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Acoustic Survey and Assessment for Proposed conversion of property to bakery on the ground floor and residential accommodation on the first at 69 King Street, Whalley, BB7 9SW.

Prepared for:

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Summary

This report has been prepared following a request for an assessment as part of the planning application to convert 69 King Street Whalley into a ground floor bakery and first floor staff accommodation.

The assessment considers the impact from existing prevailing sound levels on the residential aspect of the development. A consideration of the impact from proposed external plant on both the proposed and existing residential accommodation, along with sound transfer between the ground and first floors.

The following mitigation measures are required:

- Standard 6/12/6 double glazing units to all habitable rooms
- A suitable mechanical ventilation system to allow windows to remain closed and comply with Building Regulations Approved Documents F for background ventilation & O – overheating.
- Improvements to the floor/ceiling between the ground and first floor and the internal walls to the first floor. A suggested specification is provided in the report.
- The identified extraction fan for the extraction system will be a MUB630-EC multibox acoustic fan with a KKS100 silencer.

Contents

1. Introduction

1.1. Martin Environmental Solutions has been commissioned to undertake an acoustic survey and assessment to support a planning application for the conversion of 69 King Street, Whalley, BB7 9SW from retail to bakery on the ground floor, with staff accommodation to the first floor.

Site Location and Context

1.2. The development site is situated on the corner of King Street and George Street. To the north of the development site is George Street, with retail units to the ground floor and accommodation to the first. King Street to the east, with a small park, bus stop and public toilet. To the south and adjoining the building at a ground floor level is the Whalley Wine Bar. To the north more retail units on the ground floor of a large converted building within residential to the upper floors.

1.3. An aerial Photograph is enclosed in Figure 1, together with a proposed layout drawing in Figure 2.

1.4. The report has been produced to clarify the potential impact on the proposed development and to identify mitigation measures if required to ensure the development is appropriate in terms of noise impact.

2. Policy and Guidance

2.1. The impact of noise can be a material consideration in the determination of planning applications. The planning system has the task of guiding development to the most appropriate locations. It is recognised that on occasions it will be difficult to reconcile some land uses, such as housing, hospitals, or schools, with other activities that generate high levels of noise. However, the planning system is tasked to ensure that, wherever practicable, noise-sensitive developments are separated from major sources of noise (such as road, rail and air transport and certain types of industrial development).

2.2. The Government's publication of the National Planning Policy Framework (NPPF), updated in December 2024, states that planning policies and decisions should prevent new and existing development from contributing to or being put at unacceptable risk from, of being adversely affected by unacceptable levels of noise pollution, paragraph 187.

2.3. The document goes further in paragraph 198 by stating planning policies and decisions should ensure that new development is appropriate for its location … in doing so they should "*mitigate and reduce to a minimum potential adverse impacts from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life*". The NPPF makes direct reference to the Government published Noise Policy Statement for England (NPSE).

2.4. The NPSE sets out the long-term vision of the government's policy on noise, which is to "*promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*."

2.5. Its guiding principles include "Using Sound Science Responsibly – Ensuring policy is developed and implemented on the basis of strong scientific evidence, whilst taking into account scientific uncertainty (through the precautionary principle) as well as public attitudes and values."

2.6. The NPSE's long-term vision is supported by three aims:

- 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 improvements of health and quality of life.

2.7. The NPSE provides further guidance on "significant adverse effects" and adverse effects" and introduces the following terms, which have been used within toxicological studies for years.

NOEL – No Observed Effect Level; this is the level of noise exposure below which no effect at all on health or quality of life can be detected.

LOAEL – Lowest Observed Adverse Effect Level. this is the level of noise exposure above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level. This is the level of noise exposure above which significant adverse effects on health and quality of life occur.

2.8. The use of the words Observed is important, a change in behaviour, e.g. closing windows, turning up TV's or physical change, e.g. being woken up must be observed.

2.9. The NPSE recognises that it is not possible to have single objective noise-based measures which define the SOAEL, LOAEL and NOEL that are applicable to all sources of noise in all situations. The levels are likely to be different for different noise sources, receptors and at different times of the day.

2.10. The Planning Practice Guidance on Noise, July 2019 (PPG – N) provides further guidance on the consideration of noise as part of the planning process and highlights that plan-making and decision making need to take account of the acoustic environment and 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 a good standard of amenity can be achieved.

The guidance used the same concepts of adverse effect level, used within the NPSE.

2.11. The PPG -N document provides the following noise exposure hierarchy;

TABLE 2.1 NOISE EXPOSURE HIERARCHY

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, or having to close windows for some of the time because of the noise where there is no alternative ventilation. 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, having to keep windows closed most of the time because of the noise where there is no alternative ventilation. 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 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 (auditory and non-auditory).	Unacceptable adverse effect	Prevent

2.12. One therefore needs to determine what level represents SOAEL in a given situation, so that it can be avoided and mitigated against. While the NPSE and PPG-N identify that no single level of sound can be provided which determines an adverse impact from noise many Local Authorities have identified sound level criteria in accordance with the World Health Organisation's recommended levels, mirrored in BS8233:2014.

2.13. The World Health Organisation (WHO) "Guidelines for the prevention of Community Noise Annoyance" provides guidance on internal and external sound levels that are likely to result in community annoyance. These are mirrored within BS8233:2014. 'Guidance on sound insulation and noise reduction for buildings – Code of Practice'

2.14. The WHO recommended noise levels are based on sound scientific research principles on when observed effects are reached as required by the NPPF.

2.15. The WHO guidance identifies that for outdoor amenity areas (gardens) sound levels that should not exceeded 55dB(A) $L_{Aeq,16hr}$ in order to avoid 'Serious Community Annoyance or 50dB(A) $L_{Aeq,16hr}$ to avoid 'Moderate Community Annoyance' during the day. For internal levels the WHO set 35dB(A) $L_{Aeq,16hr}$ during the day to prevent Moderate Annoyance and 30 dB(A) $L_{Aeq,8hr}$ in bedrooms at night to prevent sleep disturbance.

2.16. The WHO guidance also recommends that maximum sound levels at night should not regularly exceed 45dB(A) within bedrooms to prevent sleep disturbance. Regularly is considered to be more than 10 times during any 8-hour night-time period.

2.17. The hours of 07:00 – 23:00 representing day-time and 23:00 -07:00 night-time periods.

2.18. BS 8233:2014 also specifies desirable noise levels to be achieved inside dwellings. The daytime period suggests internal noise levels of 35dB $L_{Aeq,16hr}$, for resting in living rooms and bedrooms while for night-time a level of 30dB $L_{Aeq,8hr}$ is recommended. Slightly higher levels are recommended for dining room areas at 40dB $L_{Aeq,16hr.}$ The for Criteria for external areas mirrors that within the WHO guidance.

2.19. The WHO/BS8233 guidelines therefore suggest sound levels above 55dB(A) externally would result in a significant adverse impact (SOAEL), between 50-55dB(A) as a moderate annoyance or LOAEL and therefore below 50dB(A) as NOEL.

2.20. Internally the guidance recommended levels of 35dB(A) during the daytime to avoid moderate annoyance and 30dB(A) at night-time to prevent sleep disturbance (LOAEL). Thus, levels below these would equate to NOEL.

2.21. Based on the 15dB reduction for an open window sited within both the WHO and BS8233 guidance documents and the sited external and internal recommended sound levels, LOAEL would be observed between 35-40dB $L_{Aeq,16hr}$ day and 30-35dB $L_{Aeq,8hr}$ night. While SOAEL levels would be above these values.

2.22. Councils typically use the 35dB day/30dB night as internal criteria when assessing the impact on and from developments as part of the planning process, along with the night-time maximum 45dB L_{Amax} level within bedrooms.

BS4142:2014+A1:2019

2.23. Another commonly used standard is British Standard 4142:2014+A1:2019 'Method for rating industrial and commercial sound' compares the sound predicted by the source in question against the background, L_{A90} sound levels. This standard aims at addressing the impact from industrial and commercial activities, taking into account the subjective nature of sound and potential short term activities.

2.24. The methodology requires the "residual sound", the ambient sound level when the specific sound source is suppressed or absent expressed as an $L_{Aeq,t}$ measurement to be then subtracted from the "ambient sound level", the overall sound level present including the specific source sound, measured as L_{Aeq} measurement resulting a in value for the specific or "problem" sound alone.

2.25. If the "specific" sound is tonal, such as whine or hum, or if it is impulsive such as bangs or clatters or if it is intermittent or irregular enough to attract attention a correction is added to the "specific level" to produce a "rating level". The "rating level" is then compared to the measured "background" L_{A90} sound level.

2.26. If the "rating level" exceeds the "background" by around 10dB(A) or more this "indicates a significant adverse impact". A difference of around 5dB(A) 'indicates an adverse impact. The lower the commercial noise level is, the lower the likely impact.

ProPG : Planning & Noise : 2017

2.27. The primary goal of this guidance is to assist the delivery of sustainable development by promoting good health and well-being through the effective management of noise.

2.28. It seeks to do that through encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise. It is applicable to noise from existing transport sources (noting that good professional practice should have regard to any reasonably foreseeable changes in existing and/or new sources of noise).

2.29. The recommended approach is also considered suitable where some industrial or commercial noise contributes to the acoustic environment provided that is "not dominant".

2.30. This ProPG advocates a systematic, proportionate, risk based, 2-stage, approach. The approach encourages early consideration of noise issues, facilitates straightforward accelerated decision making for lower risk sites, and assists proper consideration of noise issues where the acoustic environment is challenging. The two sequential stages of the overall approach are:

- Stage 1 – an initial noise risk assessment of the proposed development site; and
- Stage 2 – a systematic consideration of four key elements.

2.31. The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:

- Element 1 – demonstrating a "Good Acoustic Design Process";
- Element 2 – observing internal "Noise Level Guidelines";
- Element 3 – undertaking an "External Amenity Area Noise Assessment"; and
- Element 4 – consideration of "Other Relevant Issues".

