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CLIENT PROJECT REFERENCE:

225 Peppard Road, Emmer Green, Reading, RG4 8TS

Environmental Impact Noise Assessment

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1. Summary

An environmental noise impact assessment was carried out at the premises at 225 Peppard Road, Emmer Green, Reading, RG4 8TS on Saturday 5th October 2024. The aim of this report is to determine the impact of the proposed extractor fan unit upon noise sensitive receptors in accordance with BS4142:2014+A1:2019 guidance, and to determine interior noise levels in the flat above the shop in accordance with BS8233:2014 guidance.

The results of the environmental noise survey are reasonable considering the location of the measurement position and the existing noise sources in the local neighbourhood. Noise calculations of the sound source were undertaken using available details and plans provided by the client. The data and information form the basis of the assessment. BS4142:2014+A1:2019 and was conducted at the site and BS8233: 2014 noise assessment were conducted at the site.

The summary of the difference between the Rating Level and Background Noise Level of noise sensitive receptors is given in table below.

Noise sensitive receptor	Difference between The Rating Level and Background Level
	Day
225 Peppard Road (window of first floor flat)	– 34dB(A)
1 Kidmore End Road (window of second floor flat)	– 39.9dB(A)

In accordance with BS4142:2014+A1:2019 guidance, the day Rating Level $L_{Aeq,Tr}$ at nearest noise sensitive receptors do not exceed the background sound level $L_{A90,T}$ as shown in Table above. Therefore, the operation of the proposed extractor fan indicates the specific sound source having a low adverse impact during daytime.

The predicted daytime Rating Levels $L_{Aeq,Tr}$ at the external amenity space are 21dB(A) at the balcony, and 8dB(A) at the rear garden of 225 Peppard Road. Therefore, the Rating Level $L_{Aeq,Tr}$ at the external amenity space does not exceed 50 dB $L_{Aeq,16hr}$ of desirable category of BS8233:2014.

It can be confirmed that the Rating Levels $L_{Aeq,Tr}$ of the proposed extractor fan are expected to comply with BS4142:2014+A1:2019 guidance and are within the standard values set out by the Reading Borough Council.

A rigorous calculation method that is given in BS8233: 2014 was applied to determine external noise levels of the proposed function room above the shop by using predicted internal noise level 85dB(A) in the shop, measured environmental noise levels, and suggested multi-layer sound insulation scheme for the ceiling. Calculations show that the proposed multi-layer sound insulation scheme will reduce noise level by 57dB(A) for the ceiling. The sound insulation scheme achieves minimum airborne sound insulation value of 43 dB(A) ($D_{nTw} + C_{tr}$) which is set by Approved Document E.

In accordance with BS8233:2014 guidance; the predicted daytime internal noise level in the flat above the shop is 28 dB(A) $L_{Aeq,16hr}$ and it is within the desirable category of 35 dB(A) for living rooms and 30 dB(A) for bedrooms.

2. Introduction

Environmental noise assessment was carried out at the premises at 225 Peppard Road, Emmer Green, Reading, RG4 8TS on Saturday 5th October 2024. The site is seeking planning permission for proposed extractor fan unit at the rear of the premises. Environmental Noise Survey was undertaken in accordance with BS4142:2014+A1:2019. The site is located on a busy road (Peppard Road) with high background noise level.

3. Site Description

The site is located at 225 Peppard Road, Emmer Green, Reading, RG4 8TS. The building comprises a ground floor commercial unit, housing Coral, with residential flat at first floor. The site is located in a mixed commercial and residential area. The site will be open for business on Monday to Sunday between 09:00 and 19:00.

4. Environmental Noise Survey Methodology

Environmental noise survey was undertaken at the site to determine day noise levels in accordance with the methodology contained within BS4142:2014 +A1:2019. Noise survey at given time covers the most sensitive period of the time in which the proposed extractor fan may be operational.

4.1 Sound source under investigation

During the measurements carried out at the site, the primary noise source identified was road traffic noise from Peppard Road. Secondary noise sources are traffic lights noise, pedestrians noise, and noise from customers of Coral. An extractor fan system with the attenuator for the kitchen of the premises will be installed on the rear wall of the premises. The details of the extractor fan unit are as follow: Helios GigaBox centrifugal fan 560mm (GBW 560/4). The details of the extractor fan and attenuator are given in Appendix B.

Anti-vibration mounts will be used to provide isolation from vibration and noise via high resilience rubber. These isolation products provide high levels of reduction in vibration.

4.2 Measurement equipment

A description of the equipment used for the noise survey are given in the Table 1.

Table 1: Description of the equipment used for measurements

Equipment	Description	Quantity	Serial No
Norsonic SLM	Type 1 sound level meter, NOR140	1	1402815
Norsonic	½ inch microphone	1	1225
Norsonic	Preamplifier	1	1209
Norsonic Calibrator	Class 1 Calibrator (114 dB)	1	Nor-1251-32462

4.3 Parameters measured

BS4142:2014+A1:2019 gives a method for assessing the impact of specific sounds based upon the amount, in dB, that a specific sound level exceeds the background sound level, taking into account the context of the situation. The standard requires measurement of the **specific sound level**, in $L_{Aeq,T}$ over a period of 1 hour (daytime) and 15 minutes (night time), and the **background sound level**, L_{AF90} , when the specific sound is not in operation, the **residual sound level**, L_{Aeq} , when the specific sound is not in operation, and the background and residual sound should be measured at times which are **representative of and similar to** those at which the specific sound is in operation.

