

Assessment of Facade Sound Insulation at 78 Oxford Road, Reading

Report Reference: 160715-002A

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0. SUMMARY

- The client is preparing a planning application for the construction of new residential dwellings at 78 Oxford Road, Reading.
- ACA Acoustics Limited has been commissioned to assess the sound climate in the vicinity of the proposed development site and consider façade sound insulation for the new residential properties. The assessment is required by the Local Planning Authority, Reading Borough Council, to assist their consideration of the planning application.
- An unmanned sound level survey was carried out by ACA Acoustics at the site over nominally a 24-hour period between 20th and 21st July 2016.
- Existing ambient sound levels incident on the proposed development are comprised primarily of traffic activity on the junction of Oxford Road and Alfred Street.
- A scheme for sound insulation of the building envelope has been developed such that internal sound levels during the daytime do not exceed LAeq 35dB within living rooms and bedrooms and levels at night do not exceed LAeq 30dB within bedrooms. These levels correspond with recommended guideline limits set out in BS 8233:2014. Details of the sound insulation scheme are provided within this report.
- In accordance with national planning guidance and local requirements of Reading Borough Council, it is the author's opinion that the site is suitable for residential development, subject to implementation of the noise mitigation scheme set out in this report.

1. INTRODUCTION

ACA Acoustics Limited has been commissioned to carry out an assessment of external sound levels in the vicinity of a proposed residential development at 78 Oxford Road, Reading, and, where necessary, make recommendation for a suitable sound insulation mitigation scheme.

The objective of the assessment is to determine the impact that existing noise sources would have on the proposed new dwelling in accordance with a planning condition proposed by Reading Borough Council.

This report presents results of a sound level survey and assessment along with a scheme for sound insulation such that suitable noise levels are achieved within the proposed residential dwellings and includes:

- Description of the site and development proposals;
- Confirmation of Reading Borough Council's planning consent requirements for noise;
- Measurement and assessment of existing ambient sound levels at the site;
- Specification of a scheme of sound insulation measures;

2. ACOUSTIC CRITERIA

The proposed sound level measurement and assessment methodology is based on ACA Acoustics Limited's experience of undertaking assessments for similar developments.

A review of the relevant parts of each of the routinely used planning guidance documents and British Standards is provided below.

2.1 Reading Borough Council

Principal Planning Officer Jonathan Markwell of Reading Borough Council planning department has provided the following request relating to noise assessment of the proposed development:

Condition number	Condition
9.	In terms of previous comments from Environmental Protection officers, and consistent with a recent redevelopment permission close-by on Oxford Road (Ref 150721 at 114 Oxford Road), it is considered essential for a noise assessment to be submitted at application stage. This is owing to the location of the site adjacent to both Oxford Road and the IDR. The noise report is therefore necessary to demonstrate that future occupiers will have a suitable quality of future accommodation. There may be linkages here with the suggestion above to replace the existing building glazing, to assist with the noise impacts? In terms of air quality, although it would be far preferable to provide this at application stage, it is considered that it would ultimately be able to be secured via condition. In terms of a construction method statement (CMS), based on previous experiences, this is an element existing nearby occupiers may raise concerns with. Therefore, it is advised that an initial CMS should be submitted at application stage (showing your commitment to minimising noise/disturbance during the construction phase), with a full CMS secured via pre-commencement condition.

Table 1: Statement from Reading Borough Council Planning Department.

No specific criteria is provided within this statement, and so criteria provided within BS 8233:2014 has been used in order to define acoustic criteria within habitable rooms. BS 8233:2014 is discussed in Section 2.2 below.

2.2 British Standard 8233:2014

In advising guidance on permissible sound levels inside residential dwellings Reading Borough Council makes reference to British Standard 8233.

The current revision of BS 8233 was published in October 2014. The introduction to BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* advises that 'this guide suggests criteria, such as suitable sleeping/resting conditions, and proposes noise levels that normally satisfy

these criteria'. As such it is considered that guideline noise limits set out in BS 8233:2014 are suitable to protect future occupants of the dwelling from noise disturbance.

