

**Victoria Mill  
Miles Platting, Manchester**

**Acoustic Design Report**

**July 2017**

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Project: Victoria Mill, Lower Vickers Street, Miles Platting, Manchester

Client: Blackcroft Properties Ltd, Suite 2, Peel House, 30 The Downs,  
Altrincham, WA14 2PX

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| Signature     |  |

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# 1. Introduction

- 1.1 RS Acoustic Engineering Ltd has been appointed by Blackcroft Properties Ltd to undertake an acoustic assessment with regard to the proposed apartments at Victoria Mill, Lower Vickers Street, Manchester, M40.
- 1.2 The proposals are to construct eight apartments on the lower ground floor and an additional apartment on the ground floor (nine apartments in total).
- 1.3 Residential dwellings currently occupy the upper floors of the building and it is understood that the property is a listed building.
- 1.4 A noise ingress assessment has been undertaken with reference to the guidance contained within BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* and the World Health Organisation document *Guidelines for community noise*.
- 1.5 The separating party floor and walls will need to achieve the minimum performance standards stated within Approved Document E - *Resistance to the Passage of Sound* of the Building Regulations 2010.
- 1.6 This assessment is based on the results of an environmental noise survey undertaken at the site by RS Acoustic Engineering Ltd. The noise survey was undertaken over 24-hours to establish the prevailing acoustic environment during the daytime and night-time period.
- 1.7 An assessment of noise ingress through the building envelope with windows closed has been undertaken and the resulting sound levels determined.
- 1.8 An assessment of noise ingress through open windows has also been undertaken and the resulting sound levels determined.
- 1.9 The survey and assessment was conducted by Mr Ryan Swales (BSc<sub>(Hons)</sub>, MIOA), Principal Acoustic Consultant and Member of the Institute of Acoustics.
- 1.10 The results of the noise survey have been presented, along with the assessment criteria and a discussion of the results with respect to the appropriate guidance and targets.
- 1.11 Recommendations regarding party wall construction, party floor construction, external glazing and dwelling ventilation are also provided.

## 2. Assessment Criteria & Guidance

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

- 2.1 BS 8233 provides guidance regarding acoustic criteria and noise levels appropriate for various types of space that have different functions.
- 2.2 With regard to dwellings, appropriate internal ambient sound levels are given for bedrooms, living rooms and dining rooms (habitable rooms). The guidelines take into consideration the effect of internal noise on sleep and also the effect of noise on resting, listening and communicating.
- 2.3 For steady external noise sources such as road traffic, BS 8233 states that it is desirable that the internal ambient noise levels do not exceed the following guideline values.

**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 $L_{Aeq,8hour}$ |

- 2.4 BS 8233 (Note 7) also suggests that in some circumstances, it may be appropriate to relax the indoor ambient noise level targets by up to 5 dB:

*'Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved'.*

### World Health Organisation (WHO) 1999: Guidelines for community noise

- 2.5 The effects of noise in dwellings, typically, are sleep disturbance, annoyance and speech interference. For bedrooms, the critical effect is considered to be sleep disturbance.
- 2.6 The guideline values applicable to residential developments are reproduced in Table 2.2.

**Table 2.2 – Guideline values for community noise in specific environments**

| Specific environment | Critical health effect                                         | $L_{Aeq}$ dB | Time base (hours) | $L_{AFmax}$ dB |
|----------------------|----------------------------------------------------------------|--------------|-------------------|----------------|
| Dwelling, indoors    | Speech intelligibility & moderate annoyance, daytime & evening | 35           | 16                | ---            |
| Inside bedrooms      | Sleep disturbance, night-time                                  | 30           | 8                 | 45             |
| Outside bedrooms     | Sleep disturbance, window open (outdoor values)                | 45           | 8                 | 60             |

## Building Regulations 2010: Resistance to the passage of sound

- 2.7 The Building Regulations 2010, Approved Document E - *Resistance to the passage of sound*, provides minimum sound insulation performance standards for separating party wall and floor constructions between adjacent dwellings.
- 2.8 The appropriate acoustic performance standards for new-build apartments/flats and also for those that have been formed by a material change of use (i.e. following refurbishment) are repeated in Table 2.3.

**Table 2.3 – Performance standards of Approved Document E**

| <b>Dwelling-houses and flats – performance standards for separating walls, separating floors and stairs that have a separating function.</b> |                                                                      |                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------|
|                                                                                                                                              | Airborne sound insulation<br>$D_{nT,w} + C_{tr}$ dB (minimum values) | Impact sound insulation<br>$L'_{nT,w}$ dB (maximum values) |
| <b>Purpose built dwelling-houses and flats</b>                                                                                               |                                                                      |                                                            |
| Walls                                                                                                                                        | 45                                                                   | --                                                         |
| Floors and stairs                                                                                                                            | 45                                                                   | 62                                                         |
| <b>Dwelling-houses and flats formed by material change of use</b>                                                                            |                                                                      |                                                            |
| Walls                                                                                                                                        | 43                                                                   | --                                                         |
| Floors and stairs                                                                                                                            | 43                                                                   | 64                                                         |

- 2.9 For dwellings formed by a material change of use (or refurbishment), separating walls and floors must achieve a minimum airborne sound insulation performance of 43 dB  $D_{nT,w} + C_{tr}$ .
- 2.10 With regard to impact sound insulation, party floors must achieve a maximum impact sound insulation of 64 dB  $L'_{nT,w}$ .
- 2.11 Airborne performance standards are minimum values that must be achieved, whereas the impact performance standards are maximum values that must not be exceeded. Impact sound insulation applies to party floors only.
- 2.12 The Building Regulations also state that new internal walls within dwellings (e.g. to kitchens, bathrooms, toilets etc) will need to provide a laboratory-rated performance standard of at least 40 dB  $R_w$  (internal walls within dwellings are not acoustically tested on-site).