Noise parameters were measured using a calibrated system over a period of the time that is representative of the worst-case condition. Residual noise levels were measured in 1/3 octave bands throughout the noise survey.

Weather conditions were noted to be 15 degrees Celsius with mostly sunny skies at the beginning of the measurements with a light wind, which was less than 3 m/s, and 14 degrees Celsius at the end of the measurements with a cloudy sky and a wind, which was less than 4 m/s. These weather conditions were checked against and confirmed using the Meteorology Office mobile application available on smart phone technology.

The noise monitoring equipment was calibrated before and after the measurements. No significant drift was recorded during calibration as shown in Table 2.

Table 2: Calibration details

Measurement	Calibrator Ref Level (dB)	Level Before (dB)	Deviation Before (dB)	Level After (dB)	Deviation After (dB)
Day	114.0	114.1	0.10	114	0.00

4.4 Measurements

To undertake a BS4142:2014+A1:2019 assessment, it is necessary to measure the noise levels at the site to determine day noise levels. Day background noise levels were measured at the site. The sound level meter was positioned at minimum 4 metres away from nearby walls/fences. The sound level meter was mounted onto a tripod at 1.4 metre above the ground at the site as shown in Appendix D.

5. Noise Survey Results and Observations

5.1 Results

An environmental noise survey was carried out at the site. Details of measured noise level results are given below.

5.1.1 Day noise levels

Measured residual ($L_{Aeq,1h}$), and background ($L_{AF90,1h}$) levels at the site are 62dB, and 55dB respectively. Highest L_{AMax} , was 88.6dB that was observed at 16:25 during measuring background noise levels. A comparison of L_{Aeq} , L_{AMax} , L_{A10} , and L_{A90} results for day is given numerically in Table 3 and graphically in Figure 1. Measured day noise levels shows that measured $L_{AF,10}$ values are consistently 3dB higher than measured L_{Aeq} values throughout the measurement duration. This suggests that the dominant noise source is road traffic noise.

Table 3: Day Noise Levels measured at the site.

Recorded time	L_{Aeq}	L_{AFmax}	$L_{AF,10}$	$L_{AF,90}$
10:15	62.1	73.2	65.3	55.7
10:30	61.2	72.6	64.3	55.1
10:45	64.5	85.8	65.5	55.7
11:00	62	74.4	65.2	55.7
11:15	61.4	73.3	64.4	55.6
11:30	62.5	78	65.7	55.8
11:45	62	70.8	65.2	56.1
12:00	62.1	72.4	65.1	55.4
12:15	61.7	72	64.7	55.9
12:30	63.2	72	65.7	57.6
12:45	61.1	68.1	64.6	54.9
13:00	63	71.3	66.6	56.6
13:15	63.5	82.9	66.3	56.4
13:30	61.9	74	65	54.7
13:45	62	72.9	65.2	55.8
14:00	61.8	74.2	65.1	55.3
14:15	61.6	73.6	65	54.8
14:00	61.7	75.4	64.8	55.1
14:45	60.5	71.4	64.1	53.5
15:00	62.1	82.3	64.7	55.4
15:15	61.2	72	64.4	54.6
15:30	64.5	80.8	65.3	53.7
15:45	63.1	85	65.6	55
16:00	61.8	72.6	65.2	54.4
16:25	62.1	88.6	65.8	54.8
16:40	62.2	80.8	65.7	53.9
16:55	61.7	74	65.2	54

17:10	63.7	85.3	66.5	55.8
17:25	62.6	85.5	65.7	55.6
17:40	61.8	77	65.5	53.6
17:55	61.9	75.8	65.4	54.7
18:10	61.4	71.9	65.1	54.4
18:25	62	73.3	65.4	54.4
18:40	61.1	70.7	64.2	54.6
18:55	61.1	74.9	65.2	53.3
19:10	62	77.3	65.3	53.8
Average	$L_{Aeq,1h}=62$	$L_{AMax,1h}=80$	$L_{AF10,1h}=65$	$L_{AF90,1h}=55$

