

Noise impact assessment to a proposed residential development

23-31 London Street, Reading



Client: Mobile CAD Surveying Solutions LTD

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-	14/03/2024	Alfie Morgan BSc (Hons)	Tommy Burn MSc (Hons) MIOA

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0. SUMMARY

- 0.1. The client is preparing an application for the Prior Approval of the conversion of existing office space at 23-31 London Street, Reading, to form residential apartments.
- 0.2. ACA Acoustics Limited have been commissioned to assess acoustic impacts to the proposed new residential development.
- 0.3. An attended sound level survey overlooking nearby mechanical services equipment at the rear façade of the building of the building was carried out between the 29th February – 1st March 2024.
- 0.4. ACA Acoustics identified the kitchen extract fan unit for the 'Hotel 1843 x Calico Bar & Eatery' kitchen as the source of mechanical noise in the area.
- 0.5. An assessment of noise from mechanical equipment in the vicinity of the site indicates that without mitigation, noise from these commercial sources is at a level where there is a likelihood of adverse impact to future occupants. An acoustic specification of façade elements, including mechanical ventilation, is proposed to mitigate this impact.
- 0.6. The outline scheme for sound insulation of the building envelope has been developed such that internal sound levels during the daytime do not exceed LAeq 30dB within living rooms and bedrooms. Sound levels at night shall not exceed LAeq 25dB to bedrooms. These levels are at least 5dB more stringent than the guideline criteria in BS 8233:2014 to provide a good standard of amenity in residential dwellings. This ensures that noise intrusion from industrial and commercial sources will be low and will not be detrimental to the amenity of future occupants.
- 0.7. In summary, ACA Acoustics considers that allowing for the noise control measures set out in this report, no noise of an industrial or commercial nature will have an adverse impact on future occupants of the dwellings and therefore in accordance with The Town and Country Planning (General Permitted Development) (England) (Amendment) Order it is recommended that the application for Prior Approval is granted.

1. INTRODUCTION

The client is preparing an application to Reading Borough Council for the Prior Approval conversion of the current office block at 23-31 London Street, Reading to residential apartments.

ACA Acoustics Limited has been commissioned Mobile CAD Surveying Solutions LTD to carry out an assessment of potential acoustic impacts to the proposed residential development.

This report presents results of a sound level and subjective observation survey and assessment of results.

2. ACOUSTIC CRITERIA & ASSESSMENT METHODOLOGY

2.1 The Town and Country Planning (General Permitted Development etc.) (England) (Amendment) Order

The application for Prior Approval is being made under The Town and Country Planning (General Permitted Development etc.) (England) (Amendment) Order, Class MA (GPDO). In accordance with the Order,

“Before beginning development under Class MA, the developer must apply to the local planning authority for a determination as to whether the prior approval of the authority will be required as to ... impacts of noise from commercial premises on the intended occupiers of the development”.

It is important to consider the GPDO specifically refers to noise from commercial premises to the proposed development. Noise from other sources including traffic on nearby routes is not considered under the GPDO.

The Order does not include any assessment methodology nor criteria to be achieved and therefore it is relevant to consider guidance provided in relevant British Standards and other documents.

2.2 National Planning Policy Framework (NPPF) and Noise Policy Statement for England (NPSE)

The National Planning Policy Framework (referred to as NPPF) sets out the Government’s planning policies for England and provides guidance on how these are expected to be applied, providing a framework within which Local Authorities can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

Paragraph 180 of the NPPF states that,

“Planning policies and decisions should contribute to and enhance the natural and local environment by ... e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability”.

Paragraph 191 also talks specifically about noise and advises,

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- *Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and quality of life.*
- *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

The Government’s long-term policy aims relating to noise are contained in the Noise Policy Statement for England (referred to as NPSE). Stated aims of the NPSE are:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy of sustainable development:

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

Paragraphs 2.19 to 2.24 clarify the above aims, referring to established concepts from toxicology; NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level). It also introduces a new concept relating to “significant adverse” of SOAEL (Significant Observed Adverse Effect Level), however noting,

“It is not possible to have a single objective noise-based measure that describes SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times”.

The first aim of NPPF Paragraph 191 and the second underlying aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development, as set out in the NPPF. As neither the NPPF nor NPSE includes any numerical criteria, it is necessary to consider guidance provided in other documents to determine suitable limits that would define the LOAEL on an individual basis.

