

Residential development at Manchester Street, Heywood:

Noise Assessment

Simon & Jane Byrne

Echo Acoustics 15 March 2021

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Action:	Signatory:	Date:
Report prepared by:	M Potts	12/03/2021
Signature:		
Report reviewed by:	R Swales	12/03/2021
Signature:		
Report authorised by:	M Potts	15/03/2021
Signature:		

EXECUTIVE SUMMARY

The results of a noise measurement survey and desk-based assessment are presented, with respect to the proposed residential development of land at Manchester Street, Heywood, Greater Manchester.

The assessment shows that the site is principally affected by elevated levels of noise, during both the day and night time, from traffic using Manchester Road.

Suitable noise mitigation measures are recommended in order to protect residential amenity and the assessment concludes that, with the provision of these measures, the site is suitable for residential development and that noise need not be a reason for refusal of planning permission.

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1 INTRODUCTION AND SITE DESCRIPTION

- 1.1 Echo Acoustics was commissioned by TDM Design Ltd, on behalf of Simon & Jane Byrne, to undertake an assessment of noise affecting the proposed redevelopment of land at Manchester Street, Heywood, Greater Manchester.
- 1.2 The site is a small rectangular area, fronting directly onto Manchester Street, between Well Street and Bradshaw Street, as shown in Figure 1.

