
103 Kingswood Road, Manchester Noise Assessment Report



Project: No.103 Kingswood Road, Manchester

Client: Colin Comerford

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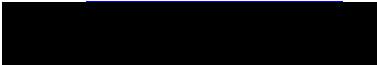
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Signature	

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1. Introduction

- 1.1 RS Acoustic Engineering Ltd has been appointed by Colin Comerford to undertake a noise and vibration assessment with regard to a material change of use at No.103 Kingswood Road, Manchester, M14 6RY.
- 1.2 The mid-terraced property was most recently used for commercial/office use (Class C3). The proposals are to create a single self-contained dwelling at ground floor level. There are currently dwellings directly above at upper floor level and either side of the property.
- 1.3 Manchester City Council granted prior approval for the proposed change of use in June 2025, subject to a number of conditions (ref: 142859/P3MAP/2025).
- 1.4 With regard to environmental noise and building envelope sound insulation, condition No.2a of the approval states the following:

"2) a) Notwithstanding details submitted, prior to the residential accommodation hereby approved being occupied, a scheme for acoustically insulating the proposed residential accommodation against noise from Kingswood Road shall be submitted to and approved in writing by the City Council as Local Planning Authority."
- 1.5 A noise assessment has been undertaken taking into consideration the guidance contained within British Standard 8233:2014 *Guidance on sound insulation and noise reduction for buildings* and ProPG's *Planning & Noise*.
- 1.6 The guidance given within Approved Document F *Ventilation* has also been taken into consideration.
- 1.7 Continuous sound level monitoring has been conducted at the property to establish the ambient sound pressure levels during the daytime and night-time period.
- 1.8 The measured sound level data has been used to determine the acoustic performance requirements for the building envelope construction and to determine whether it will be suitable to naturally ventilate habitable rooms via opening windows alone.
- 1.9 An assessment of noise ingress through the building envelope with windows open and closed has been undertaken to determine the resulting sound levels.
- 1.10 Vibration measurements have also been conducted at the property to determine the probability of adverse comment from future residents.
- 1.11 The survey and assessment were conducted by Mr Ryan Swales (BSc(Hons), MIOA), Principal Acoustic Consultant and Member of the Institute of Acoustics.
- 1.12 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.
- 1.13 Recommendations regarding sound insulation, ventilation and noise mitigation are also provided within this report.

2. Assessment Guidance & Acoustic Criteria

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 Regarding 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 the effect of noise on resting, listening and communicating.
- 2.3 The internal sound level targets presented in Table 2.1 have been reproduced directly from the standard.

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 Note 7 of the standard 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.

- 2.5 Note 5 also states:

If relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the facade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.

World Health Organisation: Guidelines for community noise (1999)

- 2.6 To help avoid sleep disturbance within bedrooms, this historical guidance document recommends that the night-time internal ambient sound level should not exceed 30 dB $L_{Aeq,T}$ and the maximum sound level should not typically exceed 45 dB $L_{AFmax,T}$.
- 2.7 The corresponding values directly outside of bedroom windows are therefore 45 dB $L_{Aeq,8hour}$ and 60 dB $L_{AFmax,T}$. This assumes that a partially open window provides approximately 15 dB of sound attenuation (from external noise).
- 2.8 With regard to sleep disturbance and maximum L_{AFmax} sound levels, the study undertaken by Vallet & Vernet (1991) suggests that for good sleep, indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night.

Professional Practice Guidance on Planning & Noise (2017)

- 2.9 Professional Practice Guidance on Planning and Noise (ProPG) has been produced in order to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England.
- 2.10 The NPPF encourages improved standards of design. This guidance document encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise.
- 2.11 The scope of ProPG is restricted to the consideration of new residential development that will be exposed predominantly to airborne noise from transportation sources.

Internal noise level guidelines

- 2.12 The recommended ProPG internal noise level guidelines are presented in Table 2.2. The guidelines reflect and extend current practice contained within BS 8233:2014.

Table 2.2 - ProPG internal noise level guidelines

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 $L_{Aeq,8hour}$ 45 dB $L_{Amax,F}$

- 2.13 Where the local planning authority accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment.
- 2.14 In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide “*whole dwelling ventilation*” in accordance with Building Regulations Approved Document F (e.g. trickle ventilators) in the open position.
- 2.15 It should also be noted that the internal noise level guidelines are generally not applicable under “*purge ventilation*” conditions as defined by Building Regulations Approved Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).