Finally, it is also of benefit to consider Paragraph 2.7, which advises that,

“... the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications”.

This provides clear guidance that noise must not be considered in isolation but as part of the overall scheme taking into account the overall sustainability and associated impacts of the proposed development; there is no benefit in reducing noise to an excessively low level if this creates or increases some other adverse impact. Similarly, it may be appropriate in some cases for noise to have an adverse impact if this is outweighed by the reduction or removal of some other adverse impact that is of greater significance to the development.

2.3 Planning Practice Guidance – Noise (PPG-N)

Related to the NPSE and the NPPF, The Department for Communities and Local Government has published additional guidance and clarifications within the Planning Practice Guidance – Noise (PPG-N), available at <https://www.gov.uk/guidance/noise--2>.

Paragraph 003 of the PPG advises,

“Plan-making and decision making need to take account of the acoustic environment and in doing so consider:

- *Whether or not a significant adverse effect is occurring or likely to occur;*
- *Whether or not an adverse effect is occurring or likely to occur; and*
- *Whether or not a good standard of amenity can be achieved.*

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure ... is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.”

This guidance is like that set out in the NPPF and NPSE, however, Paragraph 005 of the PPG provides outline guidance on the definition of ‘significant adverse effect’ and ‘adverse effect’. A copy of the table appended to Paragraph 005 is repeated below.

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Figure 1: Noise exposure hierarchy, taken from Planning Practice Guidance - Noise

Although this table provides descriptive definitions for the NOEL, LOAEL and SOAEL, as with the NPPF and NPSE there are no numerical values provided.

2.4 British Standard 8233:2014+A1:2019

The introduction to BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* confirms that,

“This guide suggests criteria, such as suitable sleeping/resting conditions, and proposes noise levels that normally satisfy these criteria.”

Guidance limits for internal sound levels within living rooms and bedrooms, taken from Table 4 of BS 8233:2014, are shown in Table 1 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 1: BS 8233:2014 indoor ambient sound levels for dwellings

2.5 British Standard 4142:2014+A1:2019

The scope of BS 4142:2014+A1:2019 advises,

“This British Standard describes methods for rating and assessing sound of an industrial and/or commercial nature ... to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident”.

The assessment method of BS 4142:2014+A1:2019 corrects the specific sound level from the source under investigation to account for characteristics that could make the sound more obtrusive to obtain a rating level. This rating level is compared against the prevailing background noise outside the noise-sensitive property.

While BS 4142:2014+A1:2019 is routinely used to assess the potential for an adverse impact on residential occupants due to commercial or industrial noise, it is important to consider that the scope of BS 4142:2014+A1:2019 specifically confirms that,

“Sound of an industrial and/or commercial nature does not include sound from the passage of vehicles on public roads and railway systems”.

In accordance with the GPDO and BS 4142:2014+A1:2019, commercial noise does not include vehicles travelling in the vicinity.

3. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS

The development site is at 23-31 London Street, Reading. The site currently consists of office units at all levels. There is a kitchen extract unit serving the ‘Hotel 1843 x Calico Bar & Eatery’ at the rear of the building, near the entrance to the parking lot on East Street.

An aerial photograph (taken from Google Maps) is shown in Figure 2 below.