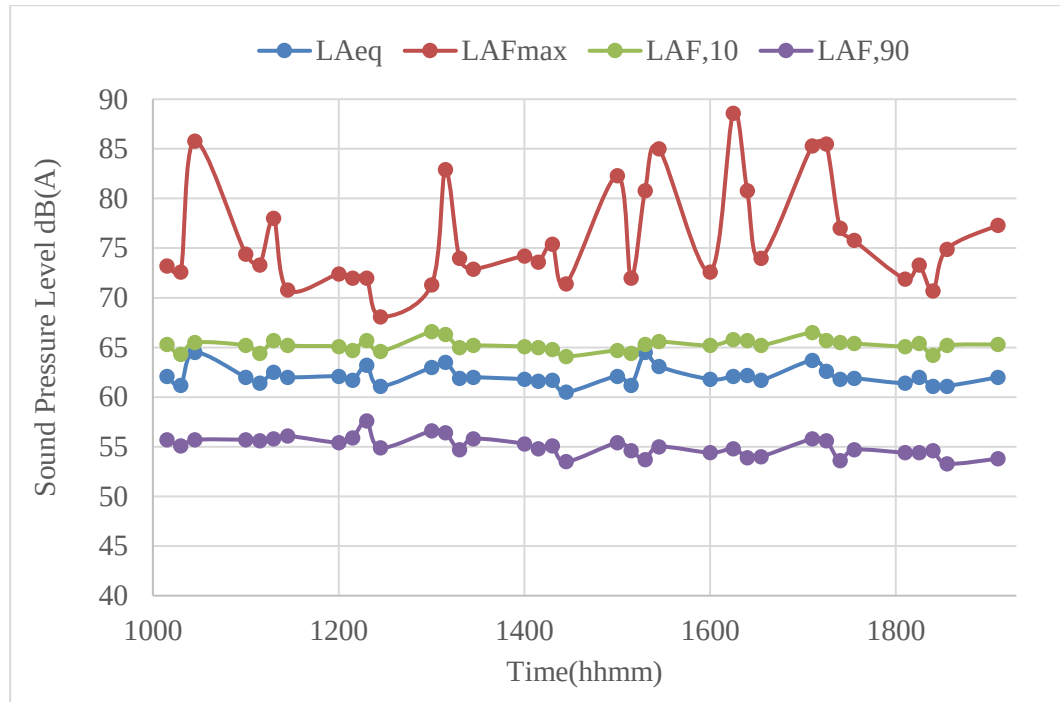


Figure 1: Day Sound Pressure Levels measured at the site.

5.1.1.1 Objective method to determine noticeable characteristics

Section B.2.1.1 of BS4142:2014+A1:2019 states “Establish whether standing waves/interference patterns are present by considering the nature of the source and the influence of any nearby sound reflecting surfaces. This can be carried out subjectively by listening in several places around the measurement location, or by measuring any change in sound pressure levels with a sound level meter at different locations in the immediate locality when traversing the measurement location”. Section 9.3 of BS 4142:2014+A1:2019 states that if the subjective method is not sufficient for assessing the audibility of tones in sound or the prominence of impulsive sounds, use the one-third octave method in 9.3.2.

Annex C of BS 4142:2014+A1:2019 states that the test for the presence of a prominent, discrete-frequency spectral component (tone) typically compares the $L_{Zeq,T}$ sound pressure level averaged over the time when the tone is present in a one-third-octave band with the time-averaged linear sound pressure levels in the adjacent one-third-octave bands. For a prominent, discrete tone to be identified as present, the time-averaged sound pressure level in the one-third-octave band of interest is required to exceed the time-averaged sound pressure levels of both adjacent one-third-octave bands by some constant level difference.

The level differences between adjacent one-third-octave bands that identify a tone is:

- 15 dB in the low-frequency one-third-octave bands (25 Hz to 125 Hz);
- 8 dB in the middle-frequency one-third-octave bands (160 Hz to 400 Hz); and

- **5 dB in the high-frequency one-third-octave bands (500 Hz to 10 000 Hz).**

The proposed extractor fan system is a brand-new system. Therefore, no acoustic features (tonality, impulsivity, and intermittency) are expected from the new extractor fan system.

5.1.2 Night noise levels

The site is closed for business after 19:00. Therefore, there will not be any noise from the site during night-time. Therefore, night noise levels were not measured.

5.2 Observation

Attended environmental noise measurements were carried out at the site. Observations and detailed notes were made of the significant noise sources, which contribute to each of the measured levels.

Road traffic noise: Road traffic noise from Peppard Road and Kidmore End Road was audible at the monitoring locations and it was subjectively loud during the measurements. Road traffic noise was the dominant noise at the noise monitoring locations.

People noise: The noise from people walking by the site and noise from customers of Coral was audible at measurement location but it was not subjectively loud during the measurements.

Site sound sources: The noise from sound sources of the site was not audible at measurement location.

Neighbourhood sound sources: The noise from mechanical units of neighbour shops was not audible at measurement location.

Airplane noise: The noise from airplanes was audible at measurement location. However, it was not subjectively loud during the measurements.

Sirens noise: The noise from police and ambulance sirens was audible at measurement location and it was subjectively loud during the measurements.

5.3 Uncertainty

The levels of uncertainty in the data and calculations are low given the robust measurements undertaken in noise monitoring and the confidence in the data statistical analysis.

6. Noise Impact Assessment

6.1 BS4142:2014 + A1:2019

BS4142:2014+A1:2019 provides guidance on the assessment of the likelihood of complaints relating to noise from industrial sources. The key aspects of the BS4142:2014+A1:2019 are summarised below. The standard presents a method of assessing potential noise impact by comparing the noise level due to industrial sources (the Rating Level) with that of the existing background noise level at the nearest noise sensitive receiver in the absence of the source (the Background Sound Level). The Specific Noise Level - the noise level produced by the source in question at the assessment location - is determined and a correction applied for certain undesirable acoustic features such as tonality, impulsivity or intermittency. The corrected *Specific Noise Level* is referred to as the *Rating Level*.

The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs.

- a) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- b) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- c) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.
- d) Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

BS4142:2014+A1:2019 criteria are given below.

Difference between the rating level and the background level	Assessment (All dependant on the context)
Around 10 dBA or more	<i>Indicates a significant adverse impact</i>
Around 5 dBA	<i>Indicates an adverse impact</i>
Below 5 dBA	<i>Lower the adverse impact</i>
Below 0 dBA	<i>Low adverse impact likely</i>

6.2 BS8233:2014 Noise Assessment Criteria

For desirable internal and external noise levels to be maintained, given in BS8233:2014 as:

- 35dB $L_{Aeq,16hr}$ within living rooms (07:00 – 23:00).
- 30dB $L_{Aeq,8hr}$ within bedrooms (23:00 – 07:00).
- 45dB L_{Amax} should not be regularly exceeded within bedrooms (23:00 – 07:00).
- <55dB $L_{Aeq,16hr}$ within external amenity spaces.

