Assessment of the Potential Sound Transmission Between the Proposed Prayer Facility at 260 - 262 Wakefield Road and the Nearby Residential Dwellings on Wakefield Road, Dewsbury.

Report Prepared for:

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Contents

1.0 Summary

2.0 Introduction

3.0 Site Description

4.0 Assessment Criteria

4.1 West Yorkshire, Planning Consultation Guidance - Noise and Vibration
4.2 BS 8233:2014 “Guidance on sound insulation and noise reduction for buildings”
4.3 Approved Document E (ADE) 2003 edition, Guidance to the Building Regulations

5.0 Kirklees Council Response

6.0 Existing Building Construction

7.0 Evaluation of Potential Sound Transmission

7.1 Potential Noise Transmission to 258 Wakefield Road
7.2 Potential Noise Transmission to the First Floor Flats at 260 - 262 Wakefield Road
7.3 Potential Disturbance from the Azan
7.4 Miscellaneous

8.0 Conclusion

Appendix 1: Kirklees Council Environmental Health Memo
Appendix 2: Calculation Results

1.0 Summary

Planning permission is being sought to permit the conversion of the former newsagent's shop, at 260 - 260 Wakefield Road in Dewsbury, to form a new Muslim prayer facility. With respect to the prayer facility it is essential to draw the distinction between the proposed prayer facility, which will be a small scale location for quiet prayer and devotional assembly, and a mosque, which the current proposal is not.

As part of the planning consultation process Kirklees Council, acting as the Local Planning Authority (LPA), received comments from the Council's Environmental Health Department. The Environmental Health comments indicated that they were concerned about the potential transmission of sound from the proposed prayer facility and the possible effect this may have on the residential dwelling at 258 Wakefield Road and the first floor flats within 260 - 262 Wakefield Road.

In support of the planning application Druk Limited were commissioned to evaluate the potential sound transmission between the proposed prayer facility at 260 - 262 Wakefield Road, the adjacent residential dwelling at 258 Wakefield Road and the first floor flats within 260 - 262 Wakefield Road. Assessment of the potential sound transmission and the sound insulation provided by the separating elements will be undertaken with reference to the guidance contained within: the West Yorkshire, Planning Consultation Guidance - Noise and Vibration British Standard (BS) 8233:2014 “Guidance on sound insulation and noise reduction for buildings respectively. As the development is currently proposed, the following evaluation will comprise a desktop assessment.

With reference to the potential sound transmission from the proposed activity within 260 - 262 Wakefield Road to 258 Wakefield Road, as the buildings are entirely separate from each other, the potential for detrimental sound transmission between the two spaces will be significantly reduced. The calculations presented within this report have revealed that the sound from internal activity within the proposed prayer facility would be regarded as inaudible within 258 Wakefield Road.

Calculations of the likely level of airborne sound insulation of the existing floor that would separate the prayer room from the first floor flats, have revealed that the sound insulation performance of this element would not comply with the minimum performance requirement contained within ADE. In addition the airborne sound insulation of the existing floor would not be sufficient to limit the direct transmission of sound from the prayer room to the flats above, in compliance with the design targets. With this in mind sound insulation remedial measures have been proposed that would enhance the airborne sound insulation of the floor, such that it should be able to comply with the performance requirement contained within ADE and limit the direct transmission of sound to the first floor flats in compliance with the design target.

Despite this, it should be remembered that whilst every effort has been made to ensure that the advice contained within this report represents best practice with respect to achieving the required sound insulation value across the separating floor in compliance within the ADE requirement, the advice will not form a performance guarantee. The ultimate sound insulation performance of the floor will depend on a number of contributory factors such as the selection and installation of the various components and the quality of workmanship, all of which are beyond the control of Druk Limited.

Turning to the call to prayer, the applicant has confirmed that there will be no external call to prayer. Additionally it has been confirmed that any internal invittion to prayer would occur within the prayer room only and would not involve any form of amplification. Finally, it is anticipated that as the prayer facility will be a local amenity, the majority of the worshippers will arrive on foot. This fact will serve to further minimise any potential effect that the proposed prayer facility may have on the local noise climate.

Consequently it is suggested that any noise from the proposed prayer facility would be unlikely to have a detrimental effect on either the nearby residential premises or the existing noise climate in the immediate vicinity. Therefore, it is contended that the transmission of noise from the proposed prayer facility should not be regarded as an impediment to the granting of planning permission.

Report Prepared by:

Robert Smith

2.0 Introduction

Planning permission is being sought to permit the conversion of the former newsagent's shop, at 260 - 260 Wakefield Road in Dewsbury, to form a new Muslim prayer facility. With respect to the prayer facility it is essential to draw the distinction between the proposed prayer facility, which will be a small scale location for quiet prayer and devotional assembly, and a mosque, which the current proposal is not.

As part of the planning consultation process Kirklees Council, acting as the Local Planning Authority (LPA), received comments from the Council's Environmental Health department. The Environmental Health comments indicated that they were concerned about the potential transmission of sound from the proposed prayer facility and the possible effect this may have on the residential dwelling at 258 Wakefield Road and the first floor flats within 260 - 262 Wakefield Road.

In support of the planning application Druk Limited were commissioned to evaluate the potential sound transmission between the proposed prayer facility at 260 - 262 Wakefield Road, the adjacent residential dwelling at 258 Wakefield Road and the first floor flats within 260 - 262 Wakefield Road. Assessment of the potential sound transmission and the sound insulation provided by the separating elements will be undertaken with reference to the guidance contained within: the West Yorkshire, Planning Consultation Guidance - Noise and Vibration British Standard (BS) 8233:2014 “Guidance on sound insulation and noise reduction for buildings respectively. As the development is currently proposed, the following evaluation will comprise a desktop assessment.

3.0 Site Description

The existing building at 260 - 262 Wakefield Road (photograph 1 overleaf) was previously used as a newsagent's shop and is believed to date from the early twentieth century. Immediately to the west of the former newsagents is the Peking House Chinese takeaway with Wakefield Crescent beyond and immediately to the east is the existing, but separate, residential dwelling at 258 Wakefield Road. The surrounding area is characterised by mainly residential dwellings and a few commercial premises (photographs 2 and 3 overleaf).

Photograph 1. Former Newsagents at 260 - 262 Wakefield Road

Photograph 2. Hairdressing salon at 193 Wakefield Road

Photograph 3. Residential dwellings on Wakefield Road to the west of the proposed prayer facility

4.0 Assessment Criteria

The potential sound transmission between the proposed prayer facility at 260 -262 Wakefield Road to the flats directly above the proposed prayer facility and the residential dwelling at 258 Wakefield Road, will be assessed with reference to the guidance relating to internal noise levels within residential dwellings contained within the West Yorkshire, Planning Consultation Guidance - Noise and Vibration, British Standard (BS) 8233:2014 “Guidance on sound insulation and Approved Document E (ADE) “Resistance to the Passage of Sound”, 2003 edition (including the 2004, 2010, 2013 and 2015 amendments), guidance to the Building Regulations 2010. In addition the concerns raised by the Kirklees Council's Environmental Health Department will also be considered.

4.1 West Yorkshire, Planning Consultation Guidance - Noise and Vibration

This document was formulated and issued by the five West Yorkshire Local Authorities in order to provide additional guidance to Planners, Environmental Health Departments and applicants on the aspects of noise and vibration issues pertinent to the determination of land use planning considerations. The intention of the document is to permit a determination of what effect, if any, the noise climate in the immediate vicinity of a proposed development may have on that development.

With regard to proposed new residential developments the guidance document attempts to expand on the guidance contained within the Noise Policy Statement for England (NPSE) document (originally released in 2010). The NPSE document provided guidance on 'acceptable' noise levels with particular reference to residential developments, and this was framed with reference to avoiding "significant adverse" impacts on health and quality of life and where necessary minimising such "adverse" impacts on health and quality of life.

In order to reflect these objectives the NPSE referenced concepts utilised by the World Health Organisation, which in turn employed two concepts imported from toxicology and applied them to noise impacts. These two concepts are:

- NOEL – No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- LOAEL – Lowest Observed Adverse Effect Level This is the level above which adverse effects on health and quality of life can be detected.

In addition the NPSE introduced the further concept of a Significant Observed Adverse Effect Level (SOAEL) and defined this as "the level above which significant adverse effects on health and quality of life occur".

The West Yorkshire, Planning Consultation Guidance - Noise and Vibration document provides additional guidance based on the potential source of the noise to which a development may be exposed. In this respect the document identifies the following main noise sources:

- Anonymous Noise Sources, such as Transportation Noise;
- Proposed Developments Containing Noise Generating Uses;
- Places of Worship;
- Entertainment Premises;
- Mixed Use Schemes;
- Wind Turbines;
- Multi-Use Games Areas;
- Nurseries;
- Schools;
- Taxi/Private Hire Premises;

With the above in mind the Planning Consultation Guidance document summarises the values for LOAEL for residential dwellings in noise environments that are primarily exposed to anonymous noise, in this case road traffic noise. This guidance is further condensed into a range of 'absolute' criteria for different internal and external areas and these 'absolute' criteria are summarised in table 1 overleaf.