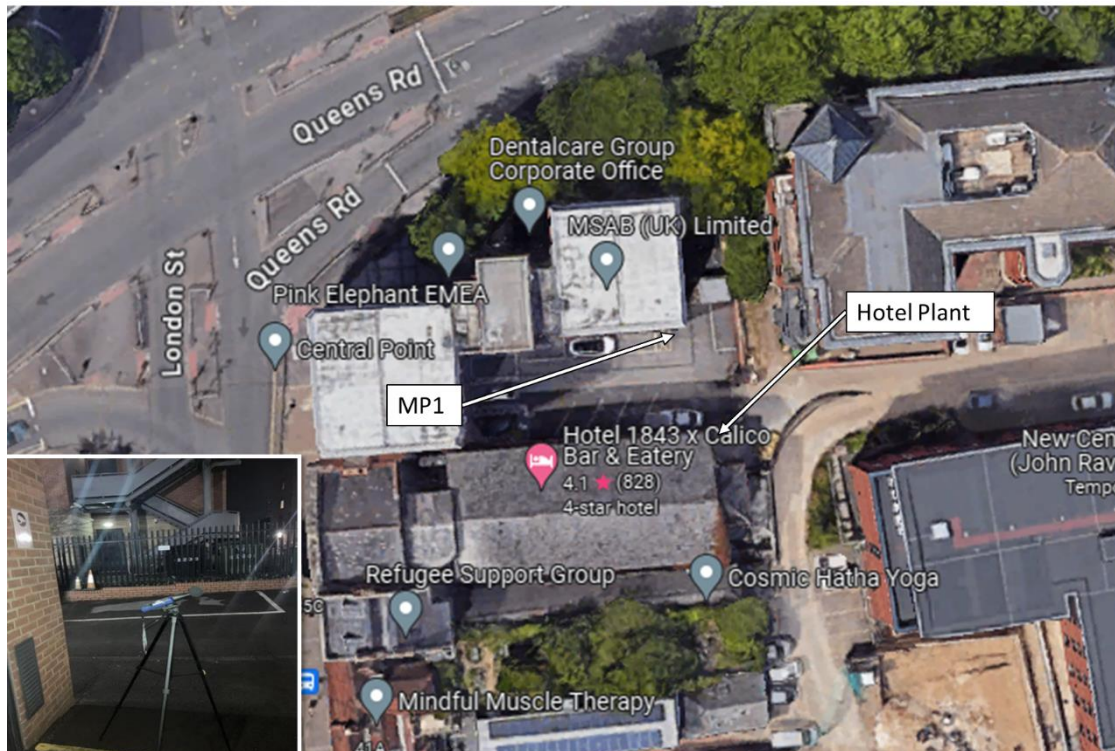


Figure 2: Site location (available at www.google.com/maps)

The development includes the conversion of the entire eastern side of the building into residential apartments. Drawing of the proposed development is included, and outlined in red within Figure 3 below.



Figure 3: Proposed development

4. SOUND LEVEL SURVEY

To assess the impact of existing noise sources, a sound level survey has been conducted at the development site.

An attended sound level survey was undertaken between the 29th February – 1st March 2024. The survey was attended by Alfie Morgan of ACA Acoustics Limited.

Details of the survey carried out by ACA Acoustics are provided below.

Sound levels were recorded in consecutive 15-minute samples of overall LAeq, LAfmax, and LA90 values along with other statistical indices and octave band spectra.

On the day of visit, the Mechanical plant servicing the Hotel 1843 kitchen turned off at around 22:45, with the kitchen understood to take last orders at 21:30. However, it is understood that on other days of the week the kitchen may close later with the extract system running later into the night. As a result, the night-time period is also considered in our report.

While on site during the manned sound level survey, the weather remained dry, cool and calm and is not considered to have adversely impacted the measured results.

The measurement position is noted below. Measurements were taken at ground floor level and will be representative of sound levels at upper floor levels which are equidistant from the fan and ductwork.

Position Reference	Description
MP1	At ground floor level, outside to the rear façade

Table 2: Sound level survey measurement positions

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

Equipment	Serial Number
NTi Audio Class 1 sound level meter type XL2-TA	A2A-16877-E0
SvanteK calibrator type SV33B. Compliant to IEC 60942:2003	57595

Table 3: Equipment used for the sound level survey

Summary sound level survey results are shown in tabular form below.

Position	Description	LAeq	LA90
At Façade	Hotel 1843 Kitchen Extract running. 21:00 – 22:30 hours	56dB	51dB
	Background with Hotel 1843 Kitchen Extract System powered off. 23:00 – 00:30 hours	53dB	49dB

Table 4: Summary sound level survey results

Results of the assessment indicate that noise from industrial and commercial sources is subjectively audible outside the proposed residential dwelling, and therefore an assessment of external noise intrusion from these sources is required.

5. BS 4142:2014+A1:2019 ACOUSTIC ASSESSMENT

Sound levels at measurement position 1 included contribution from industrial and commercial sources. As a result, a BS 4142:2014+A1:2019 assessment has been provided in Table 5 below.

Description	Hotel Equipment	Relevant Clause	Commentary
Ambient sound level	LAeq 56dB	7.3.6	Plant active
Residual sound level	LAeq 53dB	7.3.3	Representative background sound level when no commercial sources were operating
Specific sound level	53dB	7.1 7.3.6	Calculated from the measured ambient and residual sound levels
Background sound level	LA90 49dB	8.1.3 8.3	Representative measured representative background sound level to latest operating period around midnight.
Acoustic feature correction	Tonality +2dB	9.2	While on site, the author considered the fan to have low level tonal characteristics
Rating level	LAr 55dB	9.2	

Excess of rating level over background sound level	+6dB	11	Assessment indicates likelihood of adverse impact
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Table 5: BS 4142:2014+A1:2019 Assessment

The initial outcome of the BS 4142 assessment of operational noise emissions from the nearby commercial sources is that, without mitigation, there is a likelihood of adverse impact, depending on the context.

