
**The Boiler Room
222 Burton Road, Manchester**

Noise Assessment Report

Project: The Boiler Room, 222 Burton Road, Manchester

Client: Colin Lowes

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Contents

Section	Page
1. Introduction	4
2. Assessment Guidance & Criteria	5
Manchester City Council, Planning & Noise (Technical Guidance)	5
British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound	5
Building Regulations 2010: Approved Document E	5
British Standard 8233:2014: Guidance on sound insulation and noise reduction for buildings	6
3. Environmental Noise Survey	7
Survey methodology	7
Results summary	7
4. Assessment & Discussion	8
Sound level targets for new building services plant	8
Kitchen extract fan details and nearest noise sensitive receptors	8
Resulting extract fan sound levels at neighbouring dwellings	9
Noise transmission through the separating party walls	10
5. Conclusion	14
 List of Tables, Figures & Appendix	
Table 2.1 – Indoor ambient noise levels for dwellings	6
Table 3.1 – Summary of measured background L_{A90} sound pressure levels at the rear elevation	7
Table 4.1 – Sound level targets for the kitchen extract system	8
Table 4.2 – Measured sound pressure levels within kitchen space (dB)	11
Table 4.3 – Measured sound pressure levels within ground floor bar area (dB)	11
Figure 3.1 – Site location and survey measurement positions	7
Figure 4.1 – Photograph showing kitchen extract ductwork and flue	8
Figure 4.2 – Predicted sound insulation of existing separating wall	10
Figure 4.3 – Predicted sound insulation of acoustically enhanced separating wall	12
Figure 4.4 – First floor layout showing wall area to be acoustically enhanced	13
Appendix A - Assessment terminology	15

1. Introduction

- 1.1 RS Acoustic Engineering Ltd has been appointed by Mr Colin Lowes to undertake a noise impact assessment with regard to The Boiler Room, No.222 Burton Road, Manchester, M20.
- 1.2 Planning permission was granted for the bar/restaurant via an appeal on the 19th June 2020 (appeal ref: APP/B4215/C/19/3242449).
- 1.3 An assessment of noise from the kitchen extract system has been undertaken and an assessment of noise transmission to the neighbouring properties via the separating party wall has also been undertaken. Recommendations have been provided regarding acoustically enhancing the existing construction.
- 1.4 The premises operating hours are understood to be 16:00 to 23:00 hours Monday to Wednesday, 11:00 to 23:00 hours on Thursday, 11:00 to 01:00 hours Friday and Saturday and 11:00 to 23:00 hours on a Sunday.
- 1.5 The operating hours of the kitchen extract system are approximately 10:30 to 21:00 hours.
- 1.6 There are commercial properties on either side of the premises at ground floor level and there is a flat at first floor level on either side of the property (No's.220 and 224 Burton Road).
- 1.7 The dominant source of background noise at the site was observed to be road traffic on Burton Road. Other noted sources include intermittent activity from neighbouring commercial premises, noise from building services plant and passing pedestrians.
- 1.8 An external and internal noise survey has previously been conducted by Lighthouse Acoustics (report ref: 0302/APR1, dated 16 April 2018) in order to determine the typical external background sound level and internal ambient sound level during the premises operating hours.
- 1.9 Sample noise measurements have been conducted with the kitchen extract system operating. The measured sound pressure levels have been used to determine the resulting sound level at neighbouring dwellings.
- 1.10 The assessment has been undertaken taking into consideration the guidance given within British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*.
- 1.11 The site visit and assessment was conducted by Mr Ryan Swales (BSc(Hons), MIOA), Principal Acoustic Consultant and Corporate Member of the Institute of Acoustics.
- 1.12 This report provides the survey results, details of the kitchen extract system, calculated sound levels at neighbouring dwellings, anticipated impact and recommendations regarding acoustic treatment to the party wall construction.

2. Assessment Guidance & Criteria

Manchester City Council, Planning & Noise (Technical Guidance)

- 2.1 With regard to noise from fixed plant and equipment, Manchester City Council's guidance document states the following:

'Any noise assessment needs to consider not only the overall level of noise emitted but also its particular characteristics. The noise assessment should be based on BS 4142:2014 and any application for fixed plant, equipment or machinery must demonstrate that:

Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5 dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location'.