Manchester City Council: Planning & Noise Technical Guidance

- 2.16 With regard to new dwellings, Manchester City Council has adopted the following noise criteria:
- Bedrooms (night time - 23.00 - 07.00) 30 dB L_{Aeq} (individual noise events should not normally exceed 45 dB $L_{Amax,F}$ by more than 10 times).
 - Living Rooms (daytime - 07.00 - 23.00) 35 dB L_{Aeq} .
 - Gardens and terraces (daytime) 55 dB L_{Aeq} .
- 2.17 These criteria have been adopted for the following reasons:
- BS 8233: 2014 recognises these levels as a good standard for resting/sleeping conditions.
 - The WHO document 'Guidelines for Community Noise' recommends an internal L_{Aeq} of 30 dB for optimal sleep conditions (and no more than 35 dB for internal rooms during daytime).
 - The performance of acoustic insulation schemes can often be below that specified, according to the quality of installation, materials, noise spectrum and deterioration / wear and tear of building elements. A high design specification introduces a 'safety margin' should building elements not perform as well as expected ('on-site' performance).
 - Performance specification for glazing does not usually take into account the detrimental effect of vents on the sound insulation. Even 'acoustic' vents will reduce the performance of the facade insulation, as they will inherently contain a free open area for air exchange.
 - There is a general increase in urban noise levels, which can in the future be reasonably accommodated by these standards.
 - The standards support the Local Authority corporate objective to prevent ill-health and improve local people's health and well-being.

British Standard 6472-1:2008: Guide to evaluation of human exposure to vibration in buildings

- 2.18 Part 1 of BS 6472 provides guidance regarding human response to vibration and uses the vibration dose value (VDV) that an occupant would receive over a 16-hour daytime and 8-hour night-time period.
- 2.19 The VDV provides a means of specifying the time-varying, frequency-dependent vibration level of a given duration as a single number. The VDV range for the daytime and night-time period and the probability of adverse comment is presented in Table 2.3.
- 2.20 The guidance relates to vibration measured at the point of entry into the human body, which is usually taken to mean the ground surface or at a point mid-span of an internal floor.

Table 2.3 - Vibration dose values which might result in various probabilities of adverse comment within residential buildings

Place and Time	Low probability of adverse comment $ms^{-1.75}$ ⁽¹⁾	Adverse comment possible $ms^{-1.75}$	Adverse comment probable $ms^{-1.75}$ ⁽²⁾
Residential buildings 16h day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8h night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8
Note: ⁽¹⁾ Below these ranges adverse comments is not expected. ⁽²⁾ Above these ranges adverse comment is very likely.			

3. Environmental Noise Survey

Survey methodology

- 3.1 Continuous sound level monitoring was conducted over a 62-hour period at the rear north facing elevation. The equipment was installed at ground floor level and the microphone was projected through a small aperture in the existing glazing (Position A).
- 3.2 The rear elevation was chosen for the continuous monitoring since the proposed room at the rear is a bedroom and there were security constraints with the front elevation due to being at ground floor level (i.e. not possible to leave the window slightly open).
- 3.3 Measurements were performed from 21:00 hours on Sunday 22 through to 11:00 hours on Wednesday 25 June 2025.
- 3.4 Sample measurements were also conducted during the daytime period at the front elevation. The equipment was installed outside of the main entrance door (Position B). Measurements were time-synchronised with the sound level meter at the rear elevation.
- 3.5 A measurement interval of 1-minute was used during the survey and measurements were subject to sound reflections from the façade (as opposed to free-field). One-third octave band and A-weighted broadband sound pressure levels were recorded during the survey.
- 3.6 Vibration measurements were also conducted at the rear of the property to determine the Vibration Dose Values (VDV's) generated by passing trains. Measurements were conducted from Sunday 22 through to Wednesday 25 June 2025.
- 3.7 The site location, surrounding area and survey measurement positions are shown in Figure 3.1 and Figure 3.2 overleaf. The floor plans and elevations are presented in Appendix A.

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



Figure 3.2 - Photographs showing survey measurement positions



Survey equipment

- 3.8 The survey was conducted using the following Class-1 specification equipment:
- Brüel & Kjaer 2250-Light sound level meter, microphone type 4189, pre-amplifier type ZC0032.
 - Brüel & Kjaer 2260 sound level meter, microphone type 4189, pre-amplifier type ZC0032.
 - CEL-120/1 Acoustic calibrator.
 - Vibrock V901 digital seismograph with tri-axial VDV transducer.
- 3.9 Calibration of the sound level meter and microphone used for the measurements are traceable to UKAS accredited laboratories.
- 3.10 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. Calibration drift was less than 0.1 dB.

Weather conditions

- 3.11 The weather conditions during the survey were generally dry and fine with a light cloud cover. Wind speed measurements taken outside of the building were between 0.1 and 1.6 m/s⁻¹.
- 3.12 The air temperature during the survey ranged between 13°C and 20°C. The overall weather conditions were considered suitable to obtain representative measurements.

Subjective observations of the acoustic environment

- 3.13 The most significant and consistent source of noise is road traffic on Kingswood Road.
- 3.14 Vehicle movements along Kingsway (A34), Wald Avenue and Santon Avenue also contribute to the measured noise levels at the site, but to a much lesser degree than Kingswood Road.
- 3.15 Passing trains also contribute to the existing ambient noise climate and are relatively fast moving past the site.
- 3.16 During the daytime and night-time site visits, there was no audible building services plant noise associated with local commercial properties (e.g. from outdoor condenser units or kitchen extract fans).
- 3.17 Operational noise associated with the local commercial premises was negligible and mainly consisted of vehicles parking/departing from the premises.
- 3.18 Other noted sources of noise include passing pedestrians, domestic activity at neighbouring dwellings and high-altitude aircraft.