## 3. Environmental Noise Survey

### Survey methodology

- 3.1 An environmental noise survey has been undertaken by RS Acoustic Engineering Ltd to establish the prevailing acoustic environment during both daytime and night-time periods.
- 3.2 Continuous sound level monitoring was conducted over a 24-hour period on the south west facing elevation.
- 3.3 Measurements were performed from 13:25 hours on Wednesday 5<sup>th</sup> through to 13:25 hours on Thursday 6<sup>th</sup> July 2017.
- 3.4 The microphone was positioned out of an existing ground floor window approximately 0.5 metre from the facade.
- 3.5 A measurement interval of 15 minutes was used throughout the survey and all measurements were considered to be subject to reflections from the building facade (as opposed to free-field).
- 3.6 Sample measurements were also conducted on the north west facing elevation to determine any variation with the continuous monitoring position.
- 3.7 Both one-third octave band and A-weighted broadband sound pressure levels were recorded throughout the survey.
- 3.8 The site location, floor layout and survey measurement positions are shown in Appendix A.

### Survey equipment

- 3.9 The survey was carried out using the following Class 1 specification equipment:
  - Brüel & Kjaer 2250-Light data logging sound level meter, with microphone type 4189 and pre-amplifier type ZC0032.
  - Brüel & Kjaer 4231 acoustic calibrator.
- 3.10 Calibration of the sound level meter and microphone used for the measurements are traceable to UKAS accredited laboratories (UKAS calibration certificates are available on request).
- 3.11 The calibration of both sound level meter and microphone was checked using a 1 kHz tone at 94 dB prior to and following the measurements performed. The drift in calibration was less than 0.1 dB.

### Weather conditions

- 3.12 The weather conditions during the survey were dry and fine with warm sunny spells. Wind speed measurements on-site were typically less than 2 m/s<sup>-1</sup>.
- 3.13 Temperatures during the survey ranged between 14°C and 21°C. The overall weather conditions were considered suitable to obtain representative measurements.

### Measured indices

- 3.14 Although a wide range of statistical sound level data was recorded during the survey, the  $L_{Aeq}$  and  $L_{Amax}$  indices are of most interest here:
  - $L_{Aeq,T}$  – The A-weighted equivalent continuous sound pressure level over a period of time, T. Representative of the ‘average’ sound pressure level over a given period.

- $L_{Amax,T}$  – The A-weighted ‘maximum’ sound pressure level that occurred during a given period, T and is sometimes used for the assessment of occasional loud noises. Measurements are often made with a ‘fast’ time-weighting, however a ‘slow’ time weighting may be used where appropriate.

3.15 Sound pressure level measurements are taken with an A-weighting (denoted by a subscript ‘A’, e.g.  $L_{Aeq}$ ) to approximate the frequency response of the human ear.

### Observations regarding the acoustic environment

- 3.16 The dominant noise source at the site was observed to be intermittent road traffic on the local road network (i.e. Lower Vickers Street, Berkshire Road, James Street and Varley Street).
- 3.17 During the survey, no disruptions in traffic flow were observed on the local road network (due to road works etc) and therefore traffic conditions were considered to be typical.
- 3.18 During the daytime and night-time site visits, there was no audible noise of an industrial and/or commercial nature/character (e.g. fixed plant, machinery and equipment) impacting on the site.
- 3.19 Sporadic noise from cars entering/departing Victoria Mill car park was considered negligible.
- 3.20 During the morning and afternoon period, there was intermittent noise associated with the small children’s playground adjacent to the south west elevation. The noise associated with this source was considered negligible.
- 3.21 Other noted sources include pedestrians, cyclists, high altitude aircraft and intermittent domestic activity from neighbouring dwellings.

### Results summary

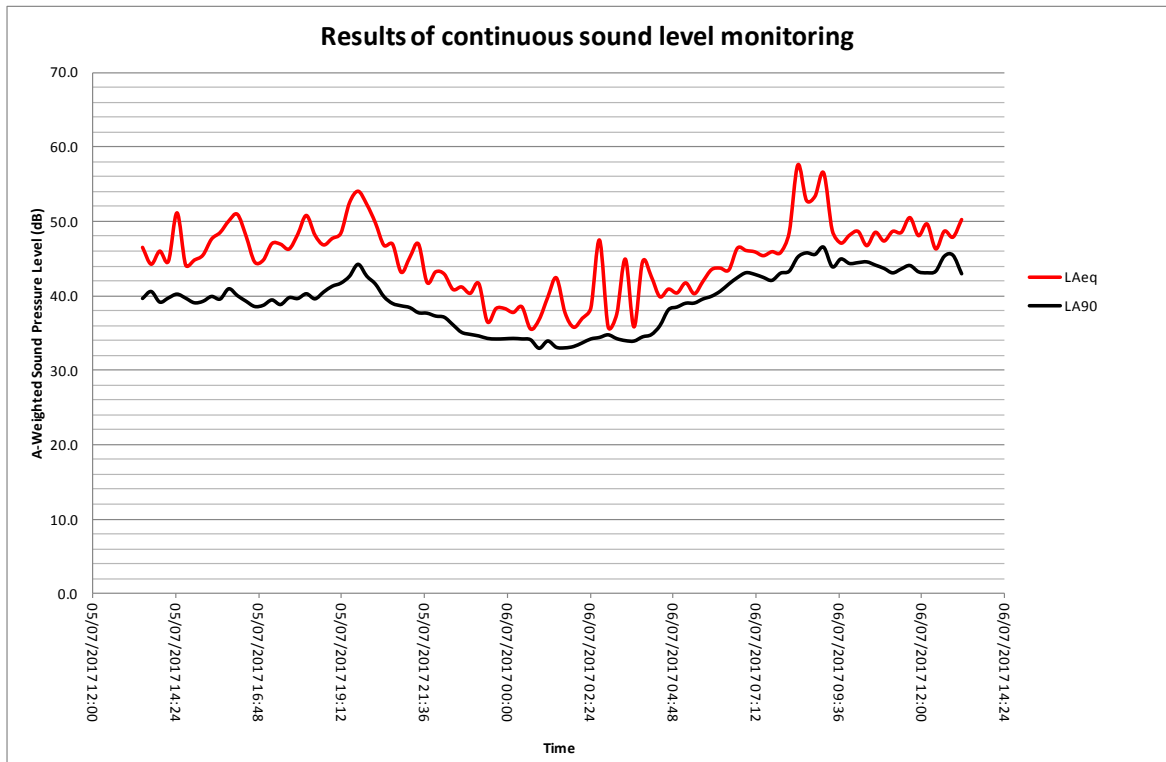
- 3.22 Table 3.1 presents a summary of the measured sound pressure levels from the continuous monitoring location. Measured values have been rounded to the nearest whole number.
- 3.23 Additional statistical and one-third octave band data can be made available on request.