Figure 1 : Development area outline and surroundings

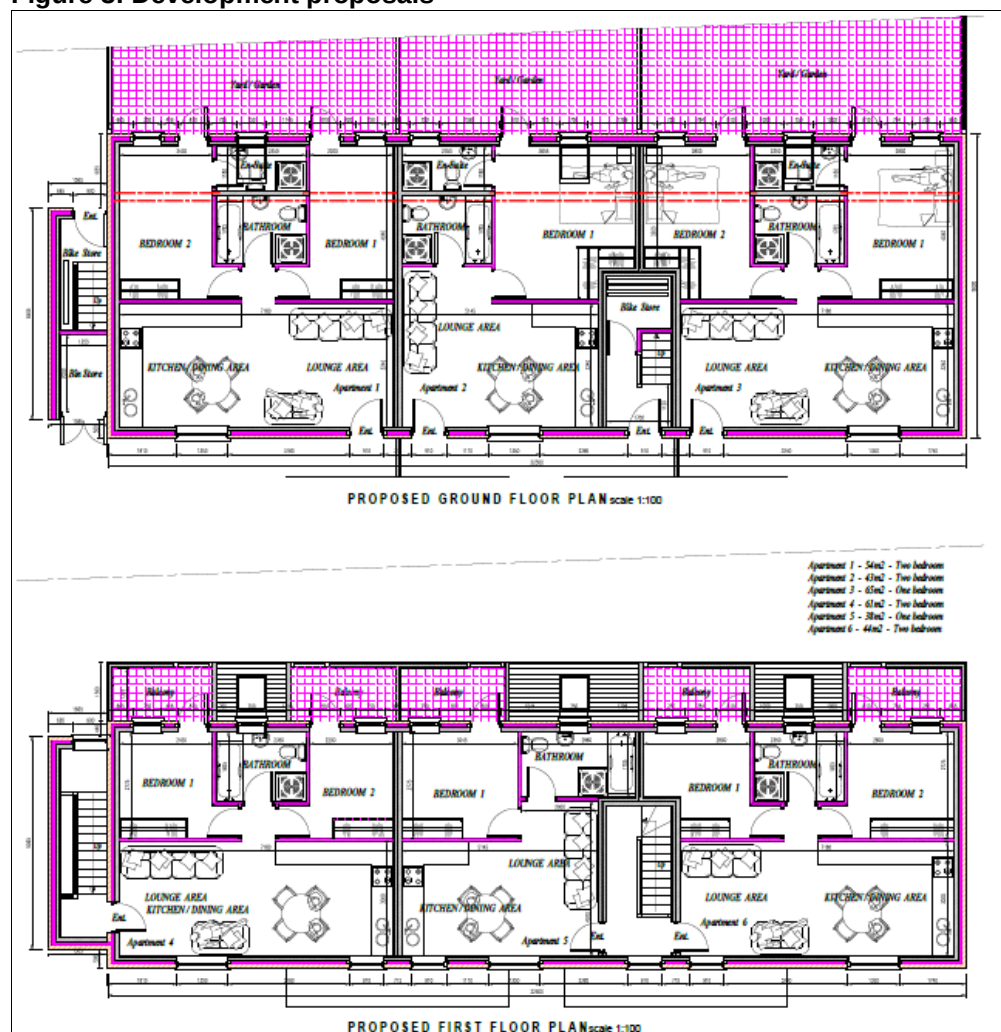


Figure 2: View of site from Manchester Road



- 1.3 The area is mixed residential and commercial; On the opposite corner of Bradshaw Street is former housing converted to commercial/office use (Hopwood Electrical Services Ltd), to the rear of the site is a relatively recently constructed light manufacturing operation, Celsius Air Conditioning, whilst immediately to the south of the site, on the opposite corner of Well Street, is a steel fabrication operation. On the opposite side of Manchester Road is residential housing.
- 1.4 The ambient noise at the site is dominated by road traffic noise from Manchester Road. There was no significant, audible noise emanating from the adjacent commercial uses, both of which operate during the daytime only.
- 1.5 Figure 2 presents the current site layout proposals, comprising six 1- and 2-bedroom apartments with their front facades directly onto the rear edge of the pavement on Manchester Street.

Figure 3: Development proposals



- 1.6 This report presents the results of a noise measurement survey and desk-based assessment of noise affecting the site and its significance with respect to the proposed residential use and, where appropriate, a discussion of suitable noise mitigation requirements for the site.
- 1.7 A glossary of acoustic terminology is presented at Appendix A.

2 GUIDANCE

Noise – national and local policy guidance

- 2.1 Planning policies are set at both a national and local level. With respect to national policy, assessment of the suitability of a site for residential development is guided by the National Planning Policy Framework (NPPF), issued in March 2012 and amended in 2018 and 2019.
- 2.2 With regard to noise, the NPPF (“the Framework”) does not provide specific noise policies or defined noise limits, but rather is intended to enable the planning system to support the Government’s aims and objectives with respect to sustainable development, and provides a general framework within which planning applications for development must *“be determined in accordance with the [local] development plan”*.
- 2.3 None of the current local or national planning policies preclude residential development of the site.
- 2.4 The National Planning Policy Framework does state that *“the planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability”*.
- 2.5 Additional national planning guidance is provided in the Government’s Noise Policy Statement for England (NPSE – “the Noise Policy”), to which the Framework makes specific reference as the main source of national guidance specifically on planning and noise.
- 2.6 The Noise Policy has a long term vision to *“Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development”*. The vision is supported by three key aims intended to promote sustainable development with respect to noise so that *“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
 - *avoid significant adverse impacts on health and quality of life;*
 - *mitigate and minimise adverse impacts on health and quality of life; and*
 - *where possible, contribute to the improvement of health and quality of life”*.
- 2.7 Health is defined by the World Health Organisation as *“a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, and recognises the enjoyment of the highest attainable standard of health as one of the fundamental rights of every human being”* and the Noise Policy makes *“a distinction between ‘quality of life’ which is a subjective measure that refers to people’s emotional, social and physical well being and ‘health’ which refers to physical and mental well being”*.
- 2.8 However, the Noise Policy recognises that it is not currently possible to define a single objective noise level having specific effects on people, hence the emphasis on “promoting” improvements to health and quality of life through effective management of noise, considered in the context of the wider environment and factors other than noise.
- 2.9 Additional guidance is given in the Planning Practice Guidance Note (PPG) on noise, issued in March 2014, alongside the NPPF and updated in 2018 and July 2019. This *“advises on how planning can manage potential noise impacts in new development”*. The PPG suggests the following noise exposure hierarchy, based on average responses to noise.

Table 1: PPG noise exposure and response hierarchy

Perception	Examples of outcomes	Increasing effect level	Action
<i>No Observed Effect Level (NOEL)</i>			
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
<i>Lowest Observed Adverse Effect Level (LOAEL)</i>			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
<i>Significant Observed Adverse Effect Level (SOAEL)</i>			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non- auditory	Unacceptable Adverse Effect	Prevent