British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

- 2.2 BS 4142 (amended June 2019) describes methods for rating and assessing sound of an industrial and/or commercial nature, such as sound from manufacturing processes and fixed mechanical plant/machinery.
- 2.3 Outdoor sound levels are used to assess the likely effect on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.
- 2.4 BS 4142 is not intended to be applied to the derivation of indoor sound levels arising from sound levels outside, or the assessment of indoor sound levels.
- 2.5 The standard has three different methods (subjective, objective and reference) of applying a penalty to tonal, impulsive and intermittent noises, as separate entities.
- 2.6 The current standard no longer indicates significance of noise impacts as giving rise to a '*likelihood of complaint*' but rather as an '*indication*' of varying degrees of '*adverse impact*'.
- 2.7 BS 4142:2014 states that a difference of around +10 dB or more (excess of rating level above the background sound level) is likely to be an indication of a significant adverse impact, depending on the context.
- 2.8 A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- 2.9 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.
- 2.10 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.

Building Regulations 2010: Approved Document E

- 2.11 The Building Regulations 2010, Approved Document E: '*Resistance to the passage of sound*', provides minimum sound insulation performance standards for separating party floor and wall constructions between adjacent dwellings (houses and flats).
- 2.12 With regard to separating party floors and walls, a minimum airborne performance of 45 dB $D_{nT,w}+C_{tr}$ applies to new-build dwellings and 43 dB $D_{nT,w}+C_{tr}$ applies to existing buildings (e.g. undergoing a material change of use).

- 2.13 It should be noted that minimum sound insulation values are not given within Approved Document E where the adjacent/neighbouring property is a commercial unit (due to the multitude of potential uses).
- 2.14 In such circumstances, it is typical for an acoustic consultant to determine an appropriate level of sound insulation for the property.

British Standard 8233:2014: Guidance on sound insulation and noise reduction for buildings

- 2.15 BS 8233 provides guidance regarding acoustic criteria and noise levels appropriate for various types of space that have different functions.
- 2.16 With regard to dwellings, appropriate internal ambient noise levels are given for bedrooms, living rooms and dining rooms (habitable rooms). The guidelines take into consideration the effect of internal noise levels on sleep and also the effect of noise levels on resting, listening and communicating.
- 2.17 BS 8233 recommends the following internal ambient noise levels for dwellings.

Table 2.1 – Indoor ambient noise levels for dwellings

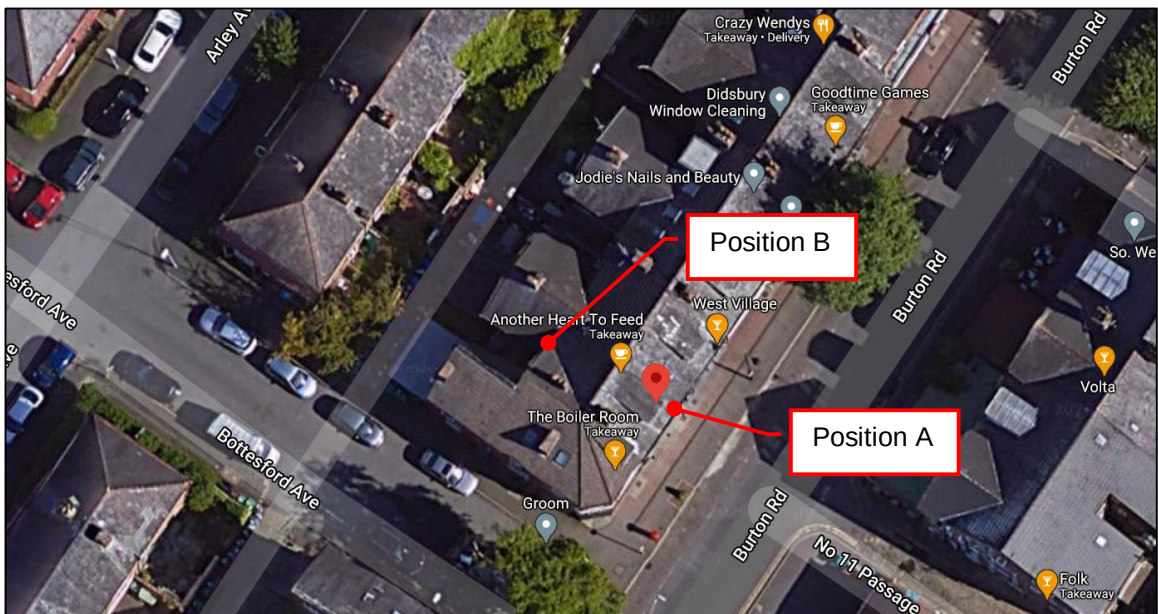
Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	---
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	---
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