6.3 Assessment

6.3.1 Day noise impact

Specific noise level from the proposed extractor fan is 30dB(A) at discharge of the extractor fan as calculated in **Appendix B**. No tonality and impulsivity are expected from proposed extractor fan unit. Therefore, the rating levels $L_{Aeq,Tr,1h}$ are equal to the specific noise levels.

6.3.2 Night noise impact

The site is not open for business during night-time. Therefore, specific noise levels from the proposed extractor fan for night-time are not considered.

6.4 Distance attenuation

The noise sensitive receptors to noise sources were noted to be windows of first floor flat of 225 Peppard Road, Emmer Green, Reading, RG4 8TS. The noise levels at window of the noise sensitive receptors can be predicted using outdoor sound propagation equation given below.

$$L_{Aeq,Tr} - L_{Receptor} = 20 \log \left(\frac{r_2}{r_1} \right)$$

- Distance attenuation at 2m (window of first floor of 225 Peppard Road, Emmer Green, Reading, RG4 8TS) from the discharge of the extractor fan is 6dB(A) using a 1 metre distance from the noise source.
- Distance attenuation at 7m (window of first floor of 1 Kidmore End Road, Reading RG4 8SD) from the discharge of the extractor fan is 16.9dB(A) using a 1 metre measurement distance from the noise source.

6.5 Barrier attenuation

Screening of the noise units to prevent line of sight to the sound source would reduce noise levels at the receivers. *Theory of outdoor sound propagation suggest that if the line-of-sight is significantly cut by a barrier/wall then a 10dB(A) reduction can be expected. If the line-of-sight is just cut by a barrier/wall, then a 5dB(A) reduction might be expected.*

6.6 Sound Insulation

6.6.1 Sound Insulation Assessment

The first floor flat above the site is used for residential purpose. A visual inspection of the building and shop was conducted. Sound insulation performance of the proposed ceiling scheme is given in **Appendix C**. The Approved Document E states that “The scheme shall achieve a minimum airborne sound insulation value of 43dB(A) ($D_{nTw} + C_{tr}$ dB) for all floors. All works, which form part of the approved scheme, shall be completed before the use commences”. $D_{nT,w}$ is the standardised level difference measured on-site.

With the regard to noise emanating from the shop to noise sensitive flat above the site, BS 8233:2014 states “Airborne sound insulation is mainly considered for intermediate floors between spaces containing either noise sources or noise-sensitive occupants. For a ground floor where there is

neither an appreciable noise source nor a noise-sensitive occupant below the floor, the floor is only of interest if it could contribute to flanking transmission”.

It is predicted that the highest internal ambient noise level generated inside seating area of proposed shop will be 85dB(A) during busiest times of operation. This specific internal ambient noise level is considered for worst-case noise level in the shop.

The assessment based on the predictions, using the properties of proposed multi-layer ceiling as showing in Figure 2, has demonstrated that the sound insulation value of multi-layer ceiling scheme is significant. Proposed multi-layer ceiling scheme will reduce noise level by 57dB(A) that is higher than required minimum sound insulation value of 43 dB(A) which is set by Approved Document E. This will contain noise from the private dining areas and non-dining areas within the premises. See the details of the prediction method given in **Appendix C**.

To control the transfer of noise from the shop to the flat above the site, a multi-layer ceiling build up shown in Figure 2 is suggested. Existing air cavity filled with mineral wool quilt, timber batten, and existing plasterboard should be covered using 30 mm acoustic dense plasterboard. Multi-layer ceiling should be finished with 20mm fire rated dense plasterboard.

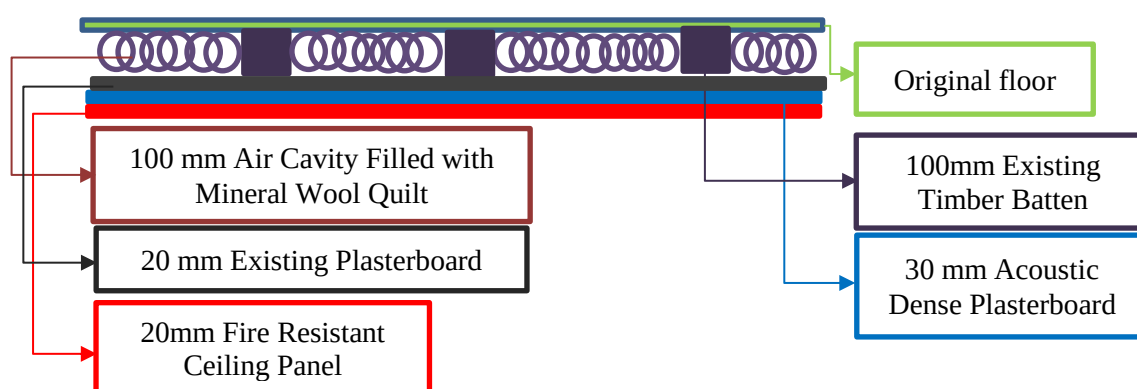


Figure 2: Suggested multi-layer ceiling scheme for additional sound insulation.