Table 1. Recommended Maximum, LOAEL sound levels based upon an Absolute criterion. (reproduced from table 1, section 4.1 of the Planning Consultation Guidance Document

Location	Time Period	Ambient Level (dB $L_{Aeq,T}$)	Maximum noise level (dB L_{AFmax})
External amenity areas	0700 - 2300	55	-
External amenity areas	2300 - 0700	45	60
Habitable room	0700 - 2300	35	-
Bedroom	2300 - 0700	30	45
Dining room	0700 - 2300	40	-

4.2 BS 8233:2014 “Guidance on sound insulation and noise reduction for buildings”

In addition to the guidance contained within the West Yorkshire, Planning Consultation Guidance (Condensed Version) - Noise and Vibration document, further guidance will be obtained from BS 8233:2014 “Guidance on sound insulation and noise reduction for buildings”.

BS 8233:2014 draws together research and best practice relating to building design, providing guidance to facilitate the development of buildings that have internal noise environments that are consistent with and appropriate for their intended use. The British Standard highlights methods for the control of noise from a number of sources including external noise and building services etc., as well as evaluating the effect that noise from these sources may have on the acoustics of the internal spaces.

With reference to the design guidance relating to the internal noise climate of residential dwellings, BS 8233:2014 summarises this guidance within table 4 of section 7.7.2. The main elements of this guidance are reproduced in table 2 overleaf.

Table 2. Indoor ambient noise levels for dwellings (reproduced from table 4 of BS8233:2014)

Activity	Location	0700 to 2300	2300 to 0700
Resting	Living room	35dB $L_{Aeq,\ 16\ hour}$	-
Dining	Dining room/area	40dB $L_{Aeq,\ 16\ hour}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,\ 16\ hour}$	30dB $L_{Aeq,\ 8\ hour}$

As can be seen the guidance contained within the above table reproduced from BS 8233:2014 is very similar to that which is contained within table 1 extracted from West Yorkshire, Planning Consultation Guidance (Condensed Version) - Noise and Vibration document.

With reference to BS 8233:2014, it must be remembered that the advice contained within this document is design guidance and the suggested levels are *desirable*. It does not represent a set of rigid criteria, below which a development ‘passes’ and above which a development ‘fails’.

4.3 Approved Document E (ADE) 2003 edition, Guidance to the Building Regulations

As the proposed redevelopment of 260 - 262 Wakefield Road will retain the residential flats on the first floor, the separating floor between the proposed prayer facility and the first floor flat within the building will fall into the "Dwelling houses and flats formed by a material change of use” category detailed in Table 0.1a of Approved Document E. As such, the sound insulation performance of the separating elements should comply with the criteria highlighted (emboldened) in table 3 overleaf.

Table 3. Sound insulation performance criteria

Dwelling Houses and Flats		
Situation	**Airborne sound insulation, $D_{nT,w} + C_{tr}$ dB (Minimum Value)**	**Impact sound insulation, $L'_{nT,w}$ dB (Maximum Value)**
Formed by material Change of use		
Walls	43	**-**
Floors and stairs	**43**	64

With respect to airborne sound insulation, the quoted performance standard is a minimum requirement, therefore the obtained test result should exceed, or as a minimum equal, the requirement.

With reference to the sound insulation of the floor separating the ground floor prayer facility from the first floor flats, according to Diagram 0.1 contained within Section 0 of ADE, which illustrates the requirements of Requirement E1, the performance requirement for this floor relates to airborne sound insulation only. Remaining with the sound insulation performance of this element ADE states at paragraph 0.8 of section 1:

> "The performance standards set out in tables 1a and 1b are appropriate for walls, floors and stairs that separate spaces for normal domestic purposes. A higher standard of sound insulation may be required between spaces used for normal domestic purposes and non-domestic purposes".

5.0 Kirklees Council Response

In a memo to the Planning Department, dated the 4th May 2020, Ms. Laura Donovan of Kirklees Council's Environmental Health Department expressed a number of concerns regarding the proposed prayer facility at 260 - 262 Wakefield Road. Her principal concerns related to the transmission of noise between the prayer facility, the residential dwelling at 258 Wakefield Road and the first floor flats above 260 - 262 Wakefield Road. In this respect the memo detailed a number of conditions that Ms. Donovan believed would be appropriate to apply to any planning permission. The full text of this memo is contained within Appendix 1 and a summary of the conditions are detailed below:

Recommended Conditions
NA1 ***Noise Report Required Before Determining the Application (new noisy development near existing residential)***

Before the application can be determined, details of a noise assessment by a suitably competent person must be submitted in writing to the Local Planning Authority. The report shall include:-

a) an assessment of all noise emissions from the proposed development

b) details of existing background and predicted future noise levels at the boundary of 258 Wakefield Road WF12 8AN and the first floor flat above 260-262 Wakefield Road.

c) a written scheme of how the occupants of the above mentioned noise sensitive premises

will be protected from noise from the proposed development with noise attenuation measures as appropriate

d) a written scheme of any necessary noise attenuation measures and demonstrate how nearby residents will be protected from noise from the proposed development

The assessment shall be appropriate for all times of day and night when the development will operate. The report should include any supporting calculations.
If the levels predicted in the report are unacceptable, it may be necessary to refuse the application. Otherwise, it may be necessary to specify attenuation measures as conditions of consent

CPC1 *Call to Prayer (Azan) –Condition*
Noise from the Azan shall be effectively controlled so that:-

a) Any calls made before 0800 hours or after 2000 hours shall not be audible beyond the boundary of the site.

b) The Azan shall not be audible at any property more than 4 times each day.

c) Each Azan shall not exceed 4 minutes in duration.

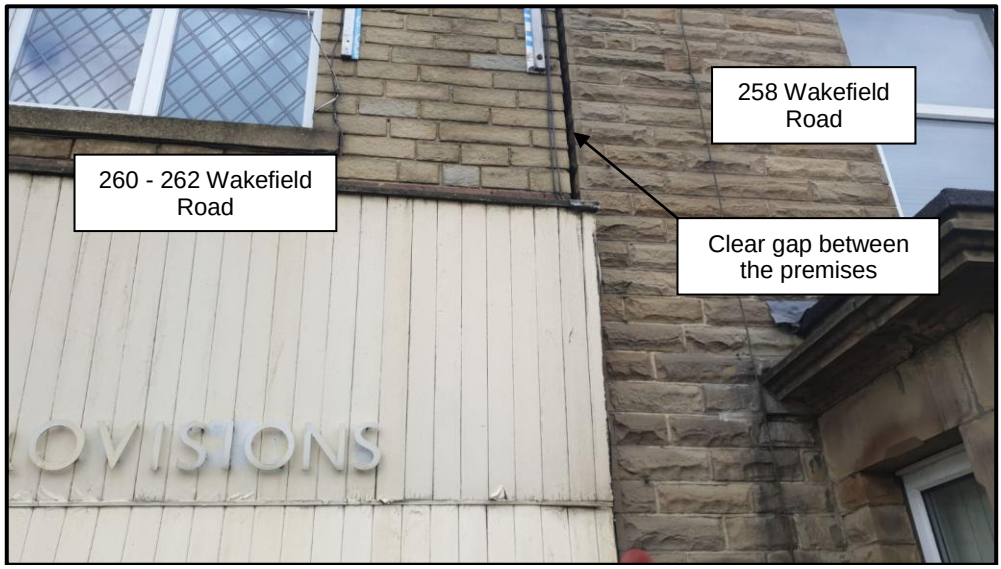
d) The sound level from the Azan shall not be more than 70 dB $L_{Aeq(t)(Fast)}$ when measured 3 metres from any elevation of any dwelling or 50 metres from the loudspeaker, whichever is the closer

e) If necessary a compressor shall be fitted to the amplifier circuit so that the above mentioned level of 70 dB(A) cannot be exceeded, even if the microphone volume is increased.

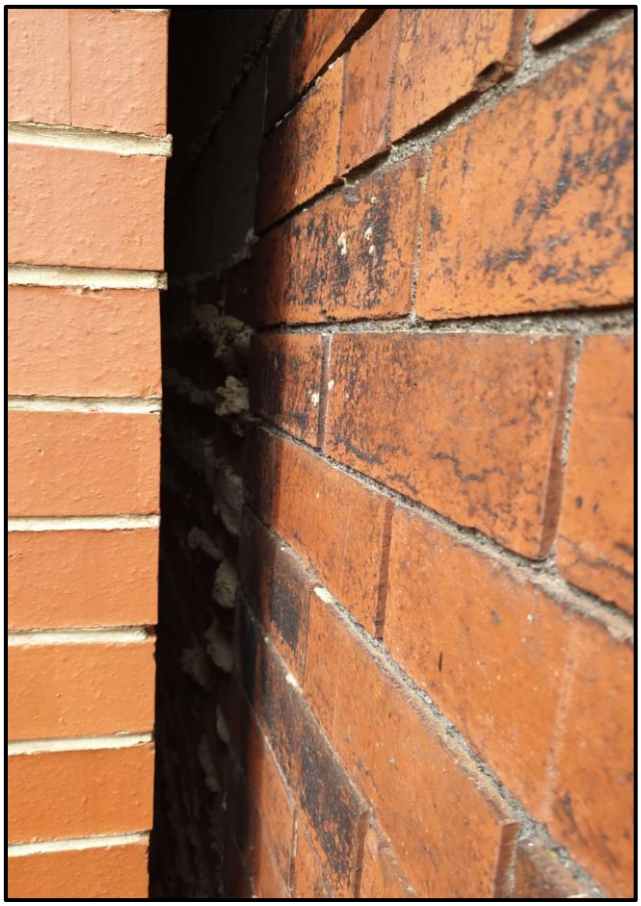
6.0 Existing Building Construction

The existing buildings at 258 and 260 - 262 Wakefield Road are entirely separate from each other, as detailed in photographs 4 and 5 below and overleaf. Both premises are of masonry construction and the photographs suggest that the gable walls of both dwellings are of cavity masonry construction.