3. Environmental Noise Survey

Survey methodology

- 3.1 An environmental noise survey has been previously undertaken at the site by Lighthouse Acoustics.
- 3.2 Continuous sound level monitoring was conducted at the front and rear elevation between 13:00 hours on Friday 2nd through to 10:00 hours on Monday 5th March 2018. The microphone was positioned out of a 1st floor window at both positions.
- 3.3 A measurement interval of 15 minutes was used throughout the survey and measurements were considered to be subject to reflections from the building elevation (as opposed to free-field).
- 3.4 The site location and survey measurement positions are shown in Figure 3.1 below.
- 3.5 Further survey details can be found within the noise assessment report dated 16th April 2018.

Figure 3.1 - Site location and survey measurement positions (Source: Google Earth)



Results summary

- 3.6 Table 3.1 presents a summary of the measured background L_{A90} sound pressure levels at the rear elevation facing Arley Avenue. Measured values have been rounded to the nearest whole number.
- 3.7 The results presented below have been corrected for reflections from the building elevation by subtracting 3 dB from the measured sound levels in order to obtain free-field sound levels.
- 3.8 The measurement results for the front elevation have been omitted from this report since the kitchen extract ductwork and flue termination are located to the rear of the property.

Table 3.1 – Summary of measured background L_{A90} sound pressure levels at the rear elevation

Position	Period	Lowest Representative Background Sound Level $L_{A90,15min}$ dB
Rear elevation facing dwellings on Arley Avenue (Pos-B)	Daytime (10:30 – 21:00)	47

4. Assessment & Discussion

Sound level targets for new building services plant

- 4.1 Taking into account MCC's requirements, the sound rating level from new building services plant should be at least 5 dB below the typical background sound level.
- 4.2 BS 4142 states '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'.
- 4.3 Taking into consideration the proximity of existing dwellings, it is considered prudent to use the lowest representative background sound level during the proposed operating hours when determining appropriate noise targets.
- 4.4 Table 4.1 presents the appropriate sound level targets for the kitchen extract system. The sound level targets should be achieved directly adjacent to the window of a habitable room.

Table 4.1 – Sound level targets for the kitchen extract system

Period, Hours	Lowest Representative Background Sound Level L _{A90,15min} dB	Target Rating Level L _{Aeq,15min} dB
Daytime (10:30-21:00)	47	42

Kitchen extract fan details and nearest noise sensitive receptors

- 4.5 Figure 4.1 shows the existing kitchen extract ductwork and flue termination on the rear elevation.

Figure 4.1 – Photograph showing kitchen extract ductwork and flue



- 4.6 A number of sample measurements were conducted on Wednesday 21 October 2020 with the extraction system running at typical operating duty. Measurements were conducted externally at approximately 1 metre from the ductwork.

- 4.7 The measurements results indicate a specific sound pressure level of approximately 57 dB $L_{Aeq,60sec}$.
- 4.8 The specific sound pressure level reduces to approximately 54 dB $L_{Aeq,60sec}$ when the speed of the extract fan is reduced to a lower setting.

Dwellings along Arley Avenue

- 4.9 The most sensitive receptors are considered to be the bedrooms on the rear elevations of the dwellings along Arley Avenue. The shortest separation distance is approximately 10 metres from the elevation to the extract ductwork. There is a direct line-of-sight between the habitable rooms and the extract ductwork.

Kitchen to No.220 Burton Road

- 4.10 There is an external door to a kitchen space associated with No.220 Burton Road at first floor level. However, the kitchen space is not considered to be a noise sensitive space when compared to the bedrooms directly opposite on Arley Avenue. In addition, there are two condenser units mounted directly on the external wall to the kitchen which are associated with the bar at ground floor level (West Village).
- 4.11 When operating, the condenser units will be generating continuous noise and vibration which will be audible within the kitchen space and will therefore acoustically mask any noise associated with the extract system. It is assumed that the condenser units are for stock refrigeration and/or air-conditioning purposes.

Dwelling at No.224 Burton Road

- 4.12 There is a flat at No.224 Burton Road at first floor level, directly above a barbers' shop at ground floor level (Groom). The separation distance between the flat window and the kitchen extract system is approximately 7 metres, however the flat window is acoustically screened from the kitchen extract system and therefore the most exposed windows are considered to be those along Arley Avenue.