Results summary

Measured noise indices

3.19 Although a wide range of statistical sound level data was recorded during the survey, the L_{Aeq} and L_{AFmax} indices are of most interest in this instance:

- $L_{Aeq,T}$ - 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 and commonly used to describe the 'ambient' sound level.
- $L_{AFmax,T}$ - The A-weighted 'maximum' sound pressure level that occurred during a given period, T. Commonly used for the assessment of occasional and transient loud noises.

3.20 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.

Continuous sound level monitoring at rear elevation

3.21 Table 3.1 presents a summary of the continuously measured sound pressure levels at the rear elevation. Measured values have been rounded to the nearest whole number.

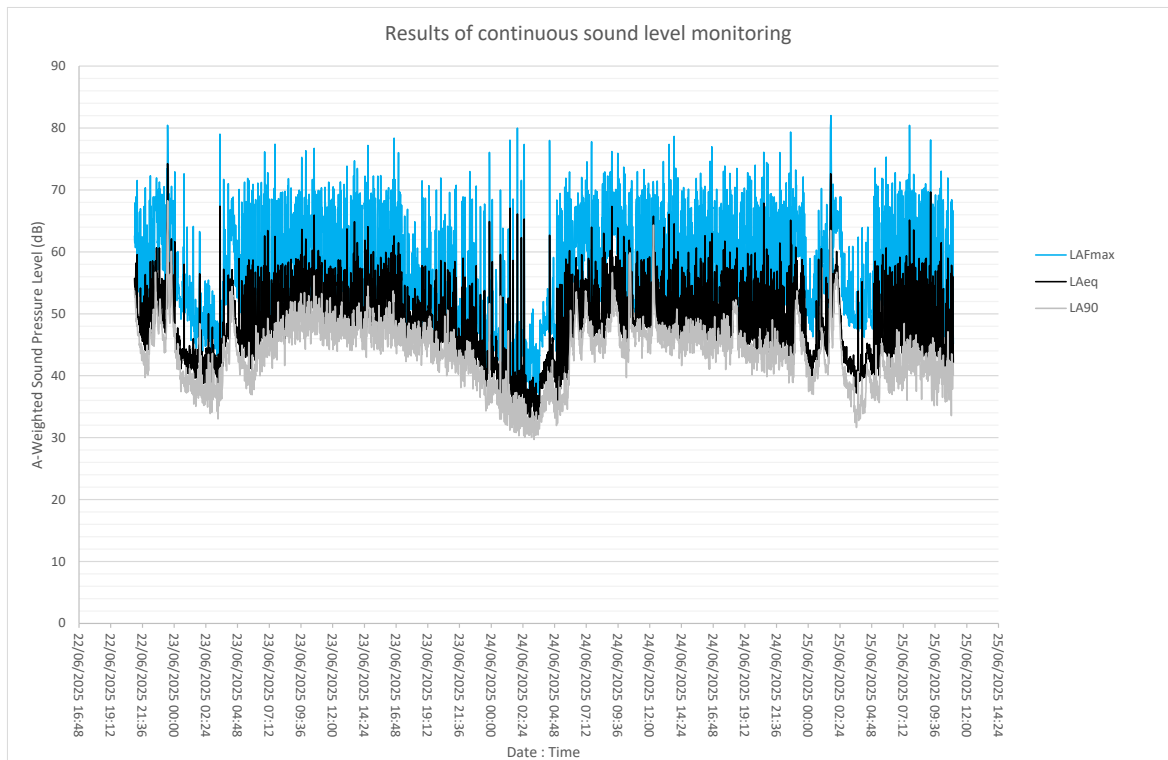
Table 3.1 - Summary of continuously measured sound pressure levels, rear elevation

Date	Period	Duration, T (hours)	$L_{Aeq,T}$ dB	10 th Highest ¹ $L_{AFmax,T}$ dB	15 th Highest ² $L_{AFmax,T}$ dB
Sunday 22/06/2026	Daytime (21:00-23:00)	2	53	---	---
	Night-time (23:00-07:00)	8	54	73	71
Monday 23/06/2026	Daytime (07:00-23:00)	16	53	---	---
	Night-time (23:00-07:00)	8	50	72	70
Tuesday 24/06/2026	Daytime (07:00-23:00)	16	54	---	---
	Night-time (23:00-07:00)	8	54	73	71
Wednesday 25/06/2026	Daytime (07:00-11:00)	4	53	---	---
¹ The 10 th highest measured value. ² The 15 th highest measured value (note: indoor sound pressure levels should ideally not exceed 45 dB L_{Amax} more than 10-15 times per night). ---Daytime values are not presented since there is no L_{AFmax} target for the daytime.					

3.22 The daytime ambient sound pressure level was 53 to 54 dB $L_{Aeq,16hour}$ and the night-time ambient sound pressure level was 50 to 54 dB $L_{Aeq,8hour}$.

3.23 The measured sound pressure levels are presented graphically in Figure 3.3 overleaf. Additional tabulated survey data can be made available upon request.

