

Noise impact assessment to a proposed residential development

197 Kentish Town Road, London



Client: Arion Developments Limited

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0. SUMMARY

- 0.1. ACA Acoustics Limited have been commissioned to assess acoustic impact to a proposed new residential development at 197 Kentish Town Road, London. The assessment is required by the Local Planning Authority, London Borough of Camden Council, to assist their consideration of a planning application.
- 0.2. A sound level survey has been carried out between 24th – 25th October 2019. Whilst on site the author subjectively considered the sound climate during the daytime to comprise of traffic activity on nearby routes.
- 0.3. An acoustic model has been set up and a scheme for sound insulation of the building envelope has been developed such that sound levels inside the new residential dwellings will not exceed the BS 8233:2014 guidance limits of LAeq 35dB during the daytime and LAeq 30dB at night. In addition, individual short-term levels at night will not regularly exceed LAFmax 45dB.
- 0.4. It is the author's opinion that, allowing for the recommended acoustic specification for façade elements, as set out in this report, internal sound levels within the proposed residential development should not be detrimental to the amenity of future occupants and no further noise mitigation measures shall be necessary.

1. INTRODUCTION

ACA Acoustics Limited have been commissioned to carry out surveys and assessment of external sound levels at the site of a proposed residential development at 197 Kentish Town Road, London.

ACA Acoustics Limited has been commissioned to carry out an acoustic assessment of the proposed development and, where necessary, make recommendation to reduce sound levels to protect the amenity of future occupants.

This report presents results of the sound level surveys and assessment along with a scheme for sound insulation such that suitable internal sound levels are achieved.

2. ACOUSTIC CRITERIA

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

The current revision of the National Planning Policy Framework (referred to as NPPF) was published by the Ministry of Housing, Communities and Local Government in July 2018. The NPPF sets out the Government’s planning policies for England and provides guidance on how these are expected to be applied, setting 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 170 of the NPPF states;

“planning policies and decisions should contribute to and enhance the natural and local environment by ... 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 180 also talks specifically about noise;

“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.”*

Paragraph 182 discusses the impact of development on existing uses and advises that;

“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed”.

In March 2010, the Department for Environment, Food and Rural Affairs (Defra) issued Noise Policy Statement for England (referred to as NPSE). This sets out the Government’s long-term policy aims

that are intended to be considered by Local Planning Authorities when developing their own Local Policies relating to noise. Stated aims of 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 stating that;

“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 second 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 or 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.

Paragraph 2.7 states 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.

2.2 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;

“Local planning authorities’ plan-making and decision taking should 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 very 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’. Copy of the table provided within Paragraph 005 is repeated below.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			

Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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 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
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 1: Likely average response to noise exposure

Although this provides descriptive definitions for the LOAEL and SOAEL, as with the NPPF and NPSE there are no numerical values provided and consideration of guideline values provided in other British Standards, including BS 8233:2014, may be considered appropriate. Discussion of BS 8233:2014 is provided below.

2.3 British Standard 8233:2014

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 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 sound levels for dwellings

2.5 World Health Organisation (WHO)

The World Health Organisation's guidance "*Community Noise 1999*" recommends a limit of Leq 30dBA for bedrooms at night as preventing sleep disturbance to vulnerable people. The WHO guidance also states that "*for a good sleep, it is believed that indoor sound pressure levels should not exceed 45dB LAFmax more than 10-15 times per night*".

The levels advised in The World Health Organisation's guidance correlate very well with those in BS 8233 described above.

2. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS

The development site is at 197 Kentish Town Road, London. The proposals include the development of the property to incorporate 4 apartments over second to fourth floors.

Existing ambient sound levels incident on the site comprise primarily of traffic on nearby routes to the east and west facades.

The assessment has been undertaken using drawings provided by the client, with reference 2018-026-02 Rev: P.

3. SOUND LEVEL SURVEY

To assess the impact of existing noise sources, a sound level survey was conducted at the development site. Details of the sound level survey carried out by ACA Acoustics are provided below.

The site was considered secure and therefore an unmanned sound level survey was carried out between the 24th – 25th October 2019 overlooking the East and Western facades of the new development. The survey was conducted typically following procedures set out in BS 4142:2014. Sound levels were recorded in consecutive 15-minute samples of overall LAeq and LA90 values along with other statistical indices.

A manned sound level survey was also undertaken at ground floor level to the eastern facade of the development on 25th August 2019. Ambient daytime and night-time levels to lower levels on this sides have been calculated pro-rata, based on measured levels during the manned and unmanned sound level surveys. Levels to lower floor windows are at most 4dB higher than those measured at roof level.

As the longer term survey was unattended it is not possible to confirm weather conditions for the duration of the survey. Weather conditions for the manned sound level survey remained calm and dry. Levels used in the assessment were calculated pro-rata based on levels measured during the manned and unmanned sound level surveys.

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

Equipment	Serial Number
Svantek Class 1 sound level meter type SVAN971, complete with MOLES weatherproof and lockable outdoor environmental kit	84045
NTi Audio sound level meter type XL2 Class 1 complete with weatherproof and lockable outdoor environmental kit	A2A-06294-E0
NTi Audio Class 1 sound level meter type XL2-TA	A2A-16877-E0
Svantek calibrator type SV33B. Compliant to IEC 60942-1:2003 (Calibrated to a reference traceable to NIST)	83826

Table 3: Equipment used

Results of the unattended measurement survey are shown in Figures 1 and 2 on the following page.