The ProPG considers suitable guidance on internal noise levels found in "BS8233:2014: Guidance on sound insulation and noise reduction for buildings".

2.32. The above being measured prior to the any equipment being turned on, e.g. the engine or bridge simulation equipment for this development.

2.33. Based on the above guidance and given the development being considered the following criterion have been identified:

Location	07:00 to 23:00	23:00 to 07:00	
Living rooms (e.g. Lounges)	35 dB $L_{Aeq,16hr}$	-	
Bedrooms	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$	45 dB L_{Amax}*
Dining rooms	40 dB $L_{Aeq,16hr}$	-	
BS4142:2014 Rating Level			
External Garden Amenity Areas	Rating level < background L_{A90}		
Living rooms	35 dB $L_{Aeq,16hr}$	-	
Bedrooms	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$	

*L_{AMax} level not regularly exceeded

3. The Assessment

The development

3.1 The proposed development consists of an extension to the rear of the ground floor and the change of use from retail to a bakery. This will include the installation of an extraction system to the rear of the site. The first floor of the site is also to be converted into staff accommodation.

3.2 Proposed operating hours of the bakery will be 05:00-18:00 Monday to Saturday, and 06:00-16:00 on Sundays. The shop will be open to the public from 08:00-18:00 Monday to Saturday and 09:00-16:00 on Sundays.

3.3 Figure 2 below provides an overview of the proposed development.

Existing Situation.

3.4 In order to obtain representative background sound levels for the area on site monitoring was undertaken over the 4th to 10th April 2026.

3.5 Two Cirrus Optimus Green sound level meter was utilised for the monitoring. The first meter was placed 1m from the first-floor façade of the building overlooking the King Street to the front. The second meter was placed 1m from the first floor rear of the site overlooking the existing “courtyard” to the rear of the site.

3.6 The meters were field calibrated at the start and end of the monitoring period with no significant variation and full laboratory calibration certificates are available on request.

3.7 The weather during the monitoring was dry with little wind <5m/s.

3.8 The full results are shown in Appendix A, with a summary in the tables below. The below tables have had a façade correction of -3dB applied.

Front

Start Time	End Time	Duration	L_{Aeq}	L_{A90}	L_{AMax}
08/04/2026 10:00	08/04/2026 23:00	12:59:59	62	50.1	97.4
08/04/2026 23:00	09/04/2026 07:00	08:00:00	57.7	27.2	82.2
09/04/2026 07:00	09/04/2026 23:00	16:00:00	63.3	49.2	90.6
09/04/2026 23:00	10/04/2026 07:00	08:00:00	59.2	27.6	83.1
10/04/2026 07:00	10/04/2026 08:00	01:00:01	64.5	56.5	80.2

Rear

Start Time	End Time	Duration	L_{Aeq}	L_{A90}	L_{AMax}
08/04/2026 10:04	08/04/2026 23:00	12:55:19	49.8	36.9	87.2
08/04/2026 23:00	09/04/2026 07:00	08:00:00	45.1	22.4	74.2
09/04/2026 07:00	09/04/2026 23:00	16:00:00	51.3	40.9	80.6
09/04/2026 23:00	10/04/2026 07:00	08:00:00	46.3	27.4	73.0
10/04/2026 07:00	10/04/2026 08:00	01:00:01	52.1	45.0	76.6

3.9 Background sound levels were dominated by passing traffic on the surrounding road network at both the front and rear the site. Birdsong was evident at both locations, but particularly to the rear. To the front in the late evening people could be heard talking presumably outside the adjacent wine bar. Night-time maximum sound levels not regularly exceeded were identified at 73.6dB(A) to the front and 64.2dB(A) to the rear.

Potential impact on proposed residential units

3.10 Given a 15dB attenuation[1] for an open window the sound levels to be experienced by the future occupants are slightly above the identified criterion detailed in section 2 of above. Therefore, further mitigation measures are required.

3.11 A standard 6/12/6 double glazing unit will, when closed, provide a sound reduction, $R_w(C;C_{tr})$, of 36(-2;-5).

3.12 Insulation values for materials are largely governed by their mass, with greater mass providing greater attenuation. A standard brick/block solid or cavity wall will generally provide much higher levels of attenuation than a standard window unit of the same size due to the greater mass involved, in this case around 49dB R_w. Thus, when carrying out a simple calculation[2] assuming the facade attenuation is equal to that of the glazing element the standard 6/12/6 double glazing unit will, when closed, be adequate to protect the occupants to the rear of the building from the prevailing environmental sound levels. See Appendix B.

3.13 To the front slightly higher levels were recorded and the simple calculation provides internal levels close to the identified criterion

[1] BS8233: 2014; Guidance on sound insulation and noise reduction for buildings
[2] Annex G1 of BS82333:2014

e.g. Night-time $L_{Aeq,8hr}$ – glazing (R_w+C_{Tr})			= internal level
59.2	-	31	= 28.2dB(A)

3.14 As this is within 5dB(A) of the target criterion a more detailed calculation of the façade attenuation has been undertaken utilising the Marshall Day Acoustics Insul Sound Insulation Prediction software, version 10.0. This predicts interval sound levels to the bedrooms at the front of the site will be below the identified criterion for day, night and night-time LAMax levels in each room. As a result, No Observed Effect Level obtained. A summary of all results and example calculation are contained in Appendix C.

3.15 Therefore, to ensure that suitable internal sound levels are maintained it is recommended that all habitable rooms are fitted with the 6/12/6 standard double glazing units.

3.16 Care must be taken to ensure that windows are well fitted and gaps between the window frame and the brick work are minimised. Where gaps do occur, these should be filled with a suitable acoustic material, not expandable foam. The window frame should be sealed across the full depth of the frame and not just around the edges. This will ensure that sound does not 'leak' around the edge of the frame.

Ventilation

3.17 To ensure a suitable internal sound levels is maintained windows will need to be kept closed. Building Regulations Approved Documents F (ADF) – Ventilation and O (ADO) – Overheating, provide a requirement for adequate ventilation of buildings.

3.18 ADF identifies three types of ventilation which must be present in a dwelling,

Background **whole dwelling** ventilation – continuous ventilation at a low rate to dilute and remove pollutants, water vapour and stale air,

Extraction ventilation from rooms where water vapour or pollutants are likely to be released (e.g. bathrooms and kitchens), to minimise their spread to the rest of the building

Purge ventilation – short duration relatively high rates to rapidly remove/dilute pollutants and/or water vapour.

3.19 As windows must remain closed additional provision for whole dwelling ventilation is required. This is likely to be consist of some form of mechanical ventilation. Where this includes direct openings between habitable rooms and the external environment, e.g. trickle vents in windows or wall fans, the chosen system must ensure a suitable level of attenuation is provided equal to or greater than the glazing specification i.e. ≥31 $D_{ne,w}+C_{Tr}$.

3.20 Extract Ventilation is typically provided with kitchen and bathroom areas and the above recommendations would not impact on the standard provision of extract ventilation.

3.21 Purge Ventilation is typically required for short periods, such as the removal of smoke from burnt food and the above recommendations do not prohibit the short opening of windows for purge ventilation of the property, particularly in this case where the exceedance of the identified internal sound level criterion is slight and short exceedances from purge ventilations would not result in a significant impact on residents.

3.22 ADO requires adequate means to remove heat from the indoor environment. In standard properties where windows can be left open and cross ventilation of the whole dwelling is possible this is usually sufficient, however where restrictions are present on the opening of windows e.g. high crime areas or for acoustic reasons alternative provision must be made. This is likely to be consist of some form of mechanical ventilation.

3.23 Given the acoustic constraints for the site traditional opening of windows is not possible, as such an alternative system will be required to remove excess heat from the building.

3.24 Ventilation system design should be carefully considered. Research has shown that annoyance caused by noise from poorly designed systems frequently results in occupants curtailing the operation of the ventilation system. Such action leads to inadequate ventilation resulting in poor air quality, which is well correlated with a range of adverse health effects.

3.25 As any system with a direct connection between a habitable room and the external environment will need to be suitable acoustically attenuated to at least the same level of attenuation level as the glazing elements.

3.26 Mechanical ventilation provided in habitable rooms should achieve the lowest possible sound levels and average sound levels when operating under normal conditions should not exceed in the case 25dB(A) due to the low internal sound levels to avoid disruption to the residents.

Impact from the proposed external plant.

3.27 The application will include the insulation of an external extraction flue to the rear of the site, in addition to the two condensing units.

3.28 In line with ProPG-N and the NPSE which require good acoustic design principles to be used it is possible and recommended that the external condensing units are repositioned towards the rear of the site and as far away from the first floor bedroom windows as possible.

3.29 The extraction system will be fitted with a MUB630-EC multibox acoustic fan. A total of two fans will be used for the extracted air covering the two proposed canopies. Sound emission data for the fans has been obtained from the manufacturers and is included within Appendix D.

3.30 The fans are to the be located internally, Fans should be installed on antivibration mounts with flexible connections to the either side to avoid any transfer of sound through the structure of the extraction system.

3.31 It has been idented that in order to ensure suitable sound levels at the first floor receptor window a KKS100 silencer will be required on each leg of the extraction system. The system has also been designed and it is recommended, that a silencer is also placed on the kitchen side of the fan to minimise sound transference back in the kitchen.

3.32 The extract fans are to be located to the rear of the main build and within 1.5 & 1.8m of the first floor Bedroom 1, see figure 2. The calculations for the combined impact of the two fans are shown within Appendix D.

3.33 In addition to the extraction system the air condition plant will be located to the rear of the site and this too will have an impact on the rear bedroom receptor. The make and model of the units has not been confirmed and so an assessment has been undertaken utilising sound emission data for a typical unit. A Mitsubishi PUMY-P200Y external unit. Designed to allow up to 8 indoor units to be connected this is a one of the larger models produced.