Guidance limits for internal noise within living rooms and bedrooms, taken from Table 4 of BS 8233:2014, are shown in Table 2 below:

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Room	35dB LAeq, 16hr	-
Dining	Dining Room/Area	40dB LAeq, 16hr	-
Sleeping (daytime resting)	Bedroom	35dB LAeq, 16hr	30dB LAeq, 8hr

Table 2: BS 8233:2014 indoor ambient noise levels for dwellings

3. REVIEW OF SITE LOCATION AND DEVELOPMENT PROPOSALS

78 Oxford Road currently consists of existing commercial properties to ground floor and apartments above. The proposed development includes development of the retail and apartment spaces.

The surrounding area is mix of residential and retail properties, with sound levels primarily due to traffic activity on the A329 and Oxford Road.

Development of 78 Oxford Road (Alfred House)
Proposed corner view



colony
architects

Figure 1: Site location plan and development proposals

External amenity areas will be situated to the rear of the proposed development, experiencing significant screening from nearby roads due to the existing buildings and proposed new development.

4. BACKGROUND SOUND LEVEL SURVEY

4.1 Measurement and Assessment Procedure

To assess the impact of existing noise sources, a sound level survey was conducted at the development site to determine levels incident on the proposed facades.

A single measurement position was selected for the unmanned survey at first floor window of the property. Rooms to the rear façade will be further away and screened from the main sound sources.

The site was considered secure and so an unmanned survey was carried out using a logging type sound level meter over nominally a 24-hour period between 20th and 21st July 2016. The weather remained dry and calm during the survey period. Sound level measurements were recorded in terms of 15-minute samples of overall LAeq and L90 values.

4.2 Instrumentation

The following equipment was used during the survey; the sound level meter was calibrated before the survey and checked after with no change noted.

Equipment	Serial Number
Rion sound level meter type NL-31 Class 1 complete with weatherproof and lockable outdoor environmental kit	00773045
NTi Audio calibrator type CAL200 94/114dB. Compliant to IEC 60942-1:2003 (Calibrated to a reference traceable to NIST)	11441

Table 3: Equipment used

4.3 Measurement Results and Observations

Complete LAeq and LA90 value results of the sound level survey are provided in graphical form in Figure 2 on the following page.