6.6.2 Sound insulation assessment outcome

It is determined that by applying the mitigation as specified above for the building’s ground floor (shop) ceiling, the outcome summarised in the following Table 4 is achieved.

Table 4: Noise Assessment Outcome

Internal Space	Noise Parameter	Internal Noise Level	BS8233 Limit	Within Desirable Limit (BS8233)
Flat above the shop (Living Room)	Daytime $L_{Aeq,16hr}$ (dB)	28	35	Yes
External Space (225 Peppard Rd)	Noise Parameter	External Noise Level	BS8233 Limit	Within Desirable Limit (BS8233)
Rear Garden	Daytime $L_{Aeq,16hr}$ (dB)	8	55	Yes
Balcony	Daytime $L_{Aeq,16hr}$ (dB)	21	55	Yes

6.7 BS41424142:2014 + A1:2019 Assessment for nearest noise sensitive receptors

6.7.1 First floor flat (225 Peppard Road)

The predicted Rating Level $L_{Aeq,Tr}$ at the receptor is 34dB(A) below background noise level at the first-floor window level of noise sensitive receptor for day as calculated in table below. In accordance with BS 4142:2014+A1:2019 guidance and criteria, **the rating level does not exceed**

the background sound level. This is an indication of the specific sound source having a low adverse impact (low adverse impact likely).

BS4142:2014+A1:2019 Assessment- Daytime	dB(A)
Specific Sound Level	30
Characteristic penalty	0
Façade correction	-3
Distance attenuation at 2m	-6
Line-of-site cut (barrier attenuation)	0
Rating Level at receptor point	21
Daytime background level, L_{A90}	55
Difference between rating level and background level	-34

6.7.2 First floor flat (1 Kidmore End Road)

The predicted Rating Level $L_{Aeq,Tr}$ at the receptor is 39.9dB(A) below background noise level at the first-floor window level of noise sensitive receptor for day as calculated in table below. In accordance with BS 4142:2014+A1:2019 guidance and criteria, ***the rating level does not exceed the background sound level. This is an indication of the specific sound source having a low adverse impact (low adverse impact likely).***

BS4142:2014+A1:2019 Assessment- Daytime	dB(A)
Specific Sound Level	30
Characteristic penalty	0
Façade correction	-3
Distance attenuation at 7m	-16.9
Line-of-site cut (barrier attenuation)	0
Rating Level at receptor point	10.1
Daytime background level, L_{A90}	55
Difference between rating level and background level	-39.9

6.7.3 External amenity of first floor flat (225 Peppard Road)

BS8233:2014 provides a desirable guideline of 50dB $L_{Aeq,16hr}$ for external amenity spaces and an acceptable guideline of 55dB $L_{Aeq,16hr}$ for noisier environments.

Nearest external amenity spaces are rear balcony and rear garden of first floor flat, **225 Peppard Road**, which are approximately 2m and 9m from the discharge of mechanical noise unit respectively. The predicted daytime Rating Levels $L_{Aeq,Tr}$ at the external amenity space are 21dB(A) at the balcony, and 8dB(A) at the rear garden as calculated in table below. Therefore, Rating Level $L_{Aeq,Tr}$ at the external amenity space is in the desirable category of BS8233:2014 <55dB $L_{Aeq,16hr}$ within external amenity spaces.

BS8233:2014 Assessment- Daytime	dB(A)	
	Balcony	Garden
Specific Sound Level	30	30
Façade correction	-3	-3
Distance attenuation (distance between the flue of the source and nearest amenity side)	-6	-19
Line-of-site cut is just cut by cold room façade	0	0
Rating Level at external amenity space	21	8

7. Vibration

In addition to the control of airborne noise transfer, it is important to consider the transfer of noise as vibration to adjacent properties as well as any sensitive areas of the same building. Proposed extractor fan unit will be installed with proper vibration dampening connections and with rubber anti-vibration mounts with extractor fan mounting feet and flanges to back wall of the site and to rear roof of the ground floor of the site. Vibration isolation products provide high levels of reduction in vibration. No vibration from brand new extractor fan unit is expected. There will not be any structural borne noise from the mechanical units.

8. Conclusion

An environmental noise survey was undertaken at the site in order to determine prevailing day noise levels that are representative of the nearest noise sensitive neighbouring residential receivers. A BS4142:2014+A1:2019 noise assessment was carried out at the site. All worst-case situations were considered for the assessment.

The summary of the difference between the Rating Level and Background Noise Level of noise sensitive receptors is given in table below.

Noise sensitive receptor	Difference between The Rating Level and Background Level
	Day
225 Peppard Road (window of first floor flat)	– 34dB(A)
1 Kidmore End Road (window of second floor flat)	– 39.9dB(A)

In accordance with BS4142:2014+A1:2019 guidance, the day Rating Level $L_{Aeq,Tr}$ at nearest noise sensitive receptors do not exceed the background sound level $L_{A90,T}$ as shown in Table above. Therefore, the operation of the proposed extractor fan indicates the specific sound source having a low adverse impact during daytime.

The predicted daytime Rating Levels $L_{Aeq,Tr}$ at the external amenity space are 21dB(A) at the balcony, and 8dB(A) at the rear garden of 225 Peppard Road. Therefore, the Rating Level $L_{Aeq,Tr}$ at the external amenity space does not exceed 50 dB $L_{Aeq,16hr}$ of desirable category of BS8233:2014.