Photograph 4. Front elevations of 260 - 262 Wakefield Road and 258 Wakefield Road



Photograph 5. Rear elevations of 260 - 262 Wakefield Road and 258 Wakefield Road



7.0 Evaluation of Potential Sound Transmission

The following sections will seek to address the concerns raised by Kirklees Council's Environmental Health Department in their memo of 4th May 2020. The subsequent assessments will relate to the potential for noise from prayer activity within the proposed prayer room to affect the neighbouring property at 258 Wakefield Road, the first floor flats within 260 - 262 Wakefield Road and the issue of the call to prayer (the Azan), which was also mentioned in the memo of the 4th May 2020.

As a consequence of the UK Government's restrictions on both travel and working practices that were instituted on the 23rd March 2020 in response to the Covid 19 pandemic, direct measurements of the sound insulation of the building elements and the noise source levels were not possible. Consequently, this assessment will take the form of a desk top assessment and will utilise representative data obtained from other, similar environments. In addition, the Covid 19 restrictions meant that it was not possible to conduct a survey to assess the character of the existing noise climate in the immediate vicinity of the proposed prayer room. Despite this, as the principal concern raised by the Environmental Health Department related to the potential transmission of sound between the two buildings, 258 and 260 - 262 Wakefield Road, the inability to obtain local noise climate data was not regarded as a significant impediment to the conduct of this assessment.

7.1 Potential Noise Transmission to 258 Wakefield Road

As previously mentioned and detailed in photographs 4 and 5 above, the proposed prayer room at 260 - 262 Wakefield Road would be formed within is an entirely separate building to the neighbouring property at 258 Wakefield Road. As a consequence of both the separation of the two buildings and the internal arrangement of the proposed prayer facility, it is suggested that the potential for noise disturbance to the occupants of 258 Wakefield Road would be very low.

The proposed internal arrangement of the prayer facility at 260 - 260 Wakefield Road is as detailed in figure 1 below. As can be seen, the prayer room would be located in the large space immediately inside the Wakefield Road elevation of the existing building. Figure 1 also highlights that there would not be a direct transmission route between the prayer area and the neighbouring residential property at 258 Wakefield Road. Indeed, any noise from the prayer area would have to 'break out' of this space in to the adjacent hall, then through the gable wall of 260 - 262 Wakefield Road and then break back in to the interior of 258 Wakefield Road via its gable.

As the prayer room is not yet operational, in order to permit the subsequent calculations to be made, noise source data from a similar sized facility will be utilised in the assessment. In this case the noise source data was obtained from an environment in which reading and a lively discussion associated with the contents of the reading occurred. Although the noise source data was not obtained from an Islamic prayer room, the source data did include raised discursive voices and as such may be regarded as being a potentially noisier environment than would be the case for the proposed prayer room. As a consequence, it is quite likely that the adopted noise source data would be higher than the activity noise level within the proposed prayer facility. Therefore the following assessment could be regarded as a worst case acoustically. The adopted internal noise source levels, in terms of the overall L_{Aeq} levels, are presented in table 4 overleaf.

Figure 1. Proposed internal arrangement of the prayer facility

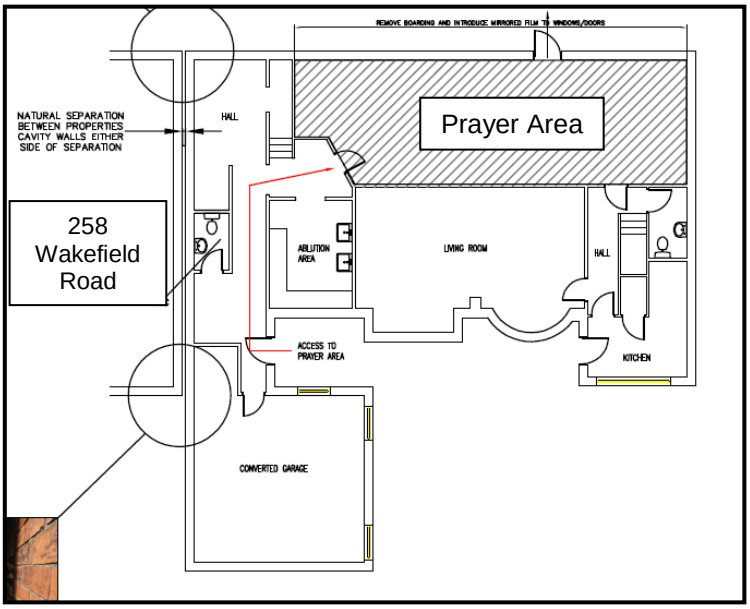


Table 4. Internal activity noise levels

OBCF, Hz*	63	125	250	500	1k	2k	4k	8k	Overall, dB(A)
Activity noise level $L_{Aeq,\ 5\ mins.}$	50	74	76	81	71	72	65	62	**80**

* Octave Band Centre Frequency

Using the noise source levels contained in table 4 above, calculations will be performed to assess the likely resulting sound levels within the neighbouring property at 258 Wakefield, resulting from the transmission of sound from activity within the prayer room. These calculations will be performed based on the transmission of sound via the following route:

1. From the prayer room to the adjacent hall within 260 - 262 Wakefield Road.
2. From the hall within 260 - 262 Wakefield Road to the outside of the gable of 260 - 262 Wakefield Road.
3. From the gap between the gable of 260 - 262 to the interior of the residential dwelling at 258 Wakefield Road.

In order to complete these calculations, a number of further assumptions have been made and these assumptions are as follows:

- The sound insulation provided by a cavity masonry wall nominally 275 - 300mm thick, would be 52dB R_w.
- There will be no glazed elements on the Wakefield Road elevation of the prayer room.
- The payer room will have a carpeted floor, a plasterboard ceiling and painted plaster walls.
- The hall will act as an acoustic 'buffer zone' and the wall separating the hall and prayer room will be masonry (approximately 100 - 125mm thick) containing a standard internal timber door.
- The hall will have a carpeted floor, a plasterboard ceiling and painted plaster walls.
- The reverberation time within the prayer room with be approximately 0.5 seconds.
- The reverberation time within the hall with be approximately 0.8 seconds.
- The external walls to both 260 - 262 and 258 Wakefield Road will be of cavity masonry construction.
- It has been assumed that there will be a living room immediately on the inside of the gable wall to 258 Wakefield Road.
- The exposed façade of living room gable will be in the order of $10m^2$.
- The living room volume will be in the order of $30m^3$.
- The reverberation time within the living room will be 0.5 seconds.

With reference to the sound insulation of the various elements detailed above, a cavity masonry wall from dwellings of this age would typically be of the following type: An external masonry (brick) leaf, a 50 - 75mm clear cavity and a 100mm brick inner leaf with a solid plaster finish. Test results for a similar construction suggest that external walls of this type should provide an overall sound insulation of around 52dB R_w, with the octave band sound insulation values being as detailed in table 5 overleaf.

Table 5. Masonry Cavity Wall Construction**,** Octave Band Sound Insulation Values

OBCF, Hz*	**125**	**250**	**500**	**1k**	**2k**	**4k**	**Overall, R_w dB(A)**
Sound Insulation, dB	38	42	51	59	63	63	**52**

* Octave Band Centre Frequency

Turning to the sound insulation value for the wall, this is believed to be of solid masonry construction, approximately 115mm thick, with a single timber door. As a result it is likely that the airborne sound insulation of this element will be significantly affected by the presence of the door and how well the door sits within its frame. The overall result would be a composite sound insulation for the element as a whole and this is detailed in table 6 below. In this case the lower sound insulation value is a consequence of the less robust wall construction and the presence of the door.

Table 6. Hall wall, Calculated Octave Band Composite Sound Insulation Values

OBCF, Hz*	**125**	**250**	**500**	**1k**	**2k**	**4k**
Sound Insulation, dB	17	20	21	22	24	26

* Octave Band Centre Frequency

Using the noise source data detailed in table 3 above, calculations have been undertaken to assess the likely break-in noise levels to 258 Wakefield Road. Although it was not possible to visit 258 Wakefield Road, the presence of a notional habitable room has been assumed on the inside of the gable wall. In this case the notional habitable room will have the characteristics listed in the assumptions detailed above. The noise transmission calculations will evaluate the likely noise levels within the notional living room in 258 Wakefield Road, resulting from break-out of noise from the prayer room to the hall, from the hall to the outside of the gable serving 260 - 262 Wakefield Road and finally break-in to 258 Wakefield Road via its gable.

The results of the noise transmission calculations, in terms of the likely resulting L_{Aeq} level within the notional living room is summarised in table 7 below. Full details of the calculations may be found within Appendix 2.

Table 7. Transmission of noise from the proposed prayer facility

Receptor location	**Calculated noise level, L_{Aeq} dB**
Inside the notional living room of 258 Wakefield Road	-7

With reference to table 7 above, the calculated noise level of -7 dB within the notional living room in 258 Wakefield Road should be taken as an indication that the resulting noise level from activity within the prayer room would be inaudible. Bearing in mind the fact that the hall within 260 - 262 Wakefield Road acts as an acoustic buffer zone between the prayer room and the gable and that the two buildings are entirely separate, the finding of inaudibility detailed above does appear to support the contention that the potential for noise disturbance to the occupants of 258 Wakefield Road would be very low.

