Supplemental Noise Assessment - Façade Mitigation

79 Camden Road & 86-100 St Pancras Way

Final

Feb 2014

47067825.20000

Prepared for:
Barratt West London

UNITED KINGDOM & IRELAND

TABLE 1: REVISION SCHEDULE					
Rev	**Date**	**Details**	**Prepared by**	**Reviewed by**	**Approved by**
1	Feb 2014	Final	Peter Davies Principal Acoustics Consultant	Robbie Pattison Principal Acoustics Consultant	Alf Maneylaws Associate, Noise and Vibration

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1 INTRODUCTION

URS has been engaged by Barratt West London to undertake an assessment of noise break in to a proposed residential development at 79 Camden Road & 86-100 St Pancras Way. The engagement follows a response made from Camden Council to a preliminary noise assessment requesting specific façade mitigation measures be defined such that internal noise criteria as set out in accordance with local planning policy can be achieved.

Acoustic terminology used in this report is explained in Appendix A.

2 SITE DESCRIPTION

The site is located in a mixed residential and commercial area bounded by Camden Road (A503) to the southeast and St Pancras Way (A5202) to the southwest. Wilmot Place and Rochester Place bound the northwest and northeast of the site respectively.

3 CRITERIA

The internal noise criteria specified for the proposed development have been stipulated by Camden Council as the 'good' design level set out in British Standard 8233[1]. Table 1 below reiterates these for completeness.

TABLE 1: INDOOR AMBIENT NOISE LEVELS LISTED BY BS 8233

Criterion	Typical situation	Design range $L_{Aeq,T}$ Good	Design range $L_{Aeq,T}$ Reasonable
Reasonable resting/sleeping conditions	Living rooms Bedrooms*	30 30	40 35

* for a reasonable standard in bedrooms at night , individual noise events (measured with F time-weighting) should not normally exceed 45 dB L_{Amax}.

4 ASSESSMENT

An assessment has been undertaken to establish what mitigation treatment will be required in order to control noise levels within dwellings to achieve the criteria set out above.

The external noise level used in the assessment was taken from recent noise survey data. Long term noise monitoring was undertaken on the two boundaries of the site adjacent to the highest volumes of traffic flow between 29th August and 3rd September 2013[2]. Of the two existing façades where unattended long term monitoring was carried out, the highest ambient noise levels were measured along Camden Road. The measured ambient noise level at this location was 73 dB L_{Aeq} during both the daytime and the evening (from 0700 to 2300). It is noted that the noise reduction required to meet internal criteria for continuous noise during the daytime is greater than at night. Daytime external noise levels have therefore been utilised for this assessment as a worst case. This level was measured at one metre from the southeast façade of the existing building. Consequently the free-field level incident upon the proposed

[1] British Standards Institute, (1999); BS 8233 - Code of Practice for Sound Insulation and Noise Reduction for Buildings, BSi, London.
[2] URS report (25.11.13) – "79 Camden Road, Noise Assessment"

façade will be the measured level corrected for the façade reflection. This equates to a -3 dB correction resulting in an external level of 70 dB L_{Aeq}.

The required internal criterion for bedrooms and living rooms is 30 dB L_{Aeq}. Consequently the noise reduction required to achieve the internal criterion for continuous noise is 40 dB.

Guidance for good sleeping conditions is provided by the World Health Organisation on page 46 of the Guidelines for Community Noise[3]. The document states that:

"It is believed that indoor sound pressure levels should not exceed approximately 45 dB $L_{Amax,fast}$ more than 10-15 times per night".

The tenth highest maximum noise level (fast weighting) typically measured overnight during the survey was 86 dB $L_{Amax,fast}$. Consequently, the noise reduction required to achieve the intermittent maximum criterion of 45 dB $L_{Amax,fast}$ is 41 dB.

The maximum criterion is the most onerous to comply with and therefore, the recommended façade treatment provided is designed to meet this requirement.

The normalised road traffic spectrum provided in BS 8233 Figure 1 has been utilised for the purposes of this assessment.