It can be confirmed that the Rating Levels $L_{Aeq,Tr}$ of the proposed extractor fan is expected to comply with BS4142:2014+A1:2019 guidance and are within the standard values set out by the Reading Borough Council.

A rigorous calculation method that is given in BS8233: 2014 was applied to determine external noise levels of the proposed function room above the shop by using predicted internal noise level 85dB(A) in the shop, measured environmental noise levels, and suggested multi-layer sound insulation scheme for the ceiling. Calculations show that the proposed multi-layer sound insulation scheme will reduce noise level by 57dB(A) for the ceiling. The sound insulation scheme achieves minimum airborne sound insulation value of 43 dB(A) ($D_{nTw} + C_{tr}$) which is set by Approved Document E.

In accordance with BS8233:2014 guidance; the predicted daytime internal noise level in the flat above the shop is 28 dB(A) $L_{Aeq,16hr}$ and it is within the desirable category of 35 dB(A) for living rooms and 30 dB(A) for bedrooms.

9. References

- BS4142:2014+A1:2019 “Methods for rating and assessing industrial and commercial sound”.
- BS8233:2014 “Guidance on sound insulation and noise reduction for buildings”.

10. Appendixes

10.1 Appendix A: Acoustic terminology

Parameter	Description
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing (20×10^{-6} Pascals).
Ambient noise level	The totally encompassing sound in a given $L_{Aeq,T}$ situation at a given time, usually composed of sound from many sources near and far.
Background noise level	The A-weighted sound pressure level of the $L_{A90,T}$ residual noise at the assessment position exceeded for 90% of a given time interval T, measured using the fast response and reported to the nearest whole dB.
Rating level $L_{Ar,T}$	The specific noise level plus any adjustment for the characteristic features of the noise.
Residual noise level	The ambient noise level at the assessment $L_{Aeq,T}$ position in the absence of the noise source under investigation.
Specific noise level	The equivalent continuous A-weighted noise $L_{Aeq,T}$ level produced by the source over a given reference time interval.
$L_{Aeq,T}$	The A-weighted equivalent continuous noise level over the time period T (typically T= 16 hours for daytime periods, T = 8 hours for night-time periods). This is the sound level that is equivalent to the average energy of noise recorded over a given period.
$L_{n,T}$	The noise level exceeded for n% of the time over a given period T. e.g., L90, the noise level exceeded for 90% of the time (background noise) level.
L_{Max}	The maximum noise level measured.
$L_{eq,ff}$	The equivalent continuous sound pressure level outside the room elements under consideration
A_0	A reference absorption area of 10 m ² and is independent of frequency;
S_f	The total facade area in square metres (m ²) of the room in question;
S_{wi}	The area in square metres (m ²) of the windows of the room;
S_{ew}	The area in square metres (m ²) of the external wall of the room;
S_{rr}	The area in square metres (m ²) of the ceiling of the room
S	The total area in square metres (m ²) of elements through which sound enters the room, i.e. $S_f + S_{rr}$;
$D_{n,e}$	The insulation of the trickle ventilator measured according to BS EN ISO 10140;
R_{wi}	The sound reduction index (octave band value) of the window (see Annex C BS EN ISO 10140)
R_{ew}	The sound reduction index (octave band value) of the external wall (see Annex C BS EN ISO 10140);
R_{rr}	The sound reduction index (octave band values) of the roof/ceiling (see Annex C BS EN ISO 10140);
A	The equivalent absorption area of the receiving room being considered (see Annex C BS EN ISO 10140);
3	A correction factor

10.2 Appendix B: Calculation of sound pressure level of the fan unit and its details.

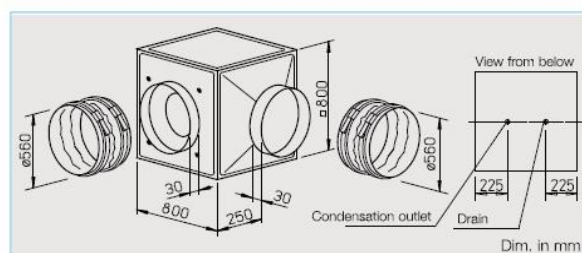
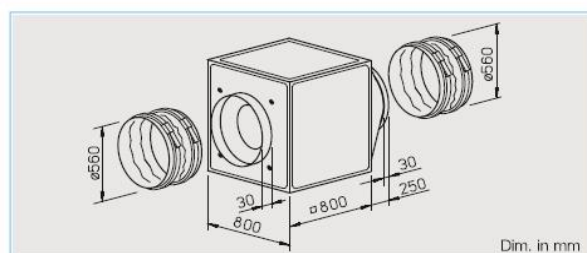
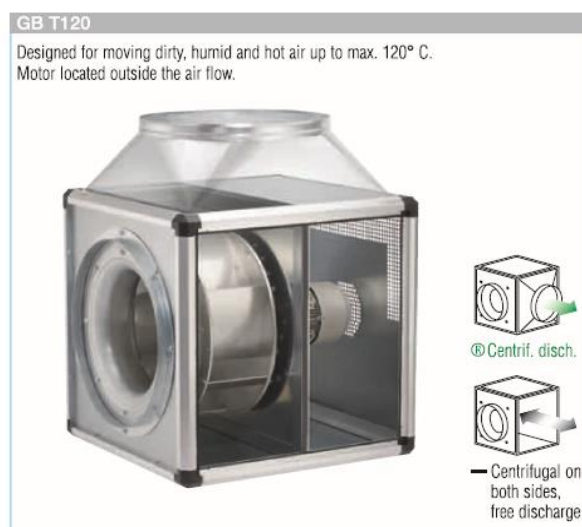
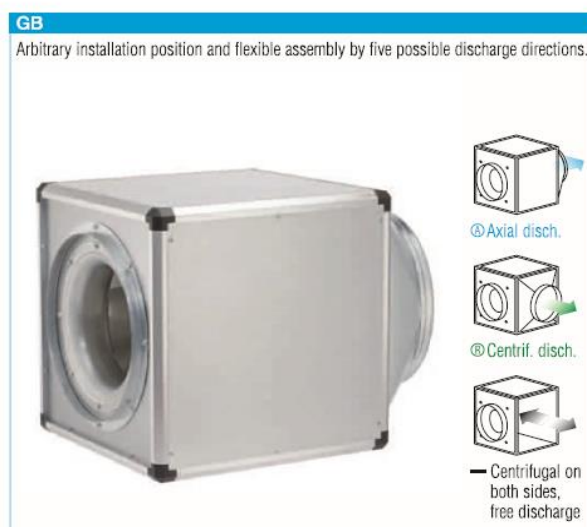
Sound pressure level of the extractor fan unit using 1m from the façade are calculated using the equation given below and the results are given in the table below.