The calculated resulting sound level detailed in table 7 above will also be compared with the design guidance for internal noise levels contained within the West Yorkshire, Planning Consultation Guidance - Noise and Vibration British Standard (BS) 8233:2014. Both documents suggest that the noise levels within a habitable room during the daytime (07:00 - 23:00 hours) should ideally not exceed 35dB $L_{Aeq,T}$. Here, the guide values for the daytime period (0700 - 2300 hours) will be applied as it is anticipated that the prayer facility will only be used during daytime hours. As the calculated sound level within the notional living room is considerably lower than this guide level, it is suggested that activity within the proposed prayer facility would not have a detrimental effect on the internal sound environment at 258 Wakefield Road.

7.2 Potential Noise Transmission to the First Floor Flats at 260 - 262 Wakefield Road

As previously stated, the Covid 19 restrictions prevented direct measurements of the airborne sound insulation of the floor separating the proposed ground floor prayer facility from the first floor flats from being made. In order to assess what level of airborne sound insulation may be achieved by the existing floor, calculations have been undertaken using BASTIAN software. This software is based on the methods and procedure detailed in BS EN 12354:2000 “Building acoustics – Estimation of acoustic performance of buildings from the performance of elements”. The airborne sound insulation performance will been evaluated in terms of the $D_{nT,w} + C_{tr}$ so permitting direct comparison with the requirement contained within ADE.

The calculations have been undertaken applying the following separating floor construction, evaluated from on site assessment. The existing floor construction was as follows:

- 200mm overall floor depth.
- 22 - 25mm existing floor boards.
- 160mm deep timber floor joists.
- 10 - 15mm plasterboard ceiling
- A lay-in grid ceiling incorporating sound absorbing tiles was suspended below the structural floor (photograph 6 overleaf).

In addition it has been assumed that the external walls of the existing building at 260 - 262 Wakefield Road are of the solid masonry type, typically around 250mm thick. In this case the density of the solid masonry external wall has been assumed to be in the order of 2000kg/m^3.

Applying the construction details and assumptions stated above, the calculation result presented in table 8 overleaf suggests that an in-situ airborne sound insulation value of around 35 - 36dB $D_{nT,w} + C_{tr}$ would be likely. Full calculation details may be found within Appendix 2. The calculated result suggests that the overall airborne sound insulation of the existing floor would not comply with the minimum performance requirement detailed in ADE. The calculation also reveals that the primary transmission route would be by the separating floor itself.

Photograph 6. Existing floor construction with the acoustic absorbent ceiling

Table 8. Calculated airborne sound insulation, remedial ceiling options

Separating element	Calculated Airborne sound insulation, $D_{nT,w}$ + C_{tr} dB
Existing floor between the first floor flat bedroom and the proposed prayer room.	35 - 36

In addition to an evaluation of the likely airborne sound insulation of the existing floor, the likely internal noise levels within the first floor flat resulting from direct noise transmission from the proposed ground floor prayer facility will be evaluated. Again, the comparison will be made with reference to the West Yorkshire, Planning Consultation Guidance - Noise and Vibration British Standard (BS) 8233:2014. Again, the guide values for the daytime period (0700 - 2300 hours) will be applied as it is anticipated that the prayer facility will only be used during daytime hours.

The calculated noise level within a bedroom of the first floor flat above the proposed prayer room is summarised in table 9 below, full data may be found within Appendix 2.

Table 9. Calculated noise levels within a first floor flat - bedroom

Source location	Reception location	Overall noise level, dB L_{Aeq}.
Existing floor with ceiling supported on resilient bars	First floor flat	41

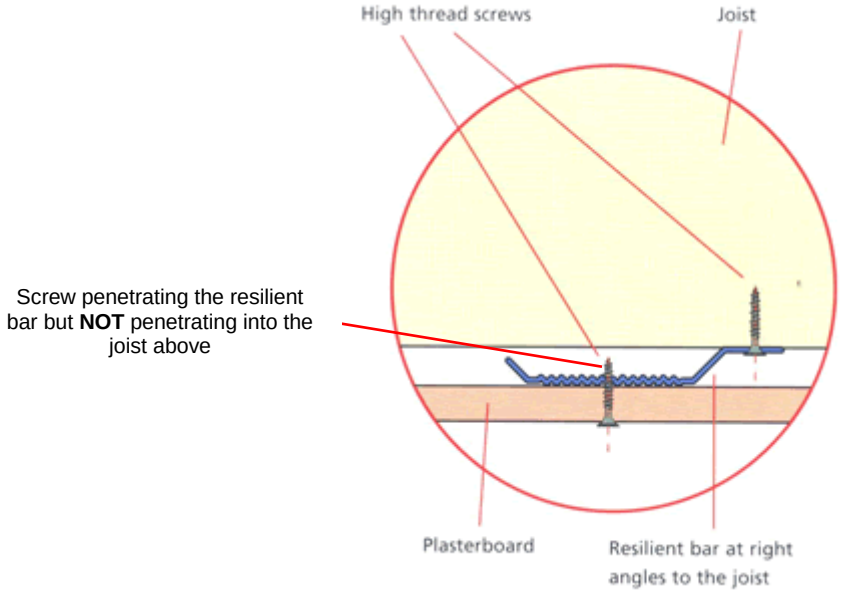
As can be seen from the above table, the calculations suggest that the noise level within the first floor flat would exceed the adopted design guide values. Despite this the cautions, stated above, relating to the use of the notional noise source are also applicable here.

In order to enhance the airborne sound insulation of what will become the separating floor between the prayer room and the first floor flats, sound insulation enhancement measures will be required. Sound insulation remedial works may be installed above or below the joists and both can produce improvements to the sound insulation of a floor. However, in general works below the level of the joists, typically in the form of a new acoustic ceiling, have the potential to produce greater improvements in the airborne sound insulation of a floor than do works above the level of the joists. With this in mind, enhancement of the existing floor construction using measures applied below the level of the joists will be specified.

The airborne sound insulation of what will become the separating floor could be enhanced by the addition of a new ceiling comprising two layers of 12.5mm SoundBloc plasterboard (or equivalent), fixed to the underside of the existing joists via resilient bars. In this case it has been assumed that the existing suspended ceiling would be removed to permit the installation of the remedial measures. Assuming the use of two layers of 12.5mm SoundBloc plasterboard (or equivalent) the new ceiling would have a mass of approximately 21kg/m^2. This being the case it is strongly recommended that the gap between the existing ceiling, fixed to the existing joists, and the rear face of the innermost layer of plasterboard forming the new ceiling, is at least 75mm. Achieving this with the suggested resilient bar ceiling, would first require that the existing joists are counter battened to increase the new ceiling void depth to at least 75mm into which space mineral fibre should be inserted.

Although resilient bars can provide performance benefits, the ultimate performance of this type of system is frequently dictated by both the correctness of the resilient bar installation and the cavity that exists between the new and existing ceilings. A common fault that can result in a considerable reduction in the overall performance of the floor, is where the resilient bars have been ‘short circuited’ by the fixings used to secure the plasterboard to the bars. The plasterboard fixings should penetrate into the resilient bar, but they should not pass through the resilient bar into the joists above as this would ‘short circuit’ the resilient bar. The correct installation is detailed on figure 2 overleaf.

Figure 2. Correct fixing of plasterboards to a resilient bar



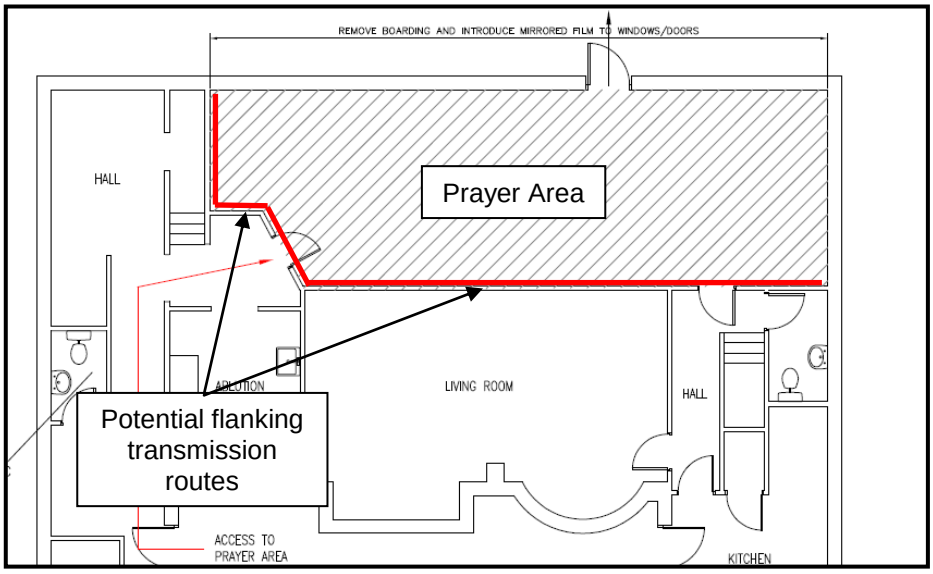
Again, the likely internal noise levels within the first floor flat, resulting from direct noise transmission from the proposed ground floor prayer facility, will be evaluated with reference to both ADE, the West Yorkshire, Planning Consultation Guidance - Noise and Vibration and British Standard (BS) 8233:2014.