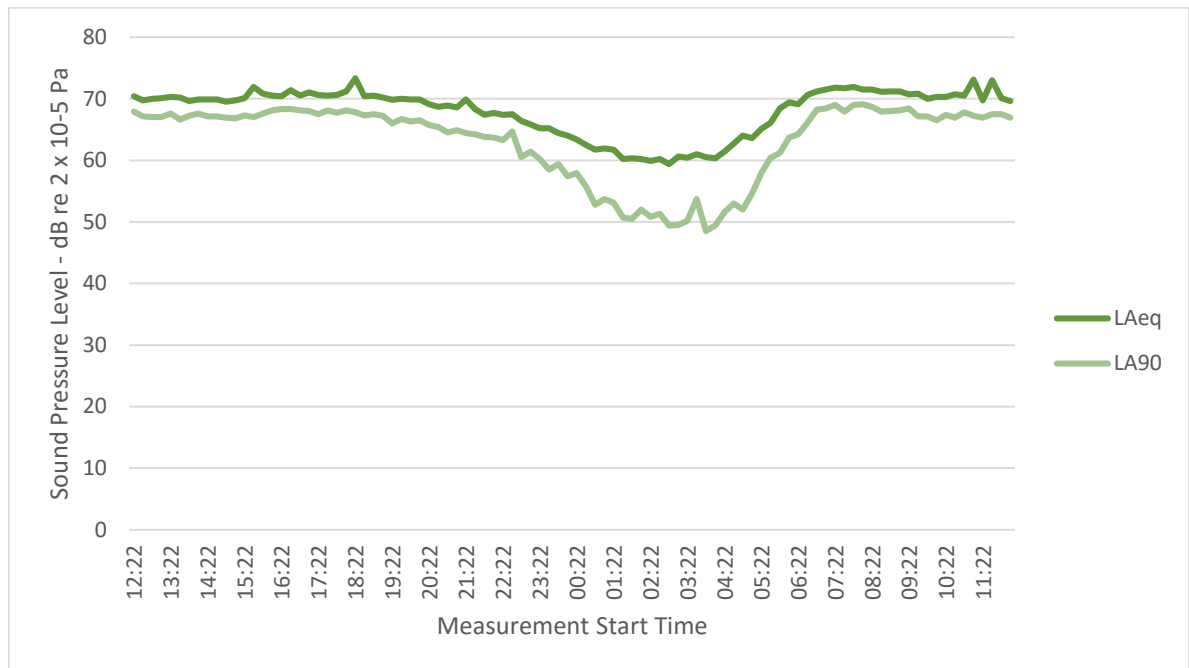


Figure 2: Sound level survey results

Summary of the 16-hour daytime and 8-hour night time period sound levels over the second 24-hour period at the unattended measurement position are shown in Table 4 below.

Description	Daytime (07:00 – 23:00) LAeq (16 hour)	Night Time (23:00 – 07:00) LAeq (8 hour)
20 th – 21 st July 2016	67dB	60dB

Table 4: Summary noise survey results for daytime and night time periods

5. SCHEME OF FACADE SOUND INSULATION

As discussed above a scheme for sound insulation is necessary to ensure noise levels inside rooms of the new dwellings are reasonable and comply with the requirements of BS 8233:2014. By following the calculation procedures outlined in BS EN ISO 12354-3:2000 and BS 8233:2014 a specification for the acoustic performance of facade elements has been established.

Copy of acoustic calculations for daytime and night time noise intrusion into sample rooms of the property are provided in Appendix A. The calculations confirm that intrusive sound levels within rooms of the residential property will comply with guidance limits in British Standard BS 8233:2014.

An item by item scheme of the acoustic performance of the building envelope is provided below.

5.1 Walls

Walls of the new dwellings are to be traditional brick-cavity-block construction. Confirmation of the wall construction and anticipated sound insulation performance is shown below. Note that the construction provided is typical and slight variations on the specification, for example filling the cavity with insulation for thermal reasons, would be acceptable so long as the installed construction achieves the specified R_w performance.

Description	R_w (dB)	$R_w + C_{tr}$ (dB)	Typical Construction
Wall Type 1 – Brickwork			
Brickwork	52	48	102mm facing brickwork, 75mm cavity then 100mm blockwork with plasterboard on dabs to the inner face.

Table 5: Specification of facade wall sound reduction index - R_w (dB)

5.2 Glazing

Values in Table 6 on the following page show a specification schedule of glazing sound insulation performance for different parts of the development. Levels to the rear of the development will be screened from the road and so lower performance glazing may be installed as shown in Table 6.

Note that there are many permutations of possible configurations and different glazing suppliers will tend to use their own preferred configuration. Providing that the overall R_w performance and the individual octave band performance are not less than those shown in Table 6 then any alternative configuration can be used.

For all living rooms and bedrooms, the window and door frames will need to have effective acoustic seals all around. Effective seals are rubber or neoprene beaded “P” or “O” profile type

that compress all around on closure of the windows. Plastic type or brush type weathering seals are not classed as effective acoustic seals. Note that glazed doors to the apartments will require to achieve the specified performance.

Description	Octave Band Frequency – Hz (dB)						Rw (dB)	Comments
	125	250	500	1k	2k	4k		
Glazing	32	32	40	44	43	48	42	Double-glazing with asymmetric panes such as 10-12-8 Schuco AWS 65 or equivalent

Table 6: Specification of glazing sound reduction index - R (dB)

5.3 Ventilation

With regard to ventilation requirements, it is usual to satisfy the noise limits with the background ventilation rate defined by Approved Document F of the Building Regulations, rather than for the rapid ventilation rate. It is therefore anticipated that it will be necessary to incorporate an acoustic ventilation scheme into the design such that residents are able to achieve background ventilation without necessarily needing to open windows. Values in Table 7 below show a specification schedule of ventilator sound insulation performance for the development.