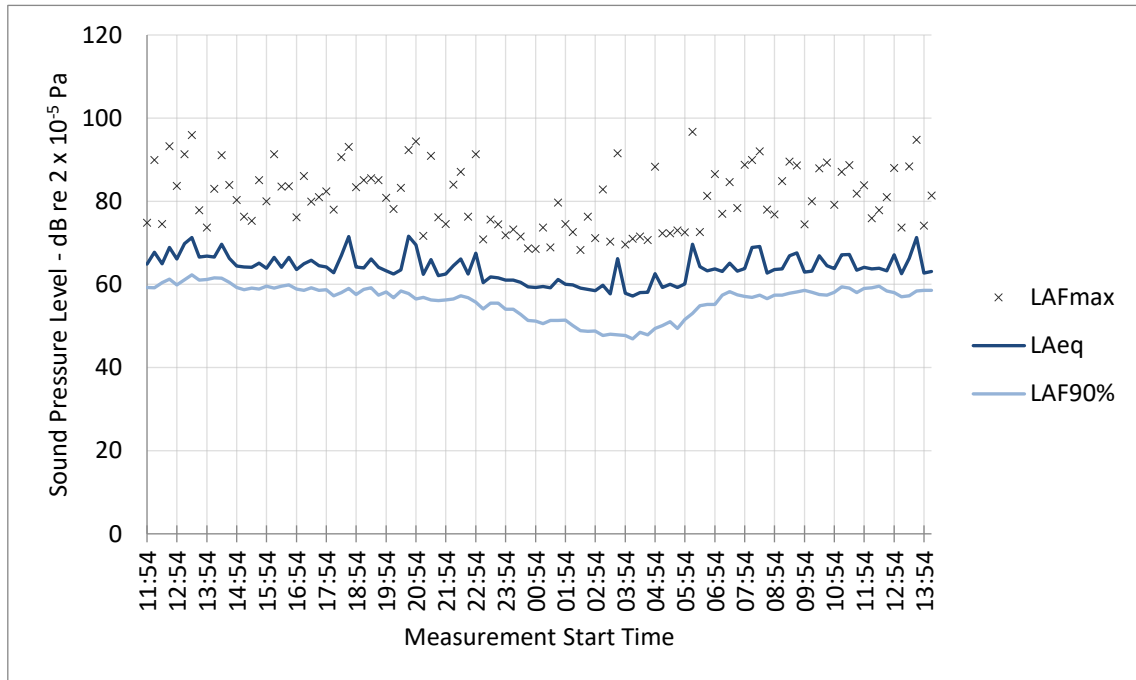


Figure 1: Unmanned sound level survey results to front facade

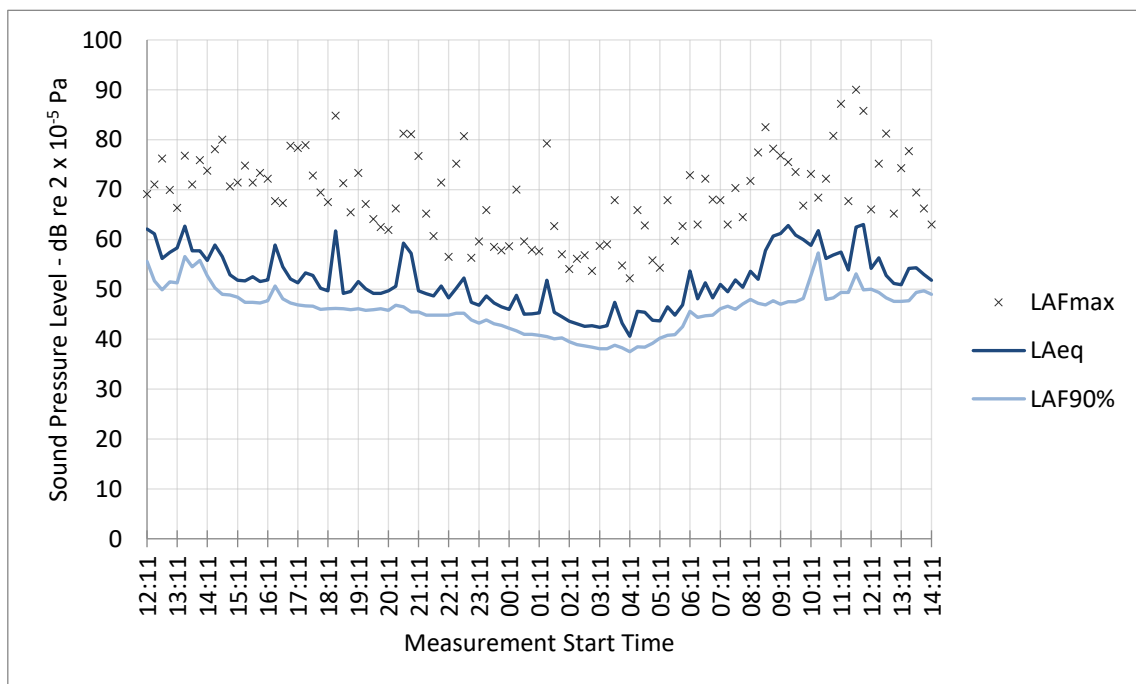


Figure 2: Unmanned sound level survey results to rear facade

Summary sound level survey results have been corrected by measured levels during the manned sound level survey. Measured levels during the manned sound level survey were nominally 4dB higher than equivalent levels measured at roof level. Levels used within the assessment are shown in tabular form below.

Location	Daytime (07:00 – 23:00) LAeq	Night Time (23:00 – 07:00) LAeq	Night Time (23:00 – 07:00) Typical LAFmax
Eastern Façade	70dB	66dB	79dB
Western Facade	57dB	47dB	63dB

Table 4: Summary sound level survey results

4. ASSESSMENT OF FAÇADE SOUND INSULATION

A scheme for sound insulation is necessary to ensure sound levels inside rooms of the new residential apartments are reasonable and do not exceed guideline levels within BS 8233:2014.

A computer model has been set up using the measured sound levels along with anticipated acoustic performance of façade elements. The computer model is based on the calculation procedures outlines 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 below. *Consideration of non-acoustic aspects including, but not limited to, Building Regulations Approved Documents and structural calculations are outside the scope of ACA Acoustics Limited and should be considered by others accordingly.*

Description	Rw (dB)	Rw + C'tr (dB)	Typical Construction
Façade walls	55	51	Solid brick external facade
Roof	47	38	Tile-Slate, 25mm plasterboard ceiling c-w insulation
Glazing – Front Livingrooms	36	31	Thermal Double glazing with a-symmetric panes, such as 4-14-6 configuration or equivalent.
Glazing – Front Bedrooms	38	32	Double glazing with laminated inner pane such as 4-0.76-4-12-4 or equivalent
Glazing Rear facade	32	27	Thermal Double glazing, such as 4-16-4 configuration or equivalent.
Passive Ventilators to front façade	Dnew 45dB		Passive acoustic window ventilators such as Passivent Fresh 90dB or equivalent
Passive Ventilators to rear façade	Dnew 40dB		Passive acoustic window ventilators such as Velfac Window Frame Air Vent or equivalent

Table 5: Acoustic performance of facade elements

Note that constructions provided are typical and variations would be acceptable, so long as the installed construction achieves the specified sound insulation performance.

Where doors and windows are fitted within the external façade to habitable rooms, the minimum Rw performance stated within Table 5 includes sound transmission paths through the frame and seals, as well as the leaf.

Copy of acoustic calculation is provided in Appendix A. Summary results are confirmed in Table 6 below and demonstrate that internal sound levels will comply with criteria in Section 2 of this report.

Plot / Room	Description	Calculated Internal Sound Level	Criteria
Flat 1 Livingroom	Daytime LAeq	35dB	≤ 35dB
	Night Time LAeq	-	-
	Night Time LAFmax	-	-
Flat 1 Bedroom 1	Daytime LAeq	32dB	≤ 35dB
	Night Time LAeq	23dB	≤ 30dB
	Night Time LAFmax	38dB	≤ 45dB
Flat 1 Bedroom 2	Daytime LAeq	34dB	≤ 35dB
	Night Time LAeq	30dB	≤ 30dB
	Night Time LAFmax	43dB	≤ 45dB
Flat 2 Bedroom 2	Daytime LAeq	33dB	≤ 35dB
	Night Time LAeq	29dB	≤ 30dB
	Night Time LAFmax	42dB	≤ 45dB
Flat 3 Livingroom	Daytime LAeq	34dB	≤ 35dB
	Night Time LAeq	-	-
	Night Time LAFmax	-	-
Flat 3 Bedroom1	Daytime LAeq	31dB	≤ 35dB
	Night Time LAeq	21dB	≤ 30dB
	Night Time LAFmax	37dB	≤ 45dB
Flat 3 Bedroom 2	Daytime LAeq	34dB	≤ 35dB
	Night Time LAeq	30dB	≤ 30dB
	Night Time LAFmax	43dB	≤ 45dB
Flat 4 Livingroom	Daytime LAeq	30dB	≤ 35dB
	Night Time LAeq	-	-
	Night Time LAFmax	-	-
Flat 4 Bedroom 1	Daytime LAeq	30dB	≤ 35dB
	Night Time LAeq	21dB	≤ 30dB
	Night Time LAFmax	36dB	≤ 45dB

Table 6: Summary internal sound levels within sample habitable rooms

Achieving levels as demonstrated within Table 6 above, will ensure a good standard of amenity for future occupants and no further mitigation would be required.

5. CONCLUSION

ACA Acoustics have undertaken sound level surveys and calculated sound intrusion to proposed residential property at 197 Kentish Town Road, London.

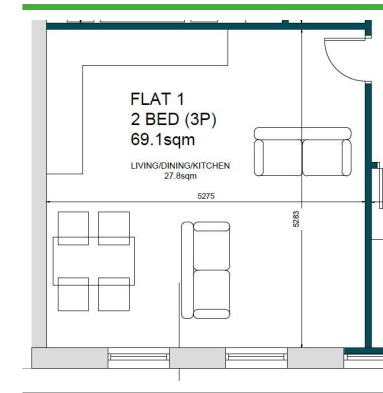
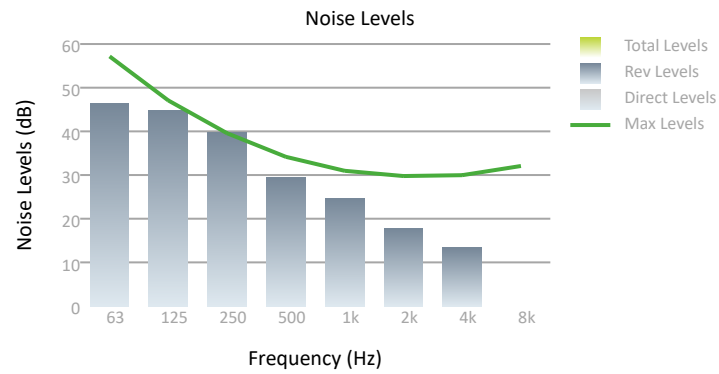
Calculated internal sound levels due to traffic and other anonymous sources comply with recommended guideline limits set out in BS 8233:2014 and thus satisfy the requirements of criteria in Section 2.

It is the author's opinion that, allowing for the recommended acoustic mitigation scheme set out in this report, internal sound levels within the new residential dwellings should not be detrimental to the amenity of future occupants.