**Table 3.1 – Summary of continuously measured  $L_{Aeq}$  and  $L_{AFmax}$  sound pressure levels**

| Date                                                                                                                                            | Period                      | Duration, T (hours) | $L_{Aeq,T}$ dB | Typical <sup>1</sup><br>$L_{AFmax,T}$ dB | Average <sup>2</sup><br>$L_{AFmax,T}$ dB |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------|----------------|------------------------------------------|------------------------------------------|
| Wednesday<br>05/07/2017 –<br>Thursday<br>06/07/2017                                                                                             | Daytime<br>(07:00-23:00)    | 16                  | 49             | ---                                      | ---                                      |
|                                                                                                                                                 | Night-time<br>(23:00-07:00) | 8                   | 41             | 60                                       | 60                                       |
| <sup>1</sup> The typical $L_{AFmax}$ sound level is taken to be the 10 <sup>th</sup> highest measured sound level (from 32 measurement periods) |                             |                     |                |                                          |                                          |
| <sup>2</sup> The arithmetic average $L_{AFmax}$ sound level                                                                                     |                             |                     |                |                                          |                                          |

- 3.24 The hourly equivalent continuous sound levels ranged between 44 and 55 dB  $L_{Aeq,60min}$  during the daytime period and 38 and 44 dB  $L_{Aeq,60min}$  during the night-time period.
- 3.25 Figure 3.1 overleaf presents the results of the continuous sound level monitoring in graphical form.
- 3.26 The results of the sample measurements indicate a difference of less than 1 dB between the two measurement positions.

Figure 3.1 – Graph showing results of continuous sound level monitoring



## 4. Noise Ingress Assessment

### Building envelope sound insulation

- 4.1 The external walls are a traditional masonry (brickwork) construction with a thickness of at least 250 mm. The external wall construction is expected to provide a sound insulation performance in the region 45 to 50 dB  $R_w+C_{tr}$ .
- 4.2 It is understood that the existing single glazed units are to be replaced with standard double-glazing (e.g. 4 mm glass, 16 - 20 mm cavity, 4 mm glass).
- 4.3 Standard double glazing typically provides a sound insulation performance in the region 25 to 30 dB  $R_w+C_{tr}$ .
- 6 mm glass / 12 mm to 20 mm cavity / 4 mm glass (28 - 30 dB  $R_w+C_{tr}$ )
  - 6 mm glass / 12 mm to 20 mm cavity / 6 mm glass (26 - 29 dB  $R_w+C_{tr}$ )
  - 4 mm glass / 12 mm to 20 mm cavity / 4 mm glass (25 - 27 dB  $R_w+C_{tr}$ )
- 4.4 The new glazing is therefore expected to be the weakest element with regard to sound insulation performance.
- 4.5 With standard double glazing (e.g. 4 mm glass / 16 mm cavity / 4 mm glass), the composite sound insulation performance of the facade is expected to be at least 28 dB  $R_w+C_{tr}$ .
- 4.6 The quantity  $R_w$  is the weighted sound reduction index expressed in dB. It is a single number quantity for rating airborne sound insulation. The ' $C_{tr}$ ' term is added to the single number rating  $R_w$  to take account of the characteristics of particular sound spectra (e.g. road traffic).

### Noise ingress with windows closed

- 4.7 Table 4.1 and 4.2 present the results of the noise ingress calculations for a lower ground floor bedroom on the south west facing elevation.
- 4.8 It is assumed that standard double glazing will be installed to habitable rooms (e.g. 4 mm glass / 16 – 20 mm cavity / 4 mm glass).
- 4.9 The calculations take into account the measured octave-band sound level data and the typical reverberation time for a habitable room.

**Table 4.1 – Noise ingress calculation results, standard double glazing ( $L_{Aeq}$  daytime)**

| Title: Victoria Mill<br>Noise Break In (ISO 12354- 3) |                  |      |    |      |      |      |      |      |      |      |    |                      |
|-------------------------------------------------------|------------------|------|----|------|------|------|------|------|------|------|----|----------------------|
| Formula/Comment                                       | Single Value     |      | 63 | 125  | 250  | 500  | 1000 | 2000 | 4000 | 8000 | Rw | (C,C <sub>tr</sub> ) |
|                                                       |                  |      |    | 27.1 | 23.1 | 31.1 | 41.1 | 43.1 | 37.1 |      |    |                      |
| L <sub>in</sub>                                       |                  |      |    | 28.9 | 28.9 | 13.9 | -0.1 | -4.1 | -5.1 |      |    |                      |
| Materials                                             |                  |      |    |      |      |      |      |      |      |      |    |                      |
| 4mm glass/16mm cavity/4mm glass                       | 6.1              |      |    |      |      |      |      |      |      |      | 29 | (-1,-4)              |
| Brickwork external wall                               | 4.7              |      |    |      |      |      |      |      |      |      | 51 | (-1,-4)              |
|                                                       |                  |      |    |      |      |      |      |      |      |      |    |                      |
| L <sub>out,s</sub>                                    |                  |      |    |      |      |      |      |      |      |      |    |                      |
| Add Element                                           |                  |      |    |      |      |      |      |      |      |      | 49 |                      |
| L <sub>out,2m</sub>                                   |                  |      |    |      |      |      |      |      |      |      | 46 |                      |
| L <sub>out,free field</sub>                           |                  |      |    |      |      |      |      |      |      |      |    |                      |
| Element 1                                             |                  |      |    |      |      |      |      |      |      |      |    |                      |
| Plane façade                                          | ΔL <sub>fs</sub> | 10.8 |    |      |      |      |      |      |      |      |    |                      |
| Visible                                               | X <sub>fs</sub>  | 0.0  |    |      |      |      |      |      |      |      |    |                      |
| L <sub>p,out,2m</sub>                                 |                  |      |    |      |      |      |      |      |      |      | 49 |                      |
| L <sub>p,in</sub>                                     |                  |      |    |      |      |      |      |      |      |      | 21 | dBA                  |

