
No.742-744 Wilmslow Road Noise Assessment Report

Project: No.742-744 Wilmslow Road, Didsbury (former Police Station)

Client: HUS Property Developments Ltd

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Signature	

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1. Introduction

- 1.1 RS Acoustic Engineering Ltd has been appointed by HUS Property Developments Ltd to undertake a noise assessment with regard to a material change of use at No.742-744 Wilmslow Road, Didsbury, Manchester, M20.
- 1.2 The detached property was formerly Didsbury Police Station and it is understood that the proposals are to convert the vacant building into six self-contained apartments. Planning permission was granted for the development in January 2021.
- 1.3 The properties in the immediate surrounding area consist of a mixture of commercial units and residential dwellings, with commercial units to the north and south along Wilmslow Road and dwellings to the west along Davenfield Grove and also to the east along Albert Hill Street.
- 1.4 The dominant source of noise at the site is road traffic on Wilmslow Road (A5145). Noise from commercial activity and pedestrians also contributes to the existing noise climate at the site.
- 1.5 A noise assessment has been undertaken with reference to the guidance contained within British Standard (BS) 8233:2014 *Guidance on sound insulation and noise reduction for buildings*.
- 1.6 This assessment is based on the results of an environmental noise survey undertaken at the site by RS Acoustic Engineering Ltd. Continuous sound level monitoring was conducted over 24-hours to establish the existing acoustic environment during the daytime and night-time period.
- 1.7 Due to the ongoing pandemic at the time of the assessment and the uncertainty regarding road traffic levels, the measured data has been compared to survey results previously obtained at various locations along Wilmslow Road.
- 1.8 The measured sound level data has been used to determine the acoustic performance requirements for the building envelope 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 closed has been undertaken and the resulting sound levels determined.
- 1.10 An assessment of noise ingress through open windows has also been undertaken and the resulting sound levels determined.
- 1.11 The survey and assessment was 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.
- 1.14 This assessment is based on architectural drawings provided by 4mation Architecture Ltd.

2. Assessment Guidance & Criteria

Manchester City Council: Planning Permission

- 2.1 Manchester City Council granted planning permission for the development on the 14th January 2021, subject to a number of conditions (planning ref: 128136/FO/2020). With regard to noise, the following conditions were attached to the permission:

4) Before the development commences a scheme for acoustically insulating the proposed residential accommodation against noise from Wilmslow Road shall be submitted to and approved in writing by the City Council as local planning authority. There may be other actual or potential sources of noise which require consideration on or near the site, including any local commercial/industrial premises. The approved noise insulation scheme shall be completed before any of the dwelling units are occupied. Upon completion of the development and before first occupation of the residential units, a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that the internal noise criteria has been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the internal noise criteria.

Reason - To secure a reduction in noise from traffic or other sources in order to protect future residents from noise disturbance, pursuant to Policy DM1 in the Manchester Core Strategy.

5) 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 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location. The scheme shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site. The approved scheme shall be completed before the premises is occupied. Upon completion of the development a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic report. The report shall also undertake post completion testing to confirm that the noise criteria has been met. Any instances of nonconformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.

Reason - To minimise the impact of the development and to prevent a general increase in pre-existing background noise levels around the site, pursuant to Policy DM1 in the Manchester Core Strategy.

Informative:

Condition no. 4 - Noise survey data must include measurements taken during a rush-hour period and night time to determine the appropriate sound insulation measures necessary. The following noise criteria will be required to be achieved:

Bedrooms (night time - 23.00 - 07.00) 30 dB L_{Aeq} (individual noise events shall not exceed 45 dB L_{Amax,F} by more than 15 times)

Living Rooms (daytime - 07.00 - 23.00) 35 dB L_{Aeq}

Gardens and terraces (daytime) 55 dB L_{Aeq}

Condition no. 5 - The applicant may need to install some form of mechanical ventilation for the apartments as they are located within the AQMA and may require a clean air intake to protect future residents.