APPENDIX A

Acoustic Calculations

Reference	Flat 1 Livingroom
Description	
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	35dB(A)
Calculated Tmf T60 (s)	0.48
Volume (m³)	70.3



Calculated Internal Sound Levels

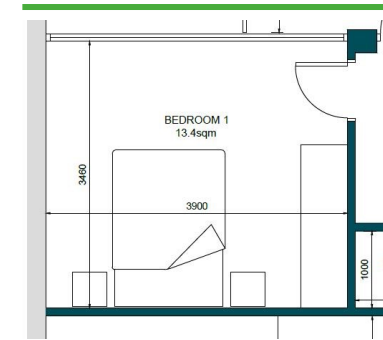
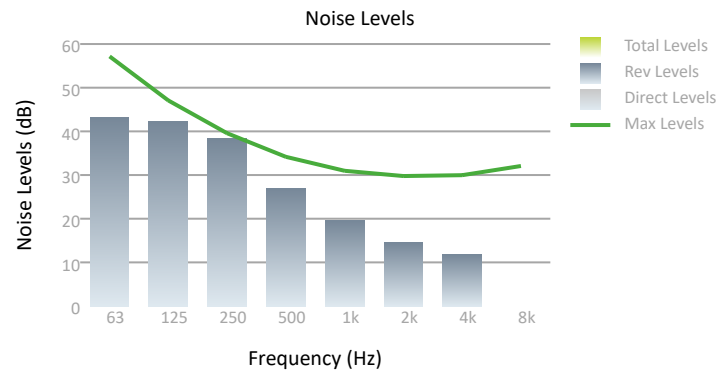
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq,ff	1	46	45	40	29	25	18	13	-

Calculation Sheet

Flat 1 Livingroom

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade										
Source dBA	70.0									
Octave Band Frequencies										
Leq,ff		74.0	72.0	68.0	66.0	66.0	62.0	57.0	51.0	Row A
Facade Wall Element										
		-41.6	-43.6	-45.6	-51.6	-57.6	-64.6	-63.6	-66.6	
Facade Glazed Element										
		-32.7	-31.7	-31.7	-41.7	-47.7	-47.7	-46.7	-	
Ventilators										
		-42.5	-41.5	-41.5	-44.5	-47.5	-55.5	-58.5	-61.5	
Cumulative Lp										
Result		42.2	41.0	36.9	26.4	21.7	15.3	11.3	-	
ISO 12354-3 Lfs Correction										
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections										
		4.1	3.7	2.9	2.9	2.9	2.5	2.0	-	
Internal Receiver Noise										
Internal Receiver Noise - Flat 1 Livingroom										
Reverberant Field, LPrev:		46.3	44.7	39.8	29.4	24.6	17.8	13.3	-	

Reference	Flat 1 Bedroom 1 Daytime LAeq
Description	
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	32dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	34.5



Calculated Internal Sound Levels

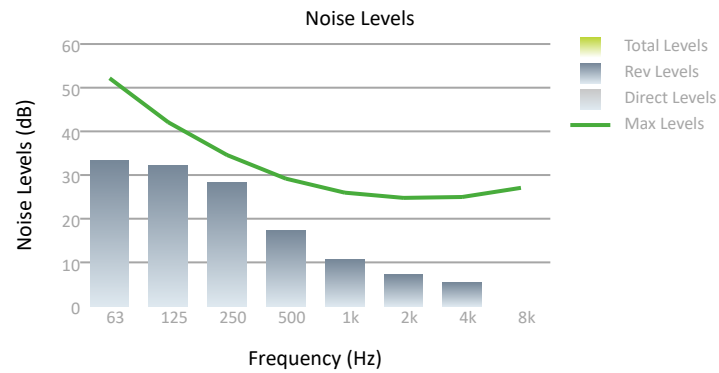
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	43	42	38	27	20	15	12	-

Calculation Sheet

Flat 1 Bedroom 1 Daytime LAeq

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Daytime Leq)									
Source dBA	57.0								
Octave Band Frequencies									
Leq,ff	61.0	59.0	55.0	53.0	53.0	49.0	44.0	38.0	Row A
Facade Wall Element									
	-59.6	-61.6	-63.6	-69.6	-75.6	-82.6	-81.6	-84.6	
Facade Glazed Element									
	-21.6	-20.1	-19.0	-28.6	-37.6	-38.8	-35.0	-	
Ventilators									
	-32.1	-33.1	-36.1	-39.1	-39.1	-39.1	-38.1	-39.1	
Cumulative Lp									
Result	39.8	39.2	36.1	24.8	17.9	13.5	11.4	-	
ISO 12354-3 Lfs Correction									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	3.4	3.0	2.1	2.1	1.6	1.1	0.4	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 1									
Bedroom 1 Daytime LAeq									
Reverberant Field, LPrev:	43.2	42.2	38.3	27.0	19.5	14.6	11.8	-	

Reference	Flat 1 Bedroom 1 Nighttime LAeq
Description	
Target Sound Level	30dB(A)
Max Sound Level	35dB(A)
Calculated Sound Level	23dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	34.5



Calculated Internal Sound Levels

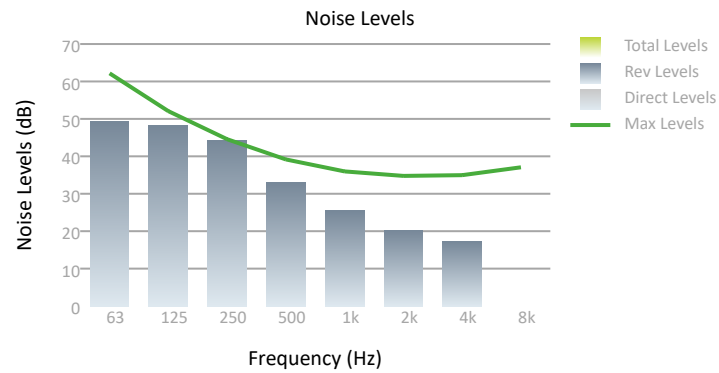
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff	1	33	32	28	17	11	7	5	-

Calculation Sheet

Flat 1 Bedroom 1 Nighttime LAeq

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Leq)									
Source dBA	47.0								
Octave Band Frequencies									
Leq,ff	51.0	49.0	45.0	43.0	43.0	39.0	34.0	28.0	Row A
Facade Wall Element									
	-59.6	-61.6	-63.6	-69.6	-75.6	-82.6	-81.6	-84.6	
Facade Glazed Element									
	-21.6	-20.1	-19.0	-28.6	-37.6	-38.8	-35.0	-	
Ventilators									
	-32.1	-33.1	-36.1	-39.1	-39.1	-39.1	-38.1	-39.1	
Cumulative Lp									
Result	29.8	29.2	26.1	15.1	9.0	6.1	5.0	-	
ISO 12354-3 Lfs Correction									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	3.4	3.0	2.1	2.1	1.6	1.1	0.4	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 1									
Bedroom 1 Nighttime LAeq									
Reverberant Field, LPrev:	33.2	32.2	28.3	17.2	10.7	7.1	5.4	-	

Reference	Flat 1 Bedroom 1 Nighttime L _{Amax}
Description	
Target Sound Level	-
Max Sound Level	45dB(A)
Calculated Sound Level	38dB(A)
Calculated T_{mf} T60 (s)	0.4
Volume (m³)	34.5



Calculated Internal Sound Levels

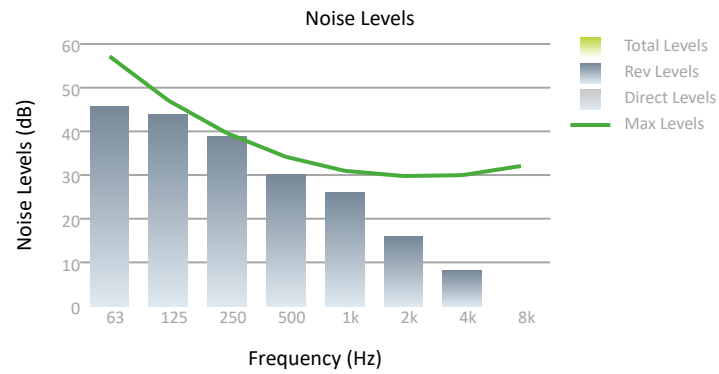
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
L _{max, ff}	1	49	48	44	33	25	20	17	-

Calculation Sheet

Flat 1 Bedroom 1 Nighttime LAmax

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Lmax)										
Source dBA	63.0									
Octave Band Frequencies										
Leq,ff		67.0	65.0	61.0	59.0	59.0	55.0	50.0	44.0	Row A
Facade Wall Element										
		-59.6	-61.6	-63.6	-69.6	-75.6	-82.6	-81.6	-84.6	
Facade Glazed Element										
		-21.6	-20.1	-19.0	-28.6	-37.6	-38.8	-35.0	-	
Ventilators										
		-32.1	-33.1	-36.1	-39.1	-39.1	-39.1	-38.1	-39.1	
Cumulative Lp										
Result		45.8	45.2	42.1	30.8	23.8	19.2	16.9	-	
ISO 12354-3 Lfs Correction										
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections										
		3.4	3.0	2.1	2.1	1.6	1.1	0.4	-	
Internal Receiver Noise										
Internal Receiver Noise - Flat 1 Bedroom 1 Nighttime LAmax Reverberant Field, LPrev:										
		49.2	48.2	44.3	33.0	25.4	20.3	17.3	-	