- 4.10 The calculation results indicate a daytime internal sound level of approximately 21 dB  $L_{Aeq}$  with standard double glazing.
- 4.11 The daytime sound level target of 35 dB  $L_{Aeq,16hour}$  will therefore be easily achieved with windows closed.

**Table 4.2 – Noise ingress calculation results, standard double glazing ( $L_{Aeq}$  night time)**

| Title: Victoria Mill<br>Noise Break In (ISO 12354- 3) |                 |      |    |      |      |      |      |       |       |      |       |               |
|-------------------------------------------------------|-----------------|------|----|------|------|------|------|-------|-------|------|-------|---------------|
| Formula/Comment                                       | Single Value    |      | 63 | 125  | 250  | 500  | 1000 | 2000  | 4000  | 8000 | $R_w$ | $(C, C_{tr})$ |
| $L_{in}$                                              |                 |      |    | 27.1 | 23.1 | 31.1 | 41.1 | 43.1  | 37.1  |      |       |               |
|                                                       |                 |      |    | 21.9 | 19.9 | 6.9  | -7.1 | -15.1 | -10.1 |      |       |               |
| <b>Materials</b>                                      |                 |      |    |      |      |      |      |       |       |      |       |               |
| 4mm glass/16mm cavity/4mm glass                       | 6.1             |      |    | 21.0 | 17.0 | 25.0 | 35.0 | 37.0  | 31.0  |      | 29    | (-1,-4)       |
| Brickwork external wall                               | 4.7             |      |    | 40.0 | 44.0 | 45.0 | 51.0 | 56.0  | 60.0  |      | 51    | (-1,-4)       |
| $L_{out,s}$                                           |                 |      |    |      |      |      |      |       |       |      |       |               |
| $L_{out,2m}$                                          | Add Element     |      |    | 49.0 | 43.0 | 38.0 | 34.0 | 28.0  | 27.0  |      | 41    |               |
| $L_{out,free field}$                                  |                 |      |    | 46.0 | 40.0 | 35.0 | 31.0 | 25.0  | 24.0  |      | 38    |               |
| <b>Element 1</b>                                      |                 |      |    |      |      |      |      |       |       |      |       |               |
| Plane façade                                          | $\Delta L_{fs}$ | 10.8 |    | 27.1 | 23.1 | 31.1 | 41.1 | 43.1  | 37.1  |      |       |               |
| Visible                                               | $X_{fs}$        | 0.0  |    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   |      |       |               |
|                                                       |                 |      |    | 27.1 | 23.1 | 31.1 | 41.1 | 43.1  | 37.1  |      |       |               |
| $L_{p,out,2m}$                                        |                 |      |    | 49.0 | 43.0 | 38.0 | 34.0 | 28.0  | 27.0  |      | 41    |               |
| $L_{p,in}$                                            |                 |      |    | 21.9 | 19.9 | 6.9  | -7.1 | -15.1 | -10.1 |      | 13    | dBA           |

- 4.12 The calculation results indicate a night-time internal sound level of approximately 13 dB  $L_{Aeq}$  with standard double glazing.
- 4.13 The night-time sound level target of 30 dB  $L_{Aeq,16hour}$  will therefore be easily achieved with windows closed.
- 4.14 With regard to maximum internal sound levels, for the majority of the night-time period the recommended target of 45 dB  $L_{AFmax}$  will also be achieved.
- 60 dB  $L_{AFmax}$  – 28 dB  $R_w + C_{tr}$  = 32 dB  $L_{AFmax}$  internally.
- 4.15 The internal sound level targets will also be satisfied along the north west facing elevation since the difference in sound level is typically less than 1 dB.
- 4.16 On the basis of the noise ingress calculation results, additional noise mitigation (e.g. installing secondary or acoustically laminated glazing) is considered unnecessary for the proposed apartments.

## Noise ingress with windows open

- 4.17 The level of sound attenuation through an open window is dependent on the type and size of window, the extent of opening, the angle of sound incidence and the acoustic characteristics of the source in question.
- 4.18 It is considered reasonable to assume a sound attenuation performance of up to 15 dBA for a partially open window. It should be noted that partially open windows are expected to provide background ventilation only, as opposed to purge/rapid ventilation.
- 4.19 The survey results indicate that daytime 'free-field' equivalent continuous sound pressure levels are in the region 46 dB  $L_{Aeq,16hour}$  and night-time sound pressure levels are in the region 38 dB  $L_{Aeq,8hour}$ .
- 4.20 Free-field sound pressure levels are considered appropriate when assessing noise ingress through an open window.
- 4.21 Assuming a partially open window provides 15 dBA of sound attenuation, the resulting internal sound level is expected to be in the region 31 dB  $L_{Aeq,16hour}$  during the daytime and 23 dB  $L_{Aeq,8hour}$  during the night-time.
- 4.22 Maximum sound levels are expected to be in the region 45 dB  $L_{AFmax,15min}$ .
- 4.23 In practice, internal sound levels are expected to be slightly lower than those predicted above (i.e. 1 – 3 dB lower), due to the presence of acoustically absorbent finishes within the habitable room (i.e. furniture, floor coverings, curtains, upholstery etc).
- 4.24 On the basis of this assessment, it is considered appropriate to naturally ventilate habitable rooms via opening windows alone.
- 4.25 Additional acoustic mitigation such as sound-attenuating trickle vents to habitable rooms or mechanical ventilation systems are therefore considered unnecessary.