Figure 3.3 - Graph showing results of continuous sound level monitoring, rear elevation



Sample measurements at front elevation

- 3.24 The results of the measurements conducted at the front elevation indicate daytime ambient sound pressure levels ranging between 52 to 59 dB $L_{Aeq,1min}$.
- 3.25 The measured sound pressures levels were approximately 2 to 6 dB L_{Aeq} higher at the front elevation when compared to the measurements recorded simultaneously at the rear elevation. The difference in sound level is due to the rear elevation being partially screened from passing road traffic.

4. Assessment & Discussion

Building envelope construction and acoustic performance

- 4.1 The external walls are of a traditional double-leaf brickwork/blockwork construction. The sound insulation performance is expected to be approximately 50 to 60 dB R_w .
- 4.2 The roof construction, ceiling and acoustic performance are not relevant due to the dwelling being on the ground floor.
- 4.3 The windows to the front elevation are currently standard thermal double-glazed units fixed within uPVC frames. The construction appears to be 4 mm glass / 16 mm cavity / 4 mm glass.
- 4.4 The sound insulation performance of standard double glazing is approximately 29 to 32 dB R_w .
- 4.5 Purge ventilation is provided by natural means (opening windows) and there are currently sound attenuating trickle vents within the front window frame as shown in the photographs below.
- 4.6 The window in the rear elevation is single glazed set within timber frames. There are currently no trickle vents in the rear elevation. However, a new door and double-glazed window will be installed within the rear elevation.

Figure 4.1 - Photographs showing frame-mounted trickle vents, front elevation



Noise ingress with windows closed

Bedroom on rear elevation

- 4.7 Table 4.1 overleaf presents the noise ingress calculation results for the ground floor bedroom on the rear elevation.
- 4.8 Façade sound pressure levels are expected to be approximately 53 to 54 dB $L_{Aeq,16hour}$ during the daytime and approximately 50 to 54 dB $L_{Aeq,16hour}$ during the night-time.
- 4.9 The calculations consider the sound insulation performance of each building element, surface area and internal room dimensions.
- 4.10 Standard thermal double glazing consisting of 4 mm glass / 16 – 20 mm cavity / 4 mm glass has been assumed in the calculation. A suitable alternative would be 6 mm glass / 16 - 20 mm cavity / 6 mm glass.
- 4.11 The measured octave-band sound pressure levels and typical reverberation time for a habitable room have also been taken into consideration.

Table 4.1 - Noise ingress calculation: bedroom with standard double glazing

Ground Floor Bedroom												
Noise Break In (ISO 12354-3)												
Formula/Comment	Single Value		63	125	250	500	1000	2000	4000	8000	R _w	(C, C _{tr})
				27.3	23.4	31.3	41.2	43.3	37.4			
L _{in}				20.7	27.6	17.7	7.8	3.7	7.6			
Materials												
4mm glass/16 - 20mm cavity/4mm glass	2.6			21.0	17.0	25.0	35.0	37.0	31.0		29	(-1,-4)
Double-leaf brickwork wall	6.4			40.0	44.0	45.0	51.0	56.0	60.0		51	(-1,-4)
L _{out,s}												
L _{out,2m}	Add Element			48.0	51.0	49.0	49.0	47.0	45.0		54	
L _{out,free field}				45.0	48.0	46.0	46.0	44.0	42.0		51	
Element 1				27.3	23.4	31.3	41.2	43.3	37.4			
Plane façade	ΔL _{fs}	9.0		0.0	0.0	0.0	0.0	0.0	0.0			
Visible	X _{fs}	0.0		27.3	23.4	31.3	41.2	43.3	37.4			
L _{p,out,2m}				48.0	51.0	49.0	49.0	47.0	45.0		54	
L _{p,in}				20.7	27.6	17.7	7.8	3.7	7.6		21	dBA

4.12 The calculation results indicate an internal sound pressure level of approximately 21 dB L_{Aeq,16hour} with standard thermal double glazing.

4.13 The daytime sound level target of 35 dB L_{Aeq,16hour} and the night-time target of 30 dB L_{Aeq,8hour} will therefore be easily achieved with the window closed.

4.14 The recommended 'maximum' sound level target of 45 dB L_{AFmax} will also be achieved within the bedroom during the night-time period.

- 73 dB L_{AFmax,T} – 33 dB R_w+C_{tr} = 40 dB L_{AFmax,T}

Living room/kitchen on front elevation

4.15 Table 4.2 presents the noise ingress calculation results for the ground floor living room/kitchen on the front elevation.

4.16 Façade sound pressure levels are expected to be approximately 59 to 60 dB L_{Aeq,16hour} during the daytime and approximately 56 to 60 dB L_{Aeq,16hour} during the night-time.

4.17 Standard thermal double glazing consisting of 4 mm glass / 16 – 20 mm cavity / 4 mm glass has been assumed in the calculation.