$$L_P = L_W - 20\log(r) - 11 - L_{\text{Attenuator}} - L_{\text{Ducts}} - L_{\text{Bends}}$$

Fan noise	125Hz	250Hz	500Hz	1kHz	2kHz	Overall dB(A)
Exhaust L_W dB(A)	71	73	76	77	74	
Attenuator dB(A)	-16	-25	-42	-50	-50	
Attenuation for straight ducts	-10	-5	-3	-2	-2	
Attenuation for bends	-5	-8	-4	-3	-3	
L_P dB(A) 1m from the façade using the equation given above	29	24	16	11	8	30

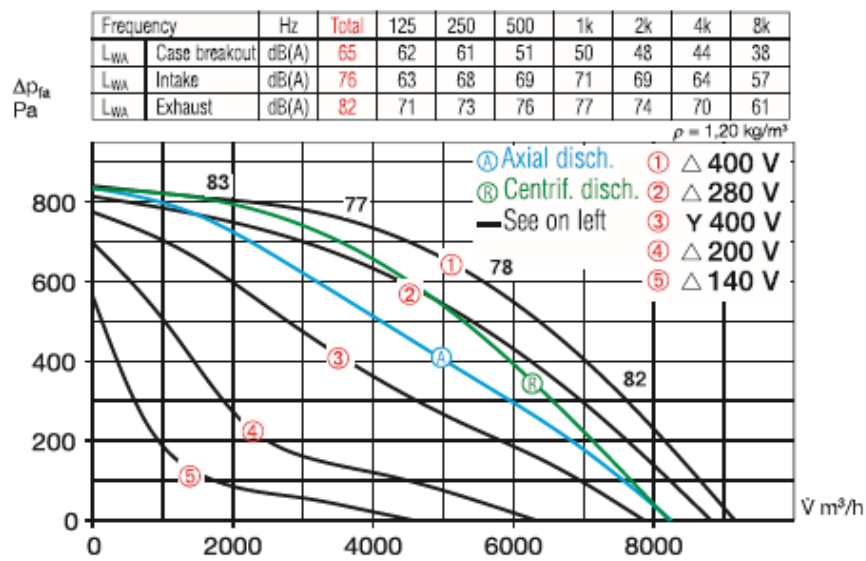
560 mm ø GigaBox centrifugal fan

Helios



Type	Ref. no.	Air flow volume (FID)	R.P.M.	Sound press. case breakout	Motor power (nominal)	Full load	Current speed controlled	Wiring diagram	Maximum air flow temperature	Weight (net)	5 step transformer controller with mot. protect. unit	Full motor protection unit using the thermal contacts
		m^3/h	min^{-1}	dB(A) in 4 m	kW	A	A	No.	+°C	kg	Type Ref. no.	Type Ref. no.
1 Phase motor, 230 V / 1 ph. / 50 Hz, capacitor motor, protection to IP 54												
GBW 560/4	5508	9123	1409	45	1.83	7.93	10.4	867	45	92	MWS 10 1946	TSW 10 1498 MW ¹⁾ 1579

GBW 560/4



R02 Rectangular Silencers



R02 - 2 - Attenuator

Available in seven standard lengths R02 2 Rectangular Duct Mounted Silencers have excellent attenuation properties, achieved with sound absorbing infill splitters, retained in the attenuator casing by a perforated liner. The resistance to airflow is a function of the face velocity and length. It is not recommended to select the R02 2 Silencers with a face velocity above 2.5 metres per second without asking advice regarding re-generated self noise. We can advise on the selections and can perform system analysis to ensure the correct unit is specified.