## 5. Internal Sound Insulation

### Party floor construction

- 5.1 Separating floor constructions need to have sufficient mass, sound absorption and acoustically isolated elements to achieve the minimum airborne and impact sound insulation requirements.
- 5.2 With a concrete separating floor (slab or planks), it is typically recommended that the mass per unit area is in the region 300 – 365 kg/m<sup>2</sup>.
- 5.3 The exact thickness of the concrete party floor is unknown. However, from observations made on-site, it is estimated that the floor is at least 150 mm thick. On this basis, it is anticipated that the mass per unit area will be at least 300 kg/m<sup>2</sup>.

### *Recommended ceiling construction*

- 5.4 It is recommended that a metal suspension system is used for the new ceiling construction.
- 5.5 A suitable framing system would be British Gypsum's CasoLine system.
  - [www.british-gypsum.com/white-book-system-selector/systems-overview/floors-and-ceilings/casoline-mf?tab0=0](http://www.british-gypsum.com/white-book-system-selector/systems-overview/floors-and-ceilings/casoline-mf?tab0=0)
- 5.6 It is recommended that the suspension depth of the ceiling board is at least 150 mm. A greater suspension depth (e.g. 200 mm) will provide slight improvements to the low frequency performance of the floor.
- 5.7 To provide sound absorption within the cavity, it is recommended that a layer of 25 mm thick (minimum) mineral wool insulation is laid over the top of the ceiling board.
- 5.8 Suitable products include Knauf's Earthwool acoustic partition roll or Isover's APR1200 (density 10 – 36 kg/m<sup>3</sup>).
  - [www.isover.co.uk/products/acoustic-partition-roll-apr-1200](http://www.isover.co.uk/products/acoustic-partition-roll-apr-1200)
  - [www.knaufinsulation.co.uk/en-gb/products/glass-mineral-wool-rolls/acoustic-rolls/earthwool-acoustic-roll.aspx#axzz3dovQZLOY](http://www.knaufinsulation.co.uk/en-gb/products/glass-mineral-wool-rolls/acoustic-rolls/earthwool-acoustic-roll.aspx#axzz3dovQZLOY)
- 5.9 Since it is not known whether an acoustic resilient layer has been installed within existing ground floor apartments, it is recommended that the metal frame is fixed to acoustic hangers.
  - [www.british-gypsum.com/products/gypframe-acoustic-hangers?tab0=0](http://www.british-gypsum.com/products/gypframe-acoustic-hangers?tab0=0).
- 5.10 It should be noted that acoustic hangers are considered unnecessary where acoustically resilient layers are installed above the new apartments (i.e. directly bonded to the floor slab or installed under a floating screed).
- 5.11 It is recommended that the ceiling board is either 12.5 mm Soundbloc (mass per unit area 10.6 kg/m<sup>2</sup>) or 15 mm Fireline plasterboard (mass per unit area 11.7 kg/m<sup>2</sup>).
  - [www.british-gypsum.com/products/gypproc-soundbloc](http://www.british-gypsum.com/products/gypproc-soundbloc)
  - [www.british-gypsum.com/products/gypproc-fireline](http://www.british-gypsum.com/products/gypproc-fireline)
- 5.12 A suitable alternative to British Gypsum's Soundbloc plasterboard would be Knauf's Sound Panel or Siniat's GTEC dB board.
  - [www.knauf.co.uk/product-range-overview/plasterboard/knauf-sound-panel](http://www.knauf.co.uk/product-range-overview/plasterboard/knauf-sound-panel)
  - [www.siniat.co.uk/en/products-and-systems/products/internal-boards/gtec-db-board](http://www.siniat.co.uk/en/products-and-systems/products/internal-boards/gtec-db-board)

### *Anticipated sound insulation performance on completion*

- 5.13 On the basis of the recommendations given, the separating party floor construction is expected to provide an airborne sound insulation performance in the region 45 - 50 dB  $D_{nT,w}+C_{tr}$ .
- 5.14 The impact sound insulation performance is expected to be in the region 55 - 60 dB  $L'_{nT,w}$ .

### *Service penetrations through floor*

- 5.15 Vertical service pipes that penetrate the separating floor should be enclosed for their full height in each room.
- 5.16 The enclosure should be constructed from two layers of Soundbloc or Fireline plasterboard. The pipe should be wrapped in mineral wool insulation (min 25 mm) or alternatively line the enclosure with mineral wool.
- 5.17 A small gap (5 mm) should be maintained between the service enclosure and the floor base and the gap sealed with flexible sealant. Similarly, the small gap between the enclosure and the ceiling boards should also be sealed with flexible sealant.
- 5.18 There should be no service penetrations through separating party walls to habitable rooms.

### *Acoustic treatment to columns*

- 5.19 To minimise vertical flanking noise transmission, it is recommended that existing columns are encased with two layers of dense plasterboard (Soundbloc or Fireline).
- 5.20 A suitable alternative would be to encase columns with 25 mm thick Glasroc FireCase or similar.