Resulting extract fan sound levels at neighbouring dwellings

- 4.13 To determine the level of sound attenuation due to distance separation, standard acoustic principals for a point source have been applied.
- 4.14 On this basis, a separation distance of 10 metres provides approximately 20 dB of sound attenuation.
- $20\log(1m/10m) = -20 \text{ dB}$
- 4.15 The resulting specific sound pressure level in this instance is therefore approximately 37 dB $L_{Aeq,60sec}$.
- $57 \text{ dB } L_{Aeq,60sec} - 20 \text{ dB} = 37 \text{ dB } L_{Aeq,60sec}$
- 4.16 Taking into consideration the tonal characteristics of the fan, it is considered appropriate to apply a correction (penalty) of +2 dB with regard to the tonality or characteristics of the noise as experienced at the neighbouring dwellings.
- 4.17 On this basis, the corresponding sound 'rating' level of the extract system is 39 dB $L_{Ar,60sec}$.
- Specific sound level of 37 dB $L_{Aeq,60sec}$ + 2 dB correction = 39 dB $L_{Ar,60sec}$.
- 4.18 When the extract fan is operating, the system runs continuously as opposed to intermittently and therefore a correction for intermittency is not required. On this basis, the operating sound level will remain the same regardless of the measurement period.
- 4.19 The lowest representative background sound level was 47 dB $L_{A90,15min}$ and therefore the applicable noise limit is 42 dB $L_{Aeq,15min}$.

4.20 The extract fan rating level is therefore approximately 8 dB below the measured background sound level and 3 dB below the applicable noise limit.

4.21 With regard to the anticipated noise impact, BS 4142 states:

'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. 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'.

4.22 On this basis, a low to negligible impact is anticipated at neighbouring dwellings due to the operation of the kitchen extract system.

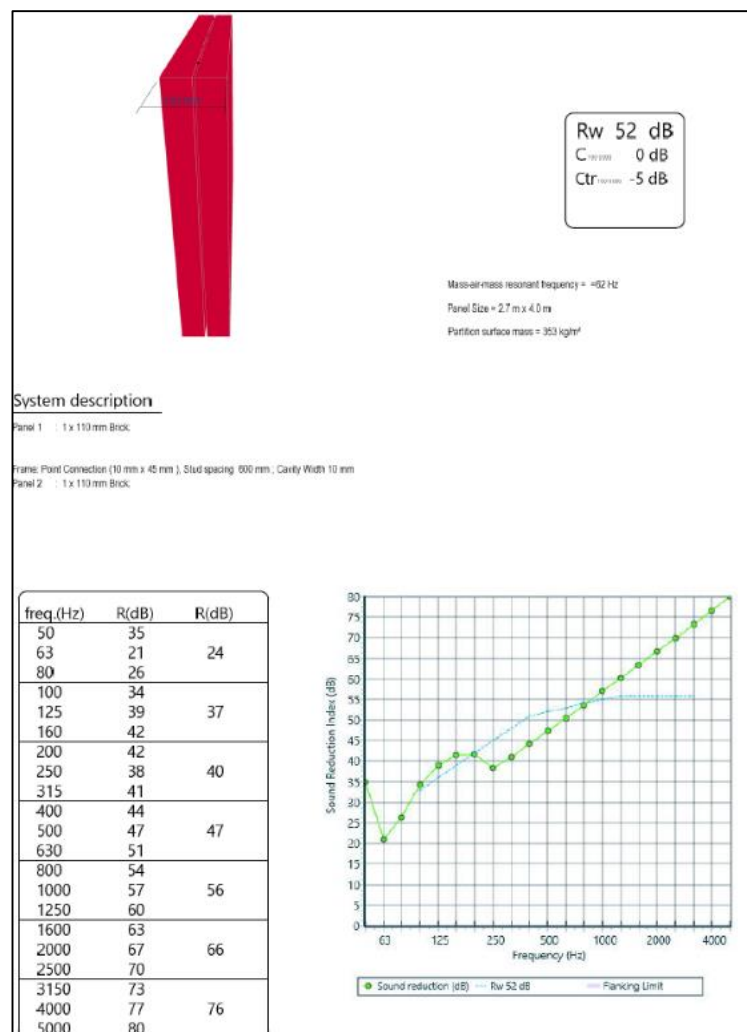
Noise transmission through the separating party walls

4.23 The separating party wall between No.222 and No.220 is a double-leaf brickwork construction with a plaster finish.

4.24 For this assessment, INSUL acoustic prediction software has been used to determine the sound insulation performance of the separating party wall.