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

- 2.2 BS 8233 provides guidance regarding acoustic criteria and noise levels appropriate for various types of space that have different functions.
- 2.3 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.
- 2.4 The internal sound level targets presented in Table 2.1 have been reproduced directly from Table 4 of BS 8233.

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 $L_{Aeq,8hour}$

- 2.5 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.

- 2.6 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.

- 2.7 With regard to outdoor living areas (gardens), the following guidance is given:

For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

World Health Organisation: Guidelines for community noise (1999)

- 2.8 To help avoid sleep disturbance within bedrooms, the now superseded 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 $L_{AFmax,T}$.
- 2.9 The corresponding values directly outside of bedroom windows are therefore 45 dB $L_{Aeq,8hour}$ and 60 dB $L_{AFmax,T}$. This is based on the assumption that a partially open window provides approximately 15 dB of sound attenuation (from external noise).
- 2.10 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.

3. Environmental Noise Survey

Survey methodology

- 3.1 Continuous sound level monitoring was conducted over a 24-hour period at the front elevation, directly overlooking Wilmslow Road. The equipment was installed within the property with the microphone positioned out of a first floor window.
- 3.2 Measurements were performed from 10:30 hours on Tuesday 9th through to 10:30 hours on Wednesday 10th February 2021.
- 3.3 A number of sample measurements were also conducted at ground floor level adjacent to the rear elevation on Wednesday morning. The sample measurements were time-synchronised with the monitoring position on the front elevation.
- 3.4 A measurement interval of 5-minutes was used during the survey and measurements were considered to be subject to reflections from the elevation (as opposed to free field). Both one-third octave band and A-weighted broadband sound pressure levels were recorded during the survey.
- 3.5 The site location, surrounding area and survey measurement positions are shown in Figure 3.1 and Figure 3.2 overleaf.
- 3.6 The proposed floor plans and elevations are presented in Appendix A.