The primary context of this assessment is the development of new residential properties to an area of existing commercial use. In the author's experience the likelihood of adverse impact is reduced in this context compared to the reverse situation of bringing a new noise-generating use to an existing residential dwelling; in situations where a new noise source is introduced, residents notice a change in the acoustic climate, potentially causing a reduction of amenity. However, in this instance residents moving into the new residential flats would not be conditioned to any pre-existing lower levels.

Section 11 of BS 4142:2014 discusses potential aspects which may alter the initial assessment result and advises that:

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following ... the sensitivity of the receptor and whether dwellings ... will incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:

- i) Façade insulation treatment;*
- ii) Ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation", and;*
- iii) Acoustic screening.*

This confirms that designing the sound insulation performance of façade elements to achieve appropriate internal sound levels mitigates the adverse impact.

An appropriate scheme of façade sound insulation has been developed to ensure external noise intrusion to the dwellings is low.

Criteria for the habitable rooms have been set at a level 5dBA below guideline criteria contained in the ProPG. This will mitigate potential adverse impacts from the existing mechanical services equipment. Noise from the mechanical plant to inside the new dwellings will be low and will not be detrimental to the amenity of future residents.

6. ASSESSMENT OF FAÇADE SOUND INSULATION

A scheme for sound insulation is necessary to ensure sound levels inside rooms of the new residential dwellings are reasonable and comply with the requirements of BS 8233:2014+A1:2019.

A computer model has been set up using the measured sound levels incident on the façades of the development along with anticipated façade elements. The computer model is based on the calculation procedures outlined in BS EN ISO 12354-3:2000 and BS 8233:2014.

Confirmation of the acoustic performance of the building envelope elements used in the calculation model is provided in Table 6 below.

Description	Location	R _w (dB)	R _w + C' _{tr} (dB)	Typical Construction
External façade walls	Ground floor, to 3 rd Floor	52	48	Masonry brick-cavity-block construction
	4 th Floor only	43	36	Lightweight cladding, with insulated frame
Windows & glazed doors	Entire development	43	36	6.5-16-8.38 Laminated double glazing
Roof	Entire development	59	49	Flat timber joist with independent 25mm plasterboard ceiling c/w insulation in the void

Table 6: Acoustic performance specification for facade elements

Note that the constructions provided are typical and variations on the specification would be acceptable, so long as the installed construction achieved the specified sound insulation performance. It is recommended the glazing supplier submit test data confirming their unit will comply with the specified performance.

7.1 Ventilation Strategy

Values in Table 7 below show a specification schedule of ventilator sound insulation performance for the development, used in the computer model. Note that there are many different passive ventilators including through-wall type and those built into the window frame. If the D_{n,e,w} performance is not lower than that shown Table 7 then any alternative ventilator may be used.

Note that ventilators to the windows of the building are relatively high performance, and the client may consider it appropriate to provide mechanical ventilation systems such as MVHR in place of the passive ventilators. If MVHR systems are used they should incorporate a summer bypass mode

and be designed to ensure that noise levels from the MVHR system and external noise intrusion through the ductwork does not exceed a level of LAeq 26dB inside habitable rooms.

Description	Dn,e,w (dB)	Typical Ventilator Type
Passive ventilation to all windows	38	Acoustic Trickle Vent or similar

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

7.2 Calculated Internal Sound Levels

Copy of acoustic calculations for daytime and night-time noise intrusion into sample rooms is provided in Appendix A. Summary results are confirmed Table 8 below and demonstrate that intrusive sound levels within rooms of the proposed residential units will comply with guidance criteria in BS 8233:2014. As discussed above, a criteria 5dBA more stringent than BS 8233:2014 has been used, to ensure that commercial activity is not detrimental to the amenity of future occupants.