### *Ceiling penetrations for lighting*

- 5.21 It is recommended that recessed down-lighting is avoided where possible in order to maintain the acoustic integrity of the separating floor.
- 5.22 However, if recessed down-lighting is to be installed, it is recommended that acoustic hoods are placed above the lights in order to help maintain the acoustic integrity of the floor.
- 5.23 The holes cut in the acoustic plasterboard for the recessed down lighters can lead to high frequency sound insulation weaknesses unless appropriately covered/sealed.
  - [www.soundservice.co.uk/acoustic\\_fire\\_hoods.html](http://www.soundservice.co.uk/acoustic_fire_hoods.html)
  - [www.astroflame.com/intumescent\\_downlighter\\_cover.html](http://www.astroflame.com/intumescent_downlighter_cover.html)
- 5.24 Alternatively, acoustically-rated down lighters could be installed as opposed to fitting acoustic hoods over standard non-rated down lighters.
  - [www.snaplite.co.uk/](http://www.snaplite.co.uk/)

## Party wall construction

### *Twin framed metal construction*

- 5.25 It is recommended that new party walls are built from a twin-framed metal construction.
- 5.26 A suitable construction would be the GypWall Quiet IWL system.
  - [www.british-gypsum.com/white-book-system-selector/systems-overview/partitions/gypwall-quiet-iwl?tab0=1](http://www.british-gypsum.com/white-book-system-selector/systems-overview/partitions/gypwall-quiet-iwl?tab0=1)
- 5.27 The minimum distance between the inner face of each lining should be 200 mm.
- 5.28 The separating wall should be full-height (to the underside of the soffit) and constructed directly off the concrete floor slab (i.e. not off a floating screed).

- 5.29 There should be no connection between the two leaves, except where bracing is necessary for structural reasons.
- 5.30 It is recommended that 2 x 12.5 mm Soundbloc (or 2 x 15 mm Fireline) is used for the wall linings.
- 5.31 Mineral wool insulation of at least 50 mm thickness should be placed within the cavity.
- 5.32 The party wall construction should be continued along the circulation/corridor partition line to help control flanking noise transmission via the corridor wall.
- 5.33 Plasterboard joints should be staggered and sealed with tape or caulked with flexible sealant. A small gap (5mm) should be left between the bottom of the plasterboard and the concrete base.

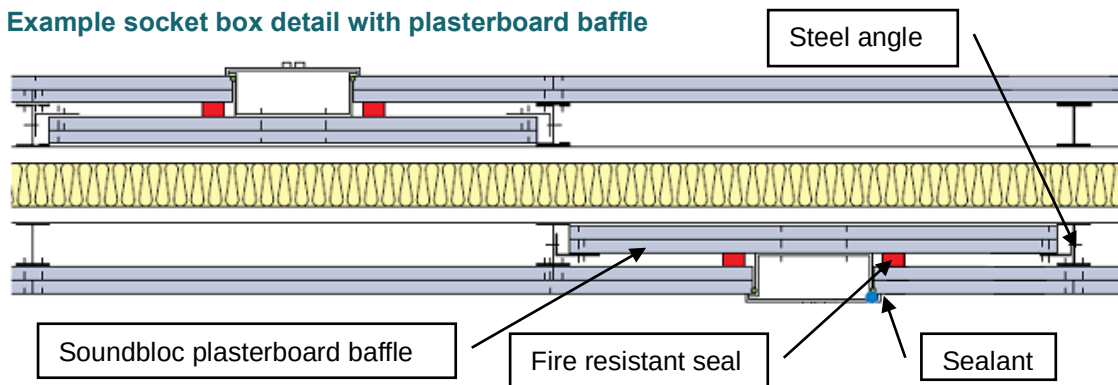
**Anticipated sound insulation performance on completion**

- 5.34 The separating party wall construction is expected to provide an airborne sound insulation performance in the region 45 to 48 dB  $D_{nT,w}+C_{tr}$ .

**Wall penetrations (electrical socket/switch boxes)**

- 5.35 Fixing electrical socket boxes into plasterboard partitions can impair acoustic performance, however with careful detailing this can be minimised.
- 5.36 Electrical socket and switch boxes should not be installed back-to-back and should ideally be staggered by a distance of at least 150 mm.
- 5.37 To maintain acoustic performance, electrical sockets should be boxed/clad at the back using the same plasterboard thickness and type (Soundbloc) as the separating wall lining.
- 5.38 Holes in the plasterboard should always be neatly cut and flexible sealant should be applied to the edges to maximise acoustic performance.

**Example socket box detail with plasterboard baffle**



## Separating walls within apartments

- 5.39 Internal walls within apartments (to bedrooms, bathrooms etc) need to achieve a laboratory rated sound insulation performance of at least 40 dB  $R_w$ .
- 5.40 Suitable constructions include.
- 1 x 12.5 mm Soundbloc each side of a 70 mm metal 'C' stud and no mineral wool insulation (40 dB  $R_w$ ).
  - 1 x 15 mm Fireline each side of a 70 mm metal 'C' stud and no mineral wool insulation (41 dB  $R_w$ ).

## External wall construction & internal linings

- 5.41 The external walls are brickwork with an overall thickness of at least 250 mm.
- 5.42 There is a small cavity between brickwork leaves and it is anticipated that there is no thermal insulation or flexible cavity stops within the external wall.
- 5.43 A degree of flanking noise transmission is expected via the external wall (both vertically and horizontally) and therefore acoustic treatment to the internal leaf of the wall is recommended.