- High performance rectangular duct silencer
- Seven standard lengths
- Many connection options
- Cross section dimensions in 1mm increments
- System pressure within ducted systems to 1500 Pa
- Special lengths on request



Insertion Loss (dB) - Centre Band Frequency

Product Code	Length (mm)	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
R02 - 2 - 600	600	7	12	20	31	39	40	38	27
R02 - 2 - 900	900	9	16	25	42	50	50	50	41
R02 - 2 - 1200	1200	11	20	20	50	50	50	50	48
R02 - 2 - 1500	1500	13	24	25	50	50	50	50	50
R02 - 2 - 1800	1800	15	30	20	50	50	50	50	50
R02 - 2 - 2100	2100	16	33	25	50	50	50	50	50
R02 - 2 - 2400	2400	7	38	20	50	50	50	50	50

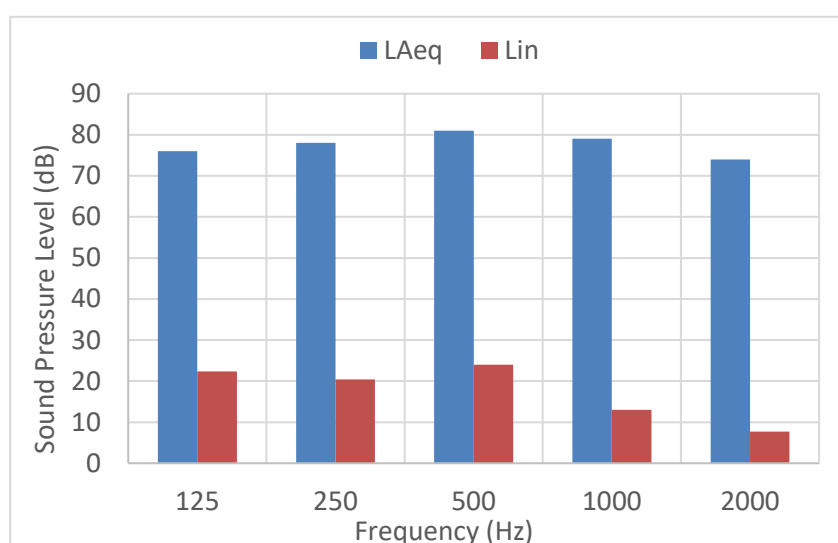
Insertion loss data is derived from continual testing to BS4718 and other standards in independent UKAS certified laboratories, which includes where appropriate, re-generated or self noise testing in both forward and reverse flow conditions. If you request system analysis from our technicians all predictions will be assessed using the relevant certified insertion loss data together with relevant dynamic corrections.

10.3 Appendix C: BS8233:2014 Specification Calculations / Construction Details

BS8233: 2014 Specification Calculation Summary;

FLOOR/CEILING between first flat and shop

		Sound Insulation Properties					
Room Width (m)	4.7	Frequency, Hz	125	250	500	1k	2k
Room Depth (m)	8.5	Wall, $R_{w,Ctr}$ (dB)	48	53	53	62	62
Room Height (m)	2.7	Shop Ceiling, $R_{w,Ctr}$ (dB)	48	53	53	62	62
Glazed Area (m ²)	6	Glazing, $R_{w,Ctr}$ (dB)	27	29	36	41	52
Is dwelling on top floor?	Yes	Vents, $D_{new,Ctr}$ (dB)	42	43	43	49	64



External Level (Inside first flat floor) L_{Aeq} 28 dB

Internal Level (shop) L_{Aeq} 85 dB

Insertion Loss L_{Aeq} 57 dB

Sound Insulation Requirement

Minimum Sound Insulation Requirement Approved Document E			Suitable Systems
Ceiling/Floor	43	dB ($D_{nTw} + C_{tr}$)	Original floor of the flat, 100 mm Mineral Wool Quilt, Existing Plasterboard, 30mm Acoustic Dense Plasterboard, 20mm Fire Resistant Floating Panel.

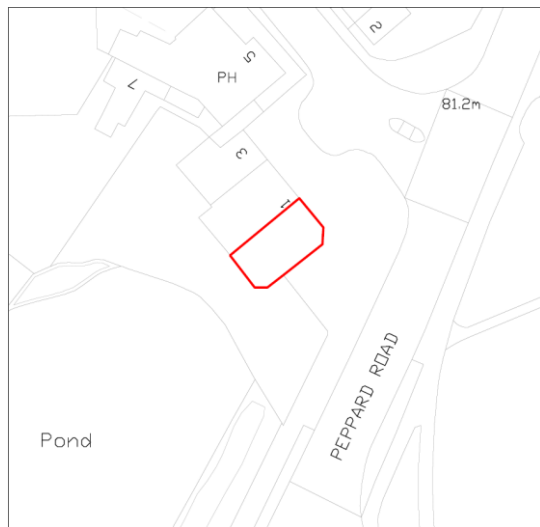
Transmission coefficients					
Frequency, Hz	125	250	500	1k	2k
Vents	0	0	0	0	0
Glazing	0	0	0	0	0
Wall	0	0	0	0	0
Ceiling (Shop)	1.58489E-05	5.01E-06	5.01E-06	6.31E-07	6.31E-07
Internal/Shop, L_{Aeq} (dB) A	76	78	81	79	74
External (inside flat), L_{Aeq} (dB) A,	22	20	24	13	8

Calculations are conducted in accordance with BS8233: 2014 rigorous calculation method:

$$L_{eq,z}=L_{eq,ff} + 10\log\left(\frac{A_0}{S} 10^{\frac{-D}{10}} + \frac{S_{wi}}{S} 10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S} 10^{\frac{-R_{rr}}{10}}\right) + 10\log\left(\frac{S}{A}\right) + 3$$

10.4 Appendix D: Measurement set-up and images

Measurement set-up and images of equipment used for environmental noise survey are given below.



Proposed Ground Floor Plan