Reference	Flat 1 Bedroom 2 Daytime LAeq
Description	
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	34dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	24.9



Calculated Internal Sound Levels

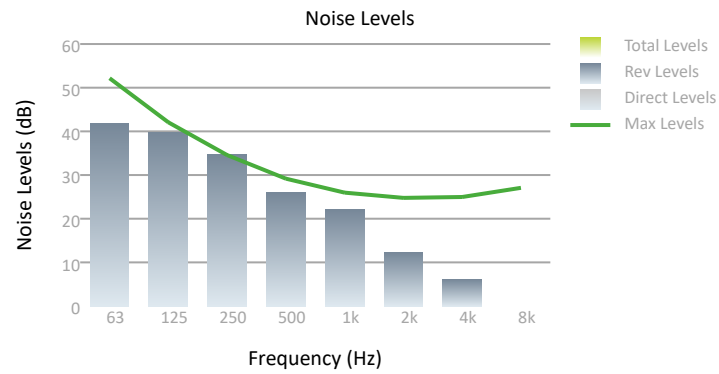
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	46	44	39	30	26	16	8	-

Calculation Sheet

Flat 1 Bedroom 2 Daytime LAeq

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Daytime Leq)									
Source dBA	70.0								
Octave Band Frequencies									
Leq,ff	74.0	72.0	68.0	66.0	66.0	62.0	57.0	51.0	Row A
Facade Wall Element									
	-41.6	-43.6	-45.6	-51.6	-57.6	-64.6	-63.6	-66.6	
Facade Glazed Element									
	-34.2	-33.6	-33.7	-44.7	-49.6	-51.1	-56.0	-	
Ventilators									
	-38.2	-37.2	-37.2	-40.2	-43.2	-51.2	-54.2	-57.2	
Cumulative Lp									
Result	41.8	40.3	36.1	27.4	23.9	14.3	7.3	-	
ISO 12354-3 Lfs Correction									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	4.0	3.6	2.7	2.7	2.2	1.6	0.9	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 1									
Bedroom 2 Daytime LAeq									
Reverberant Field, LPrev:	45.7	43.8	38.8	30.1	26.0	15.9	8.3	-	

Reference	Flat 1 Bedroom 2 Nighttime LAeq
Description	
Target Sound Level	30dB(A)
Max Sound Level	35dB(A)
Calculated Sound Level	30dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	24.9



Calculated Internal Sound Levels

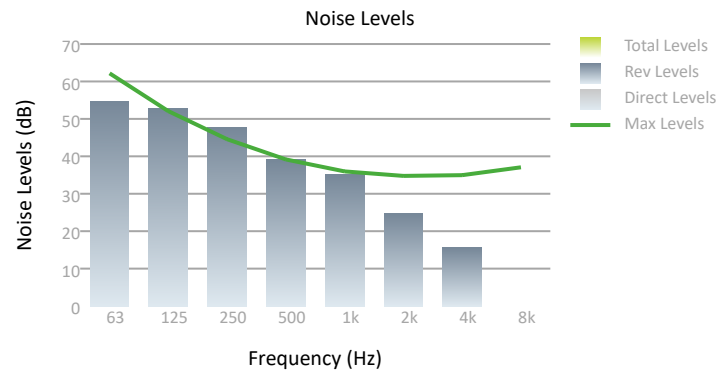
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff	1	42	40	35	26	22	12	6	-

Calculation Sheet

Flat 1 Bedroom 2 Nighttime LAeq

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Leq)									
Source dBA	66.0								
Octave Band Frequencies									
Leq,ff	70.0	68.0	64.0	62.0	62.0	58.0	53.0	47.0	Row A
Facade Wall Element									
	-41.6	-43.6	-45.6	-51.6	-57.6	-64.6	-63.6	-66.6	
Facade Glazed Element									
	-34.2	-33.6	-33.7	-44.7	-49.6	-51.1	-56.0	-	
Ventilators									
	-38.2	-37.2	-37.2	-40.2	-43.2	-51.2	-54.2	-57.2	
Cumulative Lp									
Result	37.8	36.3	32.1	23.4	19.9	10.8	5.2	-	
ISO 12354-3 Lfs Correction									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	4.0	3.6	2.7	2.7	2.2	1.6	0.9	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 1									
Bedroom 2 Nighttime LAeq									
Reverberant Field, LPrev:	41.7	39.8	34.8	26.1	22.1	12.4	6.2	-	

Reference	Flat 1 Bedroom 2 Nighttime LAfmax
Description	
Target Sound Level	-
Max Sound Level	45dB(A)
Calculated Sound Level	43dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	24.9



Calculated Internal Sound Levels

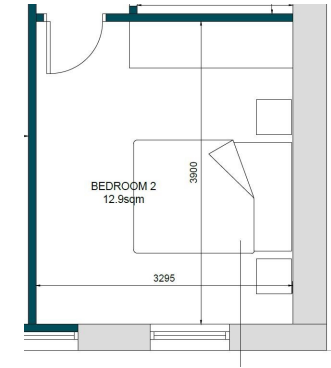
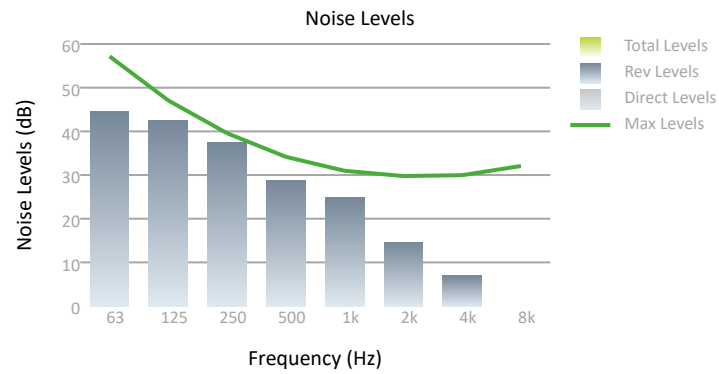
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Lmax, ff	1	55	53	48	39	35	25	16	-

Calculation Sheet

Flat 1 Bedroom 2 Nighttime LAfmax

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Lmax)									
Source dBA	79.0								
Octave Band Frequencies									
Leq,ff	83.0	81.0	77.0	75.0	75.0	71.0	66.0	60.0	Row A
Facade Wall Element									
	-41.6	-43.6	-45.6	-51.6	-57.6	-64.6	-63.6	-66.6	
Facade Glazed Element									
	-34.2	-33.6	-33.7	-44.7	-49.6	-51.1	-56.0	-	
Ventilators									
	-38.2	-37.2	-37.2	-40.2	-43.2	-51.2	-54.2	-57.2	
Cumulative Lp									
Result	50.8	49.3	45.1	36.3	32.8	23.0	14.6	-	
ISO 12354-3 Lfs Correction									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	4.0	3.6	2.7	2.7	2.2	1.6	0.9	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 1 Bedroom 2 Nighttime LAfmax Reverberant Field, LPrev:	54.7	52.8	47.8	39.1	35.0	24.6	15.5	-	

Reference	Flat 2 Bedroom 2 Daytime LAeq
Description	
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	33dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	33.5



Calculated Internal Sound Levels

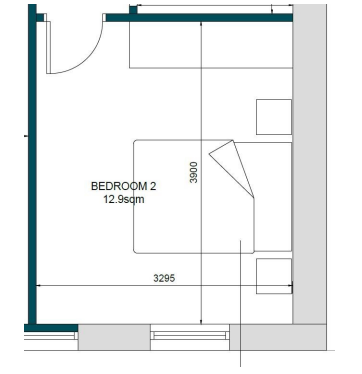
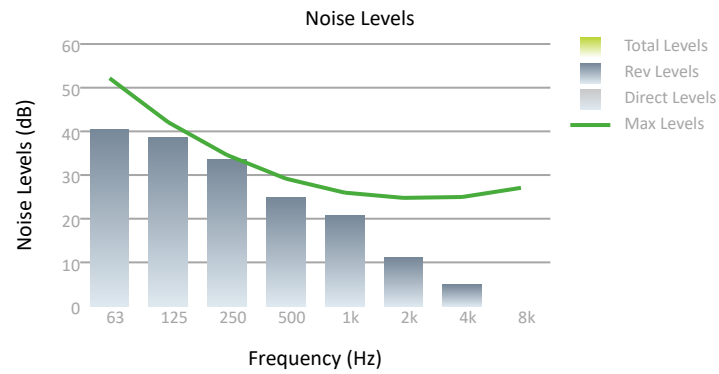
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	44	43	38	29	25	15	7	-