Figure 3.1 – Site location and survey measurement positions

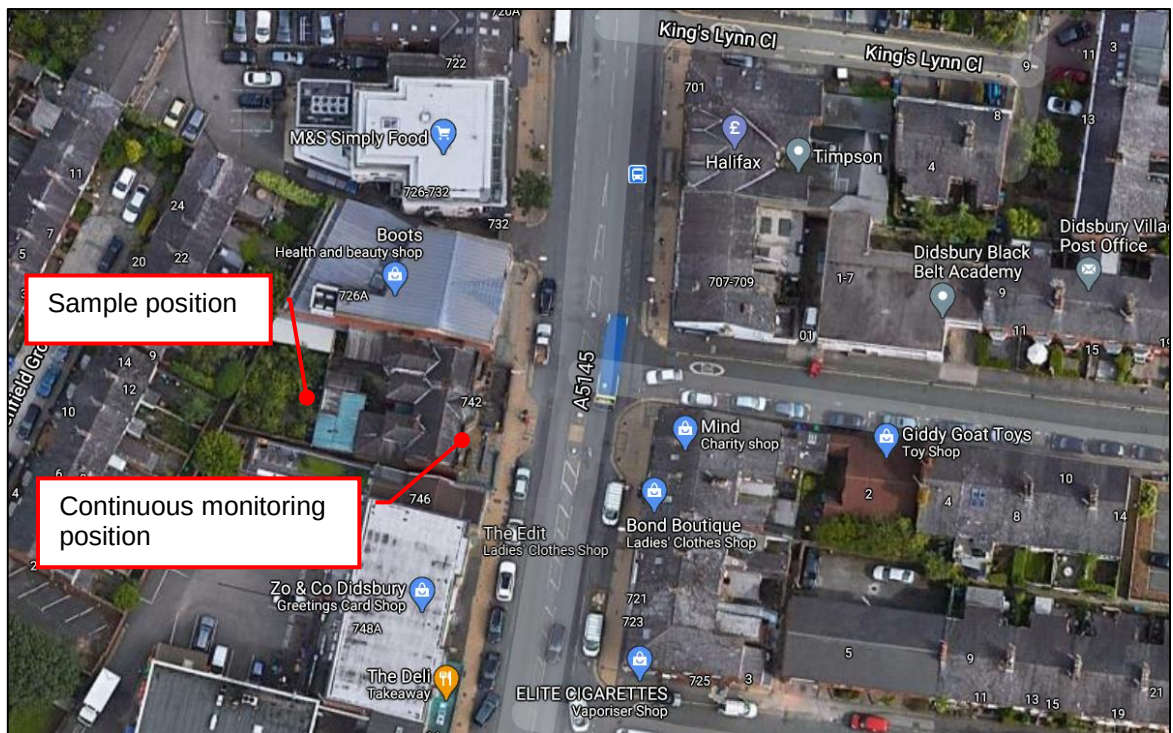


Figure 3.2 – Photographs showing monitoring position on front elevation



Survey equipment

- 3.7 The survey was conducted using the following equipment:
- Brüel & Kjaer 2250-Light data logging sound level meter, with microphone type 4189 and pre-amplifier type ZC0032.
 - CEL-120/1 Acoustic calibrator.
- 3.8 Calibration of the sound level meter and microphone used for the measurements are traceable to UKAS accredited laboratories.
- 3.9 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

- 3.10 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 typically 1 to 3 m/s⁻¹.
- 3.11 The air temperature during the survey ranged between -2°C and 3°C. The overall weather conditions were considered suitable to obtain representative measurements.

Subjective observations of the acoustic environment

- 3.12 The dominant and consistent source of noise at the site is road traffic on Wilmslow Road.
- 3.13 Vehicle movements on Albert Hill Street and Old Oak Street also contribute to the local ambient noise climate.
- 3.14 There is a Boots store immediately north of the property on Wilmslow Road. However, operational noise associated with the premises was considered to be negligible and was mostly attributable to visiting shoppers.
- 3.15 During the survey, there was no audible building services plant noise at the property.
- 3.16 Other noted sources of noise include high altitude aircraft, passing pedestrians and intermittent domestic activity at neighbouring properties.

Measured indices

3.17 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 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 (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 loud noises).

3.18 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.

Results summary

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

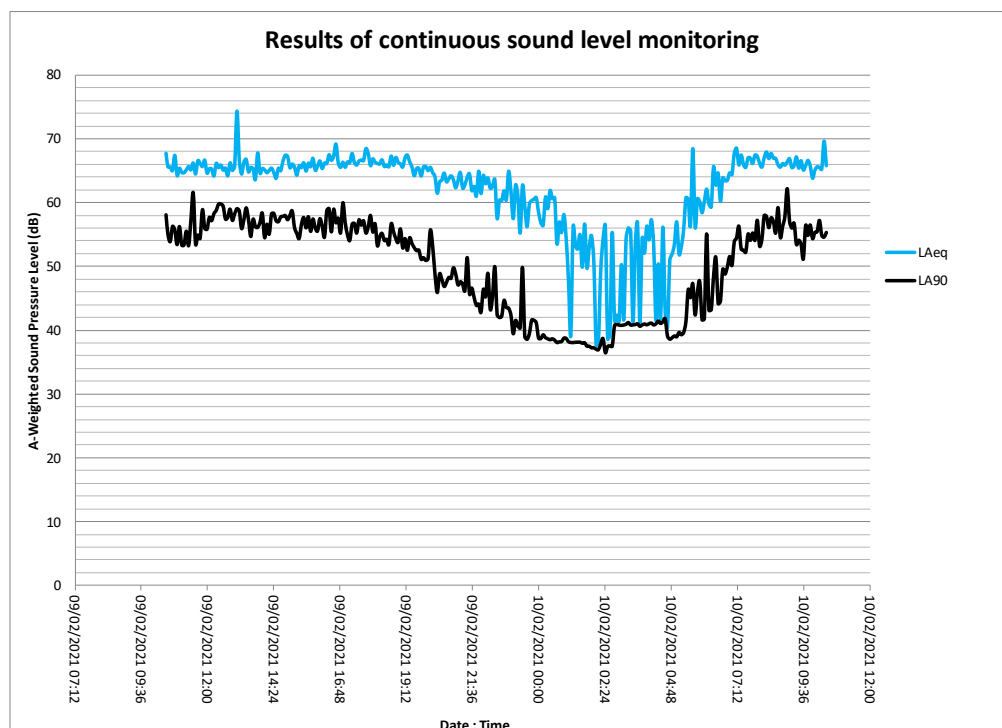
Table 3.1 – Summary of continuously measured sound pressure levels, front elevation