Plot / Room	Description	Calculated Internal Sound Level	Criteria
1 st Floor Kitchen/Dining/Communal Area	Daytime LAeq	26dB	≤ 30dB
	Night-time LAeq	-	-
1 st Floor Flat 5	Daytime LAeq	24dB	≤ 30dB
	Night-time LAeq	24dB	≤ 25dB
4 th Floor Kitchen/Dining/Communal Area	Daytime LAeq	26dB	≤ 30dB
	Night-time LAeq	-	-
4 th Floor Flat 5	Daytime LAeq	25dB	≤ 30dB
	Night-time LAeq	25dB	≤ 25dB

Table 8: Summary internal sound levels within sample habitable rooms

7. CONCLUSION

ACA Acoustics have been commissioned to provide a noise impact assessment at 23-31 London Street, Reading. In accordance with the requirements of the GDPO, the assessment is to be submitted in support of an application for permitted development.

ACA Acoustics have undertaken an external sound level survey. An assessment of noise from industrial and commercial sources has been undertaken.

As such, an acoustic specification for façade insulation elements has been developed, including mechanical ventilation, to ensure internal sound levels within habitable rooms will be at least 5dBA better than recommended guideline criteria within BS 8233:2014+A1:2019.

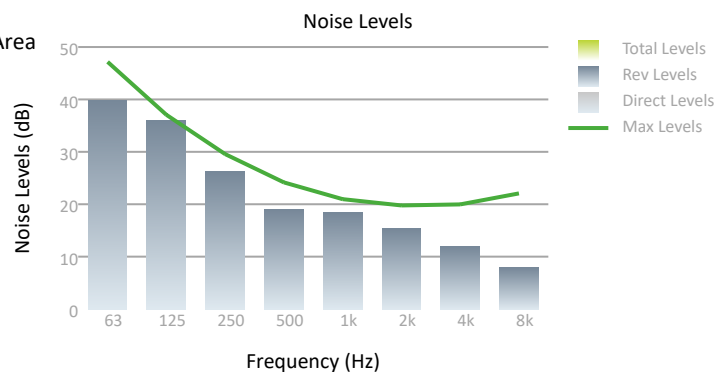
It is the author's opinion that, allowing for an appropriate mitigation strategy as set out in this report, sound intrusion to the proposed residential dwellings should not be detrimental to the amenity of future occupants and the site is suitable for the proposed development and therefore in accordance with the GPDO it is recommended that the application for Prior Approval is granted.

Appendix A

Acoustic Calculations

23-31 London Street Reading

Reference	1st Floor Kitchen/Dining/Communal Area
Description	
Target Sound Level	-
Max Sound Level	30dB(A)
Calculated Sound Level	25.5dB(A)
Calculated Tmf T60 (s)	0.53
Volume (m ³)	55

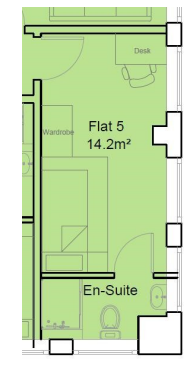
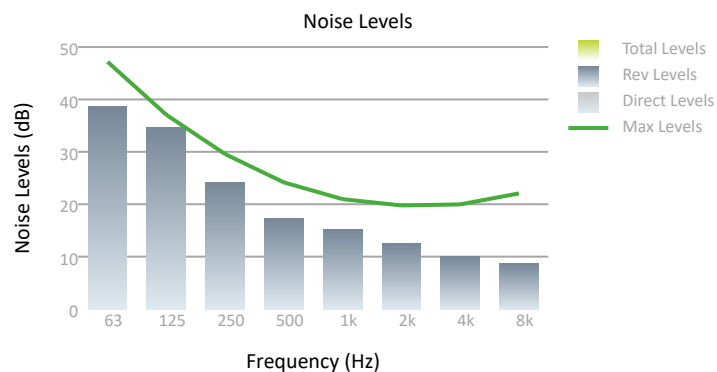


Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	39.8	36.0	26.2	19.0	18.5	15.4	12.0	7.9

23-31 London Street Reading

Reference	First Floor Flat 5 Daytime LAeq
Description	
Target Sound Level	-
Max Sound Level	30dB(A)
Calculated Sound Level	23.5dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m ³)	37.5