Table 4.2 - Noise ingress calculation: living room/kitchen with standard double glazing

Ground Floor Living Room/Kitchen												
Noise Break In (ISO 12354-3)												
Formula/Comment	Single Value		63	125	250	500	1000	2000	4000	8000	R _w	(C, C _{tr})
				25.5	21.5	29.5	39.5	41.5	35.5			
L _{in}				30.5	32.5	26.5	17.5	10.5	8.5			
Materials												
4mm glass/16 - 20mm cavity/4mm glass	4.0			21.0	17.0	25.0	35.0	37.0	31.0		29	(-1,-4)
Double-leaf brickwork wall	4.0			40.0	44.0	45.0	51.0	56.0	60.0		51	(-1,-4)
L _{out,s}												
L _{out,2m}	Add Element			56.0	54.0	56.0	57.0	52.0	44.0		60	
L _{out,free field}				53.0	51.0	53.0	54.0	49.0	41.0		57	
Element 1				25.5	21.5	29.5	39.5	41.5	35.5			
Plane façade	ΔL _{fs}	10.7		0.0	0.0	0.0	0.0	0.0	0.0			
Visible	X _{fs}	0.0		25.5	21.5	29.5	39.5	41.5	35.5			
L _{p,out,2m}				56.0	54.0	56.0	57.0	52.0	44.0		60	
L _{p,in}				30.5	32.5	26.5	17.5	10.5	8.5		28	dBA

- 4.18 The calculation results indicate an internal sound pressure level of approximately 28 dB $L_{Aeq,16hour}$ with standard thermal double glazing.
- 4.19 The daytime sound level target of 35 dB $L_{Aeq,16hour}$ will therefore be easily achieved.
- 4.20 The night-time sound level target of 30 dB $L_{Aeq,8hour}$ applies to bedrooms and does not apply to lounges/living rooms, kitchens and dining rooms. However, it is worth noting that the night-time sound level target of 30 dB $L_{Aeq,16hour}$ will also be achieved within the living room/kitchen with standard double glazing.
- 4.21 The existing double glazing is expected to provide sufficient sound insulation. Should replacement glazing be required, a suitable construction would be 4 mm glass/16 - 20 mm cavity/4 mm glass, or alternatively 6 mm glass/16 - 20 mm cavity/6 mm glass.
- 4.22 Acoustically laminated double glazing and/or thick heavy panes of glass is unnecessary for the living room/kitchen and bedroom.

Noise ingress with windows open

- 4.23 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 characteristics of the noise source in question.
- 4.24 It is reasonable to assume a sound attenuation performance of approximately 15 dB for a partially open window. Partially open windows will provide background ventilation only, as opposed to rapid/purge ventilation.
- 4.25 BS 8233 provides the following guidance regarding the sound insulation from an open window:

If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB³. ³⁾ Note that the level difference through a window partially open for ventilation can vary significantly depending on the window type and the frequency content of the external noise. If the specific details of the window and external noise are known the value for insulation may be adjusted accordingly.

Bedroom on rear elevation

- 4.26 Daytime façade sound pressure levels are approximately 53 to 54 dB $L_{Aeq,16hour}$ and night-time sound pressure levels are approximately 50 to 54 dB $L_{Aeq,8hour}$.
- 4.27 When assessing noise ingress through an open window, it is appropriate to correct the measured sound levels at the façade by approximately -3 dB to give an equivalent free-field sound level.
- 4.28 The corresponding free-field sound pressure levels are therefore 50 to 51 dB $L_{Aeq,16hour}$ during the daytime and 47 to 51 dB $L_{Aeq,8hour}$ during the night-time.
- 4.29 Assuming a partially open window provides 15 dB of sound attenuation, the resulting internal sound level is approximately 35 to 36 dB $L_{Aeq,16hour}$ during the daytime and approximately 32 to 36 dB $L_{Aeq,8hour}$ during the night-time.
- 51 dB $L_{Aeq,T}$ – 15 dB = 36 dB $L_{Aeq,T}$
- 4.30 The night-time sound level target of 30 dB $L_{Aeq,8hour}$ will not be achieved with the window open. The daytime sound level of 35 dB $L_{Aeq,16hour}$ will be just achieved or marginally exceeded.
- 4.31 BS 8233 states where occupants rely on closed windows to meet the internal noise limits, there needs to be appropriate *alternative ventilation* that does not compromise the facade sound insulation or resulting internal sound level.

4.32 BS 8233 also provides the following comment with regard to ventilation:

The Building Regulations' supporting documents on ventilation recommend that habitable rooms in dwellings have background ventilation. Where openable windows cannot be relied upon for this ventilation, trickle ventilators can be used and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

4.33 Since the sound level targets will not be achieved, it is recommended that an alternative method of ventilation is provided to the bedroom in addition to an opening window, such as a sound attenuating ventilator unit to the new window-frame.

4.34 The ventilator unit should provide a sound insulation performance of at least 32 dB $D_{n,e,w}$ in the open position.

4.35 Installing a background ventilator directly through a wall that provides the equivalent areas described in Approved Document F can also be an acceptable route to compliance (as opposed to installing the ventilator unit within the window frame).