The calculated airborne sound insulation provided by the remedial floor would be in the region of 43dB $D_{nT,w} + C_{tr}$, full details of the calculation may be found within Appendix 2. Although the calculated airborne sound insulation of the resilient bar ceiling would just comply with the minimum performance requirement contained within ADE, the calculation indicates that some flanking sound transmission would be likely along the internal walls detailed in figure 3 overleaf. Despite this, the calculated noise level within a bedroom of the first floor flat above the proposed prayer, summarised in table 10 below, indicates that the overall noise level would be just below the guide value detailed within the West Yorkshire, Planning Consultation Guidance - Noise and Vibration and British Standard (BS) 8233:2014. Full data may be found within Appendix 2.

Table 10. Calculated noise levels within a first floor flat - bedroom, enhanced floor construction only

Source location	Reception location	Overall noise level, dB L_{Aeq}.
Existing floor with ceiling supported on resilient bars	First floor flat	34

Figure 3. Potential flanking transmission routes



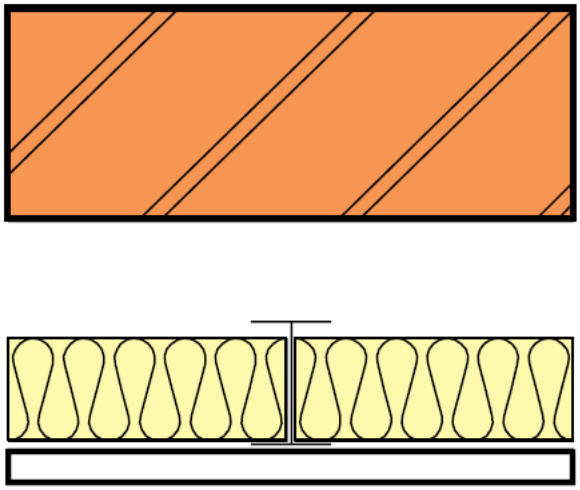
Overcoming the detrimental influence of the flanking transmission would be expected to further enhance the airborne sound insulation of the floor. This could be achieved by lining the internal walls with independent wall linings. To be effective the wall lining system must be fully independent of the existing wall and must only be fixed at the head and base only. Any connections with the face of the existing separating wall will reduce the overall airborne sound insulation of the installation so must be avoided. The suggested construction of the independent wall is as follows:

- minimum of 50mm metal or timber stud fixed at the head and base only, installed with a minimum 10mm gap between the rear face of the stud frame and the existing wall.
- A minimum of 50mm of mineral fibre in the stud cavity.
- At least one layer of 15mm SoundBloc board (or equivalent), on staggered joints, fixed to the studs.

The general details of an independent wall construction are as detailed in figures 4 and 5 overleaf.

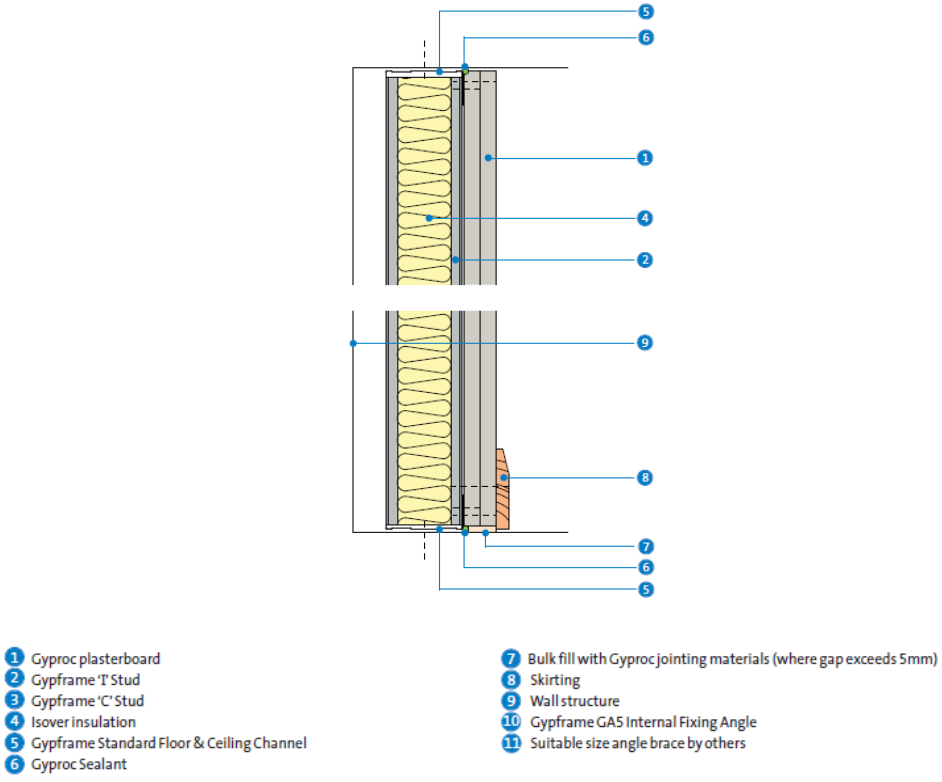
The previous calculations have been repeated but this time it has been assumed that the walls to one side of the pair of rooms, in this case the source room, have been provided with independent wall linings using one layer of 15mm SoundBloc plasterboard (or equivalent). Full calculation details may be found in Appendix 2. The calculations reveal that the inclusion of the wall linings would enhance the overall airborne sound insulation performance to around 45dB $D_{nT,w} + C_{tr}$, which would again comply with the minimum performance requirement contained within ADE. In addition a comparison with the guide values presented in the West Yorkshire, Planning Consultation Guidance - Noise and Vibration and British Standard (BS) 8233:2014 indicate that the overall sound level within the flats, as detailed in table 11 overleaf, would be around 31dB L_{Aeq}. An internal noise level of this order would again comply with the adopted design guide value. Full calculation details may be found within Appendix 2.

Figure 4. Independent wall lining system (one layer of board shown)



Source: British Gypsum

Figure 5. Independent wall lining construction (two layers of board shown)



Source: British Gypsum

Table 11. Calculated noise levels within a first floor flat - bedroom, enhanced floor construction and wall linings

Source location	Reception location	Overall noise level, dB L_{Aeq}.
Existing floor with ceiling supported on resilient bars and wall linings	First floor flat	31

7.3 Potential Disturbance from the Azan

The memo from the Environmental Health Department also raised concerns relating to the potential noise disturbance resulting from the call to prayer (the Azan). With respect to this element, as the proposal relates to the conversion of the existing premises to a prayer facility and not a mosque, there will be no external call to prayer.

The applicant has confirmed that the only invitation to prayer would occur within the prayer room only and that this call will be made using the human voice without any form of amplification. Consequently the emission of sound from these activities is very unlikely to have a detrimental effect on the existing local noise climate.

7.4 Miscellaneous

In addition to the potential for noise transmission between 260 - 262 Wakefield Road and 258 Wakefield Road and the Azan, there exists the possibility that noise from other sources may also have an effect on the local noise climate. With this in mind that following undertakings have been received from the applicant:

- There will be no madressah at the facility.
- There will be no Friday prayers.
- There will be a strict 25 person membership who will all walk to the facility.
- There will be no congregating outside the facility after prayers.
- There will be 2 disabled spaces to the rear of the facility.
- The facility will be access from the rear with a fire exit to the front.

Whilst two disabled car parking spaces will be provided to the rear of the proposed facility, as the prayer room will be a local amenity it is expected that the majority of the attendees will walk to the venue. The proposed prayer room would provide accommodation for up to 25 attendees and, it is suggested that those attending would arrive separately on foot and would not arrive simultaneously.

It will also be the case that on arriving at the prayer facility the attendees will access the facility via a door to the rear of the existing building. In neither case would the attendees congregate outside the proposed prayer facility, therefore the attendees would represent a relatively transient phenomenon. In this respect it is anticipated that the arrival and departure of the attendees would be very similar to the arrival and departure of customers from the former newsagent's shop. Consequently, it is suggested that no adverse effect on the existing local noise climate on the busy Wakefield Road would result from those attending the prayer facility.

8.0 Conclusion

The calculations presented above have revealed that the potential sound transmission from activity within the proposed prayer facility at 260 - 262 Wakefield Road would be inaudible within the notional living room at 258 Wakefield Road. With respect to the issue of the transmission of sound from the proposed prayer room to the first floor flats above, calculations have been undertaken to assess the likely airborne sound insulation of the existing floor. The calculations have indicated that airborne sound insulation of the existing floor would not be sufficient to limit the direct transmission of sound from the prayer room to the flats above, in compliance with the design targets. With this in mind sound insulation remedial measures have been proposed that would enhance the airborne sound insulation of the floor such that it should be able to comply with the performance requirement contained within ADE and limit the direct transmission of sound to the first floor flats in compliance with the design target.

Turning to the call to prayer, the applicant has confirmed that there will be no external call to prayer. Additionally it has been confirmed that the internal invitation to prayer will occur within the prayer room only and will not involve any form of amplification. Finally, it is anticipated that as the prayer facility will be a local amenity the majority of the worshippers will arrive on foot. This fact will serve to further minimise any potential effect that the proposed prayer facility may have on the local environment.

Consequently it is suggested that any noise from the proposed prayer facility would be unlikely to have a detrimental effect on either the nearby residential premises or the existing noise climate in the immediate vicinity. Therefore, it is contended that the transmission of noise from the proposed prayer facility should not be regarded as an impediment to the granting of planning permission.