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
Tuesday 09/02/2021 to Wednesday 10/02/2021	Daytime (07:00-23:00)	16	66	---	---
	Night-time (23:00-07:00)	8	59	79	77

¹The 10th highest value from 96 measurement periods ²The 15th highest value from 96 measurement periods

3.20 The results of the sound level monitoring are also presented graphically in Figure 3.3.

Figure 3.3 – Graph showing results of continuous sound level monitoring



Sample measurements

- 3.21 The measured sound pressure levels at the rear of the property were approximately 15 to 20 dB $L_{Aeq,5min}$ lower than those recorded simultaneously at the front elevation.

Other survey results along Wilmslow Road

- 3.22 Previous surveys conducted by RS Acoustic Engineering at other sites along Wilmslow Road suggest that the sound levels measured during this survey are representative for the property, despite the pandemic at the time of the assessment.
- 3.23 For example, at No.437 Wilmslow Road the ambient sound level was approximately 60 dB $L_{Aeq,16hour}$ during the day and approximately 55 dB $L_{Aeq,8hour}$ during the night (surveyed April 2019).
- 3.24 In this instance, the monitoring position was at a greater separation distance from the carriageway, which accounts for the reduction in sound level compared to the current survey data.
- 3.25 As a further example, at No.825 Wilmslow Road the ambient sound level was approximately 58 dB $L_{Aeq,16hour}$ during the day and approximately 53 dB $L_{Aeq,8hour}$ during the night (surveyed September 2017).
- 3.26 Again, the monitoring position in this instance was at a greater separation distance from the carriageway, which accounts for the reduction in sound level compared to the current survey data.

4. Assessment & Discussion

Building envelope construction and acoustic performance

- 4.1 The external walls are of a traditional double-leaf brickwork construction. The wall is expected to provide a sound insulation performance of approximately 50 to 60 dB R_w .
- 4.2 The roof and ceiling construction consists of a pitched slate roof and internal plasterboard ceiling. The roof and ceiling combination is expected to provide a sound insulation performance of approximately 40 to 50 dB R_w .
- 4.3 The existing windows are single glazed, approximately 3 to 4 mm thick with timber frames. The sound insulation performance of the glazing is expected to be approximately 23 to 25 dB R_w .
- 4.4 The glazing is therefore the weakest element with regard to the sound insulation performance of the building envelope.
- 4.5 Ventilation is currently provided via opening sash windows (i.e. there are no trickle vents or wall vents in the front or rear elevation).

Noise ingress with windows closed

Front elevation

- 4.6 Table 4.1 presents the noise ingress calculation results for the ground floor lounge on the front elevation facing Wilmslow Road. The daytime facade sound pressure level is assumed to be 66 dB $L_{Aeq,16hour}$.
- 4.7 The calculations take into account the sound insulation performance of each building element, surface area and internal room dimensions. The sound insulation data for a timber framed single glazed window has been used in the calculations.
- 4.8 The measured octave-band sound levels and the typical reverberation time for a habitable room have also been taken into consideration.