4.36 It is anticipated that installing a ventilator unit will be the simplest and most cost-effective noise mitigation measure (i.e. compared to installing a mechanically assisted ventilation system).

4.37 Further guidance regarding ventilator types and acoustic performance is provided overleaf.

4.38 Opening windows can be used to rapidly dilute indoor air pollutants and extract water vapour where necessary (i.e. provide rapid or purge ventilation to the room).

Living room/kitchen on front elevation

4.39 Free-field sound pressure levels are expected to be approximately 56 to 57 dB $L_{Aeq,16hour}$ during the daytime.

4.40 Assuming a partially open window provides 15 dB of sound attenuation, the resulting internal sound level is approximately 41 to 42 dB $L_{Aeq,16hour}$ during the daytime.

- $57 \text{ dB } L_{Aeq,T} - 15 \text{ dB} = 42 \text{ dB } L_{Aeq,T}$

4.41 The daytime sound level target of 35 dB $L_{Aeq,16hour}$ will therefore not be achieved with the window open.

4.42 Although applicable to bedrooms only, the night-time target of 30 dB $L_{Aeq,8hour}$ will also not be achieved within the living room with the window open.

4.43 Since the recommended daytime sound level target will not be achieved with the window open, an alternative method of ventilation is necessary for the living room/kitchen.

4.44 The existing frame-mounted trickle vents appear to provide a sufficient acoustic performance.

4.45 Should the vents or glazing/frames require replacement, sound attenuating trickle vents should be reinstalled.

Ventilation and noise mitigation options

Option 1 - Sound attenuating ventilator units

- 4.46 Manually controlled trickle ventilators (the most common type of background ventilators) can be located over the window frames, in window frames or just above the glass. Background ventilators are intended to normally be left open.
- 4.47 Ventilation should be controllable. Controls may be either manual (i.e. operated by the occupant) or automatic. Background ventilators should be at least 1700 mm above floor level, to reduce cold draughts, but still be easy for the occupant to reach.
- 4.48 Installing a background ventilator directly through a wall that provides the equivalent areas described in Approved Document F can also be an acceptable route to compliance.
- 4.49 Sound attenuating ventilator units can be installed to habitable rooms in order to allow background ventilation whilst maintaining a high sound insulation performance from the façade
- 4.50 The ventilator unit should provide a sound insulation performance of at least 32 dB $D_{n,e,w}$ in the open position.
- 4.51 For guidance, example manufacturers of sound attenuating ventilator units include:
 - [EHA² | Aereco](#)
 - [2500EA/5000EA AC1 \(greenwood.co.uk\)](#)
 - <https://brookvent.co.uk/product/airvent-sm-acoustic-window-vent-surface-mounted-brookvent/>
 - <https://brookvent.co.uk/wall-vents/>
- 4.52 The minimum 'equivalent area' of background ventilators for natural ventilation should follow the guidance in Table 1.7 of Approved Document F for each room type.
- 4.53 It should be noted that a window with a 'night-latch' position is not adequate for background ventilation, due to the risk of draughts, security issues and the difficulty of measuring the equivalent area.

Option 2 - Single room heat recovery ventilation unit

- 4.54 Heat recovery units are designed to improve indoor air quality and lower the risk of condensation. Single room heat recovery units tend to be more efficient than traditional extract ventilation systems but are not as complex to install as the centralised packaged units for the whole building.
- 4.55 Example through-the-wall systems include:
 - <https://www.vent-axia.com/range/lo-carbon-heat-save>

Option 3 - Mechanically assisted ventilation systems

- 4.56 A further option regarding ventilating habitable rooms whilst achieving a high facade sound insulation would be to use a mechanical ventilation system, such as a heat recovery system (MVHR) or positive input ventilation system (PIV).
- 4.57 Example suppliers of MVHR and PIV systems include:
 - www.nuaire.co.uk/residential/positive-input-ventilation
 - www.envirovent.com/specifier/products/heat-recovery-systems/
 - [MVHR | Greenwood](#)

Train vibration levels

4.58 Train vibration levels have been evaluated in order to assess the likelihood of adverse comment from future residents. The guidance contained within BS 6472 has been adopted in order to determine the vibration dose value (VDV) for a 16-hour daytime and 8-hour night-time period.

4.59 Table 4.3 presents the highest measured VDV for each axis during the daytime and night-time.

Table 4.3 - Measured vibration dose values

Period	Measured Vibration Dose Values ($\text{ms}^{-1.75}$)		
	Transverse Axis	Longitudinal Axis	Vertical Axis
Daytime	0.02	0.03	0.03
Night-time	0.01	0.03	0.02

4.60 There is a low probability of adverse comment for a VDV of between 0.2 and 0.4 $\text{ms}^{-1.75}$ during the daytime and 0.1 and 0.2 $\text{ms}^{-1.75}$ during the night-time.

4.61 The measurements indicate that there is less than a low probability of adverse comment during the daytime and night-time period (adverse comment is very unlikely).