The habitable space within the proposed development considered to be most exposed to noise from local roads has been determined from the latest architectural drawings (Sheppard Robson drawings 4998-20-102 and 4998-20-119). This has been determined to be the living room of PD01, a duplex located on the corner of Camden Road and St Pancras Way. The small volume and large glazed area associated with this room make it the worst case proposed receptor of road traffic noise at the development site.

The calculation used to predict an acceptable façade mitigation strategy follows the method set out in BS 8233 section 6.7.2.1. Appendix B provides a detailed breakdown of the calculation steps. The external wall make up has been assumed to consist of a brickwork cavity construction with a surface density of 400kg/m^2. Two glazing options have been accounted for.

The first option provides a mitigation strategy with passive acoustic ventilation. The glazing configuration is a Pilkington Optiphon™ double glazing comprising 11.1mm Optiphon™ / 20mm gap / 17.1mm Optiphon™. The passive ventilation is specified as a Caice Acoustics Ventilator Passive Window Mounted Unit. With this façade construction, the predicted internal noise level for continuous noise is 30 dB L_{Aeq}. The predicted maximum level is 46 dB $L_{Amax,fast}$. It is noted that the predicted maximum internal level marginally exceeds the intermittent maximum criterion by less than 1 dB.

The second option provides an alternative mitigation strategy utilising mechanical ventilation. If selected, then it is recommended that all of the mechanical ventilation openings are situated in façades overlooking courtyards and not the adjacent roads. The glazing configuration in this instance comprises Pilkington 9.1mm Optiphon™ / 20mm krypton gap / 17.1mm Optiphon™.

[3] Guidelines for Community Noise, World Health Organization, Geneva, April 1999

With this façade construction, the predicted internal noise level for continuous noise is 29 dB L_{Aeq}. The predicted maximum level is 45 dB $L_{Amax,fast}$.

It is recommended that the above glazing specification is applied to façades demarcated in Appendix C in red. Further calculations have been carried out to provide glazing specifications for the remainder of the building envelope. Please refer to Appendix B for calculations and Appendix C for relevant colour codes.

Façades demarcated in blue in Appendix C will achieve internal noise criteria with a glazing specification comprising Pilkington 8.8mm Optiphon™ / 16mm gap / 12.8mm Optiphon™. This specification assumes the passive ventilation strategy recommended for the façade overlooking Camden Road (coloured red in Appendix C).

Façades demarcated in yellow in Appendix C will achieve internal noise criteria with a glazing specification comprising Pilkington 4mm Optiphon™ / 12mm gap / 6.8mm Optiphon™. Standard trickle vents may be used in this area.

Façades overlooking the courtyards are demarcated in green. A suitable glazing specification for these areas that will achieve internal noise criteria comprises standard thermal double glazing and standard trickle vents.

For clarification, Table 1 below presents the colour codes against their respective glazing treatments.

TABLE 1: FAÇADE GLAZING TREATMENTS (LEGEND TO ACCOMPANY APPENDIX C)	
	11.1mm Optiphon™ / 20mm gap / 17.1mm Optiphon™ (with Caice Acoustics Ventilator Passive Window Mounted Unit)
	9.1mm Optiphon™ / 20mm krypton gap / 17.1mm Optiphon™ (with mechanical ventilation)
	8.8mm Optiphon™ / 16mm gap / 12.8mm Optiphon™ (with Caice Acoustics Ventilator Passive Window Mounted Unit)
	4mm Optiphon™ / 12mm gap / 6.8mm Optiphon™ (with standard trickle vents)
	Standard thermal double glazing and standard trickle vents

5 CONCLUSION

URS has undertaken calculations to demonstrate the façade mitigation required at a proposed residential development in Camden to achieve the internal noise criteria specified by the Local Authority.

Two options have been considered for the worst case façade (overlooking Camden Road). One of these utilises a passive ventilation strategy. This façade make up achieves the continuous internal noise criterion and marginally exceeds the intermittent noise criterion by less than 1 dB.

The second option includes a mechanical ventilation system. It is recommended that all ventilation openings associated with such a system are positioned so that they do not overlook the road. A glazing specification has been provided for this second scenario which can achieve both the continuous and the intermittent noise criteria as set out in BS 8233.