Table 4.1 – Noise ingress calculation results: Lounge (existing single glazing)

Title: 742-744 Wilmslow Road												
Noise Break In (ISO 12354-3)												
Formula/Comment	Single Value		63	125	250	500	1000	2000	4000	8000	R_w	(C, C_{tr})
				20.7	20.7	25.8	28.8	34.8	32.8			
L_{in}			44.3	43.3	35.2	34.2	24.2	17.2				
Materials												
Single 3-4mm glass	5.8		15.0	15.0	20.0	23.0	29.0	27.0			24	(-1,-3)
Brickwork (double-leaf) external wall	6.7		37.0	42.0	52.0	60.0	63.0	68.0			54	(-1,-6)
$L_{out,s}$												
$L_{out,2m}$	Add Element		65.0	64.0	61.0	63.0	59.0	50.0			66	
$L_{out,free field}$			62.0	61.0	58.0	60.0	56.0	47.0			63	
Element 1			20.7	20.7	25.8	28.8	34.8	32.8				
Plane façade	ΔL_{fs}	12.5	0.0	0.0	0.0	0.0	0.0	0.0				
Visible	x_{fs}	0.0	20.7	20.7	25.8	28.8	34.8	32.8				
$L_{p,out,2m}$			65.0	64.0	61.0	63.0	59.0	50.0			66	
$L_{p,in}$			44.3	43.3	35.2	34.2	24.2	17.2			39	dBA

- 4.9 The calculation results indicate a daytime internal sound level of approximately 39 dB $L_{Aeq,16hour}$ with the existing single glazing.
- 4.10 The daytime sound level target of 35 dB $L_{Aeq,16hour}$ will therefore be exceeded with windows closed.

- 4.11 On this basis, it is recommended that the glazing to habitable rooms on the front elevation is acoustically enhanced.
- 4.12 Acoustically laminated double glazing or secondary glazing can be used to significantly enhance the sound insulation performance of the building envelope.
- 4.13 It is understood that the preferred option is to replace the existing single glazing with new double glazed units, as opposed to retaining the existing units and installing secondary glazing.
- 4.14 Table 4.2 presents the calculation results for the front lounge with acoustically laminated double glazing installed (6 mm glass / 16- 20 mm cavity / 6.8 mm acoustic laminate).

Table 4.2 – Noise ingress calculation results: Lounge (with acoustically laminated glazing)

Title: 742-744 Wilmslow Road Noise Break In (ISO 12354- 3)												
Formula/Comment	Single Value		63	125	250	500	1000	2000	4000	8000	Rw	(C,C _{tr})
			28.6	29.7	39.7	47.7	48.7	57.6				
L _{in}			36.4	34.3	21.3	15.3	10.3	-7.6				
Materials												
6mm glass/16-20mm cavity/6.8mm lam	5.8		23.0	24.0	34.0	42.0	43.0	52.0			37	(-2,-6)
Brickwork (double-leaf) external wall	6.7		37.0	42.0	52.0	60.0	63.0	68.0			54	(-1,-6)
L _{out,s}												
L _{out,2m}	Add Element		65.0	64.0	61.0	63.0	59.0	50.0			66	
L _{out,free field}			62.0	61.0	58.0	60.0	56.0	47.0			63	
Element 1			28.6	29.7	39.7	47.7	48.7	57.6				
Plane façade	ΔL _{fs}	12.5	0.0	0.0	0.0	0.0	0.0	0.0				
Visible	X _{fs}	0.0	28.6	29.7	39.7	47.7	48.7	57.6				
L _{p,out,2m}			65.0	64.0	61.0	63.0	59.0	50.0			66	
L _{p,in}			36.4	34.3	21.3	15.3	10.3	-7.6			28	dBA