Calculation Sheet

Flat 2 Bedroom 2 Daytime LAeq

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Daytime Leq)									
Source dBA	70.0								
Octave Band Frequencies									
Leq,ff	74.0	72.0	68.0	66.0	66.0	62.0	57.0	51.0	Row A
Facade Wall Element									
	-41.6	-43.6	-45.6	-51.6	-57.6	-64.6	-63.6	-66.6	
Facade Glazed Element									
	-34.2	-33.6	-33.7	-44.7	-49.6	-51.1	-56.0	-	
Ventilators									
	-38.2	-37.2	-37.2	-40.2	-43.2	-51.2	-54.2	-57.2	
Cumulative Lp									
Result	41.8	40.3	36.1	27.4	23.9	14.3	7.3	-	
ISO 12354-3 Lfs Correction									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	2.7	2.3	1.4	1.4	0.9	0.3	-0.3	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 2									
Bedroom 2 Daytime LAeq									
Reverberant Field, LPrev:	44.5	42.6	37.5	28.8	24.8	14.6	7.0	-	

Reference	Flat 2 Bedroom 2 Nighttime LAeq
Description	
Target Sound Level	30dB(A)
Max Sound Level	35dB(A)
Calculated Sound Level	29dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	33.5



Calculated Internal Sound Levels

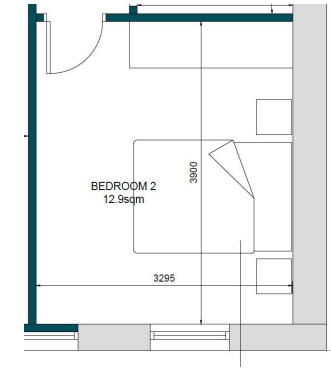
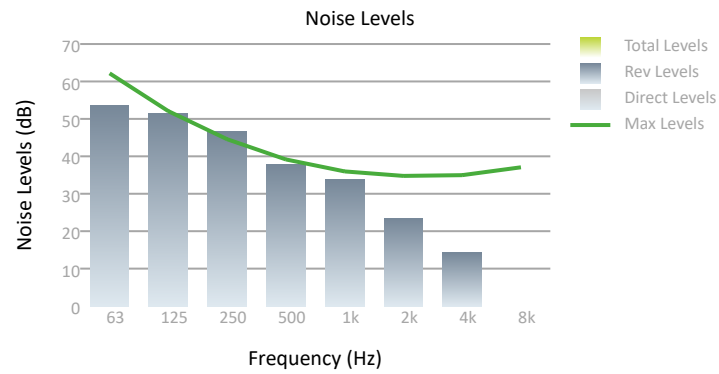
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff	1	40	39	34	25	21	11	5	-

Calculation Sheet

Flat 2 Bedroom 2 Nighttime LAeq

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Leq)									
Source dBA	66.0								
Octave Band Frequencies									
Leq,ff	70.0	68.0	64.0	62.0	62.0	58.0	53.0	47.0	Row A
Facade Wall Element									
	-41.6	-43.6	-45.6	-51.6	-57.6	-64.6	-63.6	-66.6	
Facade Glazed Element									
	-34.2	-33.6	-33.7	-44.7	-49.6	-51.1	-56.0	-	
Ventilators									
	-38.2	-37.2	-37.2	-40.2	-43.2	-51.2	-54.2	-57.2	
Cumulative Lp									
Result	37.8	36.3	32.1	23.4	19.9	10.8	5.2	-	
ISO 12354-3 Lfs Correction									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	2.7	2.3	1.4	1.4	0.9	0.3	-0.3	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 2 Bedroom 2 Nighttime LAeq Reverberant Field, LPrev:	40.5	38.6	33.5	24.8	20.8	11.1	4.9	-	

Reference	Flat 2 Bedroom 2 Nighttime LAfmax
Description	
Target Sound Level	-
Max Sound Level	45dB(A)
Calculated Sound Level	42dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	33.5



Calculated Internal Sound Levels

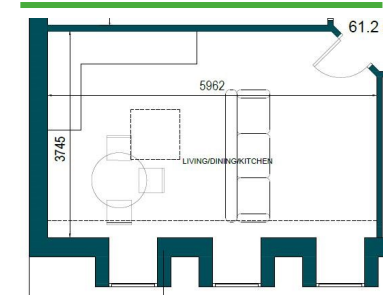
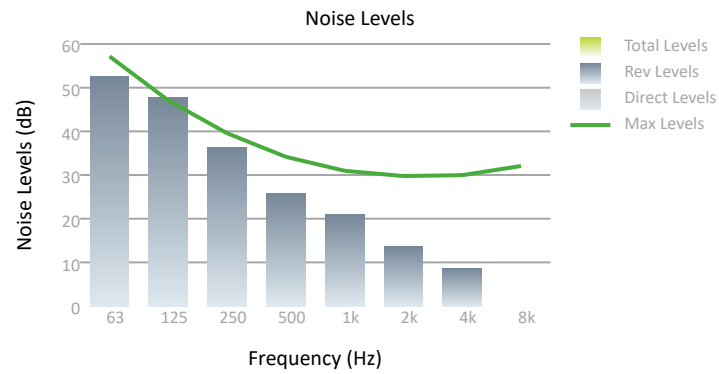
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Lmax, ff	1	53	52	47	38	34	23	14	-

Calculation Sheet

Flat 2 Bedroom 2 Nighttime LAfmax

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Lmax)									
Source dBA	79.0								
Octave Band Frequencies									
Leq,ff	83.0	81.0	77.0	75.0	75.0	71.0	66.0	60.0	Row A
Facade Wall Element									
	-41.6	-43.6	-45.6	-51.6	-57.6	-64.6	-63.6	-66.6	
Facade Glazed Element									
	-34.2	-33.6	-33.7	-44.7	-49.6	-51.1	-56.0	-	
Ventilators									
	-38.2	-37.2	-37.2	-40.2	-43.2	-51.2	-54.2	-57.2	
Cumulative Lp									
Result	50.8	49.3	45.1	36.3	32.8	23.0	14.6	-	
ISO 12354-3 Lfs Correction									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	2.7	2.3	1.4	1.4	0.9	0.3	-0.3	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 2 Bedroom 2 Nighttime LAfmax Reverberant Field, LPrev:	53.5	51.6	46.5	37.8	33.7	23.3	14.3	-	

Reference	Flat 3 Livingroom
Description	
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	34dB(A)
Calculated Tmf T60 (s)	0.48
Volume (m³)	53.7



Calculated Internal Sound Levels

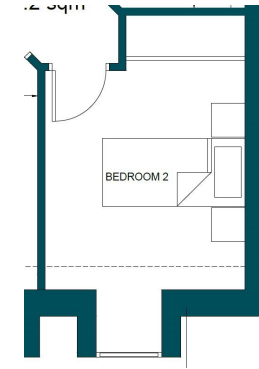
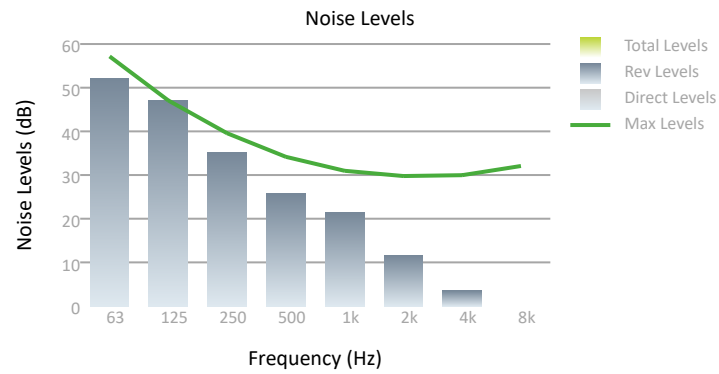
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq,ff	1	53	48	36	26	21	14	9	-

Calculation Sheet

Flat 3 Livingroom

	Octave Band Centre Frequency (Hz)								Row A
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade									
Source dBA	70.0								
Octave Band Frequencies									
Leq,ff	74.0	72.0	68.0	66.0	66.0	62.0	57.0	51.0	Row A
Facade Wall Element									
	-45.5	-47.5	-49.5	-55.5	-61.5	-68.5	-67.5	-70.5	
Facade Glazed Element									
	-35.9	-34.9	-34.9	-44.9	-50.9	-50.9	-49.9	-	
Facade Roof Element									
	-24.3	-27.3	-39.3	-49.3	-55.3	-58.3	-64.3	-66.3	
Ventilators									
	-44.8	-43.8	-43.8	-46.8	-49.8	-57.8	-60.8	-63.8	
Cumulative Lp									
Result	50.0	45.5	34.9	24.3	19.5	12.8	8.3	-	
ISO 12354-3 Lfs Correction									
	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-	
Room Corrections									
	7.5	7.2	6.4	6.4	6.4	5.9	5.4	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 3 Livingroom									
Reverberant Field, LPrev:	52.5	47.6	36.3	25.7	20.9	13.7	8.7	-	

