the band centre frequency is given, along with the associated noise level, e.g. 63dB L_{eq} at 500Hz.

Noise levels can also be reported as single figure values where all energy contained within the measured frequency range is summed to provide a single figure. However, as the human ear does not hear noise at different frequencies with equal loudness, a weighting curve is often applied to levels before summing to account for this fact.

The most common curve is the A-weighting curve, and its use is denoted by including the letter 'A' with either the index e.g. 63dB L_{Aeq}, or with the decibel suffix (if the index is described elsewhere), e.g. 63dBA. 'B' and 'C' weighting curves may also be applied, depending on the application. A 'Z' is used to indicate a single figure where no weighting has been applied, e.g. 63dB L_{Zeq}.

Noise Level Indices

Noise level measurements can be made and reported in a variety of indices. The index is reported using the letter *L* to indicate Level, followed by, for example, abbreviations to represent the specifics of the index, and time intervals where applicable. The most commonly used are given below.

$L_{eq,T}$, (dB) - Equivalent Continuous Sound Pressure Level

The $L_{eq,T}$ value is the sound pressure level in decibels of a continuous steady sound that within a specified time interval, T, has the same mean-squared sound pressure as a sound that varies with time. It is often used as a descriptor of the **ambient noise climate**, and commonly seen as a single A-weighted figure $L_{Aeq,T}$.

L_{max}, (dB) - Maximum Sound Pressure Level

The L_{max} value is the highest recorded sound pressure level in decibels averaged across a specified time constant during a noise measurement of certain duration. Two time constants are used, Fast and Slow, where the time constants are 0.125s and 1s respectively. The time constant is denoted in the index, $L_{max,F}$ for Fast and $L_{max,S}$ for Slow. It is often used to identify transient events that have a high-level relative to the ambient noise climate, and commonly seen as a single A-weighted figure L_{Amax}.

$L_{10,T}$, (dB) - Equivalent Continuous Sound Pressure Level

The $L_{10,T}$, value is the sound pressure level in decibels that is exceeded for 10% of a given time interval, T. It is often used as a measurement of noise from transportation sources such as road and rail. It is commonly seen as a single A-weighted figure $L_{A10,T}$.

$L_{90,T}$, (dB) - Equivalent Continuous Sound Pressure Level

The $L_{90,T}$, value is the sound pressure level in decibels that is exceeded for 90% of a given time interval, T. It is often used as a descriptor of the **background noise climate**, and commonly seen as a single A-weighted figure $L_{A90,T}$.

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Document Naming and Version Control Policy

All documents are issued with a unique number which comprises the principle 7-digit project and 1-digit subsection numbers, for example 2015123-0, and a reference indicting iteration of document type, for example R1 for Report 1, M2 for Memorandum 2 etc.

All documents employ version control through the use of a unique version number. The version numbers employ two levels of hierarchy, and use the format illustrated below:

V 1 . 2

Major Minor

Major

A major revision occurs when the report is revised to reflect significant changes in design strategy. For example, wide scale changes to building footprint or general arrangements, changes to principle construction type (e.g. masonry to lightweight), reselection of mechanical services plant etc. A change in strategy that takes place within the same RIBA work stage for example will prompt a major revision to a document.

Minor

A minor revision occurs when the report is revised to reflect minor changes to the design implementation. For example a change in the type of natural vent, extract fan, surface finish etc. to be used, on the project. Minor revisions will also occur when there is a change in wording of the report text.

Reporting

The Document History and Version Control table on the second page of each report identifies the versions through which the document has moved, along with the date, author that produced the version, and a description of its purpose or change. Prior to issue, the document will be signed (physically or electronically) by the most recent author and reviewer.

Electronic File Naming

Reports issued electronically use the following format:

2015xxx	-	x	Rx	Noise Assessment Report	v1.0	15.02.12	.pdf
Project Number		Subsection	Report Number	Report Name	Version	Date	File Extension

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Photographs of Noise Monitoring Equipment

MP1 – Unscreened View of Road

MP2 – Within Site

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