3.34 A check on the chosen unit must be made and if the published sound levels are higher than those used within the report a further assessment must be made to ensure the units are suitable and will result in no adverse impact.

3.35 These unit are to be located 3.5m & 4.7m away from the bedroom window and will also be at 90^{o} to the window.

3.36 The impact of these units has been included within the calculation in Appendix D.

3.37 The overall combined impact from all external plant at the bedroom window will be 64.4dB(A). Given the above mitigation measures (closed windows) an internal sound level has been calculated using the Insul Software for the full facade with a calculated internal sound level of 24.3dB(A).

3.38 This is below the identified internal criterion for day and night-time periods and the recommended level to avoid any adverse impact.

3.39 It should also be noted that the residential apartments to the rear of the site are located further away than the calculated receptor position of the bedroom. The extraction system will be 17m away compared with less than 2m for the calculated receptor bedroom position. And the AC units will be 8-10m as opposed to the 3.5-4.2m. These apartments have also been designed to have closed standard 6/12/6 windows and as such a lower impact would be expected at a combined 52.3dB(A)

3.40 It is typical to consider external plant in line with BS4142:2014. BS4142 is an external rating of the specific sound level at the receptor location.

3.41 As such a BS4142:2014 assessment has been undertaken for the rear. The extraction system will be on continuously and but is likely to be noticeable, while the AC plant will cycle on and off throughout the day. Both units are typically designed to be none tonal and. As such a correction for intermittency (+3dB) and other sound characteristics

(+3dB) have been applied. Both units will be off outside the operational hours of 05:00-18:00.

	Day	Night	
Measured Ambient sound level	-	-	Plant not present
Residual Sound level	L_{Aeq} = 55.1dB	L_{Aeq} =54.0dB	Average during operational hours taken from monitoring at rear of site.
Background Sound Level	L_{A90} = 49dB	L_{A90} = 46.9dB	Background taken from second monitoring point.
Reference period	60 minutes	15 minutes	Normal ref period,
Specific sound Level	L_{Aeq} = 64.4dB	L_{Aeq} = 64.4dB	Calculated to the nearest receptor – Bed 1
Acoustic feature	+6	+6	+3dB intermittency +3dB other characteristics
Rating level	70.4dB	70.4dB	
Background sound level	L_{A90} = 49dB	L_{A90} = 46.9dB	
Excess of Rating level over background level	(70.4-49) dB = **+21.4dB** indicates a significant adverse impact	(70.4-49) dB = +21.4d**B** indicates a significant adverse impact	
Uncertainty			Actual AC units are currently unknown.

3.42 The BS4142:2014 assessment has identified a significant adverse impact at the façade of the property. However, when the mitigation measures in the form of closed

windows are taken into account the internal rating levels fall to 30.3dB(A) (internal sound level of 24.3dB +6dB corrections).

3.43 The internal sound level at the nearest receptor is therefore consider to be acceptable.

3.44 The residential properties to the rear are also fitted with the same mitigation measures – closed windows. Sound levels at the façade are 52.3dB(A), rating 58.3dB. considering just the reduction from the glazing of 31dB R_w+C_{Tr}, an internal level of 27.3dB(A) is obtained. Note this is a simple calculation and does not take into account the full façade of the building or the internal room sizes. Levels are therefore likely to be lower.

3.45 The external plant will not result in any internal adverse impact on the surrounding residential properties.

Internal Transfer of Sound

3.46 It is also important to consider the transfer of sound within the proposed development.

3.47 This has been undertaken using the principles within BS E N 123454-1 and the following equation:

$$L_2 = L_1 - R + 10\log(S) - 10\log(A)$$

where L1 is the source noise level (dB), R is the sound reduction index of the floor/wall(dB), S is the surface area of the separating element (M^2) and A is the equivalent absorption area within the recevieing room (m^2).

3.48 The current floor/ceiling construction between the ground and first floor appears to be the original traditional method of 200mm joist with standard floor boarding to the floor and a single layer of lathe& plaster to the underside. The first floor separating walls are a mixture of a single course of brick plastered on both sides and 100mm stud walls with lathe and plaster to both sides.

3.49 The sound reduction index for these partitions has been based on the Insul sound insulation modelling software.

3.50 The separating structures are likely to need improving to meet fire safety requirements. This needs to be considered separately by an appropriately qualified person.

3.51 A source noise level of 80dB(A) has been identified for the ground floor bakery. This is taken from the noise spectrum within the "Little Red Book of Acoustics" for a busy restaurant and is considered to be representative of the development. The same values have bene used for the first floor accommodation although it is anticipated that levels will be lower.

Source	Octave Band centre Freq (Hz)							dB(A)
	63	125	250	500	1000	2000	4000	
Bakery	60	70	75	75	75	75	70	80
First floor Bedrooms /lounge	60	70	75	75	75	75	70	80

3.52 The above calculation identifies an internal sound level within the first floor rooms of 48.5dB(A), Appendix E. This is not sufficient to achieve the required day/night-time internal criteria of 35/30dB(A) and as such the separating floor will need to be improved.

3.53 The existing walls between the proposed bedrooms are based on the above construction methods also need to be improved in order to meet the identified criterion.

3.54 A proposed construction method for the improved ceiling has been developed using the Insul software, see Appendix E. Consisting 200mm joists with 100mm acoustic insulation between joists, a 20mm particle flooring board to the topside. A Gyproc suspended acoustic hanger increasing the cavity by 115mm attached to the joists with 2x layers of overlapping 15mm sound board attached to the grid.

3.55 This will result in an internal sound level of ~16.1dB(A).

3.56 For the existing walls between units the sound levels within the adjacent rooms will be 41-45dB(A) depending on which construction separates the rooms. The improved wall construction will reduce this down to <28.9dB(A), see Appendix E.

4 Conclusion

4.1 An assessment has been undertaken to determine the impact from the prevailing environmental sound levels on the proposed accommodation element of the development. The impact form the proposed external plant to the rear of the site and sound transfer throughout the building.

4.2 On-site monitoring has identified existing background sound levels in the area will result in an exceedance of the identified internal criterion levels and an adverse impact on the proposed development would be experienced. As such additional mitigation measures are required.

4.3 These have been identified as standard double-glazing units (6/12/6) with suitable alternative ventilation to allow the windows to remain closed.

4.4 The impact from the external plant has been assessed on both the proposed first -floor accommodation and the nearby residential properties to the rear. Silencers have been recommended for the extraction system and a calculation undertaken of the likely internal impact at both receptor sites. The levels are below the identified criterion as such no adverse impact is expected from the external plant,

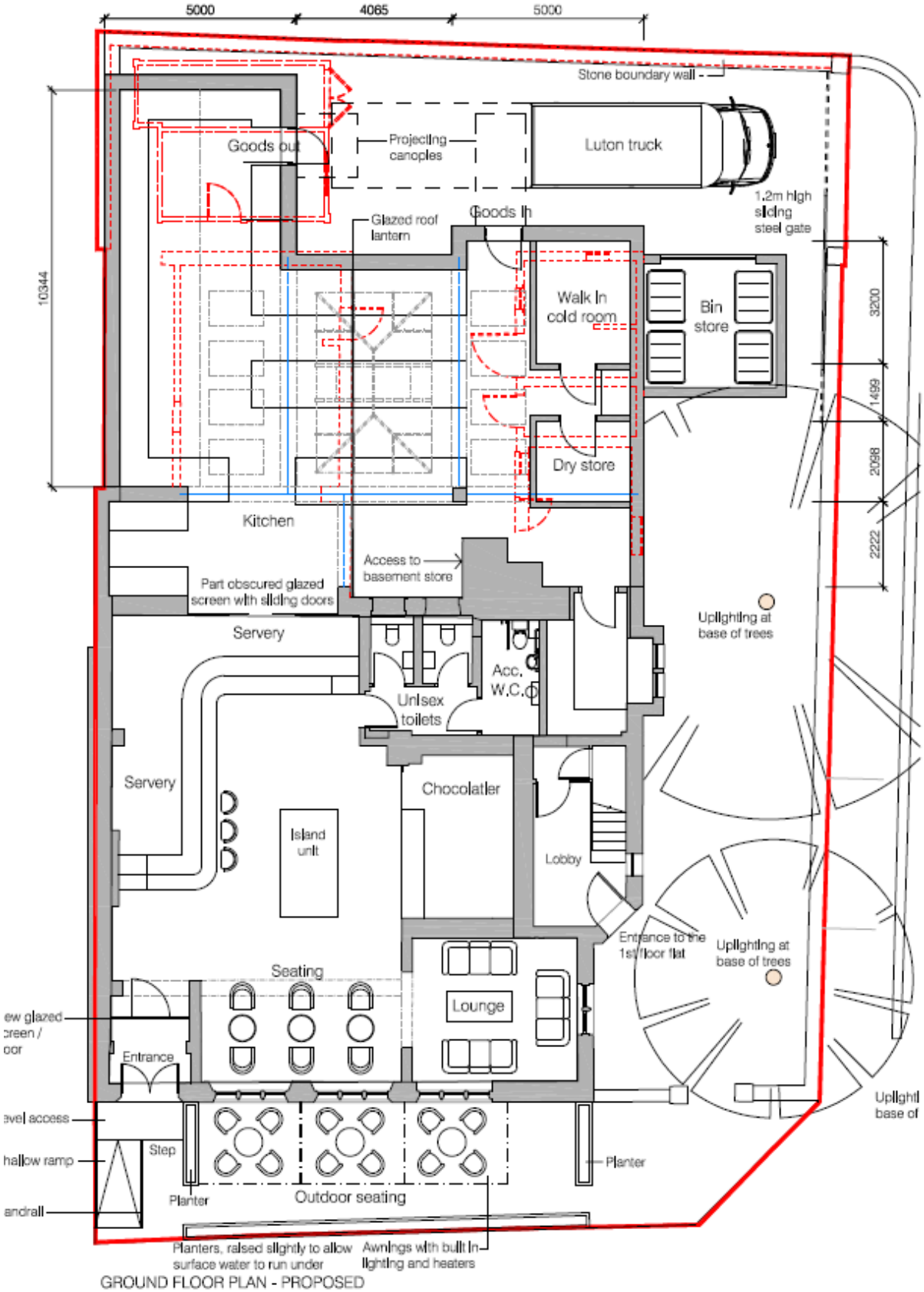
4.5 Separating partitions have also been assessed and the current construction is likely to result in an exceedance of the identified criterion. As such an improved specification has been identified for both the floor and separating walls within the development.