Reference	Flat 3 Bedroom 2 Daytime LAeq
Description	
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	34dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	24.6



Calculated Internal Sound Levels

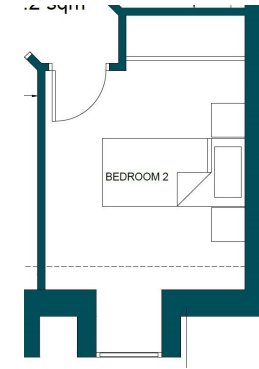
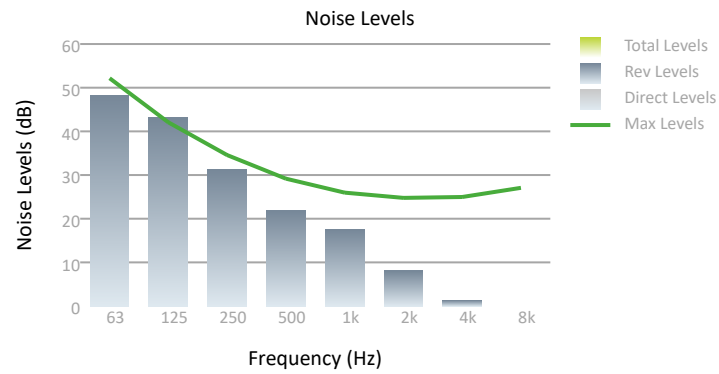
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	52	47	35	26	21	12	4	-

Calculation Sheet

Flat 3 Bedroom 1 Daytime LAeq

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Daytime Leq)									
Source dBA	57.0								
Octave Band Frequencies									
Leq,ff	61.0	59.0	55.0	53.0	53.0	49.0	44.0	38.0	Row A
Facade Wall Element									
	-46.5	-48.5	-50.5	-56.5	-62.5	-69.5	-68.5	-71.5	
Facade Glazed Element									
	-28.3	-26.8	-25.7	-35.3	-44.3	-45.5	-41.7	-	
Facade Roof Element									
	-25.0	-28.0	-40.0	-50.0	-56.0	-59.0	-65.0	-67.0	
Ventilators									
	-35.7	-36.7	-39.7	-42.7	-42.7	-42.7	-41.7	-42.7	
Cumulative Lp									
Result	38.0	35.0	29.7	18.7	12.9	8.8	6.4	-	
ISO 12354-3 Lfs Correction									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	7.0	6.6	5.8	5.8	5.2	4.7	4.0	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 3 Bedroom 1 Daytime LAeq Reverberant Field, LPrev:	45.0	41.6	35.4	24.4	18.2	13.5	10.4	-	

Reference	Flat 3 Bedroom 2 Nighttime LAeq
Description	
Target Sound Level	30dB(A)
Max Sound Level	35dB(A)
Calculated Sound Level	30dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	24.6



Calculated Internal Sound Levels

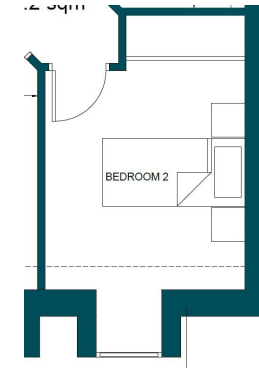
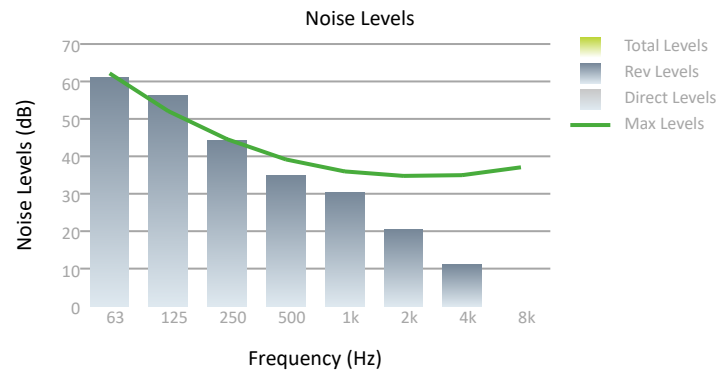
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff	1	48	43	31	22	18	8	1	-

Calculation Sheet

Flat 3 Bedroom 1 Nighttime LAeq

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Leq)									
Source dBA	47.0								
Octave Band Frequencies									
Leq,ff	51.0	49.0	45.0	43.0	43.0	39.0	34.0	28.0	Row A
Facade Wall Element									
	-46.5	-48.5	-50.5	-56.5	-62.5	-69.5	-68.5	-71.5	
Facade Glazed Element									
	-28.3	-26.8	-25.7	-35.3	-44.3	-45.5	-41.7	-	
Facade Roof Element									
	-25.0	-28.0	-40.0	-50.0	-56.0	-59.0	-65.0	-67.0	
Ventilators									
	-35.7	-36.7	-39.7	-42.7	-42.7	-42.7	-41.7	-42.7	
Cumulative Lp									
Result	28.0	25.0	19.7	9.2	4.6	2.2	1.3	-	
ISO 12354-3 Lfs Correction									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	7.0	6.6	5.8	5.8	5.2	4.7	4.0	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 3 Bedroom 1 Nighttime LAeq Reverberant Field, LPrev:	35.0	31.6	25.5	14.9	9.8	6.9	5.3	-	

Reference	Flat 3 Bedroom 2 Nighttime LAmax
Description	
Target Sound Level	-
Max Sound Level	45dB(A)
Calculated Sound Level	43dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	24.6



Calculated Internal Sound Levels

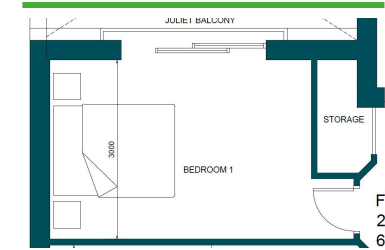
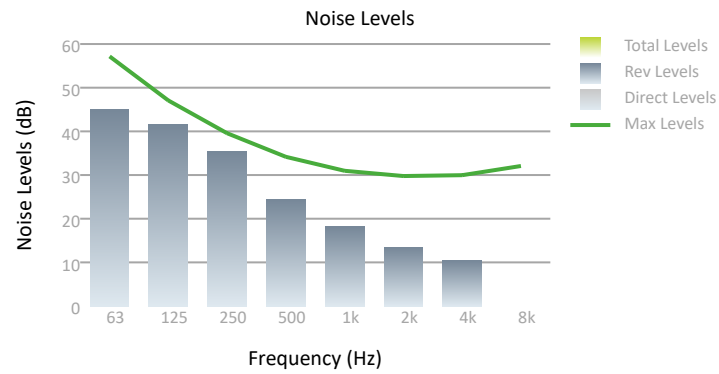
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Lmax, ff	1	61	56	44	35	30	20	11	-

Calculation Sheet

Flat 3 Bedroom 1 Nighttime LAfmax

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Lmax)									
Source dBA	63.0								
Octave Band Frequencies									
Leq,ff	67.0	65.0	61.0	59.0	59.0	55.0	50.0	44.0	Row A
Facade Wall Element									
	-46.5	-48.5	-50.5	-56.5	-62.5	-69.5	-68.5	-71.5	
Facade Glazed Element									
	-28.3	-26.8	-25.7	-35.3	-44.3	-45.5	-41.7	-	
Facade Roof Element									
	-25.0	-28.0	-40.0	-50.0	-56.0	-59.0	-65.0	-67.0	
Ventilators									
	-35.7	-36.7	-39.7	-42.7	-42.7	-42.7	-41.7	-42.7	
Cumulative Lp									
Result	44.0	41.0	35.7	24.6	18.8	14.4	11.6	-	
ISO 12354-3 Lfs Correction									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	7.0	6.6	5.8	5.8	5.2	4.7	4.0	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 3 Bedroom 1 Nighttime LAfmax Reverberant Field, LPrev:	51.0	47.6	41.4	30.4	24.0	19.0	15.6	-	

Reference	Flat 3 Bedroom 1 Daytime LAeq
Description	
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	31dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	35.1