Appendix 1: Kirklees Council Environmental Health Memo

Kirklees COUNCIL

Consultation Response from: KC Environmental Health (Pollution & Noise Control)		
2020/90784-260-262, Wakefield Road, Earlsheaton, Dewsbury, WF12 8AN		
Alterations to convert part of existing newsagent into prayer facility		
Date Responded: 04/05/2020	Responding Officer: Laura Donovan	Responding Ref: WK202007472

It should be noted that the proposed development is in a mixed residential and commercial area of Huddersfield. The potential for noise impact from the proposed development to the adjoining property, 258 Wakefield Road, and the nearby first floor residences could be substantial. I would recommend refusal as it is not an appropriate location for this development. However if the applicant chooses to proceed with the application then the following conditions would be required to be met.

Recommended Conditions

NA1 ***Noise Report Required Before Determining the Application (new noisy development near existing residential)***

Before the application can be determined, details of a noise assessment by a suitably competent person must be submitted in writing to the Local Planning Authority. The report shall include:-

a) an assessment of all noise emissions from the proposed development

b) details of existing background and predicted future noise levels at the boundary of 258 Wakefield Road WF12 8AN and the first floor flat above 260-262 Wakefield Road.

c) a written scheme of how the occupants of the above mentioned noise sensitive premises will be protected from noise from the proposed development with noise attenuation measures as appropriate

d) a written scheme of any necessary noise attenuation measures and demonstrate how nearby residents will be protected from noise from the proposed development

The assessment shall be appropriate for all times of day and night when the development will operate. The report should include any supporting calculations.

If the levels predicted in the report are unacceptable, it may be necessary to refuse the application. Otherwise, it may be necessary to specify attenuation measures as conditions of consent.

CPC1 ***Call to Prayer (Azan) –Condition***

Noise from the Azan shall be effectively controlled so that:-

a) Any calls made before 0800 hours or after 2000 hours shall not be audible beyond the boundary of the site.
b) The Azan shall not be audible at any property more than 4 times each day.
c) Each Azan shall not exceed 4 minutes in duration.
d) The sound level from the Azan shall not be more than 70 dB $L_{Aeq(t)(Fast)}$ when measured 3 metres from any elevation of any dwelling or 50 metres from the loudspeaker, whichever is the closer

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e) If necessary a compressor shall be fitted to the amplifier circuit so that the above mentioned level of 70 dB(A) cannot be exceeded, even if the microphone volume is increased.

Appendix 2: Calculation results

Transmission to 258 Wakefield Road

260 - 260 Wakefield Road, Dewsbury										
Proposed Islamic prayer facility										
Prayer room dimensions (260 - 262 Wakefield Road)										
Length, m	12.69									
Width, m	4.09									
Height, m	2.57									
Space Volume, ≈ m^3	**133.4**									
Surface Area, ≈ m^2	**190.1**									
Acoustic Data										
Element and surface covering		**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Carpet and underlay, m^2	51.9	m^2	0.03	0.07	0.23	0.44	0.77	0.94	0.99	0.99
Painted plastered walls, m^2	86.2	m^2	0.01	0.01	0.01	0.02	0.03	0.04	0.05	0.05
Ceiling, m_2	51.9	m^2	0.30	0.29	0.10	0.05	0.04	0.07	0.09	0.10
Mean Absorption Coefficient, a		m^2	0.09	0.10	0.09	0.14	0.23	0.29	0.32	0.32
L_p at room boundary of prayer room										
Total aborption			18.0	19.5	18.0	27.2	44.6	55.9	60.4	60.9
Mean aborption coeffcient			0.09	0.10	0.09	0.14	0.23	0.29	0.32	0.32
Room constant			19.9	21.8	19.9	31.7	58.3	79.1	88.5	89.6
Q	2		2	2	2	2	2	2	2	2
Distance to reception point, m	4		4	4	4	4	4	4	4	4
Equivalent noise source level, L_p		**84**	54	78	80	85	75	76	69	66
Equivalent L_w (assuming hemispherical radiation)		**92**	62	86	88	93	83	84	77	74
Total Lp at reference distance		**83**	55	79	81	84	72	72	65	61
L_p in hall										
Composite R_w of wall + door			17	20	21	22	24	26	32	34
L_p in hall on other side of wall		**60**	38	58	60	62	48	45	32	27
Hall dimensions										
Length, m	4.94									
Width, m	2.26									
Height, m	2.57									
Space Volume, ≈ m^3	**28.7**									
Surface Area, ≈ m^2	**59.3**									
Acoustic Data										
Element and surface covering		**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Carpet and underlay, m^2	11.2	m^2	0.03	0.07	0.23	0.44	0.77	0.94	0.99	0.99
Painted plastered walls, m^2	37.1	m^2	0.01	0.01	0.01	0.02	0.03	0.04	0.05	0.05
Ceiling, m_2	11.2	m^2	0.30	0.29	0.10	0.05	0.04	0.07	0.09	0.10
Mean Absorption Coefficient, a	59.5	m^2	0.07	0.07	0.07	0.10	0.17	0.22	0.24	0.24
L_p at room boundary of hall (by gable)										
Total aborption			4.1	4.4	4.1	6.2	10.2	12.8	14.0	14.1
Mean aborption coeffcient			0.07	0.07	0.07	0.10	0.17	0.22	0.24	0.24
Room constant			4.4	4.8	4.4	7.0	12.3	16.4	18.3	18.5
Q	2		2	2	2	2	2	2	2	2
Distance to reception point, m	5		5	5	5	5	5	5	5	5
Equivalent noise source level, L_p		**60**	38	58	60	62	48	45	32	27
Equivalent L_w (assuming hemispherical radiation)		**69**	47	67	69	71	57	54	41	36
Total Lp at reference distance		**67**	46	67	69	69	52	48	35	29
L_p just outside gable		**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
R_w of cavity gable wall (cavity masonry)			32	37	41	49	58	62	61	66
-6			-6	-6	-6	-6	-6	-6	-6	-6
L_p just outside gable		**16**	8	24	22	14	-12	-20	-32	-43
L_p inside neighbouring property		**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Calculated L_{Aeq} in gap between walls		**16**	8	24	22	14	-12	-20	-32	-43
Exposed façade, m^2	9		9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
Volume of receiving room, m^3	30									
Reverb Time, seconds	0.5		0.5	0.5	0.5	0.35	0.5	0.5	0.5	0.5
10 x Log(RT60/(0.163 x V)			-9.9	-9.9	-9.9	-11.5	-9.9	-9.9	-9.9	-9.9
SRI, R_w, of gable			32	37	41	49	58	62	61	66
A + B + E - F		**-7**	-24.0	-13.6	-19.6	-37.3	-70.6	-82.1	-93.4	-109.1
Total L_p in neighbouring property (258 Wakefield Road)		**-7**								

Assessment of airborne sound insulation of the existing floor

BASTIAN® - Worksheet 1 [DM Ts (1)]

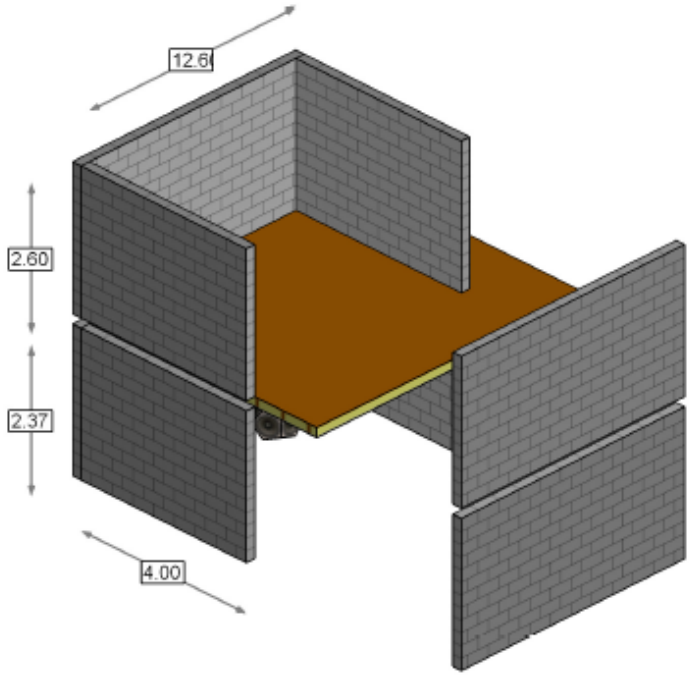
Project Info

Project Name:	260 - 262 Wakefield Road
Client:	Mr. S. D. Hazi
Project:	Proposed Islamic Prayer Room
Worksheet:	Worksheet 1 [DM Ts (1)]
Program:	BASTIAN V 2.3

Worksheet Configuration

Calculation Model:	DM Ts (1)
Perf. Param. Airborne Sound Transm. in Buildings:	DnT,w + Ctr
Perf. Param. Impact Sound Transm. in Buildings:	L'n,w
Perf. Param. Outdoor Sound Transmission:	R'45°,w
Reference Reverberation Time T0 (s):	0.5
f1: Surface mass m"4 (kg/m²):	200
f1: Outer leaf interrupted:	no
f2: Surface mass m"4 (kg/m²):	200
f2: Outer leaf interrupted:	no
f3: Surface mass m"4 (kg/m²):	200
f4: Surface mass m"4 (kg/m²):	200
Correction Sigma_free/Sigma_forced for Monolithic Flanking Elements:	off
Correction Sigma_free/Sigma_forced for Lightweight Flanking Elements:	off
Alpha_k-Limit, MIN (-):	-
Alpha_k-Limit, MAX (-):	-
Ts-Limit for Elements, MIN (dB):	-
Ts-Limit for Elements, MAX (dB):	-
R'45°- R' (dB):	1.0
R'tr,s - R' (dB):	0.0
Level Difference DeltaL_fs (dB):	-