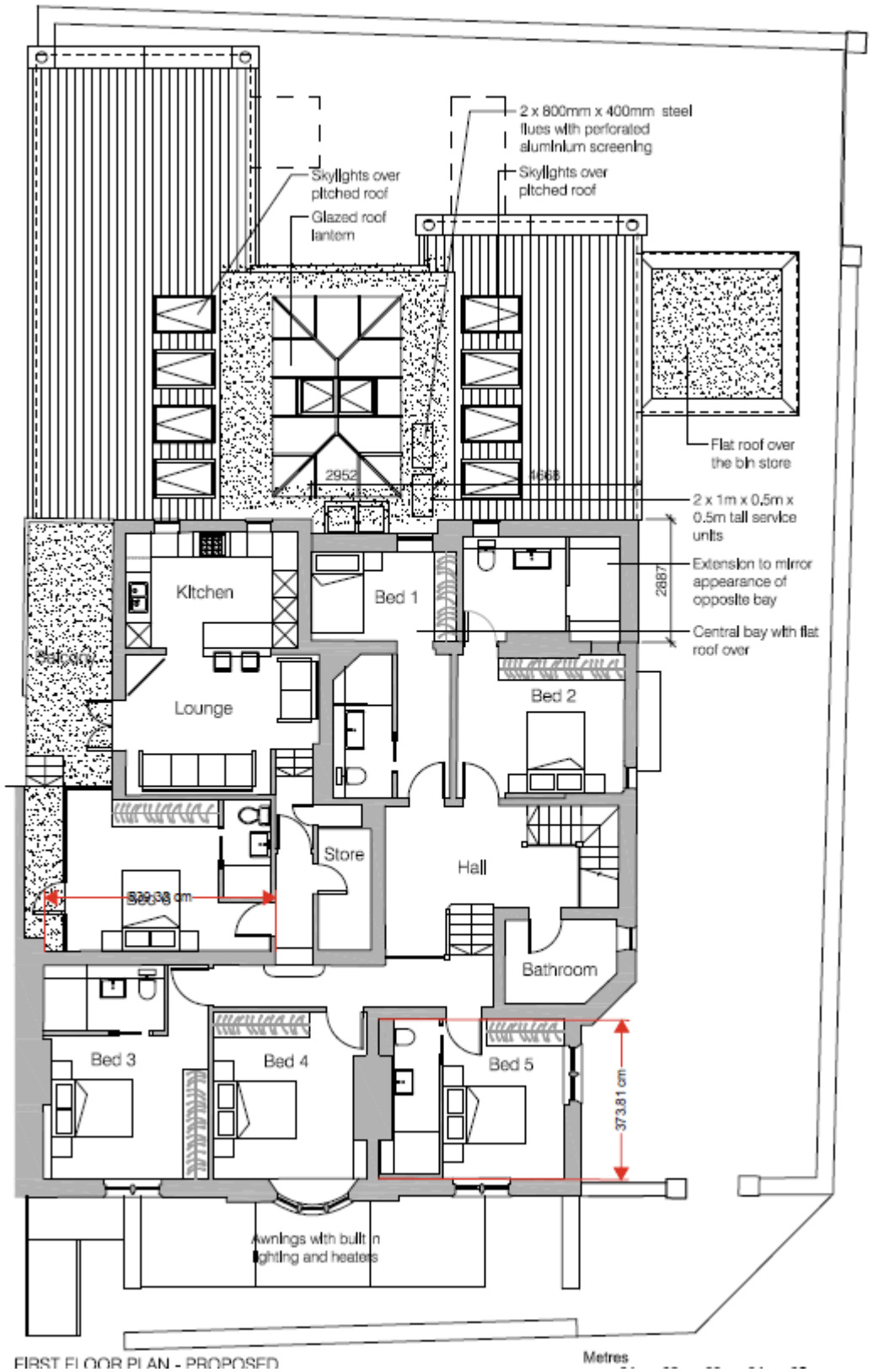
4.6 The inclusion of the identified mitigation measures to all habitable rooms will ensure that the internal sound levels are acceptable and will achieve the identified sound levels, resulting in a No Observe Effect on the future or neighbouring residents in line with the Noise Policy Statement for England & PPG-N.

4.7 As such the development will meet the objectives of the National Planning Policy Framework in ensuring that no significant adverse impact is experienced by the future residents. The development is therefore considered to be acceptable in terms of noise.

Figure 1 – Aerial Photograph

Figure 2 – Proposed Layout Plan




2 x 800mm x 400mm steel flues with perforated aluminium screening
Skylights over pitched roof
Glazed roof lantern
Skylights over pitched roof
Flat roof over the bin store
2952
4668
2 x 1m x 0.5m x 0.5m tall service units
Extension to mirror appearance of opposite bay
2887
Central bay with flat roof over
Kitchen
Bed 1
Lounge
Bed 2
Store
Hall
Bathroom
Bed 3
Bed 4
Bed 5
373.81 cm
Awnings with built in lighting and heaters
FIRST FLOOR PLAN - PROPOSED
Metres

Appendix A – Full Monitoring Results

Front

Time	L_{Aeq} (dB)	L_{AMax} (dB)	L_{A90} (dB)
08/04/2026 11:00	64.2	80.8	58.3
08/04/2026 12:00	64.1	85.4	58.7
08/04/2026 13:00	64.4	81.9	57.7
08/04/2026 14:00	63.9	86.2	58.0
08/04/2026 15:00	64.8	87.9	58.7
08/04/2026 16:00	64.4	79.8	60.1
08/04/2026 17:00	66.3	80.7	61.9
08/04/2026 18:00	65.6	79.1	60.5
08/04/2026 19:00	65.5	92.1	59.1
08/04/2026 20:00	69.3	98.4	53.9
08/04/2026 21:00	65.1	100.4	54.1
08/04/2026 22:00	60.7	81.5	44.8
08/04/2026 23:00	56.2	76.1	36.7
09/04/2026 00:00	54.8	78.1	32.7
09/04/2026 01:00	48.8	74.1	30.0
09/04/2026 02:00	47.2	70.7	28.8
09/04/2026 03:00	51.8	77.9	29.2
09/04/2026 04:00	53.1	74.1	31.3
09/04/2026 05:00	60.0	79.9	39.8
09/04/2026 06:00	64.3	80.1	50.1
09/04/2026 07:00	66.9	85.2	58.3
09/04/2026 08:00	66.4	83.4	58.7
09/04/2026 09:00	68.4	88.1	60.7
09/04/2026 10:00	67.7	87.3	60.3
09/04/2026 11:00	66.0	82.8	60.0
09/04/2026 12:00	67.5	82.9	61.3
09/04/2026 13:00	68.6	83.9	62.3
09/04/2026 14:00	66.6	87.2	60.4
09/04/2026 15:00	67.0	81.3	61.8
09/04/2026 16:00	66.3	80.1	61.2
09/04/2026 17:00	67.3	93.6	61.1
09/04/2026 18:00	67.2	78.8	60.0
09/04/2026 19:00	65.1	76.4	56.4
09/04/2026 20:00	63.8	76.7	51.4
09/04/2026 21:00	62.6	85.4	45.8
09/04/2026 22:00	62.2	91.7	43.0
09/04/2026 23:00	58.2	75.5	35.8
10/04/2026 00:00	54.1	75.7	30.6
10/04/2026 01:00	50.8	75.2	29.4

10/04/2026 02:00	50.4	74.1	30.0
10/04/2026 03:00	50.8	73.6	29.9
10/04/2026 04:00	53.0	73.1	30.5
10/04/2026 05:00	60.0	80.4	39.4
10/04/2026 06:00	64.9	82.3	48.4
10/04/2026 07:00	69.2	86.1	58.7
10/04/2026 08:00	67.5	83.2	59.3

Rear

Time	L_{Aeq} (dB)	L_{AMax} (dB)	L_{A90} (dB)
08/04/2026 11:04	51.4	71.1	44.6
08/04/2026 12:00	52.9	78.7	45.7
08/04/2026 13:00	52.4	73.5	46.7
08/04/2026 14:00	51.6	74.7	45.8
08/04/2026 15:00	52.1	77.8	46.2
08/04/2026 16:00	51.6	76.2	46.4
08/04/2026 17:00	53.1	75.3	47.4
08/04/2026 18:00	53.1	72.0	45.6
08/04/2026 19:00	52.9	76.5	45.5
08/04/2026 20:00	58.7	90.2	42.3
08/04/2026 21:00	48.7	72.6	38.4
08/04/2026 22:00	47.3	71.4	36.6
08/04/2026 23:00	43.3	64.6	31.3
09/04/2026 00:00	41.5	67.6	27.4
09/04/2026 01:00	36.0	61.3	25.4
09/04/2026 02:00	33.9	59.0	23.3
09/04/2026 03:00	36.7	60.6	23.1
09/04/2026 04:00	41.0	66.9	26.9
09/04/2026 05:00	48.7	67.1	33.9
09/04/2026 06:00	52.0	73.9	42.7
09/04/2026 07:00	54.0	77.2	46.6
09/04/2026 08:00	52.8	74.8	45.6
09/04/2026 09:00	57.2	70.5	48.2
09/04/2026 10:00	54.4	70.9	47.8
09/04/2026 11:00	56.1	78.7	48.4
09/04/2026 12:00	56.0	83.6	49.2
09/04/2026 13:00	55.3	72.4	50.0
09/04/2026 14:00	55.1	73.6	49.3
09/04/2026 15:00	55.6	81.5	49.9
09/04/2026 16:00	55.2	72.3	50.3
09/04/2026 17:00	55.2	73.3	50.3
09/04/2026 18:00	55.5	73.9	49.7