Description	Dn,e,w (dB)	Typical Construction
Passive ventilation	45	Passivent Fresh 90dB

Table 7: Specification for ventilator Element Normalized Level Difference – Dn,e,w (dB)

As alternative to passive ventilation the client may prefer to provide a mechanical ventilation system such as MVHR or equivalent. Suppliers including Vent Axia or Nuaire would be able to offer suitable ventilation systems for residential purposes.

It is important that any self-noise (i.e. noise from the fans) and traffic noise intrusion through any ducted system must not cause internal sound levels to exceed the design requirements. To achieve these limits, it is recommended that the overall noise from any mechanical ventilation system will need to be no higher than LAeq 30dB during the daytime and LAeq 25dB within bedrooms overnight to allow for accumulation of noise sources.

5.4 Roof & Ceilings of Upper Floor Habitable Rooms

Top floor rooms that are directly beneath roof level will be exposed to noise break-in via the roof and ceiling structure. It is anticipated the roof will be of reinforced concrete construction with plasterboard ceilings to the rooms below.

To control noise break-in, it is recommended that ceilings to rooms below roof level be formed from minimum one layer of 12.5mm *SoundBloc* plasterboard.

APPENDIX A

Acoustic Calculations

Calculation Sheet

Flat 1 Master Bedroom

	Octave Band Centre Frequency (Hz)									
	63	125	250	500	1k	2k	4k	8k		
Measured Sound Level										
Leq,ff - LAeq Bedrooms										
8ve Band Shaper - Road Traffic										
Leq,ff	64.0	62.0	58.0	56.0	56.0	52.0	47.0	41.0	Row A	
Facade Wall Element										
	-38.9	-41.9	-45.9	-45.9	-54.9	-58.9	-60.9	-65.9		
Facade Glazed Element										
	-33.2	-39.2	-39.2	-47.2	-51.2	-50.2	-55.2	-56.2		
Ventilators										
	-37.9	-36.9	-36.9	-39.9	-42.9	-50.9	-53.9	-56.9		
Cumulative Lp										
Transmission Path Rew	25.1	20.1	12.1	10.1	1.1	-6.9	-13.9	-24.9	From Row B	
Transmission Path Rwi	30.8	22.8	18.8	8.8	4.8	1.8	-8.2	-15.2	From Row C	
Transmission Path Dn,e	26.1	25.1	21.1	16.1	13.1	1.1	-6.9	-15.9	From Row D	
Result	32.9	27.9	23.5	17.8	14.3	7.0	3.8	3.1		
ISO 12354-3 Lfs Correction										
Lfs - Facade Type Correction - 1. Plane Facade										
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Room Corrections										
	3.3	2.5	1.5	1.5	1.5	0.9	0.3	-1.5		
Internal Receiver Noise										
Internal Receiver Noise - Flat 1 Master Bedroom										
Reverberant Field, LPrev:	36.2	30.4	25.0	19.3	15.8	7.9	4.1	1.6		

Calculation Sheet

Flat 1 Guest bedroom

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Measured Sound Level									
Leq,ff - LAeq Bedrooms									
8ve Band Shaper - Road Traffic									
Leq,ff	64.0	62.0	58.0	56.0	56.0	52.0	47.0	41.0	Row A
Facade Wall Element									
	-39.5	-42.5	-46.5	-46.5	-55.5	-59.5	-61.5	-66.5	
Facade Glazed Element									
	-31.4	-37.4	-37.4	-45.4	-49.4	-48.4	-53.4	-54.4	
Ventilators									
	-36.2	-35.2	-35.2	-38.2	-41.2	-49.2	-52.2	-55.2	
Cumulative Lp									
Transmission Path Rew	24.5	19.5	11.5	9.5	0.5	-7.5	-14.5	-25.5	From Row B
Transmission Path Rwi	32.6	24.6	20.6	10.6	6.6	3.6	-6.4	-13.4	From Row C
Transmission Path Dn,e	27.8	26.8	22.8	17.8	14.8	2.8	-5.2	-14.2	From Row D
Result	34.3	29.4	25.1	19.2	15.8	8.1	4.1	3.2	
ISO 12354-3 Lfs Correction									
Lfs - Facade Type Correction - 1. Plane Facade									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Room Corrections									
	2.7	1.9	0.9	0.9	0.9	0.4	-0.3	-2.1	
Internal Receiver Noise									
Internal Receiver Noise - Flat 1 Guest bedroom									
Reverberant Field, LPrev:	37.0	31.3	26.0	20.1	16.7	8.4	3.8	1.1	