### *Sound insulating plasterboard laminate*

- 5.44 The external wall may be lined with a 52 mm Gyproc TriLine sound insulating laminate (composed of wallboard pre-bonded to a glass mineral wool backing).
- 5.45 The sound insulating laminate may be fixed via either the DriLyner 'RF' system or 'SI' system.
  - [www.british-gypsum.com/white-book-system-selector/systems-overview/driilyner-rf](http://www.british-gypsum.com/white-book-system-selector/systems-overview/driilyner-rf)
  - [www.british-gypsum.com/white-book-system-selector/systems-overview/driilyner-si](http://www.british-gypsum.com/white-book-system-selector/systems-overview/driilyner-si)

### *Virtually independent wall lining*

- 5.46 As an alternative to a plasterboard laminate, a virtually independent construction could be used for a greater acoustic performance.
- 5.47 A suitable example would be the GypLyner Universal metal framed wall lining system, comprising 1 x 12.5 mm Soundbloc, Gypframe GL1 lining channels, minimum 35 mm cavity and 25 mm mineral wool insulation.
  - [www.british-gypsum.com/white-book-system-selector/systems-overview/linings/gyplyner-universal-wall](http://www.british-gypsum.com/white-book-system-selector/systems-overview/linings/gyplyner-universal-wall)

## Entrance doors, construction & acoustic performance

- 5.48 Approved Document E states that main entrance doors to apartments should achieve a minimum laboratory rated sound insulation performance of 29 dB  $R_w$ .
- 5.49 A performance of 29 dB  $R_w$  can be typically achieved with a 44 – 56 mm thick solid-core fire door of at least 25 kg/m<sup>2</sup> mass closing onto a rebated frame with wipe or compression acoustic door seals to head, jambs and threshold.
- 5.50 Good quality acoustic seals are essential in achieving the performance standard and will also help with regard to fire safety. The exclusion of perimeter sealing is likely to result in a reduction in performance of approximately 5 to 10 dB. A doorset without sealing would therefore provide a reduced sound insulation performance in the region 20 to 25 dB  $R_w$ .
- 5.51 As an example, for seals along the head and jambs, 'batwing' seals (e.g. Lorient LAS1010 and LAS1212) work well as they fit in the corner of the frame and continue past door locks and hinges. They will often be used in combination with a 'double fin seal' such as the LAS1011 Firtree.
- 5.52 For threshold seals, either an automatic drop-threshold seal can be used (e.g. Lorient IS8020 Si or IS8040) or alternatively a fixed threshold seal such as the IS3015 can be used in combination with an aluminium threshold plate.
- 5.53 The following suppliers provide high performance acoustic seals for internal doors.
  - <http://www.lorientuk.com/>
  - <https://norseal.co.uk/browse/acoustic-perimeter-seals>

## 6. Conclusion

- 6.1 Standard double glazing will provide sufficient sound insulation for the proposed apartments.
- 6.2 Acoustically laminated double glazing or secondary glazed units are considered unnecessary.
- 6.3 The recommended daytime and night-time internal sound level targets will be achieved with windows open. Acoustic trickle vents or a mechanical ventilation system are considered unnecessary.
- 6.4 An acoustically isolated metal framed suspension system is recommended for new ceilings.
- 6.5 Recommendations have been provided regarding suitable plasterboard type and insulation layer.
- 6.6 Twin framed metal stud constructions are recommended for the party walls.
- 6.7 Guidance regarding the attenuation of flanking noise transmission (vertically and horizontally) is provided within this report.
- 6.8 Recommendations regarding general acoustic detailing and service penetrations have also been provided.