- 4.15 The calculation results indicate a daytime internal sound level of approximately 28 dB L_{Aeq,16hour} with acoustically laminated double glazing installed.
- 4.16 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 acoustically laminated double glazing.
- 4.17 With regard to the maximum L_{AFmax} internal sound levels, the recommended target of 45 dB L_{AFmax} will also be achieved.
- 77 dB L_{AFmax} – 37 dB R_w = 40 dB L_{AFmax} (internally)
- 4.18 As an example, Pilkington Optiphon is a high performing acoustic laminate that can be used within double glazed systems.
- www.pilkington.com/en-gb/uk/products/product-categories/noise-control/pilkington-optiphon/
- 4.19 The acoustic performance of a particular construction may differ slightly between manufacturers and therefore the sound insulation performance should be verified where possible.
- 4.20 To achieve the optimum performance, external windows should be well sealed around the frame when installed. Large gaps between the frame and the brickwork and poorly sealed frames can notably reduce performance.
- 4.21 Should secondary glazing be considered, a 6 mm thick pane of glass should provide sufficient sound insulation and may be face-fixed to the primary (original) timber frame or reveal-fixed. The combined sound insulation performance in this instance is expected to be circa 37 to 38 dB R_w.

Rear elevation

- 4.22 The daytime sound pressure level at the rear elevation is approximately 15 to 20 dB $L_{Aeq,T}$ lower than the sound pressure level at the front elevation due to the degree of acoustic screening provided by the property (i.e. from road traffic) and also due to the increased distance from the road.
- 4.23 Taking into consideration the degree of acoustic screening and resulting sound level, standard thermal double glazing will be appropriate for habitable rooms on the rear elevation. A suitable construction would be 4 mm glass / 16- 20 mm cavity / 4 mm glass.
- 4.24 Acoustically laminated double glazed units or secondary glazed units are therefore considered unnecessary for the rear elevation.

Noise ingress with windows open

- 4.25 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.
- 4.26 It is considered reasonable to assume a sound attenuation performance of approximately 15 dBA for a partially open window.

Front elevation

- 4.27 Daytime façade sound pressure levels are approximately 66 dB $L_{Aeq,16hour}$ on the front elevation facing Wilmslow Road.
- 4.28 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).
- 4.29 The corresponding free-field sound pressure level is therefore 63 dB $L_{Aeq,16hour}$ during the daytime period.
- 4.30 Assuming a partially open window provides 15 dBA of sound attenuation, the resulting internal sound level is expected to be in the region of 48 dB $L_{Aeq,16hour}$ during the daytime within the lounge/dining areas.
- 4.31 The daytime internal sound level target will therefore be exceeded with windows open.
- 4.32 It should be noted that BS 8233 suggests that 'reasonable' acoustic conditions can be achieved where the internal targets are relaxed by 5 dB (i.e. daytime target of 40 dB $L_{Aeq,16hour}$ and a night-time target of 35 dB $L_{Aeq,8hour}$).

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.

- 4.33 However, the relaxed target will still be exceeded during the daytime period.
- 4.34 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.
- 4.35 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.

- 4.36 It is therefore recommended that an alternative means of ventilation is provided to habitable rooms on the front elevation.

- 4.37 A suitable mitigation measure would be to install acoustically rated (sound attenuating) ventilator units so that windows can remain closed during noisier periods.
- 4.38 Alternatively, mechanically assisted ventilation or an air-conditioning system could be installed within the property. An appropriate system would allow occupants to keep windows closed whilst achieving satisfactory ventilation and cooling.
- 4.39 Further guidance regarding ventilation and noise mitigation is provided in Section 5.

Rear elevation

- 4.40 Taking into consideration the degree of acoustic screening, free-field sound pressure levels are expected to be approximately 48 dB $L_{Aeq,16hour}$ during the daytime and 41 dB $L_{Aeq,8hour}$ during the night-time.
- 4.41 With windows open, the resulting internal sound level is expected to be approximately 33 dB $L_{Aeq,16hour}$ during the daytime and approximately 26 dB $L_{Aeq,8hour}$ during the night-time.
- 4.42 The maximum sound level during the night-time period is expected to be approximately 40 to 45 dB $L_{AFmax,T}$ within bedrooms with windows open.
- 4.43 The daytime and night-time internal sound level targets should therefore be achieved with windows open.
- 4.44 On this basis, an alternative method of ventilation such as acoustic ventilator units are considered unnecessary for the rear elevation.