4.25 Figure 4.2 presents the prediction results for the existing wall construction.

Figure 4.2 – Predicted sound insulation of existing separating wall



4.26 The prediction results indicate a sound insulation performance of approximately 52 dB Rw.

Party wall adjacent to kitchen space and hallway of No.220 Burton Road

- 4.27 Sample measurements previously undertaken by Lighthouse Acoustics indicate internal sound pressure levels of approximately 70 dB $L_{Aeq,15min}$ within the first floor kitchen space.
- 4.28 The measurement results are presented below in Table 4.2.

Table 4.2 – Measured sound pressure levels within kitchen space (dB)

Octave Band Centre Frequency (Hz)								L_{Aeq}
63	125	250	500	1000	2000	4000	8000	
73	71	64	67	64	61	60	53	70

- 4.29 Taking into consideration the sound insulation performance of the existing wall and the measured internal sound level, the resulting sound level within the adjacent kitchen space and hallway of No.220 is expected to be approximately 25 dB $L_{Aeq,T}$.
- 4.30 The resulting sound level is notably below the recommended guideline noise levels of 30 to 40 dB $L_{Aeq,T}$ for habitable rooms.
- 4.31 On this basis, it is considered unnecessary to acoustically enhance the party wall to the kitchen space and also the wall area which is adjacent to the hallway of No.220 Burton Road.

Party wall adjacent to living room of No.220 Burton Road

- 4.32 The living room to No.220 is situated on the front elevation of the property at first floor level.
- 4.33 The adjacent first floor space of No.222 is an ancillary area that is used for storage.
- 4.34 Sample measurements previously undertaken by Lighthouse Acoustics indicate internal sound pressure levels of approximately 80 to 84 dB $L_{Aeq,15min}$ within the ground floor bar area. However, it should be noted that noise levels within the first floor storage area will be notably lower than those generated within the ground floor bar area and will be of a similar magnitude to those generated within the kitchen space.
- 4.35 Nonetheless, to help provide a robust assessment, the highest sound pressure levels measured within the ground floor bar area have been used to represent the first floor storage space (i.e. worst-case scenario).
- 4.36 The measurement results are presented below in Table 4.3.

Table 4.3 – Measured sound pressure levels within ground floor bar area (dB)

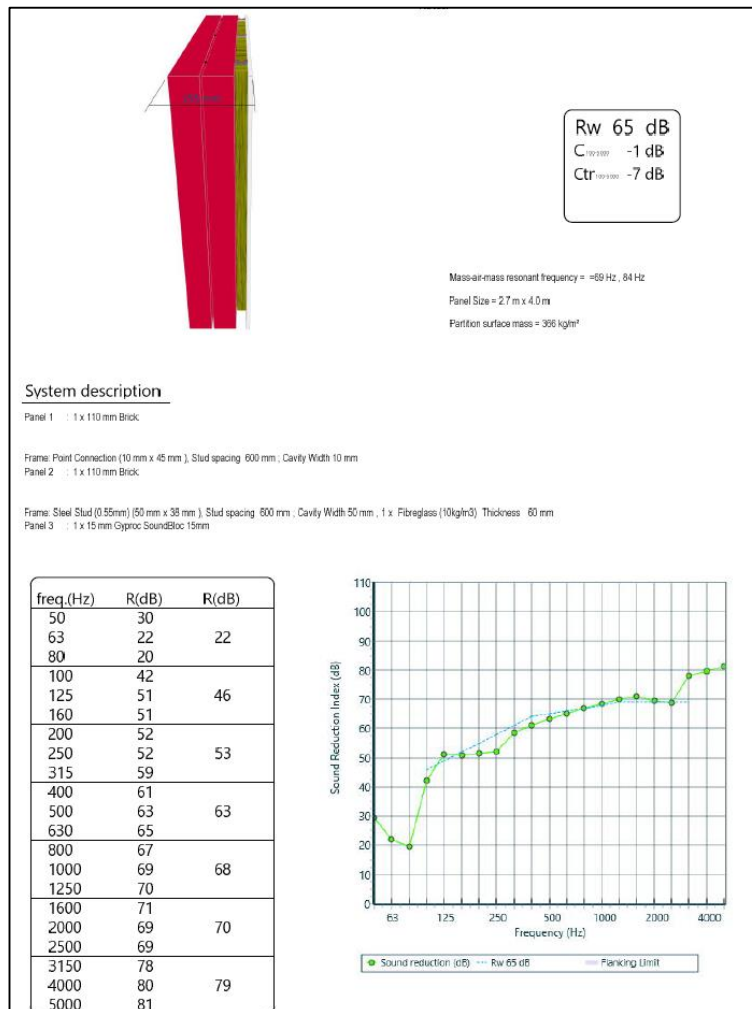
Octave Band Centre Frequency (Hz)								L_{Aeq}
63	125	250	500	1000	2000	4000	8000	
74	77	78	81	82	71	64	53	84