Room View



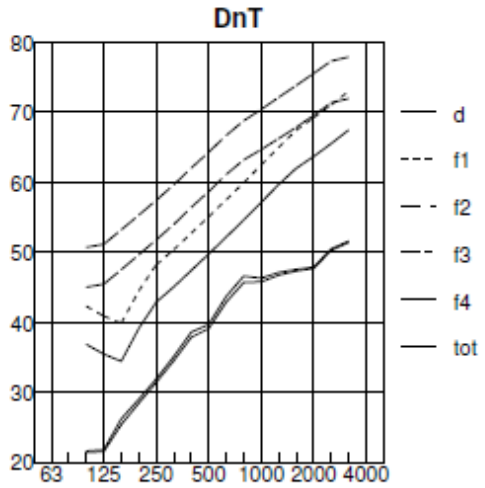
Worksheet-Table

		Sending Room		Junctio	Receiving Room		DnT,w (0.5 s) -		L'n,w	
M	t	Basic Element	Additional L	Type-N	Basic Element	Additional L	dB	%	dB	%
X	d	22mm fbs 180mm joist 10mm plastert					36.1	90		
X	f1	BAST: brick (1600 kg/m³) 115 mm, re		17	BAST: brick (1600 kg/m³) 115 mm, re		52.7	2		
X	f2	BAST: brick (1600 kg/m³) 240 mm, re		18	BAST: brick (1600 kg/m³) 240 mm, re		62.5	0		
X	f3	BAST: brick (1600 kg/m³) 240 mm, re		18	BAST: brick (1600 kg/m³) 240 mm, re		56.8	1		
X	f4	BAST: brick (1600 kg/m³) 115 mm, re		17	BAST: brick (1600 kg/m³) 115 mm, re		47.4	7		
						Total:	35.6	100		

Airborne Sound per Element

tau	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	DnT,w (0.5 s) +
d				21.6	21.8	26.2	29.0	31.9	35.1	38.6	39.7	43.7	46.6	46.3	47.1	47.6	47.9	50.5	51.6			36.1
f1				42.3	40.9	39.9	44.5	48.2	50.4	52.8	55.1	57.5	60.0	62.5	65.0	67.5	69.3	71.1	73.0			52.7
f2				50.7	51.2	53.2	55.3	57.4	59.6	62.0	64.3	66.7	68.8	70.4	72.2	73.8	75.6	77.3	77.9			62.5
f3				45.0	45.5	47.5	49.6	51.8	54.0	56.4	58.7	61.1	63.2	64.7	66.3	67.9	69.6	71.4	72.0			56.8
f4				36.9	35.4	34.4	39.1	42.9	45.1	47.4	49.8	52.2	54.6	57.2	59.7	62.0	63.7	65.5	67.5			47.4
tot				21.4	21.5	25.4	28.4	31.4	34.5	37.8	39.1	42.9	45.7	45.8	46.7	47.3	47.7	50.3	51.4			35.6

Resulting Diagram



DnT,w = 42
DnT,w + C = 40
DnT,w + Ctr = 35

Assessment of airborne sound insulation of the existing floor with the ceiling fixed via resilient bars

BASTIAN® - Worksheet 1 [DM Ts (1)]

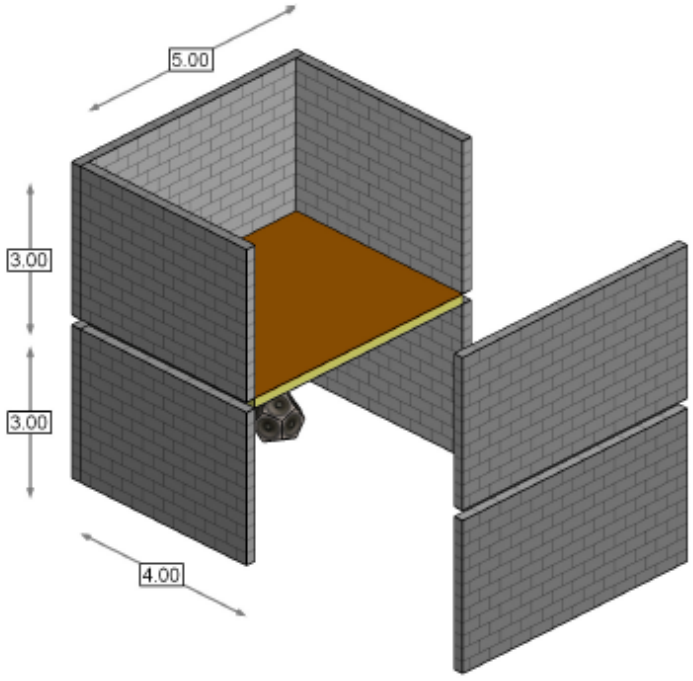
Project Info

Project Name:	260 - 262 Wakefield Road
Client:	Mr. S. D. Hazi
Project:	260 - 262 Wakefield Road, Dewsbury
Worksheet:	Worksheet 1 [DM Ts (1)]
Program:	BASTIAN V 2.3

Worksheet Configuration

Calculation Model:	DM Ts (1)
Perf. Param. Airborne Sound Transm. in Buildings:	DnT,w + Ctr
Perf. Param. Impact Sound Transm. in Buildings:	L'n,w
Perf. Param. Outdoor Sound Transmission:	R'45°,w
Reference Reverberation Time T0 (s):	0.5
f1: Surface mass m"4 (kg/m²):	200
f1: Outer leaf interrupted:	no
f2: Surface mass m"4 (kg/m²):	200
f2: Outer leaf interrupted:	no
f3: Surface mass m"4 (kg/m²):	200
f4: Surface mass m"4 (kg/m²):	200
Correction Sigma_free/Sigma_forced for Monolithic Flanking Elements:	off
Correction Sigma_free/Sigma_forced for Lightweight Flanking Elements:	off
Alpha_k-Limit, MIN (-):	-
Alpha_k-Limit, MAX (-):	-
Ts-Limit for Elements, MIN (dB):	-
Ts-Limit for Elements, MAX (dB):	-
R'45°- R' (dB):	1.0
R'tr,s - R' (dB):	0.0
Level Difference DeltaL_fs (dB):	-

Room View



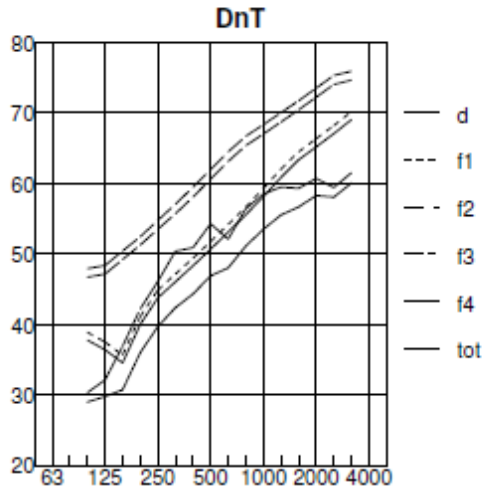
Worksheet-Table

		Sending Room		Junctio	Receiving Room		DnT,w (0.5 s)		L'n,w	
M	t	Basic Element	Additional	Type-f	Basic Element	Additional	dB	%	dB	%
X	d	22mm T&G f'boards, 180mm timber joist, 2 x					46.0	46		
X	f1	BAST: brick (2000 kg/m³) 115 mm, render 1x1		18	BAST: brick (2000 kg/m³) 115 mm,		49.3	22		
X	f2	BAST: brick (2000 kg/m³) 240 mm, render 1x1		18	BAST: brick (2000 kg/m³) 240 mm,		60.1	2		
X	f3	BAST: brick (2000 kg/m³) 240 mm, render 1x1		18	BAST: brick (2000 kg/m³) 240 mm,		58.8	2		
X	f4	BAST: brick (2000 kg/m³) 115 mm, render 1x1		18	BAST: brick (2000 kg/m³) 115 mm,		48.2	28		
						Total:	42.6	100		

Airborne Sound per Element

tau	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	DnT,w (0.5 s) +
d				30.3	32.1	36.9	42.2	46.1	50.4	50.9	54.3	52.1	56.4	58.5	59.5	59.3	60.7	59.4	61.5			46.0
f1				38.9	37.5	35.6	41.1	44.9	47.1	49.4	51.7	54.2	56.6	59.3	62.0	64.5	66.4	68.2	70.2			49.3
f2				47.9	48.4	50.4	52.5	54.8	57.1	59.5	62.0	64.5	66.7	68.4	70.0	71.8	73.6	75.3	76.0			60.1
f3				46.7	47.2	49.2	51.3	53.5	55.7	58.1	60.6	63.2	65.4	67.0	68.7	70.5	72.3	74.1	74.7			58.8
f4				37.8	36.4	34.5	40.0	43.8	46.0	48.3	50.7	53.1	55.6	58.1	60.9	63.3	65.2	67.1	69.1			48.2
tot				29.0	29.8	30.7	36.0	39.7	42.4	44.3	46.9	48.0	51.1	53.5	55.5	56.7	58.3	58.1	60.1			42.6

Resulting Diagram



DnT,w = 49
DnT,w + C = 47
DnT,w + Ctr = 43

Assessment of airborne sound insulation of the existing floor with the ceiling fixed via resilient bars and independent wall linings

BASTIAN® - Worksheet 1 [DM Ts (1)]