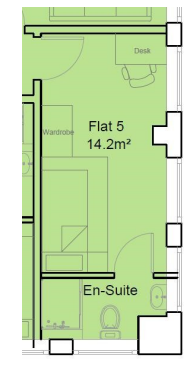
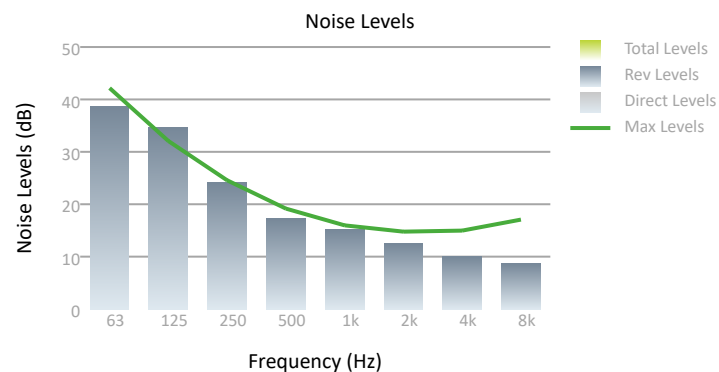


Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	38.6	34.7	24.2	17.3	15.2	12.5	10.0	8.7

23-31 London Street Reading

Reference	First Floor Flat 5 Night-time LAeq
Description	
Target Sound Level	-
Max Sound Level	25dB(A)
Calculated Sound Level	23.5dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m ³)	37.5



Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Night)	1	38.6	34.7	24.2	17.3	15.2	12.5	10.0	8.7

23-31 London Street Reading

Reference

Top Floor Kitchen/Dining/Communal Area

Description

Target Sound Level

-

Max Sound Level

30dB(A)

Calculated Sound Level

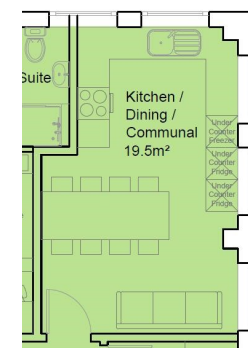
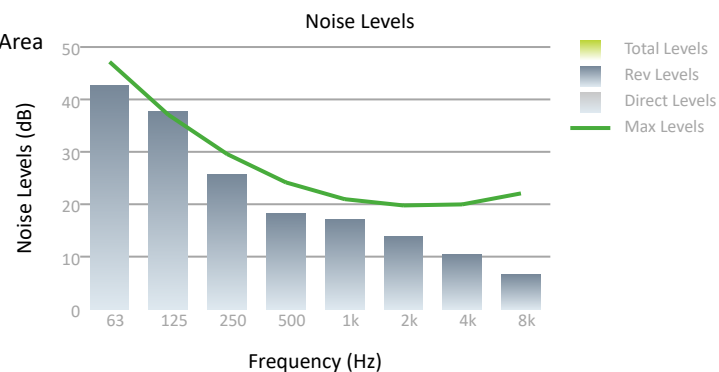
25.7dB(A)

Calculated Tmf T60 (s)

0.53

Volume (m³)

55

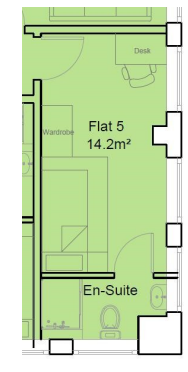
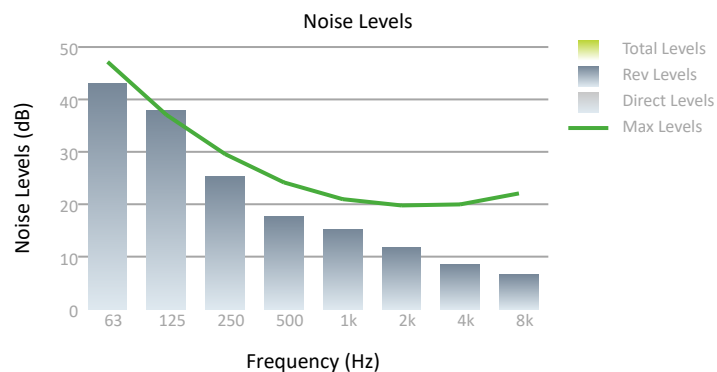


Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	42.6	37.6	25.8	18.3	17.2	13.9	10.5	6.7

23-31 London Street Reading

Reference	Top Floor Flat 5 Daytime LAeq
Description	
Target Sound Level	-
Max Sound Level	30dB(A)
Calculated Sound Level	25.3dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m ³)	37.5