Further calculations have been carried out to demonstrate compliant glazing specifications for all other areas of the building envelope that will be exposed to lower levels of noise.

APPENDIX A: NOISE TERMINOLOGY

For the purposes of this report, the following terminology and abbreviations are used:

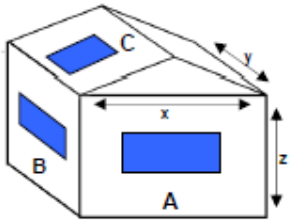
- dB(A) – The unit of noise measurement that expresses the loudness in terms of decibels (dB) based on a weighting factor for humans sensitivity to sound (A);
- Hz – Hertz (unit of frequency);
- L_{A1}, L_{A5}, L_{A10}, L_{A50}, L_{A90}, L_{A99} – A-weighted sound pressure level exceeded for 1, 5, 10, 50, 90 or 99% of the measured time;
- L_{Aeq} – Equivalent continuous A-weighted sound pressure level over a given period of time;
- L_{Amax} - Equivalent maximum continuous sound level over a given period of time;
- SWL – Sound Power Level; and
- SPL – Sound Pressure Level.

Where decibel (dB (A)) levels are followed by a given noise indicator (e.g. L_{Aeq}), then the annotation will read as dB L_{Aeq}.

APPENDIX B: CALCULATIONS

Calculation Based on BS 8233:1999 6.7.2.1 and EN 12354-3
URS Prediction of internal noise level attributed to external sources.

Project Details:	47067825.20000	79 Camden Rd
Room Details:	FD 01 d/x (Gnd Fl - Cnr Camden Rd / St Pancras Way)	



X - Room Width (m)	3.1	Room RT	0.5	yes/no
Y - Room Depth (m)	4.75	Use Defined RT		
Z - Room Height (m)	3.95			
Glazing Area A (m^2)	7.35	Use Defined Spectral Data:		yes/no
Glazing Area B (m^2)	6.65	$L_{Aeq,T}$	70	dB
Glazing Area C (m^2)	0	L_{AFmax}	86	dB
Room Volume (m^3)	58.2			

Break in Areas:

	In/out	Screening dB:
Façade Area (Sf) A 12.245 sq m	☑	
Façade Area (Sf) B 18.7625 sq	☑	0
Ceiling Area (Srr) C 0 sq m	☐	0

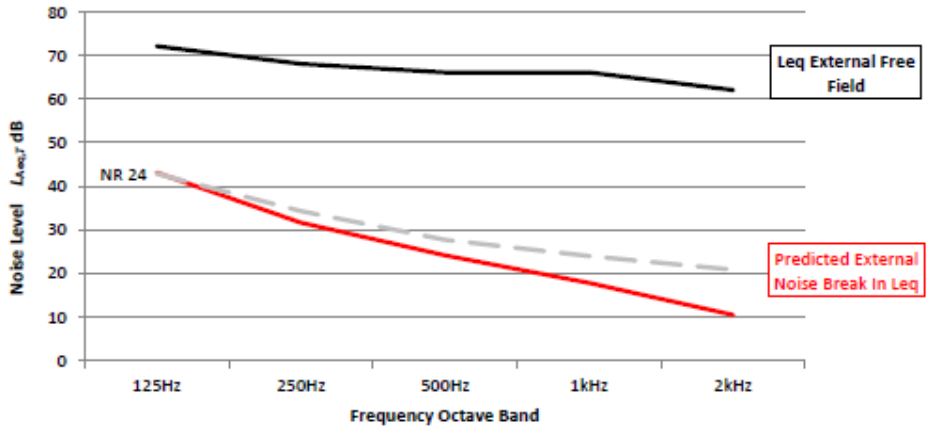
Total Transmitting Area (S) 31.0075 sq m

Normalised Road Traffic Spectrum (BS8233)