09/04/2026 19:00	52.3	73.2	46.9
09/04/2026 20:00	51.0	68.0	44.7
09/04/2026 21:00	49.7	69.0	42.6
09/04/2026 22:00	47.6	67.1	38.3
09/04/2026 23:00	45.8	68.9	37.1
10/04/2026 00:00	42.0	63.0	30.3
10/04/2026 01:00	38.1	61.0	28.6
10/04/2026 02:00	39.0	62.0	29.8
10/04/2026 03:00	39.1	62.2	28.9
10/04/2026 04:00	42.9	61.5	30.1
10/04/2026 05:00	48.5	67.1	37.8
10/04/2026 06:00	51.5	69.6	43.3
10/04/2026 07:00	56.2	76.0	48.0
10/04/2026 08:00	55.1	79.6	47.9

Appendix B – Standard Glazing Attenuation

Sound Insulation Prediction (v10.0.6)

Date: 14/09/2025

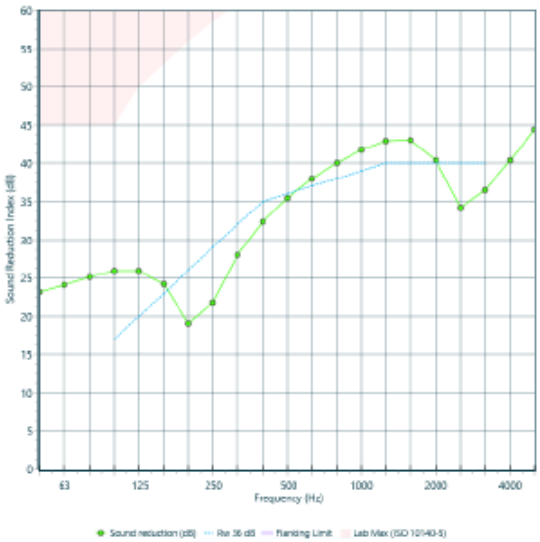
Job Name:

Rw 36 dB
C -2 dB
Ctr -5 dB

System description

Pane 1	1 x 6 mm Glass
Cavity	: 12 mm
Pane 2	1 x 6 mm Glass
Details	Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 29.2 kg/m², Mass-air-mass resonant frequency = : 200 Hz

freq. (Hz)	R (dB)	Roct (dB)
50	23	
63	24	24
80	25	
100	26	
125	26	25
160	24	
200	19	
250	22	22
315	28	
400	32	
500	35	35
630	38	
800	40	
1000	42	41
1250	43	
1600	43	
2000	40	38
2500	34	
3150	36	
4000	40	39
5000	44	



Appendix C – External Sound Break In Calculations

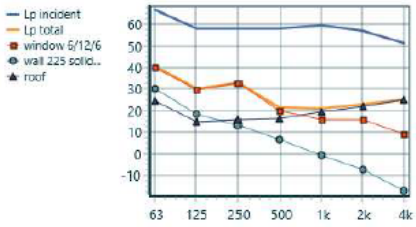
Room	Daytime (dB $L_{Aeq,16hr}$)	Night-time (dB $L_{Aeq,8hr}$)	Night-time L_{Amax}
Bed 3	27.6	20.3	31.6
Bed 4	28.5	20.3	32.6
Bed 5	27.6	20.3	33.3

Bed 4 Daytime

Outdoor To Indoor Sound Transmission (v10.0.6)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 2594
Job Name:
Job No.: Initials:info
Date:20/04/2026
File Name:

INSUL



Source	Octave Band Centre Frequency (Hz) 63	125	250	500	1k	2k	4k	NR
Incident sound level (freefield)	66.8	57.8	57.8	57.8	59.6	57.0	51.2	58.6
Path								
Element 1 , STL	-24	-25	-22	-35	-41	-38	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 3 m²	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Element sound level contribution	40	30	33	20	16	16	9	19.7
Element 2 , STL	-37	-40	-45	-52	-61	-65	-69	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 7 m²	8.1	8.1	8.1	8.1	8.1	8.1	8.1	
Element sound level contribution	30	18	13	6	-1	-7	-17	15.0
Element 3 , STL	-46	-47	-46	-45	-44	-39	-30	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 13 m²	11.3	11.3	11.3	11.3	11.3	11.3	11.3	
Element sound level contribution	25	15	16	17	19	22	25	27.5
Receiver								
Room volume (-10LogV), 34.84 m³	-4.4	-4.4	-4.4	-4.4	-4.4	-4.4	-4.4	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	40	30	33	22	21	23	25	27.6
Level difference								LpAinc - LpARev,T0
D2m,nT	29.6	30.7	28.0	39.3	41.8	37.4	29.3	58.6

** Element descriptions:

#1: window 6/12/6
Glazing (Double):
- Pane 1: 1 x 6 mm Glass
- Cavity: : 12 mm
- Pane 2: 1 x 6 mm Glass
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 29.2 kg/m², Mass-air-mass resonant frequency = : 200 Hz

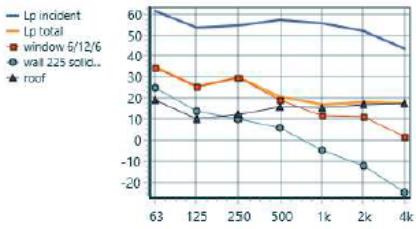
#2: wall 225 solid and plasterd
Wall (Single):
- Panel 1: 1 x 225 mm Brick + 1 x 10 mm Sand/Cement render (plaster)
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 376 kg/m²

#3: roof

Bedroom 4 Night-time

Outdoor To Indoor Sound Transmission (v10.0.6)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 2594
Job Name:
Job No.: Initials:info
Date:20/04/2026
File Name:



Source	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	NR
Incident sound level (freefield)	61.4	53.2	54.5	56.9	55.4	51.9	43.4	54.4
Path								
Element 1 , STL	-24	-25	-22	-35	-41	-38	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 3 m²	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Element sound level contribution	34	25	29	19	11	11	1	15.6
Element 2 , STL	-37	-40	-45	-52	-61	-65	-69	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 7 m²	8.1	8.1	8.1	8.1	8.1	8.1	8.1	
Element sound level contribution	25	14	10	6	-5	-12	-25	15.0
Element 3 , STL	-46	-47	-46	-45	-44	-39	-30	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 13 m²	11.3	11.3	11.3	11.3	11.3	11.3	11.3	
Element sound level contribution	19	10	12	16	15	17	17	20.2
Receiver								
Room volume (-10LogV), 34.84 m³	-4.4	-4.4	-4.4	-4.4	-4.4	-4.4	-4.4	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	35	26	30	21	17	18	17	20.3
Level difference								LpAinc - LpARev,T0
D2m,nT	29.6	30.7	28.0	39.3	41.8	37.4	29.3	54.4

** Element descriptions:

#1: window 6/12/6
Glazing (Double):
- Pane 1: 1 x 6 mm Glass
- Cavity: : 12 mm
- Pane 2: 1 x 6 mm Glass
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 29.2 kg/m², Mass-air-mass resonant frequency = : 200 Hz

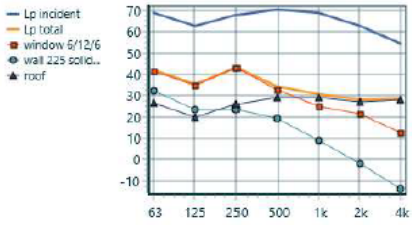
#2: wall 225 solid and plasterd
Wall (Single):
- Panel 1: 1 x 225 mm Brick + 1 x 10 mm Sand/Cement render (plaster)
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 376 kg/m²

#3: roof

Bed 4 Night-time L_{Amax}

Outdoor To Indoor Sound Transmission (v10.0.6)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 2594
Job Name:
Job No.: Initials:info
Date:20/04/2026
File Name:



Source	Octave Band Centre Frequency (Hz) 63	125	250	500	1k	2k	4k	NR
Incident sound level (freefield)	68.7	62.9	68.0	70.5	69.2	62.5	54.5	65.0
Path								
Element 1 , STL	-24	-25	-22	-35	-41	-38	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 3 m²	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Element sound level contribution	42	35	43	32	25	21	12	32.5
Element 2 , STL	-37	-40	-45	-52	-61	-65	-69	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 7 m²	8.1	8.1	8.1	8.1	8.1	8.1	8.1	
Element sound level contribution	32	24	24	19	9	-2	-14	15.0
Element 3 , STL	-46	-47	-46	-45	-44	-39	-30	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 13 m²	11.3	11.3	11.3	11.3	11.3	11.3	11.3	
Element sound level contribution	26	20	26	29	29	27	28	30.3
Receiver								
Room volume (-10LogV), 34.84 m³	-4.4	-4.4	-4.4	-4.4	-4.4	-4.4	-4.4	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	42	35	43	34	31	28	28	32.6
Level difference								LpAinc - LpARev,T0
D2m,nT	29.6	30.7	28.0	39.3	41.8	37.4	29.3	65.0

** Element descriptions:

#1: window 6/12/6
Glazing (Double):
- Pane 1: 1 x 6 mm Glass
- Cavity: : 12 mm
- Pane 2: 1 x 6 mm Glass
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 29.2 kg/m², Mass-air-mass resonant frequency = : 200 Hz

#2: wall 225 solid and plasterd
Wall (Single):
- Panel 1: 1 x 225 mm Brick + 1 x 10 mm Sand/Cement render (plaster)
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 376 kg/m²