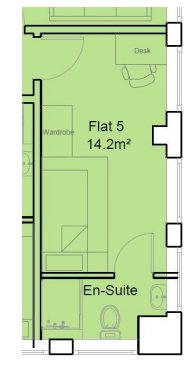
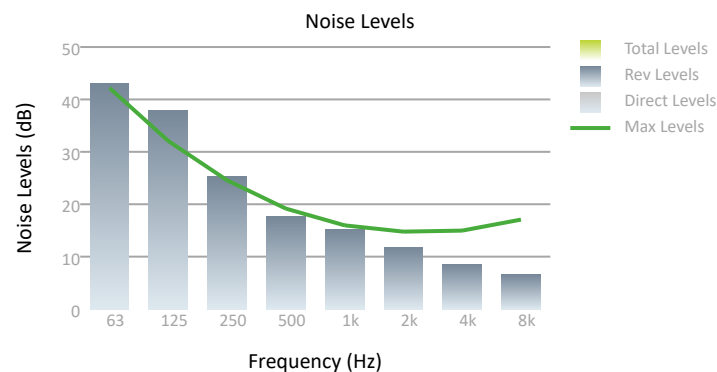


Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	42.9	38.0	25.2	17.6	15.3	11.7	8.6	6.6

23-31 London Street Reading

Reference	Top Floor Flat 5 Night-time LAeq
Description	
Target Sound Level	-
Max Sound Level	25dB(A)
Calculated Sound Level	25.3dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m ³)	37.5



Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Night)	1	42.9	38.0	25.2	17.6	15.3	11.7	8.6	6.6

Calculation Sheet

Top Floor Kitchen/Dining/Communal Area

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade										
Source dBA	53.0									
Octave Band Frequencies										
Leq,ff		57.0	55.0	51.0	49.0	49.0	45.0	40.0	34.0	Row A
Facade Wall Element										
		-25.8	-28.8	-38.8	-44.8	-49.8	-53.8	-56.8	-60.8	
Facade Glazed Element										
		-28.9	-30.9	-37.9	-44.9	-52.9	-54.9	-65.9	-67.9	
Facade Roof Element										
		-33.9	-38.9	-54.9	-62.9	-70.9	-77.9	-80.9	-82.9	
Ventilators										
		-34.6	-33.6	-36.6	-41.6	-40.6	-39.6	-38.6	-39.6	
Cumulative Lp										
Result		33.7	29.3	18.2	10.7	9.6	6.7	3.8	1.1	
ISO 12354-3 Lfs Correction										
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Room Corrections										
		8.9	8.3	7.6	7.6	7.6	7.2	6.7	5.6	
Internal Receiver Noise										
Internal Receiver Noise - Top Floor Kitchen/Dining/Communal Area										
Reverberant Field, LPrev:		42.6	37.6	25.8	18.3	17.2	13.9	10.5	6.7	

Calculation Sheet

1st Floor Kitchen/Dining/Communal Area

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade										
Source dBA	53.0									
Octave Band Frequencies										
Leq,ff		57.0	55.0	51.0	49.0	49.0	45.0	40.0	34.0	Row A
Facade Wall Element										
		-41.9	-44.9	-48.9	-48.9	-57.9	-61.9	-63.9	-68.9	
Facade Glazed Element										
		-25.3	-27.3	-34.3	-41.3	-49.3	-51.3	-62.3	-64.3	
Ventilators										
		-31.0	-30.0	-33.0	-38.0	-37.0	-36.0	-35.0	-36.0	
Cumulative Lp										
Result		32.8	29.6	20.6	13.3	12.8	10.1	7.2	4.2	
ISO 12354-3 Lfs Correction										
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Room Corrections										
		7.0	6.4	5.7	5.7	5.7	5.3	4.8	3.7	
Internal Receiver Noise										
Internal Receiver Noise - 1st Floor Kitchen/Dining/Communal Area										
Reverberant Field, LPrev:		39.8	36.0	26.2	19.0	18.5	15.4	12.0	7.9	