Calculation Sheet

Flat 2 Living Room

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Measured Sound Level									
Leq,ff - LAeq Living Rooms									
8ve Band Shaper - Road Traffic									
Leq,ff	71.0	69.0	65.0	63.0	63.0	59.0	54.0	48.0	Row A
Facade Wall Element									
	-38.9	-41.9	-45.9	-45.9	-54.9	-58.9	-60.9	-65.9	
Facade Glazed Element									
	-33.5	-39.5	-39.5	-47.5	-51.5	-50.5	-55.5	-56.5	
Ventilators									
	-44.3	-43.3	-43.3	-46.3	-49.3	-57.3	-60.3	-63.3	
Cumulative Lp									
Transmission Path Rew	32.1	27.1	19.1	17.1	8.1	0.1	-6.9	-17.9	From Row B
Transmission Path Rwi	37.5	29.5	25.5	15.5	11.5	8.5	-1.5	-8.5	From Row C
Transmission Path Dn,e	26.7	25.7	21.7	16.7	13.7	1.7	-6.3	-15.3	From Row D
Result	38.9	32.5	27.7	21.4	16.7	10.7	5.0	3.4	
ISO 12354-3 Lfs Correction									
Lfs - Facade Type Correction - 1. Plane Facade									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Room Corrections									
	8.5	7.8	7.0	7.0	7.0	6.5	6.0	4.8	
Internal Receiver Noise									
Internal Receiver Noise - Flat 2 Living Room									
Reverberant Field, LPrev:	47.4	40.3	34.7	28.4	23.7	17.2	11.0	8.2	

Calculation Sheet

Flat 4 Bedroom/Living room

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Measured Sound Level									
Leq,ff - LAeq Living Rooms									
8ve Band Shaper - Road Traffic									
Leq,ff	71.0	69.0	65.0	63.0	63.0	59.0	54.0	48.0	Row A
Facade Wall Element									
	-39.5	-42.5	-46.5	-46.5	-55.5	-59.5	-61.5	-66.5	
Facade Glazed Element									
	-31.2	-37.2	-37.2	-45.2	-49.2	-48.2	-53.2	-54.2	
Ventilators									
	-39.0	-38.0	-38.0	-41.0	-44.0	-52.0	-55.0	-58.0	
Cumulative Lp									
Transmission Path Rew	31.5	26.5	18.5	16.5	7.5	-0.5	-7.5	-18.5	From Row B
Transmission Path Rwi	39.8	31.8	27.8	17.8	13.8	10.8	0.8	-6.2	From Row C
Transmission Path Dn,e	32.0	31.0	27.0	22.0	19.0	7.0	-1.0	-10.0	From Row D
Result	41.0	35.1	30.7	24.2	20.4	13.0	6.2	3.7	
ISO 12354-3 Lfs Correction									
Lfs - Facade Type Correction - 1. Plane Facade									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Room Corrections									
	2.0	1.2	0.2	0.2	0.2	-0.3	-1.0	-2.8	
Internal Receiver Noise									
Internal Receiver Noise - Flat 4 Bedroom/Living room									
Reverberant Field, LPrev:	43.0	36.3	30.9	24.5	20.7	12.6	5.2	1.0	