Calculated Internal Sound Levels

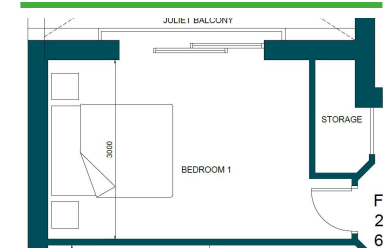
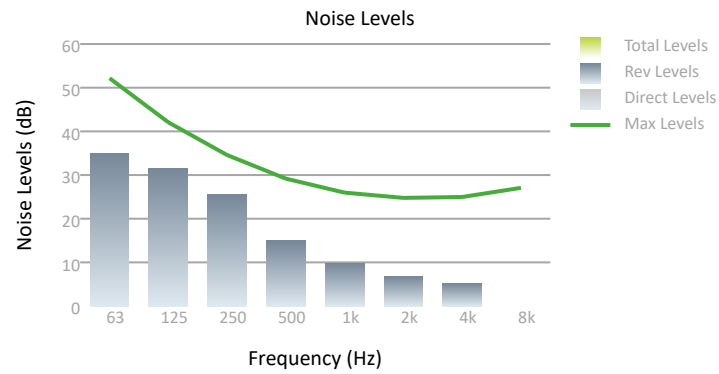
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	45	42	35	24	18	13	10	-

Calculation Sheet

Flat 3 Bedroom 2 Daytime LAeq

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Daytime Leq)									
Source dBA	70.0								
Octave Band Frequencies									
Leq,ff	74.0	72.0	68.0	66.0	66.0	62.0	57.0	51.0	Row A
Facade Wall Element									
	-45.8	-47.8	-49.8	-55.8	-61.8	-68.8	-67.8	-70.8	
Facade Glazed Element									
	-37.2	-36.6	-36.7	-47.7	-52.6	-54.1	-59.0	-	
Facade Roof Element									
	-24.2	-27.2	-39.2	-49.2	-55.2	-58.2	-64.2	-66.2	
Ventilators									
	-41.2	-40.2	-40.2	-43.2	-46.2	-54.2	-57.2	-60.2	
Cumulative Lp									
Result	50.1	45.5	34.5	25.0	21.3	12.0	4.6	-	
ISO 12354-3 Lfs Correction									
	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-	
Room Corrections									
	7.0	6.6	5.7	5.7	5.2	4.6	4.0	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 3 Bedroom 2 Daytime LAeq Reverberant Field, LPrev:	52.1	47.1	35.2	25.8	21.5	11.6	3.5	-	

Reference	Flat 3 Bedroom 1 Nighttime LAeq
Description	
Target Sound Level	30dB(A)
Max Sound Level	35dB(A)
Calculated Sound Level	21dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	35.1



Calculated Internal Sound Levels

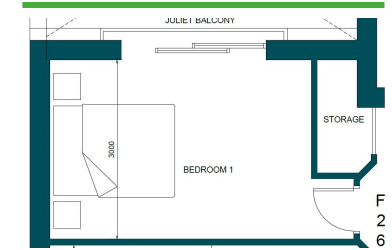
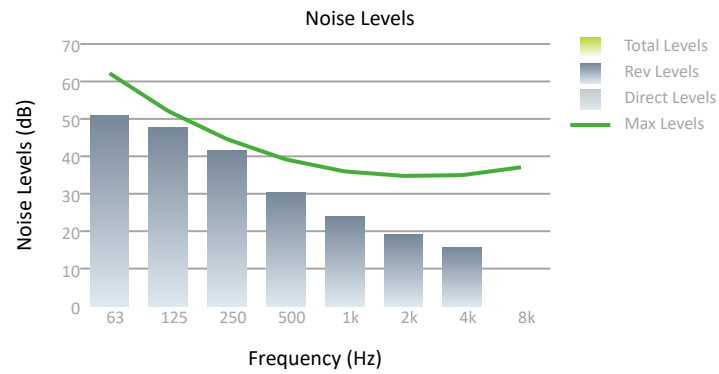
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff	1	35	32	25	15	10	7	5	-

Calculation Sheet

Flat 3 Bedroom 2 Nighttime LAeq

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Leq)									
Source dBA	66.0								
Octave Band Frequencies									
Leq,ff	70.0	68.0	64.0	62.0	62.0	58.0	53.0	47.0	Row A
Facade Wall Element									
	-45.8	-47.8	-49.8	-55.8	-61.8	-68.8	-67.8	-70.8	
Facade Glazed Element									
	-37.2	-36.6	-36.7	-47.7	-52.6	-54.1	-59.0	-	
Facade Roof Element									
	-24.2	-27.2	-39.2	-49.2	-55.2	-58.2	-64.2	-66.2	
Ventilators									
	-41.2	-40.2	-40.2	-43.2	-46.2	-54.2	-57.2	-60.2	
Cumulative Lp									
Result	46.1	41.5	30.5	21.1	17.3	8.4	2.4	-	
ISO 12354-3 Lfs Correction									
	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-	
Room Corrections									
	7.0	6.6	5.7	5.7	5.2	4.6	4.0	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 3 Bedroom 2 Nighttime LAeq Reverberant Field, LPrev:	48.1	43.1	31.2	21.8	17.5	8.0	1.4	-	

Reference	Flat 3 Bedroom 1 Nighttime LAfmax
Description	
Target Sound Level	-
Max Sound Level	45dB(A)
Calculated Sound Level	37dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	35.1



Calculated Internal Sound Levels

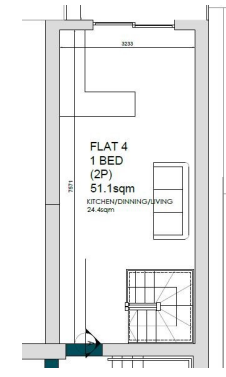
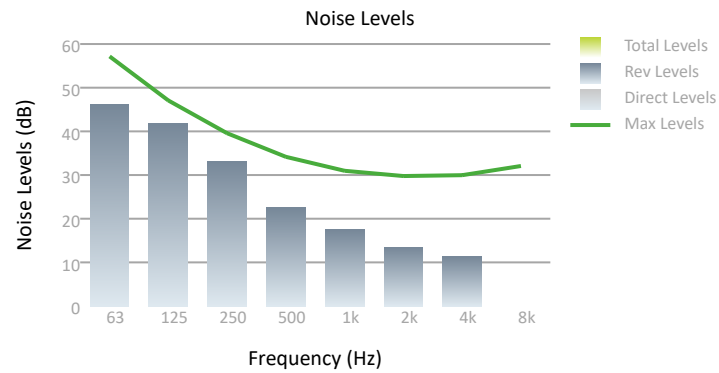
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Lmax, ff	1	51	48	41	30	24	19	16	-

Calculation Sheet

Flat 3 Bedroom 2 Nighttime L_{Amax}

	Octave Band Centre Frequency (Hz)								Row A
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (L_{max})									
Source dBA	79.0								
Octave Band Frequencies									
Leq,ff	83.0	81.0	77.0	75.0	75.0	71.0	66.0	60.0	Row A
Facade Wall Element									
	-45.8	-47.8	-49.8	-55.8	-61.8	-68.8	-67.8	-70.8	
Facade Glazed Element									
	-37.2	-36.6	-36.7	-47.7	-52.6	-54.1	-59.0	-	
Facade Roof Element									
	-24.2	-27.2	-39.2	-49.2	-55.2	-58.2	-64.2	-66.2	
Ventilators									
	-41.2	-40.2	-40.2	-43.2	-46.2	-54.2	-57.2	-60.2	
Cumulative L_p									
Result	59.1	54.5	43.5	34.0	30.2	20.8	12.0	-	
ISO 12354-3 L_fs Correction									
	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-	
Room Corrections									
	7.0	6.6	5.7	5.7	5.2	4.6	4.0	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 3 Bedroom 2 Nighttime L _{Amax} Reverberant Field, L _{Prev} :	61.1	56.1	44.2	34.8	30.5	20.4	11.0	-	

Reference	Flat 4 Livingroom
Description	
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	30dB(A)
Calculated Tmf T60 (s)	0.48
Volume (m³)	58.5



Calculated Internal Sound Levels

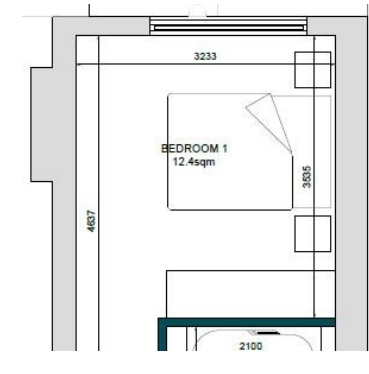
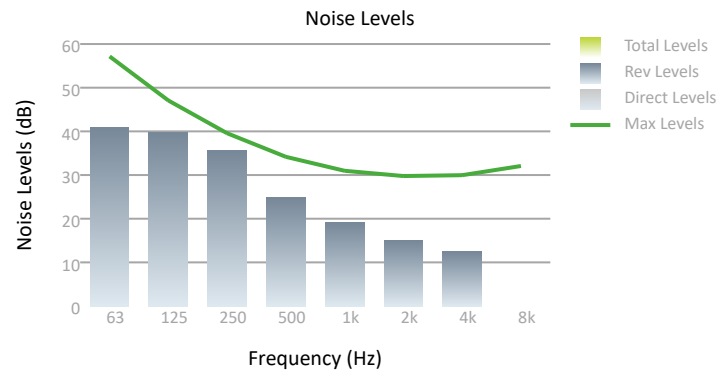
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq,ff	1	46	42	33	22	17	13	11	-