63 Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
73	69	65	63	63	59	53

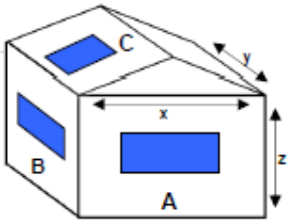
Building Elements: Construction	Element	L_{eq} External Free Field 76	72	68	66	66	62	56	dB(A) 70.0	In/out
		1 Number of Vents:								
Calce' Acoustic Ventilator Passive Window Mounted Unit (8000mm2)	Ventilation $D_{n,e}$		33	40	45	56	67	75	50	☑
11.1 Phon/20/17.1 Phon	Glazing SRI R_{wi} (Facades A & B)		34	43	49	52	54	64		☑
Cavity Brick Wall (120/50/100) 400kg/m2	Wall SRI R_{ew} (Facades A & B)		41	46	52	58	64		57	
BS 8233 calc roof	Roof SRI R_{rr}		28	34	40	45	49			
	Roof Glazing SRI R_{wi}		31	42	52	54	57	64		
Predicted External Noise Break In L_{eq}			**43.1**	**31.7**	**24.2**	**17.8**	**10.5**	**-5.9**	**29.6**	

Predicted Internal $L_{Aeq,T}$ (63Hz - 4kHz)	29.6	dB
Predicted Internal L_{AFmax} (63Hz - 4kHz)	45.6	dB
Internal Noise Rating	NR 24	



Calculation Based on BS 8233:1999 6.7.2.1 and EN 12354-3
URS Prediction of internal noise level attributed to external sources.

Project Details:	47067825.20000	79 Camden Rd
Room Details:	PD 01 d/x (Gnd Fl - Cnr Camden Rd / St Pancras Way)	



X - Room Width (m)	3.1	**Room RT**	0.5	yes/no
Y - Room Depth (m)	4.75	Use Defined RT		
Z - Room Height (m)	3.95			
Glazing Area A (m^2)	7.35	Use Defined Spectral Data:		yes/no
Glazing Area B (m^2)	6.65	$L_{Aeq,tT}$	70	dB
Glazing Area C (m^2)	0	L_{AFmax}	86	dB
Room Volume (m^3)	58.2			

Break in Areas:

	In/out	Screening dB:
Façade Area (Sf) A 12.245 sq m	☑	
Façade Area (Sf) B 18.7625 sq	☑	0
Ceiling Area (Srr) C 0 sq m	☐	0

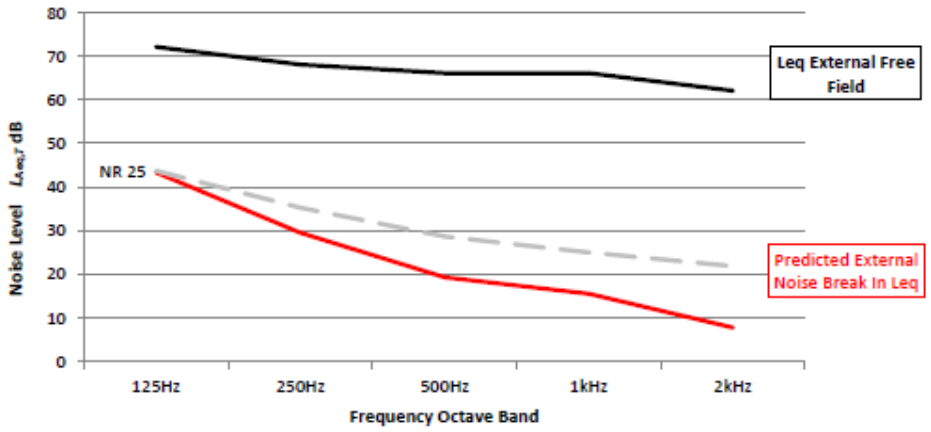
Total Transmitting Area (S) 31.0075 sq m

Normalised Road Traffic Spectrum (BS8233)