Calculation Sheet

Flat 10 Bedroom

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Measured Sound Level									
Leq,ff - LAeq Bedrooms									
8ve Band Shaper - Road Traffic									
Leq,ff	64.0	62.0	58.0	56.0	56.0	52.0	47.0	41.0	Row A
Facade Wall Element									
	-∞.0	-∞.0	-∞.0	-∞.0	-∞.0	-∞.0	-∞.0	-∞.0	
Facade Glazed Element									
	-29.4	-35.4	-35.4	-43.4	-47.4	-46.4	-51.4	-52.4	
Facade Roof Element									
	-38.6	-41.6	-42.6	-51.6	-55.6	-59.6	-62.6	-	
Ventilators									
	-42.6	-41.6	-41.6	-44.6	-47.6	-55.6	-58.6	-61.6	
Cumulative Lp									
Transmission Path Rew	-∞.0	-∞.0	-∞.0	-∞.0	-∞.0	-∞.0	-∞.0	-∞.0	From Row B
Transmission Path Rwi	34.6	26.6	22.6	12.6	8.6	5.6	-4.4	-11.4	From Row C
Transmission Path Rrr	25.4	20.4	15.4	4.4	0.4	-7.6	-15.6	-	From Row D
Transmission Path Dn,e	21.4	20.4	16.4	11.4	8.4	-3.6	-11.6	-20.6	From Row E
Result	35.2	28.3	24.1	15.5	12.1	7.2	1.6	-	
ISO 12354-3 Lfs Correction									
Lfs - Facade Type Correction - 9. Terrace									
	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-	
Room Corrections									
	6.7	5.9	4.9	4.9	4.9	4.4	3.7	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 10 Bedroom									
Reverberant Field, LPrev:	36.9	29.2	24.1	15.5	12.0	6.5	0.3	-	

Calculation Sheet

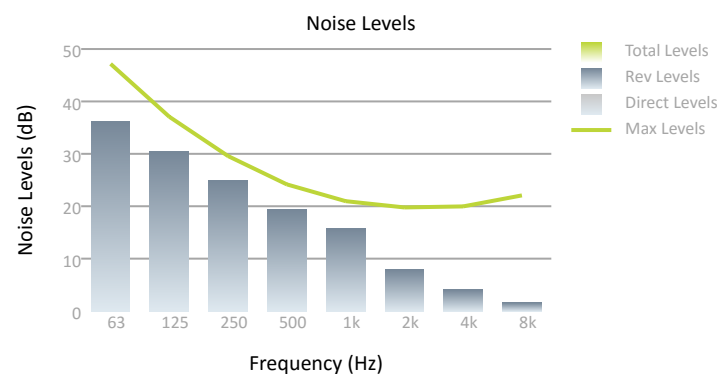
Flat 10 Living Room

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Measured Sound Level									
Leq,ff - LAeq Living Rooms									
8ve Band Shaper - Road Traffic									
Leq,ff	71.0	69.0	65.0	63.0	63.0	59.0	54.0	48.0	Row A
Facade Wall Element									
	-61.6	-64.6	-68.6	-68.6	-77.6	-81.6	-83.6	-88.6	
Facade Glazed Element									
	-28.4	-34.4	-34.4	-42.4	-46.4	-45.4	-50.4	-51.4	
Facade Roof Element									
	-39.8	-42.8	-43.8	-52.8	-56.8	-60.8	-63.8	-	
Ventilators									
	-45.2	-44.2	-44.2	-47.2	-50.2	-58.2	-61.2	-64.2	
Cumulative Lp									
Transmission Path Rew	9.4	4.4	-3.6	-5.6	-14.6	-22.6	-29.6	-40.6	From Row B
Transmission Path Rwi	42.6	34.6	30.6	20.6	16.6	13.6	3.6	-3.4	From Row C
Transmission Path Rrr	31.2	26.2	21.2	10.2	6.2	-1.8	-9.8	-	From Row D
Transmission Path Dn,e	25.8	24.8	20.8	15.8	12.8	0.8	-7.2	-16.2	From Row E
Result	43.0	35.6	31.5	22.2	18.5	14.1	5.6	-	
ISO 12354-3 Lfs Correction									
Lfs - Facade Type Correction - 9. Terrace									
	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-	
Room Corrections									
	9.0	8.3	7.5	7.5	7.5	7.1	6.6	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 10 Living Room									
Reverberant Field, LPrev:	47.0	38.9	34.0	24.7	21.0	16.2	7.1	-	