# Appendix A

## Site location, floor layout and survey measurement positions

Figure A.1 – Site location, surrounding area and survey measurement positions

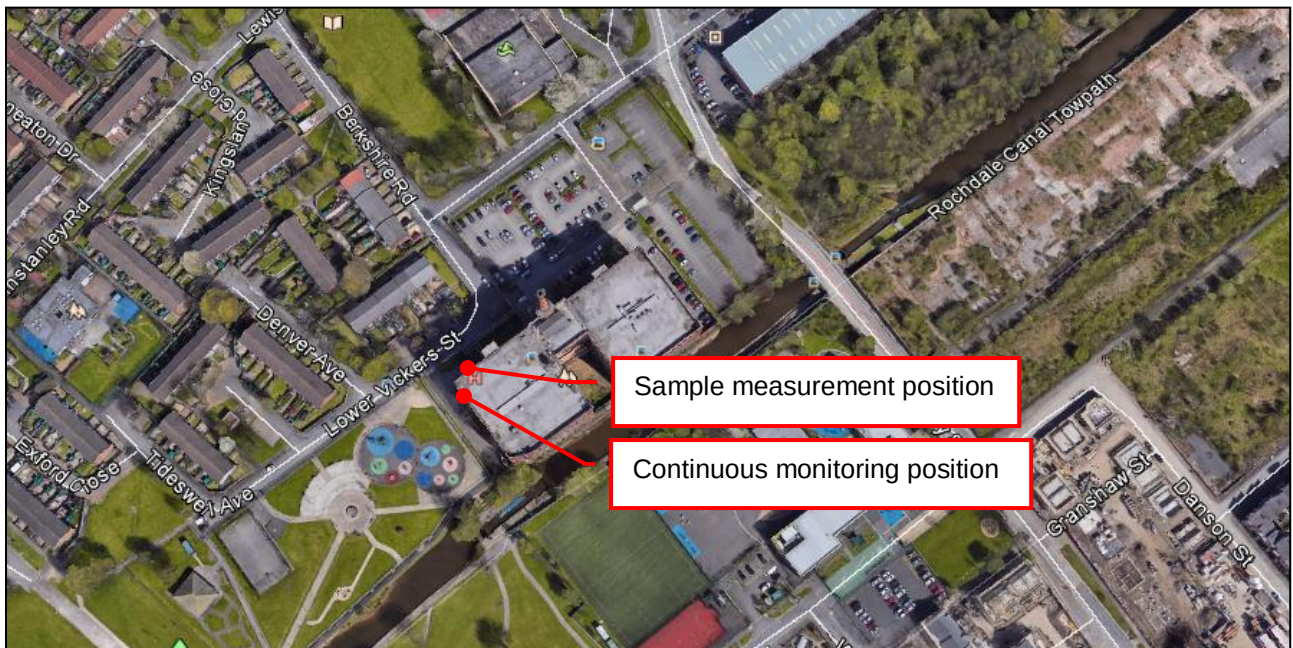
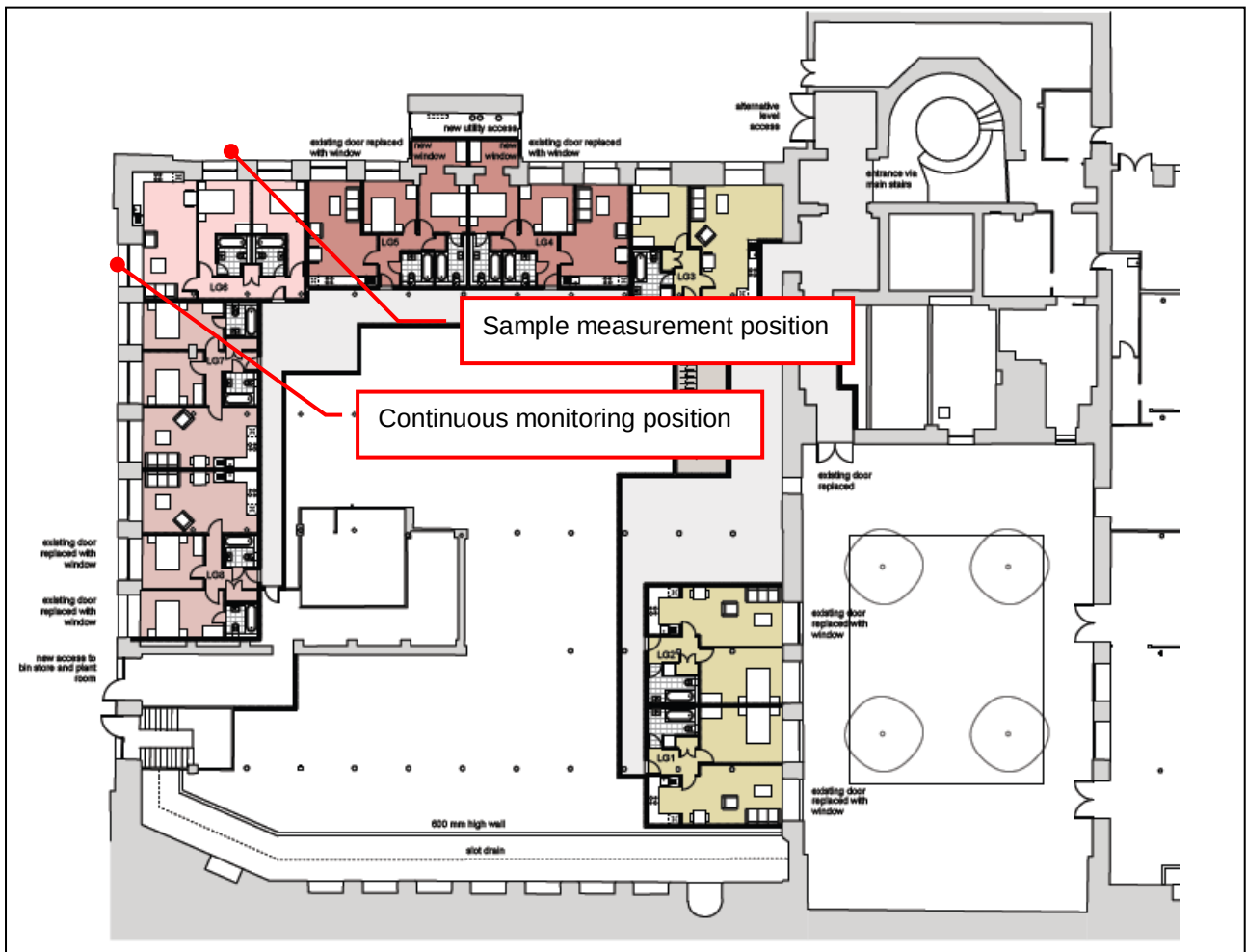


Figure A.2 – Lower ground floor layout and survey measurement positions



## Appendix B

### 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 ( $2 \times 10^{-5}$ 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.                                                                                               |
| Ambient noise level        | The totally encompassing noise in a given situation at a given time; it is usually composed of noise from many sources, near and far.                                                                                                                                                                                                                                                           |
| Background noise level     | The noise level in the absence of a specific noise source under consideration (e.g. plant/machinery), measured in $L_{A90,T}$ .                                                                                                                                                                                                                                                                 |
| Habitable room             | A room used for dwelling purposes but which is not solely a kitchen, utility room, bathroom, cellar or sanitary accommodation.                                                                                                                                                                                                                                                                  |
| Background ventilator      | A small ventilation opening designed to provide controllable whole building ventilation.                                                                                                                                                                                                                                                                                                        |
| Whole building ventilation | Continuous ventilation of rooms or spaces at a relatively low rate to dilute and remove pollutants and water vapour not removed by operation of extract ventilation, purge ventilation or infiltration, as well as supplying outdoor fresh air into the building. For an individual dwelling, this is referred to as 'whole dwelling ventilation'.                                              |
| Purge ventilation          | Manually controlled ventilation of rooms or spaces at a relatively high rate to rapidly dilute pollutants and/or water vapour. Purge ventilation is intermittent and may be provided by natural means (e.g. openable window) or by mechanical means (e.g. a fan). Purge ventilation may also be used to improve thermal comfort, however this is not controlled under the Building Regulations. |
| $R_w$                      | The weighted sound reduction index expressed in dB. A single number quantity for airborne sound insulation rating.                                                                                                                                                                                                                                                                              |
| $R_w + C_{tr}$             | The weighted sound reduction index with a spectrum adaptation term (e.g. for traffic noise). The $C_{tr}$ term is a value in dB which is added to the single number rating ( $R_w$ ) to take account of the characteristics of a particular sound spectra.                                                                                                                                      |