63 Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
73	69	65	63	63	59	53

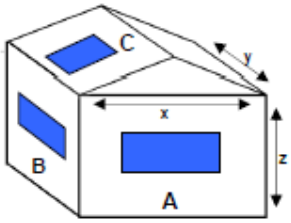
Building Elements: Construction	Element	63 Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	dB(A)	In/out
	L_{eq} External Free Field	76	72	68	66	66	62	56	70.0	
	Number of Vents:	1								
Calce' Acoustic Ventilator Passive Window Mounted Unit (8000mm2)	Ventilation $D_{n,e}$		33	40	45	56	67	75	50	☐
9.1 Phon/20 (kr)/17.1 Phon	Glazing SRI R_{wi} (Facades A & B)		31	42	52	54	57	64		☑
Cavity Brick Wall (120/50/100) 400kg/m2	Wall SRI R_{ew} (Facades A & B)		41	46	52	58	64		57	
BS 8233 calc roof	Roof SRI R_{rr}		28	34	40	45	49			
	Roof Glazing SRI R_{wi}									
Predicted External Noise Break In L_{eq}			43.3	29.5	19.3	15.5	7.8	-6.2	28.7	

Predicted Internal $L_{Aeq,T}$ (63Hz - 4kHz)	28.7	dB
Predicted Internal L_{AFmax} (63Hz - 4kHz)	44.7	dB
Internal Noise Rating	NR 25	



Calculation Based on BS 8233:1999 6.7.2.1 and EN 12354-3
URS Prediction of internal noise level attributed to external sources.

Project Details:	47067825.20000	79 Camden Rd
Room Details:	SR 07 d/x (Gnd Fl - Cnr Wilmot Place / St Pancras Way)	



X - Room Width (m)	3.1	**Room RT**	0.5	yes/no
Y - Room Depth (m)	4.75	Use Defined RT		
Z - Room Height (m)	3.95			
Glazing Area A (m^2)	7.35	Use Defined Spectral Data:		yes/no
Glazing Area B (m^2)	6.65	$L_{Aeq,ff}$	66 dB	
Glazing Area C (m^2)	0	L_{AFmax}	79 dB	
Room Volume (m^3)	58.2			

Break in Areas:

	In/out	Screening dB:
Façade Area (Sf) A 12.245 sq m	☑	
Façade Area (Sf) B 18.7625 sq	☑	0
Ceiling Area (Srr) C 0 sq m	☐	0

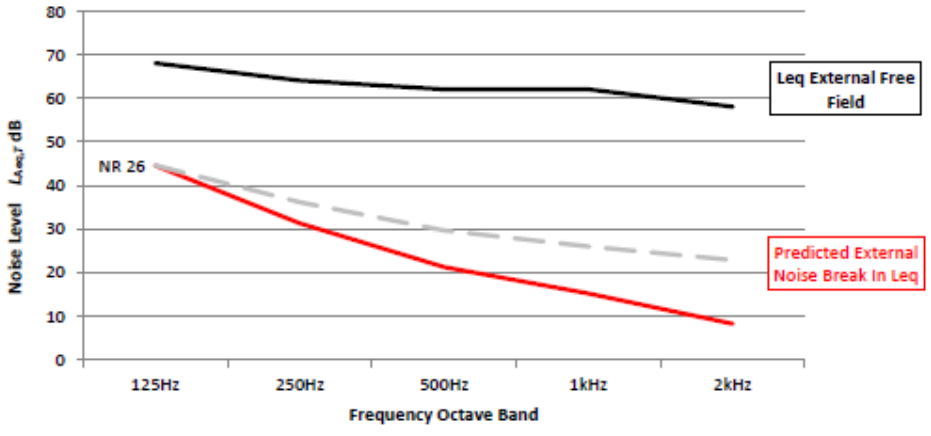
Total Transmitting Area (S) 31.0075 sq m

Normalised Road Traffic Spectrum (BS8233)