#3: roof

Appendix D – External Plant

Extraction System MUB630-EC

systemair Products Applications

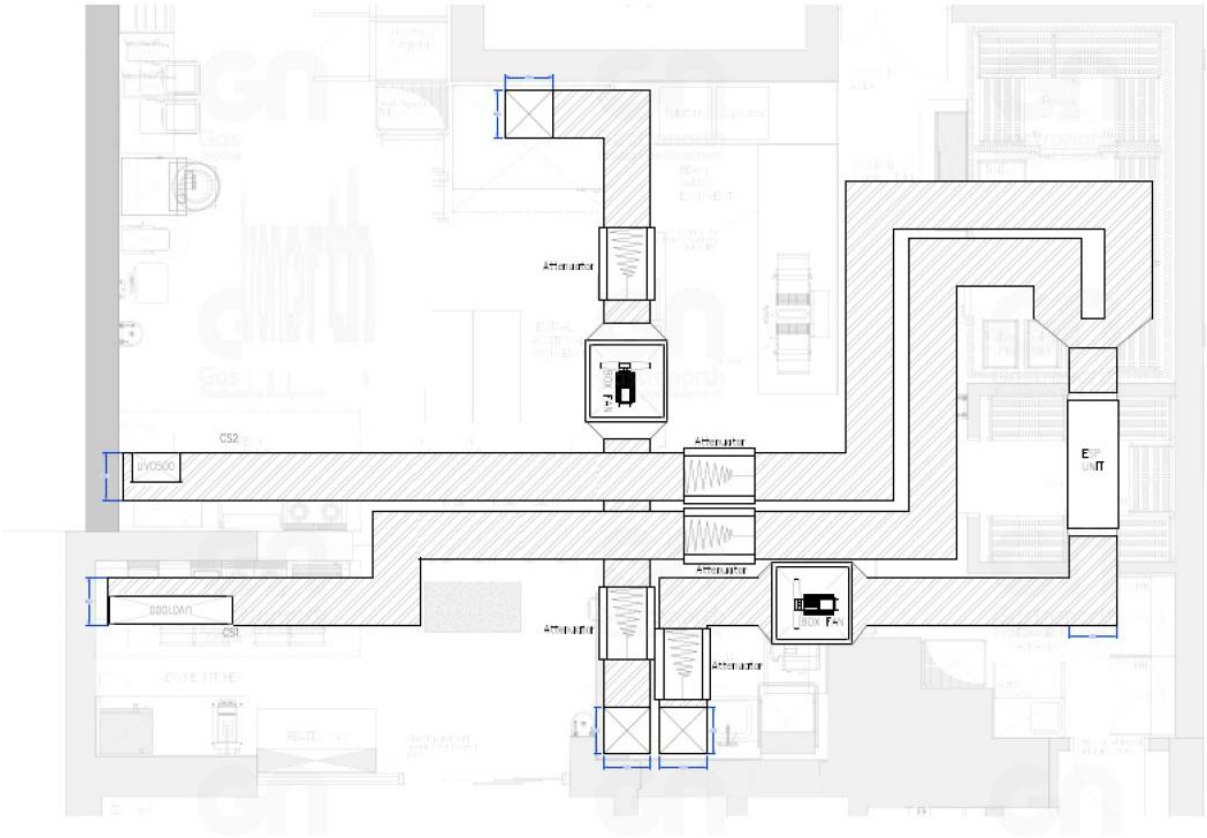
Duct Fans › Insulated duct fans › MUB › MUB CAV/VAV

Sound power level

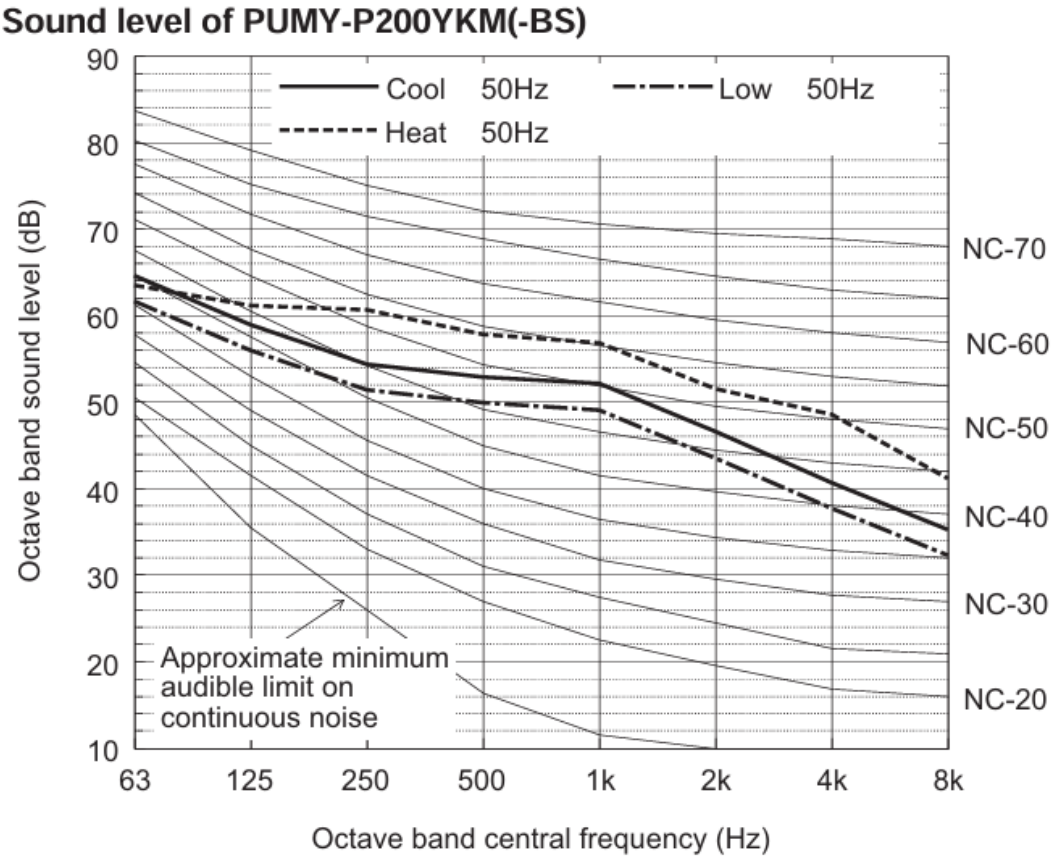
Acoustic filter: No filter

Octave bands: Octave bands

		63	125	250	500	1k	2k	4k	8k	Total
Inlet	dB	82	88	84	84	81	78	75	67	92
Outlet	dB	84	90	85	85	83	79	76	69	93
Surrounding	dB	61	71	55	51	50	48	41	31	71


Attenuator
CS2
Attenuator
Attenuator
Attenuator
Attenuator
CS1

AC Units



		63	125	250	500	1k	2k	4k	8k	dB(A)
Standard Cooling	50Hz	64.6	58.9	54.4	53.0	52.1	46.6	40.7	35.3	56.0
Standard Heating	50Hz	63.4	61.2	60.7	57.8	56.9	51.6	48.6	41.1	61.0
Low noise mode (Cooling)	50Hz	61.6	55.9	51.4	50.0	49.1	43.6	37.7	32.3	53.0

When Low noise mode is set,the A/C system's capacity is limited. The system could return to normal operation from Low noise mode automatically in the case that the operation condition is severe.

Calculations

At Bed 1 facade

Extraction

Outlet									
	63	125	250	500	1000	2000	4000	Lw	Lp@1.5m
MUB630-EC	83	90	85	85	93	79	76	93	
Directivity	1	1	2	2.5	4	7	10		
KKS-100	3	8	17	16	15	11	8		
a-weighting	-26.2	-16.1	-8.6	-3.2	0	1.2	1		
resulting sound level	52.8	64.9	57.4	63.3	74	62.2	59	93	76.9
Distance	38.3	50.4	42.9	48.8	59.5	47.7	44.5	78.5	

Outlet									
	63	125	250	500	1000	2000	4000	Lw	Lp@1.8m
MUB630-EC	83	90	85	85	93	79	76	93	
Directivity	1	1	2	2.5	4	7	10		
KKS-100	3	8	17	16	15	11	8		
a-weighting	-26.2	-16.1	-8.6	-3.2	0	1.2	1		
resulting sound level	52.8	64.9	57.4	63.3	74	62.2	59	93	76.9
dustance	36.7	48.8	41.3	47.2	57.9	46.1	42.9	76.9	

Canopy 1	38.3	50.4	42.9	48.8	59.5	47.7	44.5	46.3	
Canopy 2	36.7	48.8	41.3	47.2	57.9	46.1	42.9	47.8	
Canopy 1&2	40.6	52.7	45.2	51.1	61.8	50.0	46.8	50.1	63.0

AC Units

	63	125	250	500	1000	2000	4000	LP
PUMY-P200Y @ 1m	63.4	61.1	60.7	57.8	56.9	51.6	48.6	60
at 3.5m	45.3	50.2	49.8	46.9	46.0	40.7	37.7	
at 4.7m	50.0	47.7	47.3	44.4	43.5	38.2	35.2	
Combined	51.2	52.1	51.7	48.8	47.9	42.6	39.6	57.9

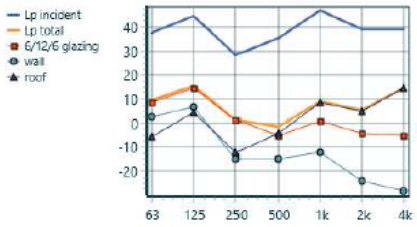
	63	125	250	500	1000	2000	4000	Lp
Extraction and AC Units	51.6	55.4	52.6	53.1	61.9	50.7	47.5	64.2

Internal at Bed 1

Outdoor To Indoor Sound Transmission (v10.0.6)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 2594
Job Name:
Job No.: Initials:info
Date:24/04/2026
File Name:

INSUL



Octave Band Centre Frequency (Hz)								
Source	63	125	250	500	1k	2k	4k	NC
Incident sound level (freefield)	37.6	44.7	28.2	35.1	46.8	39.0	38.8	45.8
Path								
Element 1 , STL	24	25	22	35	41	38	39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 2 m²	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
Element sound level contribution	8	15	1	5	1	4	5	15.0
Element 2 , STL	37	40	45	52	61	65	69	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 8 m²	8.9	8.9	8.9	8.9	8.9	8.9	8.9	
Element sound level contribution	3	7	15	15	12	24	28	15.0
Element 3 , STL	47	44	44	43	42	38	28	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 12 m²	10.7	10.7	10.7	10.7	10.7	10.7	10.7	
Element sound level contribution	6	4	12	4	9	5	15	17.6
Receiver								
Room volume (-10LogV), 30.73 m³	3.9	3.9	3.9	3.9	3.9	3.9	3.9	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	10	16	1	1	9	5	15	17.6
Level difference								LpAinc - LpARev,T0
D2m,nT	31.2	32.3	30.0	39.6	40.7	36.9	27.3	45.8

** Element descriptions:

#1: 6/12/6 glazing
Glazing (Double):
- Pane 1: 1 x 6 mm Glass
- Cavity: : 12 mm
- Pane 2: 1 x 6 mm Glass
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 29.2 kg/m², Mass-air-mass resonant frequency = : 200 Hz

#2: wall
Wall (Single):
- Panel 1: 1 x 225 mm Brick + 1 x 10 mm Sand/Cement render (plaster)
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 376 kg/m²

#3: roof

Appendix E – Internal Sound Transfer

Ground to First floor

Existing

Sound Insulation Prediction (v10.0.6)

Program copyright Marshall Day Acoustics 2023 | Margin of error is generally within Rw ±3 dB

Date: 25/04/2026

Job Name:

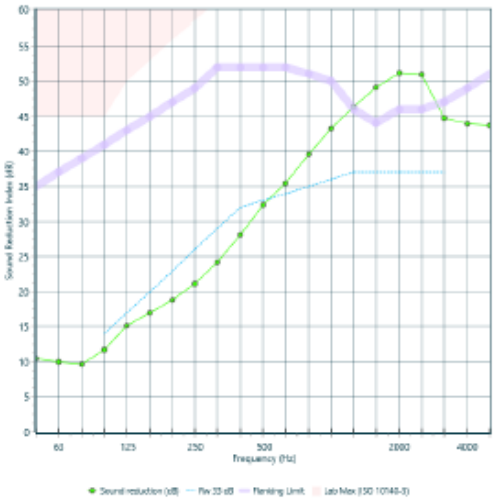
INSUL

Rw 33 dB
C -1 dB
Ctr -6 dB

System description

Panel 1	1 x 12.5 mm SoftBoard
Frame	Solid Joist (194 mm x 47 mm), Stud spacing 600 mm , Cavity Width 194 mm + (Empty cavity)
Panel 2	1 x 10 mm Plasterboard
Details	Panel Size 2.7 m x 4.0 m, Partition surface mass = 11.1 kg/m², Mass-air-mass resonant frequency = : 85 Hz

freq. (Hz)	R (dB)	Rocr (dB)
50	10	
63	10	10
80	10	
100	12	
125	15	14
160	17	
200	19	
250	21	21
315	24	
400	28	
500	32	31
630	35	
800	40	
1000	43	42
1250	46	
1600	49	
2000	51	50
2500	51	
3150	45	
4000	44	44
5000	44	



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Proposed

Sound Insulation Prediction (v10.0.6)

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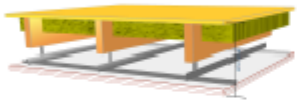
Date: 25/04/2026

Job Name:

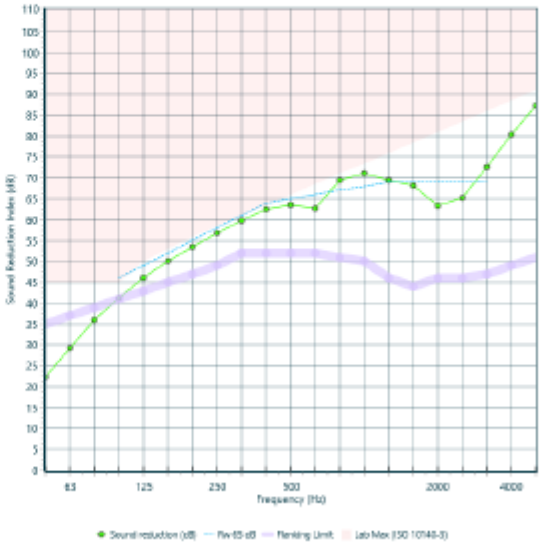


Rw 65 dB
C -2 dB
Ctr -7 dB

System description

Panel 1	1 x 20 mm Flooring Particle Board
Frame	Solid Joist with Gyproc acoustic hanger (194 mm x 47 mm), Stud spacing 600 mm , Cavity Width 307 mm + 100 mm Fibreglass (10kg/m3) 60mm
Panel 2	2 x 15 mm Gyproc SoundBloc 15mm
Details	Panel Size 2.7 m x 4.0 m, Partition surface mass = 40.4 kg/m², Mass-air-mass resonant frequency = : 35 Hz

freq. (Hz)	R (dB)	Rοct (dB)
50	22	
63	29	26
80	36	
100	41	
125	46	44
160	50	
200	53	
250	57	56
315	60	
400	62	
500	64	63
630	63	
800	69	
1000	71	70
1250	70	
1600	68	
2000	63	65
2500	65	
3150	73	
4000	80	76
5000	87	



Proposed structure calculations

		L2 = L1 – R + 10 Log10(S) - 10 Log10(A)									
				Rw	63	125	250	500	1K	2K	4K
Construction detail of partition					16	29	45	54	61	59	65
Surface area			14.31	m2		10log(S)	11.5564				
Volume of room			37.2	m3							
Absorption			11.9784	m2		10log(A)	10.78399				

L1	60	70	75	75	75	75	70	
R	16	29	45	54	61	59	65	
10+Log(s)	11.5564	11.5564	11.5564	11.5564	11.5564	11.5564	11.5564	
10+log(A)	10.78399	10.78399	10.78399	10.78399	10.78399	10.78399	10.78399	
L2	44.8	41.8	30.8	21.8	14.8	16.8	5.8	
a-weighting	-26.2	-16.1	-8.6	-3.2	0	1.2	1	
	18.6	25.7	22.2	18.6	14.8	18.0	6.8	
dB(A)								**28.9**

Between First floor rooms

Original Walls

Sound Insulation Prediction (v10.0.6)

Date: 25/04/2026

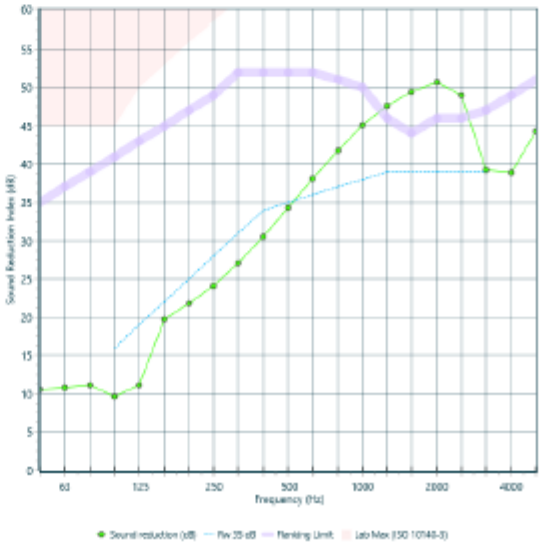
Job Name:

Rw 35 dB
C -3 dB
Ctr -9 dB

System description

Panel 1	1 x 10 mm Plasterboard
Frame	Timber stud (90 mm x 45 mm), Stud spacing 600 mm , Cavity Width 90 mm + (Empty cavity)
Panel 2	1 x 10 mm Plasterboard
Details	Panel Size 2.7 m x 4.0 m, Partition surface mass = 14.2 kg/m², Mass-air-mass resonant frequency = 106 Hz

freq. (Hz)	R (dB)	Roct (dB)
50	11	
63	11	11
80	11	
100	10	
125	11	12
160	20	
200	22	
250	24	24
315	27	
400	31	
500	34	33
630	38	
800	42	
1000	45	44
1250	48	
1600	50	
2000	51	50
2500	49	
3150	39	
4000	39	40
5000	44	



Sound Insulation Prediction (v10.0.6)

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Date: 25/04/2026

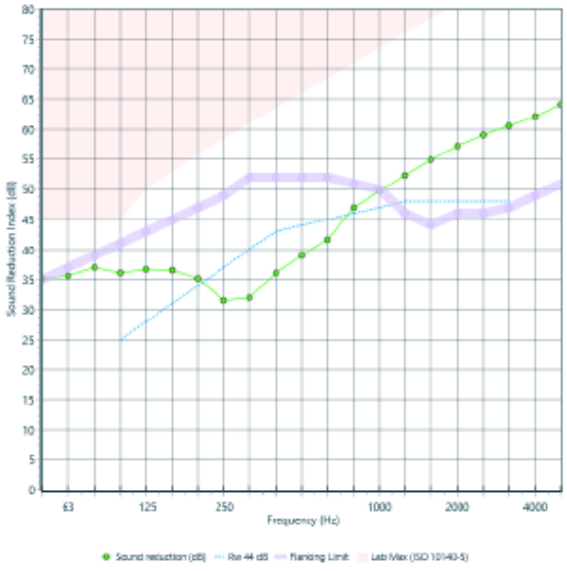
Job Name:

Rw 44 dB
C -1 dB
Ctr -4 dB

System description

Panel 1	1 x 10 mm Sand/Cement render (plaster) + 1 x 100 mm Brick + 1 x 10 mm Sand/Cement render (plaster)
Details	Panel Size 2.7 m x 4.0 m, Partition surface mass = 192 kg/m²

freq. (Hz)	R (dB)	Roct (dB)
50	35	
63	36	36
80	37	
100	36	
125	37	36
160	37	
200	35	
250	32	33
315	32	
400	36	
500	39	38
630	42	
800	47	
1000	50	49
1250	52	
1600	55	
2000	57	57
2500	59	
3150	61	
4000	62	62
5000	64	