78 Oxford Road, Reading

Reference	Flat 1 Master Bedroom
Description	First Floor Bedroom
Room Type	Bedrooms - Night Time
Maximum Noise Level	30dB(A)
Calculated Noise Level	22dB(A)
Calculated Tmf T60 (s)	0.38
Volume (m3)	27.3



Direct Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k

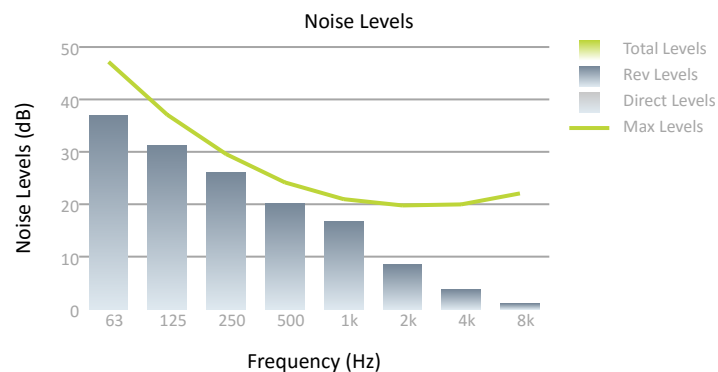
Reverberant Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq,ff	1	36	30	25	19	16	8	4	2



78 Oxford Road, Reading

Reference	Flat 1 Guest bedroom
Description	First Floor Bedroom
Room Type	Bedrooms - Night Time
Maximum Noise Level	30dB(A)
Calculated Noise Level	23dB(A)
Calculated Tmf T60 (s)	0.38
Volume (m3)	20.8



Direct Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k

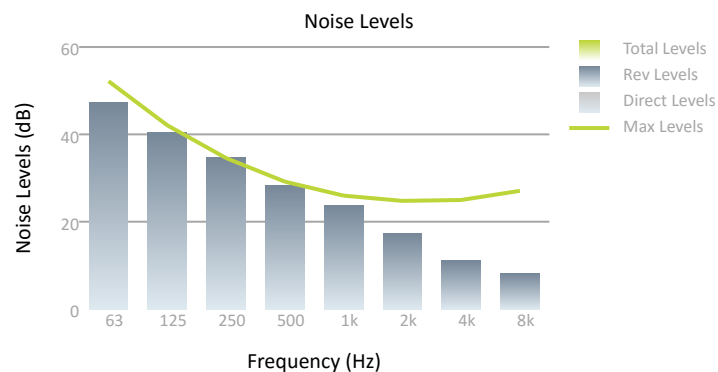
Reverberant Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq,ff	1	37	31	26	20	17	8	4	1



78 Oxford Road, Reading

Reference	Flat 2 Living Room
Description	First Floor Living Room
Room Type	Domestic Living Room
Maximum Noise Level	35dB(A)
Calculated Noise Level	32dB(A)
Calculated Tmf T60 (s)	0.48
Volume (m3)	41.4



Direct Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k

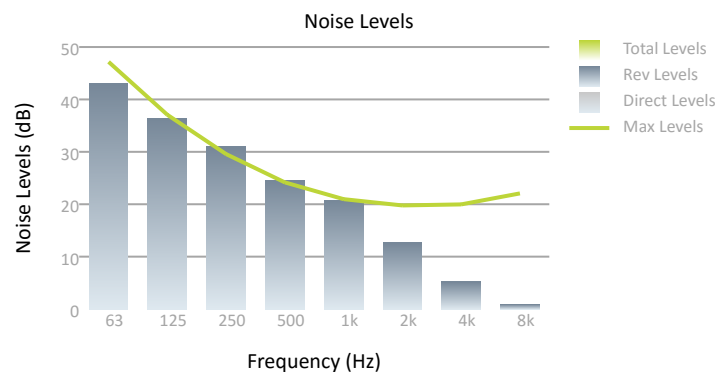
Reverberant Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq,ff	1	47	40	35	28	24	17	11	8