63 Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
73	69	65	63	63	59	53

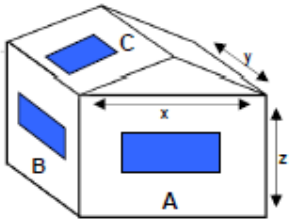
Building Elements: Construction	Element	L_{eq} External Free Field 72	68	64	62	62	58	52	dB(A) 66.0	In/out
		1 Number of Vents:								
Calce' Acoustic Ventilator Passive Window Mounted Unit (8000mm2)	Ventilation $D_{n,e}$	33	40	45	56	67	75	50	☑
8.8 Phon/16/12.8	Glazing SRI R_{wi} (Facades A & B)	26	36	46	50	52	63		☑
Cavity Brick Wall (120/50/100) 400kg/m2	Wall SRI R_{ew} (Facades A & B)	41	46	52	58	64		57	
0	Roof SRI R_{rr}								
	Roof Glazing SRI R_{wi}								
Predicted External Noise Break In L_{eq}		44.6	31.3	21.3	15.2	8.2	-9.0	30.0	

Predicted Internal $L_{Aeq,T}$ (63Hz - 4kHz)	30.0	dB
Predicted Internal L_{AFmax} (63Hz - 4kHz)	43.0	dB
Internal Noise Rating	NR 26	



Calculation Based on BS 8233:1999 6.7.2.1 and EN 12354-3
URS Prediction of internal noise level attributed to external sources.

Project Details:	47067825.20000	79 Camden Rd
Room Details:	SR 03 I (Gnd Fl - Rochester Place)	



X - Room Width (m)	3.1	**Room RT**	0.5	yes/no
Y - Room Depth (m)	4.75	Use Defined RT		
Z - Room Height (m)	3.95			
Glazing Area A (m^2)	7.35	Use Defined Spectral Data:		yes/no
Glazing Area B (m^2)	6.65	$L_{Aeq,ff}$	58	dB
Glazing Area C (m^2)	0	L_{AFmax}	71	dB
Room Volume (m^3)	58.2			

Break in Areas:

	In/out	Screening dB:
Façade Area (Sf) A 12.245 sq m	☑	
Façade Area (Sf) B 18.7625 sq	☑	0
Ceiling Area (Srr) C 0 sq m	☐	0

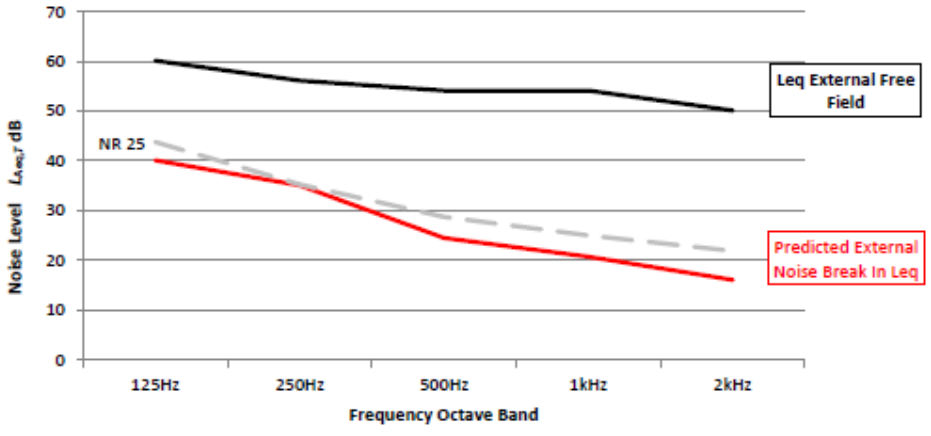
Total Transmitting Area (S) 31.0075 sq m

Normalised Road Traffic Spectrum (BS8233)

63 Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
73	69	65	63	63	59	53

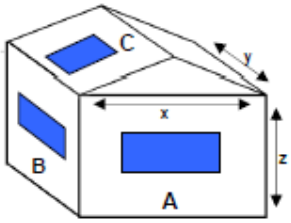
Building Elements: Construction	Element	63 Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	dB(A)	In/out
	L_{eq} External Free Field	64	60	56	54	54	50	44	58.0	
	Number of Vents:	1								
Vent Opening of 2500mm2	Ventilation $D_{n,e}$	35	35	35	35	35	35	35	36	☑
4/12/6.8 Phon	Glazing SRI R_{wi} (Facades A & B)		22	23	33	41	44	46		☑
Cavity Brick Wall (120/50/100) 400kg/m2	Wall SRI R_{ew} (Facades A & B)		41	46	52	58	64		57	
0	Roof SRI R_{rr}									
	Roof Glazing SRI R_{wi}									
Predicted External Noise Break In L_{eq}		29.4	40.1	35.1	24.5	20.7	16.1	9.8	30.0	