- 4.37 Taking into consideration the sound insulation performance of the existing wall, the resulting sound level within the living room of No.220 is expected to be approximately 35 dB $L_{Aeq,T}$.
- 4.38 The resulting sound level is equal to the recommended daytime noise level for habitable rooms but is 5 dB above the recommended night-time noise level.
- 4.39 On this basis, it is recommended that the separating wall adjacent to the living room of No.220 is acoustically enhanced. Taking into consideration our observations during the site visit, the most practical solution will be to fix metal wall channels to the existing wall, install 50 mm thick mineral wool insulation between channels and line the frame with 15 mm thick acoustic plasterboard (e.g.

Soundbloc or similar). The wall lining will need to continue up through to the upper floor/loft space in order to optimise performance.

4.40 Figure 4.3 presents the prediction results for the acoustically enhanced wall construction.

Figure 4.3 – Predicted sound insulation of acoustically enhanced separating wall



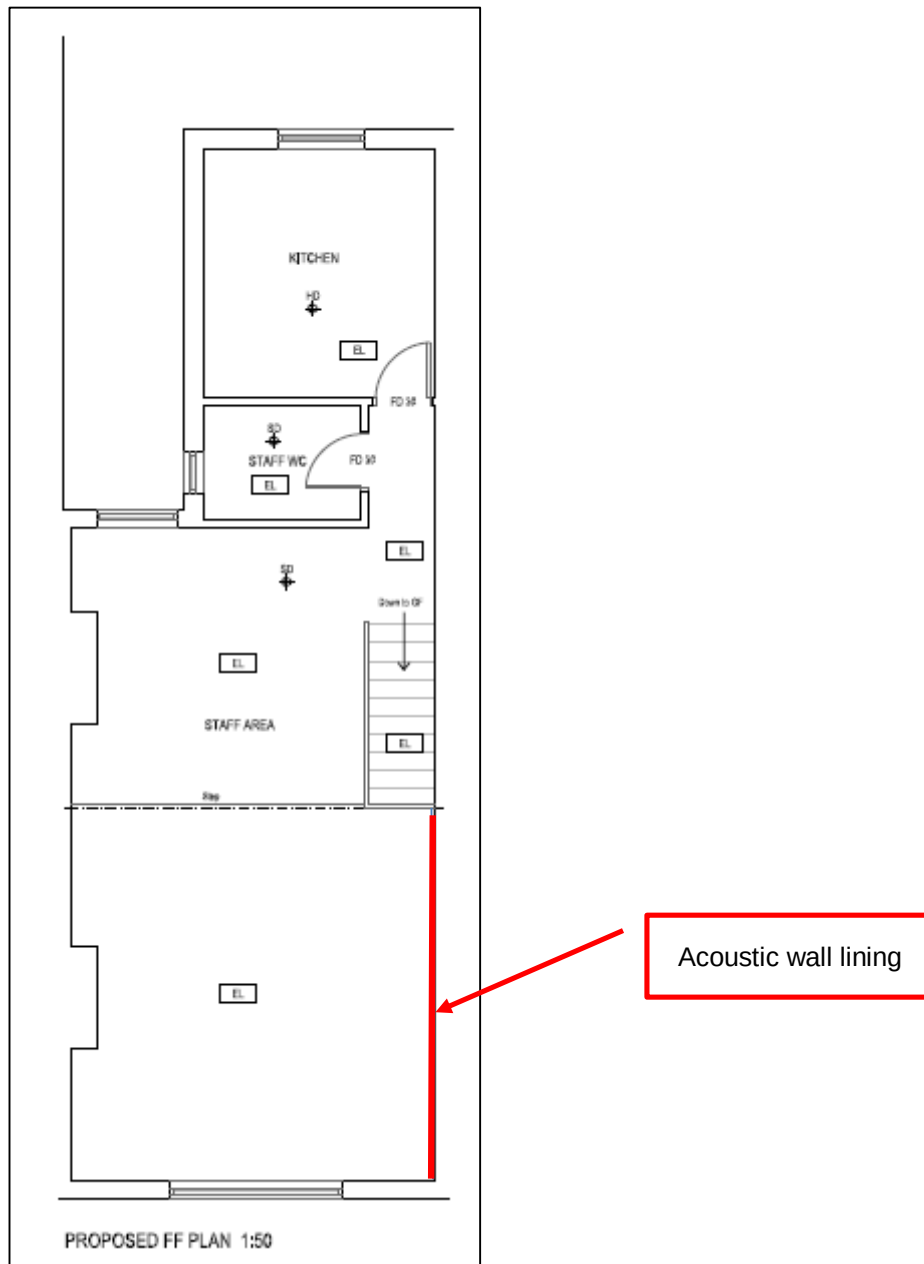
4.41 The prediction results indicate a sound insulation performance of approximately 65 dB R_w with acoustic enhancement.