5. Conclusion

- 5.1 The external walls will provide sufficient sound insulation from external noise and do not require acoustic enhancement.
- 5.2 Standard thermal double glazing will provide sufficient sound insulation for the front and rear elevation. A suitable glazing construction would be 4 mm glass/16 - 20 mm cavity/4 mm glass, or alternatively 6 mm glass/16 - 20 mm cavity/6 mm glass.
- 5.3 The existing standard thermal double glazing and associated frames can be retained on the front elevation if required.
- 5.4 Acoustically laminated double glazing and/or thick heavy panes of glass is unnecessary for the living room/kitchen and bedroom.
- 5.5 With the windows open, the daytime and night-time internal sound level targets will not be achieved.
- 5.6 An alternative means of ventilation should be provided to the living room and bedroom, in addition to opening the window.
- 5.7 A suitable noise mitigation measure would be to install sound attenuating trickle vents to the new window frame on the rear elevation.
- 5.8 The ventilator unit should provide a sound insulation performance of at least 32 dB $D_{n,e,w}$ in the open position.
- 5.9 The existing frame-mounted trickle vents on the front elevation are expected to provide a sufficient acoustic performance. Should the vents or glazing/frame require replacement, sound attenuating trickle vents should be reinstalled.
- 5.10 Vibration measurements indicate that adverse comment due to passing trains is very unlikely during the daytime and night-time period.