Predicted Internal $L_{Aeq,T}$ (63Hz - 4kHz)	30.0	dB
Predicted Internal L_{AFmax} (63Hz - 4kHz)	43.0	dB
Internal Noise Rating	NR 25	



Calculation Based on BS 8233:1999 6.7.2.1 and EN 12354-3
URS Prediction of internal noise level attributed to external sources.

Project Details:	47067825.20000	79 Camden Rd
Room Details:	Areas overlooking courtyards	



X - Room Width (m)	3.1	**Room RT**	0.5 yes/no
Y - Room Depth (m)	4.75	Use Defined RT	☐
Z - Room Height (m)	3.95		
Glazing Area A (m^2)	7.35	Use Defined Spectral Data: yes/no	
Glazing Area B (m^2)	6.65	$L_{Aeq,ff}$	50 dB ☐
Glazing Area C (m^2)	0	L_{AFmax}	63 dB ☐
Room Volume (m^3)	58.2		

Break in Areas:	In/out	Screening dB:
Façade Area (Sf) A 12.245 sq m	☑	
Façade Area (Sf) B 18.7625 sq	☑	0
Ceiling Area (Srr) C 0 sq m	☐	0

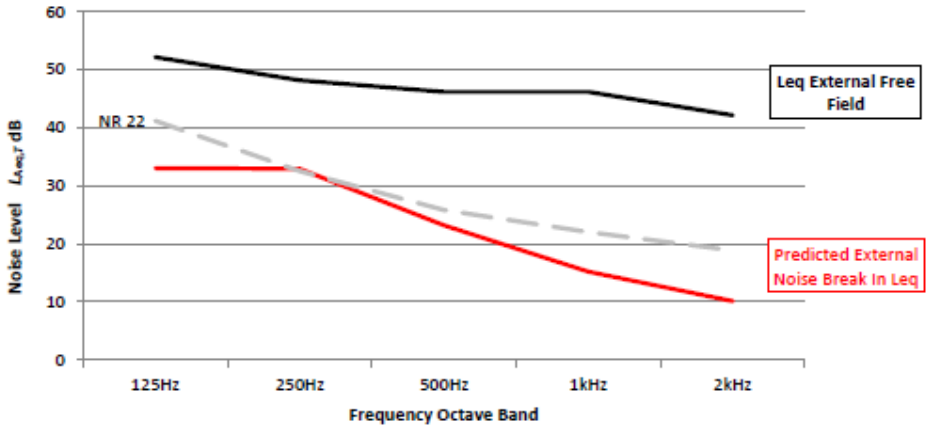
Total Transmitting Area (S) 31.0075 sq m

Normalised Road Traffic Spectrum (BS8233)

63 Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
73	69	65	63	63	59	53

Building Elements: Construction	Element				L_{eq} External Free Field				dB(A)	
		56	52	48	46	46	42	36	50.0	
		1	Number of Vents:							In/out
Vent Opening of 2500mm2	Ventilation $D_{n,e}$	35	35	35	35	35	35	35	36	☑
4-(6-16)-4 Standard air filled cavity	Glazing SRI R_{wi} (Facades A & B)		21	17	25	35	37	31	29	☑
Cavity Brick Wall (120/50/100) 400kg/m2	Wall SRI R_{ew} (Facades A & B)		41	46	52	58	64		57	
0	Roof SRI R_{rr}									
	Roof Glazing SRI R_{wi}									
Predicted External Noise Break In L_{eq}		21.4	33.0	32.9	23.1	15.2	10.1	7.9	26.7	

Predicted Internal $L_{Aeq,T}$ (63Hz - 4kHz)	26.7	dB
Predicted Internal L_{AFmax} (63Hz - 4kHz)	39.7	dB
Internal Noise Rating	NR 22	



APPENDIX C: FAÇADE MARK UP