Calculation Sheet

First Floor Flat 5 Daytime LAeq

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Daytime Leq)										
Source dBA	53.0									
Octave Band Frequencies										
Leq,ff		57.0	55.0	51.0	49.0	49.0	45.0	40.0	34.0	Row A
Facade Wall Element										
		-40.9	-43.9	-47.9	-47.9	-56.9	-60.9	-62.9	-67.9	
Facade Glazed Element										
		-27.3	-29.3	-36.3	-43.3	-51.3	-53.3	-64.3	-66.3	
Ventilators										
		-36.3	-35.3	-38.3	-43.3	-42.3	-41.3	-40.3	-41.3	
Cumulative Lp										
Result		30.3	26.8	17.1	10.3	8.7	6.5	4.7	3.4	
ISO 12354-3 Lfs Correction										
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Room Corrections										
		8.3	7.9	7.0	7.0	6.5	5.9	5.3	5.3	
Internal Receiver Noise										
Internal Receiver Noise - First Floor										
Flat 5 Daytime LAeq										
Reverberant Field, LPrev:		38.6	34.7	24.2	17.3	15.2	12.5	10.0	8.7	

Calculation Sheet

First Floor Flat 5 Night-time LAeq

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Nighttime Leq)										
Source dBA	53.0									
Octave Band Frequencies										
Leq,ff		57.0	55.0	51.0	49.0	49.0	45.0	40.0	34.0	Row A
Facade Wall Element										
		-40.9	-43.9	-47.9	-47.9	-56.9	-60.9	-62.9	-67.9	
Facade Glazed Element										
		-27.3	-29.3	-36.3	-43.3	-51.3	-53.3	-64.3	-66.3	
Ventilators										
		-36.3	-35.3	-38.3	-43.3	-42.3	-41.3	-40.3	-41.3	
Cumulative Lp										
Result		30.3	26.8	17.1	10.3	8.7	6.5	4.7	3.4	
ISO 12354-3 Lfs Correction										
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Room Corrections										
		8.3	7.9	7.0	7.0	6.5	5.9	5.3	5.3	
Internal Receiver Noise										
Internal Receiver Noise - First Floor										
Flat 5 Night-time LAeq										
Reverberant Field, LPrev:		38.6	34.7	24.2	17.3	15.2	12.5	10.0	8.7	

Calculation Sheet

Top Floor Flat 5 Daytime LAeq

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Daytime Leq)										
Source dBA	53.0									
Octave Band Frequencies										
Leq,ff		57.0	55.0	51.0	49.0	49.0	45.0	40.0	34.0	Row A
Facade Wall Element										
		-24.8	-27.8	-37.8	-43.8	-48.8	-52.8	-55.8	-59.8	
Facade Glazed Element										
		-29.4	-31.4	-38.4	-45.4	-53.4	-55.4	-66.4	-68.4	
Facade Roof Element										
		-34.5	-39.5	-55.5	-63.5	-71.5	-78.5	-81.5	-83.5	
Ventilators										
		-37.0	-36.0	-39.0	-44.0	-43.0	-42.0	-41.0	-42.0	
Cumulative Lp										
Result		34.0	29.4	17.5	9.9	8.1	5.1	2.6	0.7	
ISO 12354-3 Lfs Correction										
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Room Corrections										
		9.0	8.6	7.7	7.7	7.2	6.6	6.0	6.0	
Internal Receiver Noise										
Internal Receiver Noise - Top Floor										
Flat 5 Daytime LAeq										
Reverberant Field, LPrev:		42.9	38.0	25.2	17.6	15.3	11.7	8.6	6.6	

Calculation Sheet

Top Floor Flat 5 Night-time LAeq

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Sound Level at Facade (Nighttime Leq)									
Source dBA	53.0								
Octave Band Frequencies									
Leq,ff		57.0	55.0	51.0	49.0	49.0	45.0	40.0	34.0
									Row A
Facade Wall Element									
		-24.8	-27.8	-37.8	-43.8	-48.8	-52.8	-55.8	-59.8
Facade Glazed Element									
		-29.4	-31.4	-38.4	-45.4	-53.4	-55.4	-66.4	-68.4
Facade Roof Element									
		-34.5	-39.5	-55.5	-63.5	-71.5	-78.5	-81.5	-83.5
Ventilators									
		-37.0	-36.0	-39.0	-44.0	-43.0	-42.0	-41.0	-42.0
Cumulative Lp									
Result		34.0	29.4	17.5	9.9	8.1	5.1	2.6	0.7
ISO 12354-3 Lfs Correction									
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Room Corrections									
		9.0	8.6	7.7	7.7	7.2	6.6	6.0	6.0
Internal Receiver Noise									
Internal Receiver Noise - Top Floor									
Flat 5 Night-time LAeq Reverberant Field, LPrev:		42.9	38.0	25.2	17.6	15.3	11.7	8.6	6.6