Appendix A

Floor plans and elevations

Figure A.1 - Site location plan

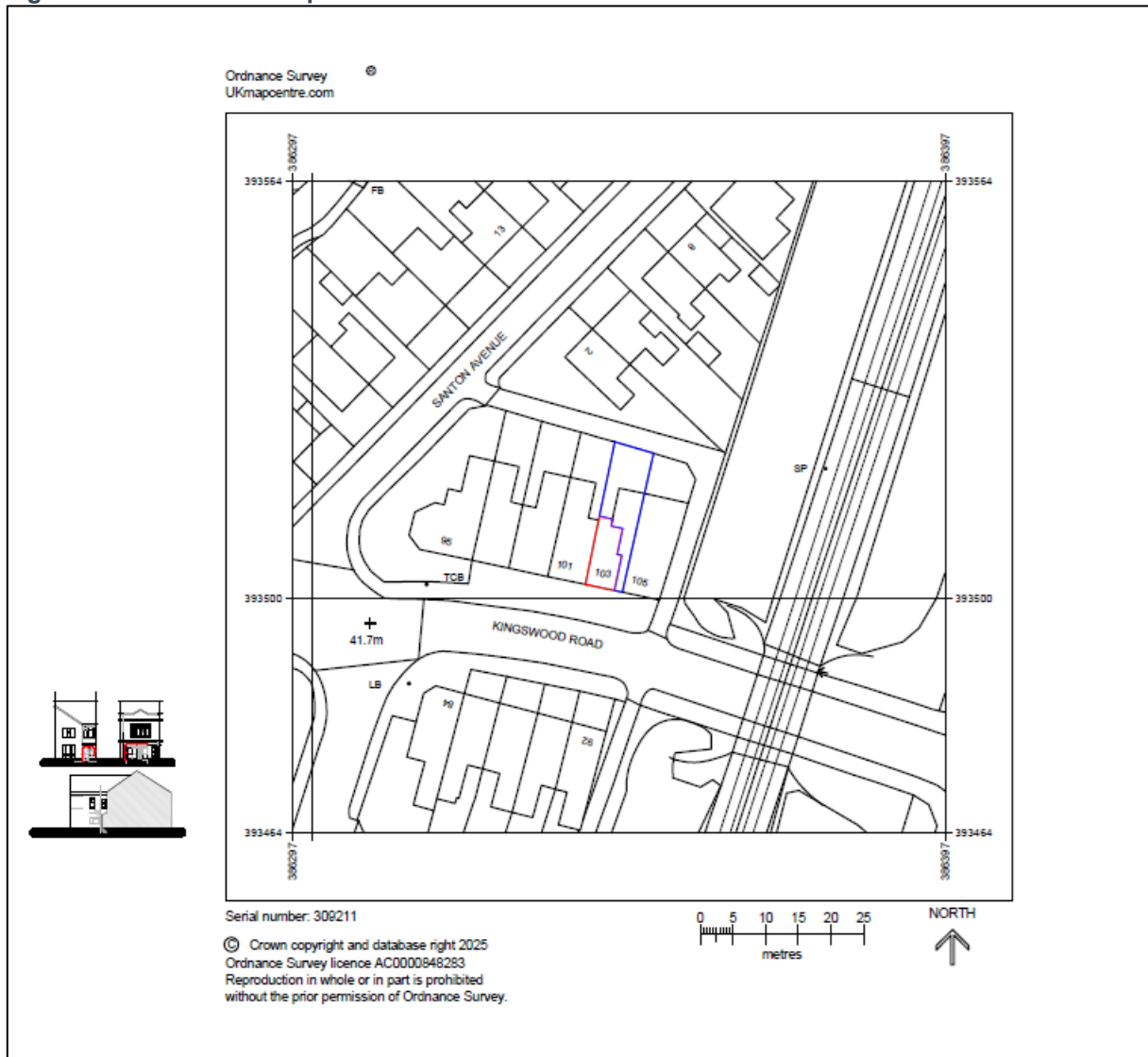
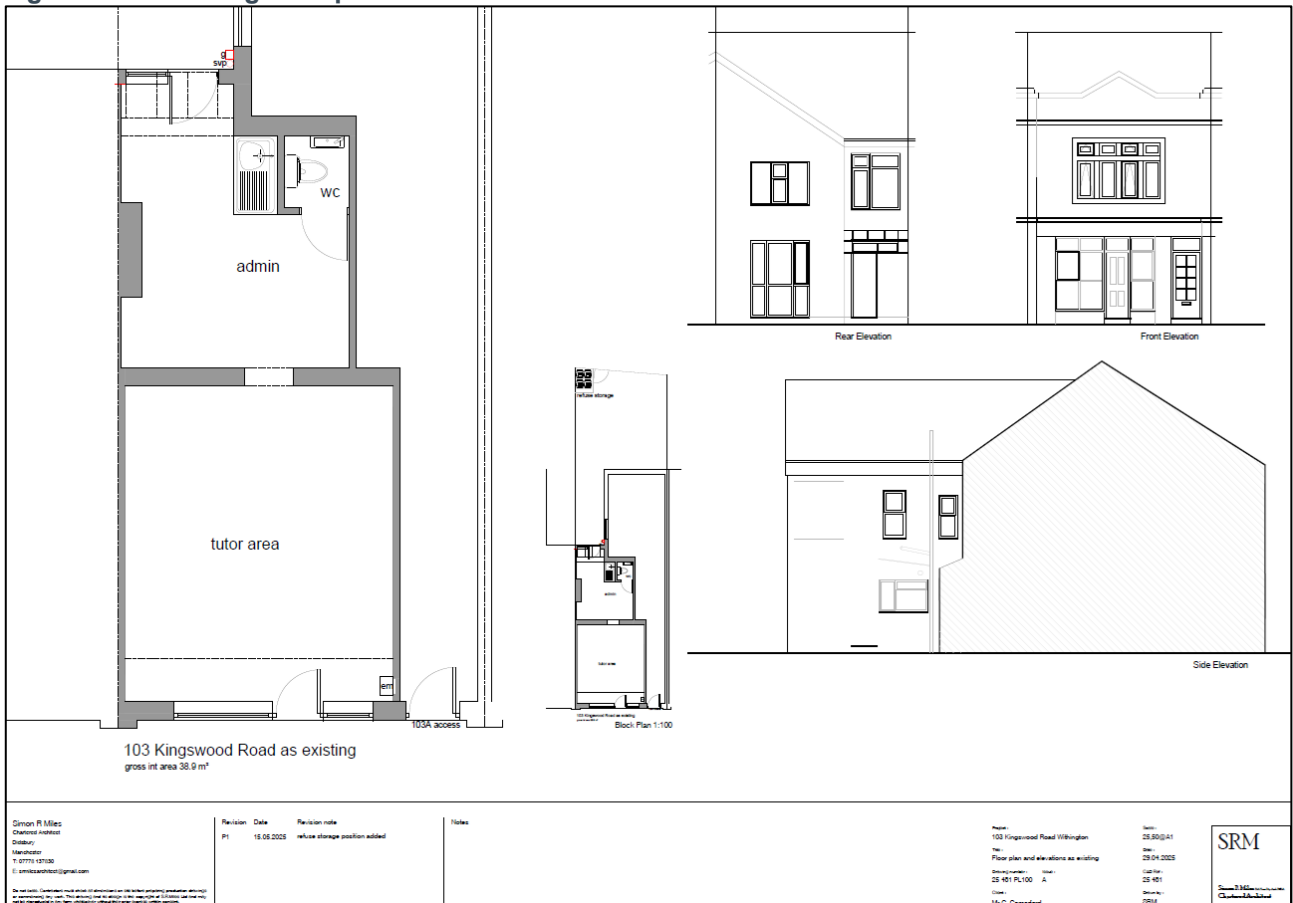


Figure A.2 - Existing floor plans and elevations



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 ($2 \times 10^{-5} \text{Pa}$).
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.
Equivalent continuous sound level - $L_{Aeq,T}$	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 (commonly used to describe the 'ambient' sound level).
Maximum sound level - $L_{AFmax,T}$	The A-weighted 'maximum' sound pressure level that occurred during a given period, T (commonly used for the assessment of intermittent loud noises).
Background sound level - $L_{A90,T}$	The sound pressure level that is exceeded for 90% of the measurement time interval, T. $L_{A90,T}$ is often used to describe the 'background' sound level.
Habitable room	Any room used or intended to be used for sleeping, cooking, living or eating purposes (enclosed spaces such as bath or toilet facilities, service rooms, corridors, laundries, hallways, utility rooms or similar spaces are excluded from this definition).
R_w	The weighted sound reduction index expressed in dB. A single number quantity for airborne sound insulation rating.
Free-field level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other significant reflective surfaces. Generally measured outside and away from buildings (>3.5metres).