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Proposed Specification

Stud

Sound Insulation Prediction (v10.0.6)

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Date: 25/04/2026

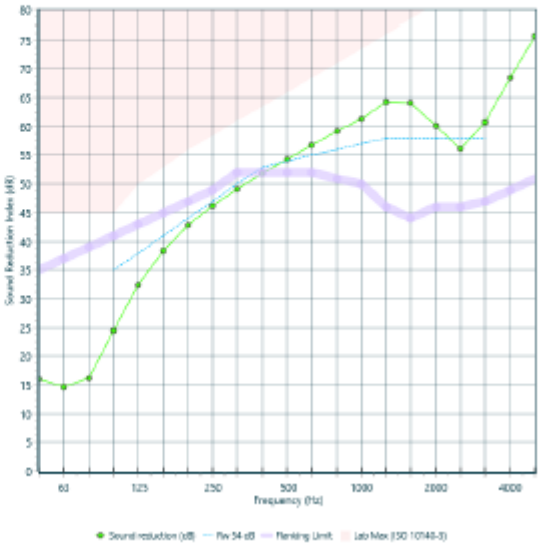
Job Name:

Rw 54 dB
C -4 dB
Ctr -11 dB

System description

Panel 1	1 x 15 mm Gyproc Fireline 15mm
Frame	Timber stud + Resilient rail/bar (94 mm x 47 mm), Stud spacing 600 mm , Cavity Width 106 mm + 60 mm Fibreglass (10kg/m3) 60mm
Panel 2	1 x 15 mm Gyproc SoundBloc 15mm + 1 x 15 mm Gyproc Fireline 15mm
Details	Panel Size 2.7 m x 4.0 m, Partition surface mass = 36.6 kg/m², Mass-air-mass resonant frequency = 64 Hz

freq. (Hz)	R (dB)	Roct (dB)
50	16	
63	15	16
80	16	
100	25	
125	32	29
160	38	
200	43	
250	46	45
315	49	
400	52	
500	54	54
630	57	
800	59	
1000	61	61
1250	64	
1600	64	
2000	60	59
2500	56	
3150	61	
4000	68	65
5000	76	



Brick

Sound Insulation Prediction (v10.0.6)

Program copyright Marshall Day Acoustics 2023 | Margin of error is generally within Rw ±3 dB

Date: 25/04/2026

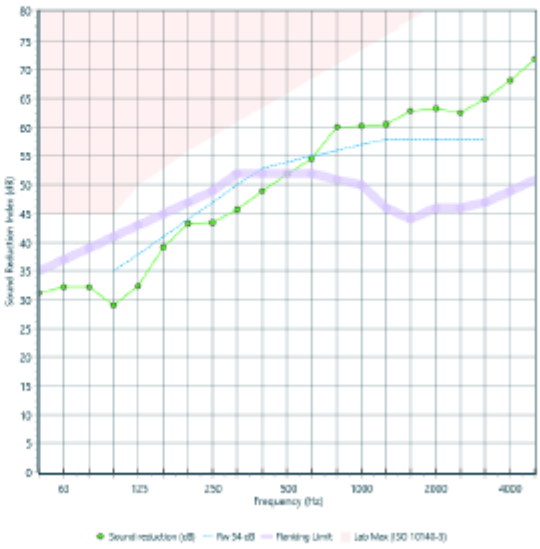
Job Name:

Rw 54 dB
C -2 dB
Ctr -8 dB

System description

Panel 1	1 x 10 mm Sand/Cement render (plaster) + 1 x 100 mm Brick + 1 x 10 mm Sand/Cement render (plaster)
Frame	Timber stud (50 mm x 47 mm), Stud spacing 600 mm , Cavity Width 50 mm + 25 mm Fibreglass (10kg/m3) 60mm
Panel 2	1 x 15 mm Gyproc Fireline 15mm
Details	Panel Size 2.7 m x 4.0 m, Partition surface mass = 204 kg/m², Mass-air-mass resonant frequency = 79 Hz

freq. (Hz)	R (dB)	Rocr (dB)
50	31	
63	32	32
80	32	
100	29	
125	32	32
160	39	
200	43	
250	43	44
315	46	
400	49	
500	52	51
630	55	
800	60	
1000	60	60
1250	61	
1600	63	
2000	63	63
2500	63	
3150	65	
4000	68	67
5000	72	



Stud wall

		L2 = L1 – R + 10 Log10(S) - 10 Log10(A)								
			Rw	63	125	250	500	1K	2K	4K
Construction detail of partition				16	29	46	54	61	59	65
Surface area		14.3	m2		10log(S)	11.55336				
Volume of room		30.73	m3							
Absorption		9.89506	m2		10log(A)	9.954184				

L1	60	70	75	75	75	75	70	
R	16	29	46	54	61	59	65	
10+Log(s)	11.55336	11.55336	11.55336	11.55336	11.55336	11.55336	11.55336	
10+log(A)	9.954184	9.954184	9.954184	9.954184	9.954184	9.954184	9.954184	
L2	45.6	42.6	30.6	22.6	15.6	17.6	6.6	
a-weighting	-26.2	-16.1	-8.6	-3.2	0	1.2	1	
	19.4	26.5	22.0	19.4	15.6	18.8	7.6	
dB(A)								29.5

Brick Wall

		L2 = L1 – R + 10 Log10(S) - 10 Log10(A)								
			Rw	63	125	250	500	1K	2K	4K
Construction detail of partition				32	32	44	51	60	63	67
Surface area		14.3	m2		10log(S)	11.55336				
Volume of room		30.73	m3							
Absorption		9.89506	m2		10log(A)	9.954184				

L1	60	70	75	75	75	75	70	
R	32	32	44	51	60	63	67	
10+Log(s)	11.55336	11.55336	11.55336	11.55336	11.55336	11.55336	11.55336	
10+log(A)	9.954184	9.954184	9.954184	9.954184	9.954184	9.954184	9.954184	
L2	29.6	39.6	32.6	25.6	16.6	13.6	4.6	
a-weighting	-26.2	-16.1	-8.6	-3.2	0	1.2	1	
	3.4	23.5	24.0	22.4	16.6	14.8	5.6	
dB(A)								28.6

Appendix F - Acoustic Terminology

Descriptor	Explanation
dB (decibel)	The unit used to describe the magnitude of sound is the decibel (dB) and the quantity measured is the sound pressure level. The decibel scale is logarithmic and it ascribes equal values to proportional changes in sound pressure, which is a characteristic of the ear. Use of a logarithmic scale has the added advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed to a more manageable range of numbers. The threshold of hearing occurs at approximately 0 dB (which corresponds to a reference sound pressure of 2 x 10-5 Pascals) and the threshold of pain is around 120 dB.
dB(A) – A-weighting	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
L_{Amax}	A noise level index defined as the maximum noise level. L_{Max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{A10} and L_{90}	A noise level index. The noise level exceeded for percentage of the time over the period T. L90 can be considered to be the "average minimum" noise level and is often used to describe the background noise. L10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
R +R_w	The weighted (w) sound reduction index (R), a single figure rating of the laboratory airborne sound insulation performance of a construction, usually measured across the frequency range 100-3150Hz. The higher the value, the greater the sound insulation, and the more onerous the requirement.
D_{nTw}	Weighted standardized level difference. Single-number quantity that characterizes the airborne sound insulation between rooms. Specified in Building Regulations and measured on site.
C or C_{Tr}	These are spectrum adaptation terms for taking into account the effect of different sound spectra. C and Ctr are corrections for pink noise and traffic noise respectively and are added to single figure quantities, e.g. Rw + Ctr
Reverberation Time	The time required for the steady sound pressure level un an enclosed space to decay by 60dB, measured from the moment the sound source is switched off.

Free-field	Far from the presence of sound reflecting objects (except the ground),
Fast/slow time weighting	An averaging time used in sound level meters. Defined in BS 5969.
$D_{n,e,w}$	A weighted normalised sound level difference as measured in laboratory conditions for small building components like ventilators. The higher the figure the greater the level of attenuation is achieved.
SEL	Single Event Level – A 1 second figure which contains the same energy as the whole event.
Frequency	the pitch of a sound in Hz or kHz.
Octave Bands or 1/3 Octave Bands	Whilst single figure values are useful, often spectral data is required for analysis and/or acoustic specification. To represent the frequency content, sound level or acoustic properties are presented in specific frequency bands, also known as octave bands. The frequencies of octave bands have been internationally standardised. For example, the 500 Hz octave band (500 Hz being the centre frequency) has a range from 354 Hz to 707 Hz. Where finer spectral detail is required, 1/3-octave band data can be used. Each octave band is divided into three 1/3-octave bands.
Sound Pressure Level, L_P	a measure of the sound pressure at a point, in decibels.
Sound Power Level, $_w$	sound power level. It is a measure of the total sound energy radiated by a sound source and is used to calculate sound levels at a distant location. The LWA is the A-weighted sound power level.

Appendix G - Report Author Details

This report has been produced by Neil Martin, BSc (Hons), PGDip, CEnvH MCIEH, MIOA.

Neil is the principal acoustic consultant at Martin Environmental Solutions Ltd, a consultancy company specialising in Environmental Health disciplines including environmental noise assessment and control. He holds a Bachler's degree in Environmental Health and Diploma in Acoustics. He is a Chartered Member of the Chartered Institute of Environmental Health and a Full member of the Institute of Acoustics.

Neil has over 20year's experience working within a Local Authority Environmental Health setting, principally in the Environmental Protection and Public Health areas and has been working as an acoustic consultant since 2011.

Since its formation, Martin Environmental Solutions has advised and assisted many groups including residents, developers and local authorities about the problems of noise and vibration in the environment and the possible solutions. Neil also acts as an expert witness in the area of acoustics.