Garden ambient sound levels

- 4.45 With regard to outdoor living areas, BS 8233 states that it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments.
- 4.46 There are private gardens at ground floor level and balconies at upper floor level on the rear elevation.
- 4.47 Due to the degree of acoustic screening provided by the building itself, the existing ambient sound level during the daytime period is generally below 50 dB $L_{Aeq,T}$. The existing sound levels therefore achieve the lower guideline value given within BS 8233.
- 4.48 The existing ambient sound level is therefore considered appropriate for external amenity space and specific mitigation with regard to external noise is considered unnecessary.

5. Ventilation & Noise Mitigation Options

Acoustically rated ventilator units

- 5.1 Manually controlled trickle ventilators (the most common type of background ventilators) can be located over the window frames, in window frames, just above the glass or directly through the wall.
- 5.2 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 facade.
- 5.3 Should the external glazing be replaced on the front elevation, the simplest option may be to have acoustically rated ventilator units fitted within the window frame. However, should secondary glazing be installed, wall mounted ventilator units are likely to be the most practical option.
- 5.4 The acoustic performance of the ventilator unit should not compromise the overall sound insulation of the facade. The unit should provide a performance of at least 32 dB $D_{n,e,w}$ (in the open position).
- 5.5 Example manufacturers of acoustically-rated ventilator units include:
 - www.aereco.co.uk/products-and-systems/
 - www.greenwood.co.uk/acoustic
 - <http://brookvent.co.uk/product/airvent-sm-acoustic/>

Mechanically assisted ventilation

- 5.6 A further option with regard to ventilating and cooling habitable rooms whilst preserving facade sound insulation (i.e. keeping windows closed) would be to use a mechanical ventilation system, such as a heat recovery system (MVHR) or Positive Input Ventilation (PIV) system.
- 5.7 Where mechanical ventilation is employed, it is typically unnecessary to install acoustically rated ventilator units within walls/windows.
- 5.8 Example suppliers of MVHR systems include:
 - www.envirovent.com/specifier/products/heat-recovery-systems/
 - www.greenwood.co.uk/range/5/heat-recovery-mvhr.html
- 5.9 Appropriate ventilation rates will depend on the number of bedrooms within the dwelling and the anticipated occupancy rate (refer to Approved Document F for guidance).

Air conditioning system

- 5.10 Air-conditioning units can also be used within a property to provide effective cooling and air filtration to habitable rooms.
- 5.11 For example, a split-type air conditioning system provides internal units that can be mounted on the wall, ceiling or directly on the floor.
- 5.12 Example manufacturers of domestic air conditioning systems/units include:
 - www.aircon.panasonic.eu/GB_en/ranges/domestic/
 - www.daikin.co.uk/en_gb/product-group/air-to-air-heat-pumps.html
- 5.13 Checks should be made regarding the suitability of the unit in terms of room size and cooling capability.

6. Conclusion

- 6.1 With the existing single glazing, the daytime internal sound level target will be exceeded on the front elevation facing Wilmslow Road.
- 6.2 It is recommended that the glazing to habitable rooms is acoustically enhanced on the front elevation. Acoustically-laminated double glazing or secondary glazing can be used to significantly enhance the sound insulation performance of the building envelope.
- 6.3 Standard thermal double glazing will be suitable for habitable rooms on the rear elevation.
- 6.4 With windows open, the daytime internal sound level target will be exceeded on the front elevation. An alternative means of ventilation should therefore be provided to habitable rooms.
- 6.5 A suitable mitigation measure would be to install acoustically rated (sound attenuating) ventilator units or alternatively install a mechanical ventilation system.
- 6.6 On the rear elevation, the daytime and night-time internal sound level targets should be achieved with windows open. An alternative method of ventilation such as acoustic ventilator units is therefore unnecessary for the rear elevation.
- 6.7 The existing ambient sound level is considered appropriate with regard to the rear amenity space and therefore specific noise mitigation is considered unnecessary.

Appendix A

Proposed floor plans and elevations

Figure A.2 – Proposed 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 as measured outside and away from buildings (>3.5metres).