78 Oxford Road, Reading

Reference	Flat 4 Bedroom/Living room
Description	First Floor Bedroom
Room Type	Bedrooms - Night Time
Maximum Noise Level	30dB(A)
Calculated Noise Level	28dB(A)
Calculated Tmf T60 (s)	0.38
Volume (m3)	46.8



Direct Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k

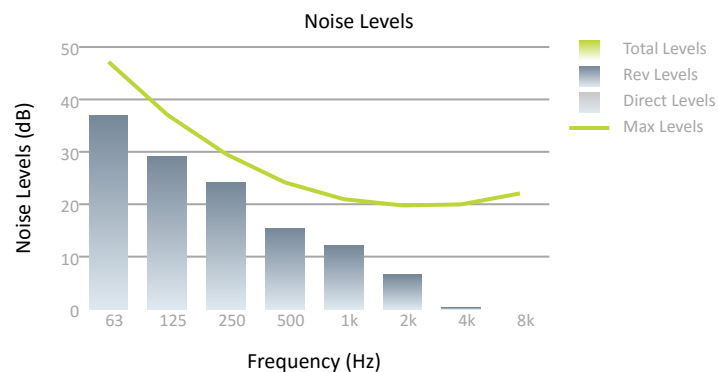
Reverberant Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq,ff	1	43	36	31	24	21	13	5	1



78 Oxford Road, Reading

Reference	Flat 10 Bedroom
Description	First Floor Bedroom
Room Type	Bedrooms - Night Time
Maximum Noise Level	30dB(A)
Calculated Noise Level	20dB(A)
Calculated Tmf T60 (s)	0.38
Volume (m3)	36.4



Direct Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k

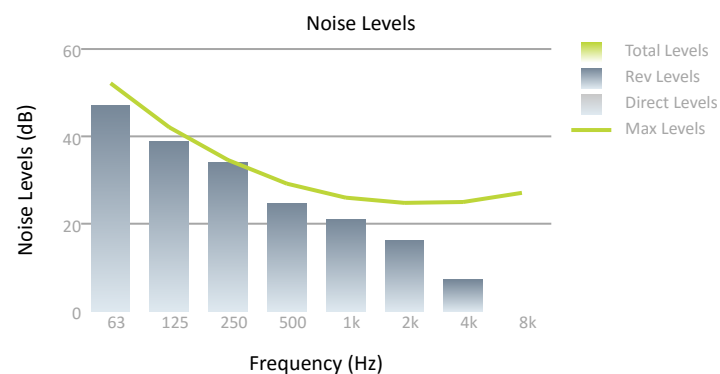
Reverberant Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq,ff	1	37	29	24	15	12	7	0	-



78 Oxford Road, Reading

Reference	Flat 10 Living Room
Description	Third Floor Living Room
Room Type	Domestic Living Room
Maximum Noise Level	35dB(A)
Calculated Noise Level	30dB(A)
Calculated Tmf T60 (s)	0.48
Volume (m3)	45.5



Direct Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k

Reverberant Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq,ff	1	47	39	34	25	21	16	7	-



78 Oxford Road, Reading

Acoustic Performance of Construction Elements

Reference	Description	Location	Density (kg/m3)	Sound Reduction Indices (dB)							Rw	
				63	125	250	500	1k	2k	4k		8k
External Wall	105mm Brick, 75mm Cavity, 100mm Block			38	41	45	45	54	58	60	65	52
Roof	100mm Reinforced concrete			36	39	40	49	53	57	60	-	52
Glazing	10-12-8 Schuco AWS 65			26	32	32	40	44	43	48	49	42