Calculation Sheet

Flat 4 Livingroom

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade										
Source dBA	57.0									
Octave Band Frequencies										
Leq,ff		61.0	59.0	55.0	53.0	53.0	49.0	44.0	38.0	Row A
Facade Wall Element										
		-43.4	-45.4	-47.4	-53.4	-59.4	-66.4	-65.4	-68.4	
Facade Glazed Element										
		-34.7	-33.2	-32.1	-41.7	-50.7	-51.9	-48.1	-	
Facade Roof Element										
		-26.2	-29.2	-41.2	-51.2	-57.2	-60.2	-66.2	-68.2	
Ventilators										
		-41.2	-42.2	-45.2	-48.2	-48.2	-48.2	-47.2	-48.2	
Cumulative Lp										
Result		35.6	31.5	23.7	13.0	8.0	4.5	2.7	-	
ISO 12354-3 Lfs Correction										
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections										
		10.6	10.3	9.5	9.5	9.5	9.0	8.5	-	
Internal Receiver Noise										
Internal Receiver Noise - Flat 4 Livingroom										
Reverberant Field, LPrev:		46.2	41.8	33.2	22.5	17.5	13.5	11.3	-	

Reference	Flat 4 Bedroom 1 Daytime LAeq
Description	
Target Sound Level	35dB(A)
Max Sound Level	40dB(A)
Calculated Sound Level	30dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	27.3



Calculated Internal Sound Levels

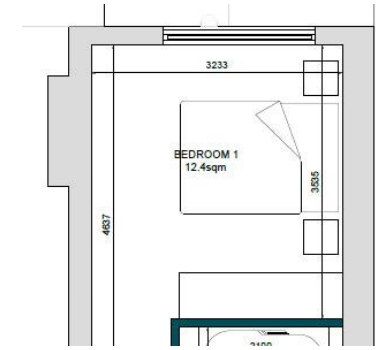
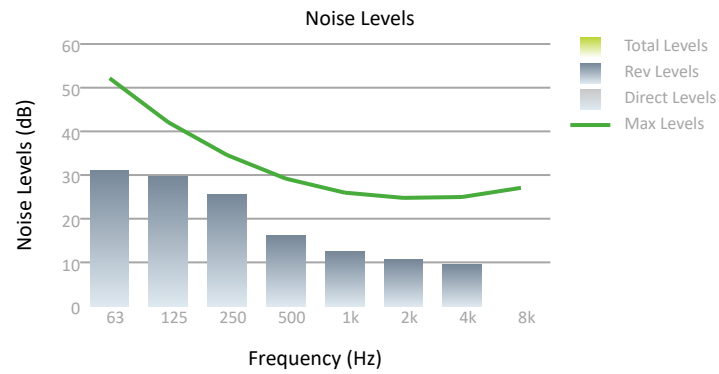
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff (Day)	1	41	40	36	25	19	15	12	-

Calculation Sheet

Flat 4 Bedroom 1 Daytime LAeq

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Daytime Leq)									
Source dBA	57.0								
Octave Band Frequencies									
Leq,ff	61.0	59.0	55.0	53.0	53.0	49.0	44.0	38.0	Row A
Facade Wall Element									
	-41.7	-43.7	-45.7	-51.7	-57.7	-64.7	-63.7	-66.7	
Facade Glazed Element									
	-30.0	-28.5	-27.4	-37.0	-46.0	-47.2	-43.4	-	
Ventilators									
	-36.6	-37.6	-40.6	-43.6	-43.6	-43.6	-42.6	-43.6	
Cumulative Lp									
Result	32.1	31.1	27.8	17.1	12.1	8.5	6.6	-	
ISO 12354-3 Lfs Correction									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	8.9	8.5	7.7	7.7	7.2	6.6	5.9	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 4 Bedroom 1 Daytime LAeq Reverberant Field, LPrev:	41.0	39.6	35.5	24.8	19.2	15.0	12.5	-	

Reference	Flat 4 Bedroom 1 Nighttime LAeq
Description	
Target Sound Level	30dB(A)
Max Sound Level	35dB(A)
Calculated Sound Level	21dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	27.3



Calculated Internal Sound Levels

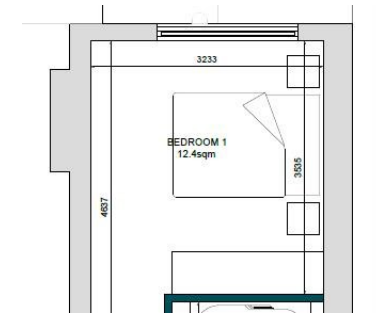
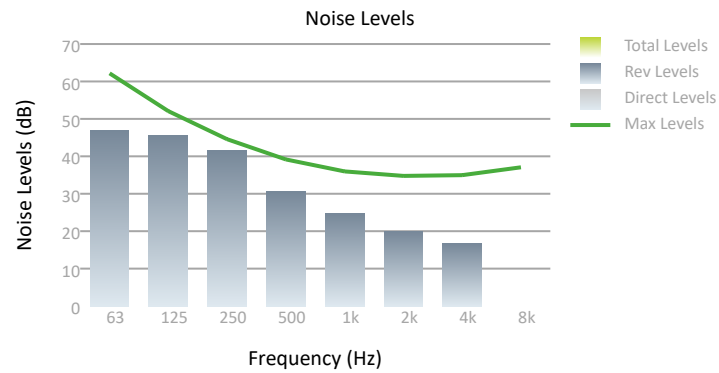
Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Leq, ff	1	31	30	26	16	12	11	9	-

Calculation Sheet

Flat 4 Bedroom 1 Nighttime LAeq

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (Leq)									
Source dBA	47.0								
Octave Band Frequencies									
Leq,ff	51.0	49.0	45.0	43.0	43.0	39.0	34.0	28.0	Row A
Facade Wall Element									
	-41.7	-43.7	-45.7	-51.7	-57.7	-64.7	-63.7	-66.7	
Facade Glazed Element									
	-30.0	-28.5	-27.4	-37.0	-46.0	-47.2	-43.4	-	
Ventilators									
	-36.6	-37.6	-40.6	-43.6	-43.6	-43.6	-42.6	-43.6	
Cumulative Lp									
Result	22.1	21.2	18.0	8.4	5.3	4.0	3.5	-	
ISO 12354-3 Lfs Correction									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	8.9	8.5	7.7	7.7	7.2	6.6	5.9	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 4 Bedroom 1 Nighttime LAeq Reverberant Field, LPrev:	31.0	29.7	25.6	16.1	12.5	10.6	9.4	-	

Reference	Flat 4 Bedroom 1 Nighttime LAmax
Description	
Target Sound Level	-
Max Sound Level	45dB(A)
Calculated Sound Level	36dB(A)
Calculated Tmf T60 (s)	0.4
Volume (m³)	27.3



Calculated Internal Sound Levels

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Lmax, ff	1	47	46	41	31	25	20	17	-

Calculation Sheet

Flat 4 Bedroom 1 Nighttime L_{max}

	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Sound Level at Facade (L_{max})									
Source dBA	63.0								
Octave Band Frequencies									
Leq,ff	67.0	65.0	61.0	59.0	59.0	55.0	50.0	44.0	Row A
Facade Wall Element									
	-41.7	-43.7	-45.7	-51.7	-57.7	-64.7	-63.7	-66.7	
Facade Glazed Element									
	-30.0	-28.5	-27.4	-37.0	-46.0	-47.2	-43.4	-	
Ventilators									
	-36.6	-37.6	-40.6	-43.6	-43.6	-43.6	-42.6	-43.6	
Cumulative L_p									
Result	38.1	37.1	33.8	23.0	17.6	13.4	10.8	-	
ISO 12354-3 L_fs Correction									
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
Room Corrections									
	8.9	8.5	7.7	7.7	7.2	6.6	5.9	-	
Internal Receiver Noise									
Internal Receiver Noise - Flat 4 Bedroom 1 Nighttime L _{max} Reverberant Field, L _{Prev} :	47.0	45.6	41.5	30.7	24.8	20.0	16.7	-	