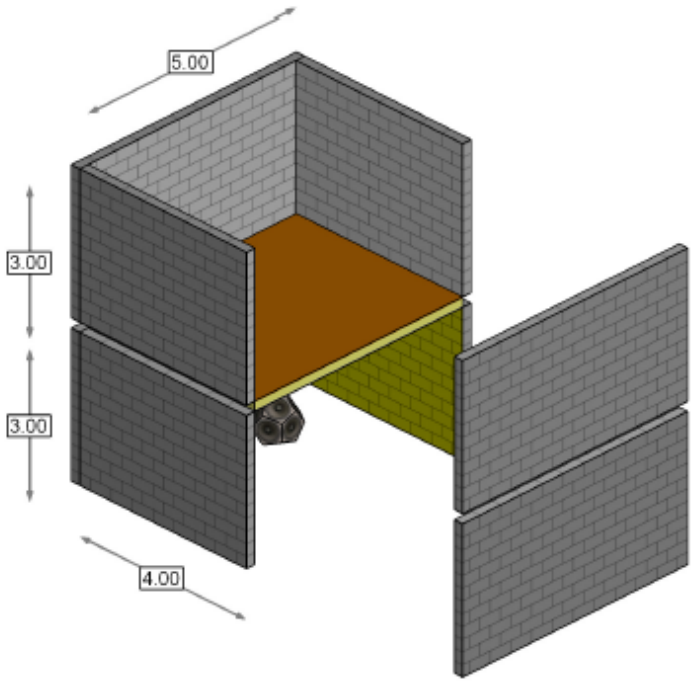
Project Info

Project Name:	260 - 262 Wakefield Road
Client:	Mr. S. D. Hazi
Project:	260 - 262 Wakefield Road, Dewsbury
Worksheet:	Worksheet 1 [DM Ts (1)]
Program:	BASTIAN V 2.3

Worksheet Configuration

Calculation Model:	DM Ts (1)
Perf. Param. Airborne Sound Transm. in Buildings:	DnT,w + Ctr
Perf. Param. Impact Sound Transm. in Buildings:	L'n,w
Perf. Param. Outdoor Sound Transmission:	R'45°,w
Reference Reverberation Time T0 (s):	0.5
f1: Surface mass m"4 (kg/m²):	200
f1: Outer leaf interrupted:	no
f2: Surface mass m"4 (kg/m²):	200
f2: Outer leaf interrupted:	no
f3: Surface mass m"4 (kg/m²):	200
f4: Surface mass m"4 (kg/m²):	200
Correction Sigma_free/Sigma_forced for Monolithic Flanking Elements:	off
Correction Sigma_free/Sigma_forced for Lightweight Flanking Elements:	off
Alpha_k-Limit, MIN (-):	-
Alpha_k-Limit, MAX (-):	-
Ts-Limit for Elements, MIN (dB):	-
Ts-Limit for Elements, MAX (dB):	-
R'45°- R' (dB):	1.0
R'tr,s - R' (dB):	0.0
Level Difference DeltaL_fs (dB):	-

Room View



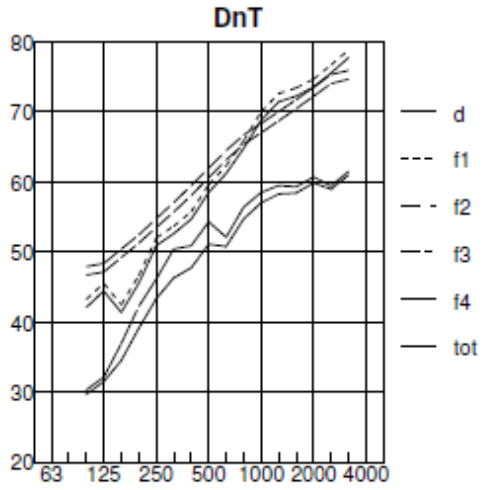
Worksheet-Table

		Sending Room		Junct	Receiving Room		DnT,w (0.5 s		L'n,w	
M	t	Basic Element	Additional Layer	Type-	Basic Element	Additional	dB	%	dB	%
X	d	22mm T&G f'boards, 180mm timber joist,					46.0	74		
X	f1	BAST: brick (2000 kg/m³) 115 mm, render	15mm SB p.b on in	18	BAST: brick (2000 kg/m³) 115 m		55.4	8		
X	f2	BAST: brick (2000 kg/m³) 240 mm, render		18	BAST: brick (2000 kg/m³) 240 m		60.1	3		
X	f3	BAST: brick (2000 kg/m³) 240 mm, render		18	BAST: brick (2000 kg/m³) 240 m		58.8	4		
X	f4	BAST: brick (2000 kg/m³) 115 mm, render	15mm SB p.b on in	18	BAST: brick (2000 kg/m³) 115 m		54.3	11		
						Total:	44.7	100		

Airborne Sound per Element

tau	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	DnT,w (0.5 s) +
d				30.3	32.1	36.9	42.2	46.1	50.4	50.9	54.3	52.1	56.4	58.5	59.5	59.3	60.7	59.4	61.5			46.0
f1				43.2	45.5	42.5	46.6	52.0	53.7	55.8	59.6	62.3	65.9	70.0	72.6	73.4	74.7	76.7	78.9			55.4
f2				47.9	48.4	50.4	52.5	54.8	57.1	59.5	62.0	64.5	66.7	68.4	70.0	71.8	73.6	75.3	76.0			60.1
f3				46.7	47.2	49.2	51.3	53.5	55.7	58.1	60.6	63.2	65.4	67.0	68.7	70.5	72.3	74.1	74.7			58.8
f4				42.1	44.4	41.4	45.5	50.9	52.6	54.7	58.5	61.2	64.8	68.8	71.5	72.3	73.5	75.6	77.8			54.3
tot				29.7	31.5	34.5	39.1	43.3	46.3	47.7	51.1	50.8	54.7	57.0	58.3	58.4	59.9	59.0	61.0			44.7

Resulting Diagram



DnT,w = 52
DnT,w + C = 50
DnT,w + Ctr = 45

Transmission to first floor flat

260 - 260 Wakefield Road, Dewsbury										
Proposed Islamic prayer facility										
Prayer room dimensions (260 - 262 Wakefield Road)										
Length, m	12.69									
Width, m	4.09									
Height, m	2.37									
Space Volume, ≈ m^3	123.0									
Surface Area, ≈ m^2	183.3									
Acoustic Data										
Element and surface covering		dB(A)	63	125	250	500	1k	2k	4k	8k
Carpet and underlay, m^2	51.9	m^2	0.03	0.07	0.23	0.44	0.77	0.94	0.99	0.99
Painted plastered walls, m^2	86.2	m^2	0.01	0.01	0.01	0.02	0.03	0.04	0.05	0.05
Ceiling, m_2 (absorbent ceiling tiles)	51.9	m^2	0.00	0.50	0.60	0.65	0.75	0.80	0.75	0.08
Mean Absorption Coefficient, a		m^2	0.01	0.17	0.24	0.32	0.44	0.51	0.52	0.33
L_p at room boundary of prayer room										
Total aborption			2.4	30.4	43.9	58.3	81.5	93.8	94.6	59.8
Mean aborption coeffcient			0.01	0.17	0.24	0.32	0.44	0.51	0.52	0.33
Room constant			2.5	36.5	57.8	85.5	146.6	191.9	195.5	88.8
Q	2		2	2	2	2	2	2	2	2
Distance to reception point, m	1.5		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Equivalent noise source level, L_p		**80**	50	74	76	81	71	72	65	62
Equivalent L_W (assuming hemispherical radiation)		**88**	58	82	84	89	79	80	73	70
Total Lp at reference distance		78	60	74	76	79	69	69	63	60
Internal noise levels within the first floor flat, basic floor										
Octave Band Centre Frequency, Hz.		dB(A)	63	125	250	500	1k	2k	4k	8k
Calculated level difference (D_{nT}) of floor, dB			17	22	31	40	46	48	51	56
Red = extrapolated value										
Noise source level, dB, at room perimeter, dB		**78**	60	74	76	79	69	69	63	60
Noise source level - L_D		**41**	43	52	45	40	23	21	12	4
BS8233:2014 guide value, dB (bedrooms, daytime - resting)		**35**								
BS8233:2014 guide value, dB (bedrooms, night time)		**30**								
Internal noise levels within the first floor flat, enhanced floor										
(enhanced floor = 2 x SB p.b. on res bars)										
Octave Band Centre Frequency, Hz.		dB(A)	63	125	250	500	1k	2k	4k	8k
Calculated level difference (D_{nT}) of floor, dB			25	30	39	46	53	58	61	66
Red = extrapolated value										
Noise source level, dB, at room perimeter, dB		**78**	60	74	76	79	69	69	63	60
Noise source level - L_D		**34**	35	44	37	33	16	11	2	-6
BS8233:2014 guide value, dB (bedrooms, daytime - resting)		**35**								
Internal noise levels within the first floor flat, enhanced floor										
(enhanced floor = 2 x SB p.b. on res bars + wall linings)										
Octave Band Centre Frequency, Hz.		dB(A)	63	125	250	500	1k	2k	4k	8k
Calculated level difference (D_{nT}) of floor, dB			26	31	42	50	56	59	62	67
Red = extrapolated value										
Noise source level, dB, at room perimeter, dB		**78**	60	74	76	79	69	69	63	60
Noise source level - L_D		**31**	34	43	34	29	13	10	1	-7
BS8233:2014 guide value, dB (bedrooms, daytime - resting)		**35**								