4.42 Taking into consideration the sound insulation performance of the acoustically enhanced wall, the resulting sound level within the living room of No.220 is expected to be approximately 27 dB L_{Aeq,T} (i.e. circa 8 dB improvement in sound attenuation).

4.43 In this instance, the resulting sound level is below both the daytime and night-time recommended guideline noise levels for habitable rooms.

4.44 Figure 4.4 overleaf shows the existing first floor layout of No.222 Burton Road. The wall area requiring acoustic enhancement is highlighted in red.

Figure 4.4 – First floor layout showing wall area to be acoustically enhanced



Party wall adjacent to No.224 Burton Road

- 4.45 It is understood that the party wall with No.224 Burton Road has already been acoustically enhanced with an independent wall lining comprising of a stud wall fixed 30 mm from the existing masonry, 75 mm thick mineral wool insulation between studs and 12.5 mm thick acoustic plasterboard with skim finish.
- 4.46 The installed wall lining is expected to provide a slightly higher sound insulation performance than the acoustic lining recommended above, since there is no physical connection to the existing masonry wall.
- 4.47 On this basis, the resulting sound level within No.224 is expected to be below 25 dB $L_{Aeq,T}$ as a result of noise transmission via the party wall.
- 4.48 The separating wall and acoustic lining therefore provides sufficient sound insulation and no further remedial work is considered necessary.

5. Conclusion

- 5.1 The kitchen extract fan sound rating level is approximately 8 dB below the measured background sound level and 3 dB below the applicable noise limit.
- 5.2 On the basis of this assessment and BS 4142 guidance, a low to negligible impact is anticipated at neighbouring dwellings due to the operation of the kitchen extract system.
- 5.3 Additional noise mitigation measures are considered unnecessary with regard to the operation of the extract system.
- 5.4 It is considered unnecessary to acoustically enhance the separating party wall to the kitchen space and also the wall area which is adjacent to the hallway of No.220 Burton Road.
- 5.5 It is recommended that the area of wall adjacent to the living room of No.220 is acoustically enhanced in order to increase the level of sound insulation. An appropriate specification has been provided taking into consideration the existing floor layout and practicalities of construction.
- 5.6 The separating party wall with No.224 Burton Road and the existing acoustic lining provides sufficient sound insulation and therefore no further remedial work is considered necessary.

Appendix A

Assessment terminology

Assessment terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2 \times 10^{-5} \text{Pa}$).
dB(A)	The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc, according to the parameter being measured.
Acoustic environment	Sound from all sources as modified by the environment.
Ambient sound level	The totally encompassing sound in a given situation at a given time; it is usually composed of sound from many sources, near and far.
Background sound level $L_{A90,T}$	The sound level in the absence of a specific noise source under consideration (e.g. plant/machinery), measured as $L_{A90,T}$.
Residual sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Specific sound source	Sound source being assessed.
Specific sound level $L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T.
Rating level $L_{Ar,T}$	Specific sound level plus any adjustment for the characteristic features of the sound.