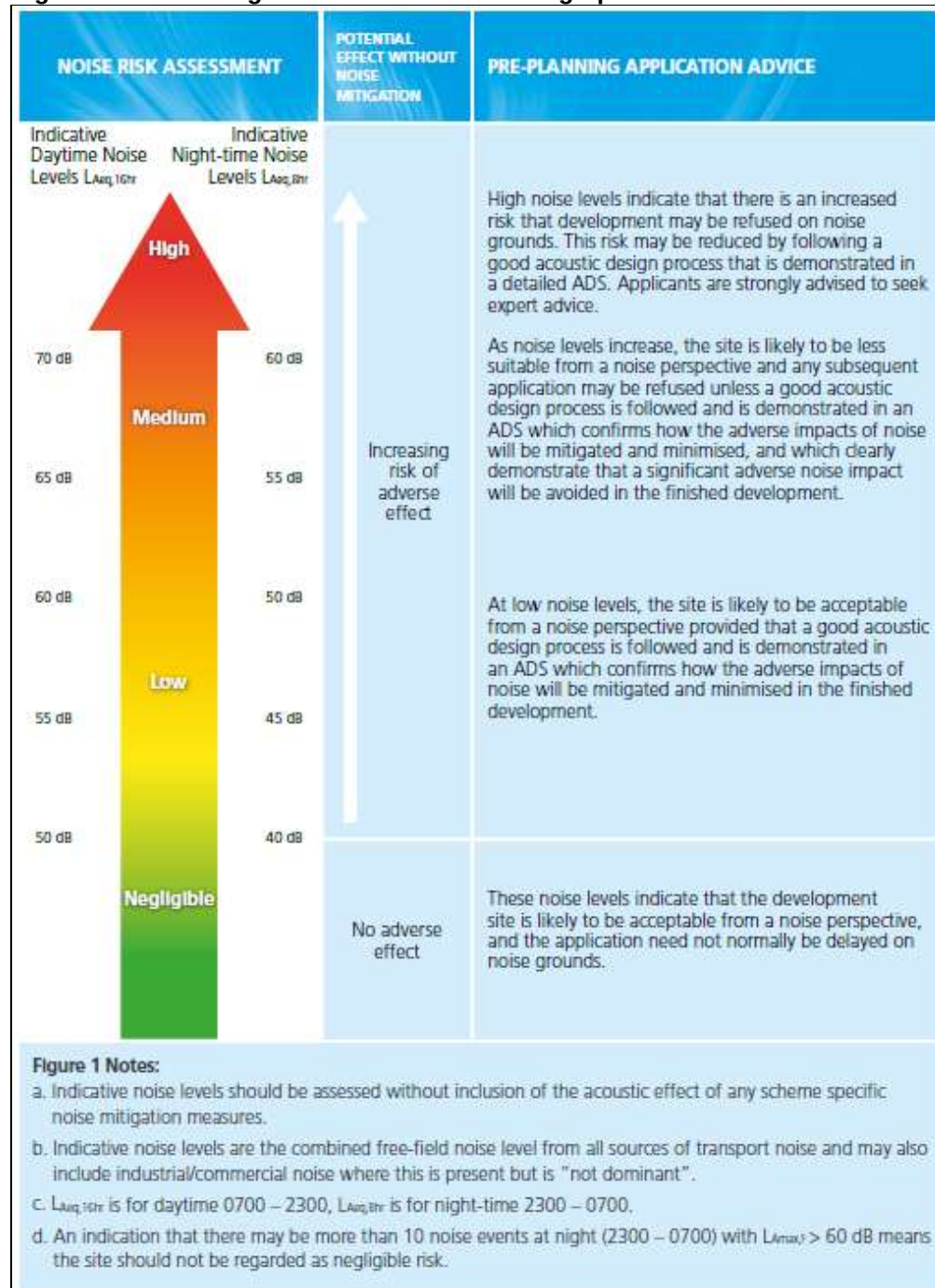
- 2.10 Beyond this, however, the guidance is relatively generic. It avoids specifying ‘acceptable’ environmental noise levels as the acceptability of a source of is both subjective and context-dependant.

Noise – technical guidance

- 2.11 In May 2017, a Working Group consisting of representatives of the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH) produced a Professional Practice Guidance (Pro PG) document¹. The guidance was produced “to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England” and “which encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise”. Its primary aim is “to assist the delivery of sustainable development by promoting good health and wellbeing through the effective management of noise. It seeks to do that through encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise”.
- 2.12 The guidance identifies that “Good acoustic design is about more than the numbers. It is a holistic design process that creates places that are both comfortable and attractive to live in, where acoustics is considered integral to the living environment.
- Good acoustic design can involve, for example, careful site layouts and better orientation of rooms within dwellings. Good acoustic design does not mean “gold plating” or significantly increasing costs. This guidance seeks to encourage and promote design outcomes that are proportionate and reasonable in the particular circumstances of each development site”.*
- 2.13 It should be noted that the Pro PG “does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy on which users should take their own advice as appropriate”.
- 2.14 The guidance “advocates a systematic, proportionate, risk based, 2-stage, approach. The approach encourages early consideration of noise issues, facilitates straightforward accelerated decision making for lower risk sites, and assists proper consideration of noise issues where the acoustic environment is challenging”. The two sequential stages are:
- Stage 1 – an initial noise risk assessment of the proposed development site; and
 - Stage 2 – a systematic consideration of four key elements.
- 2.15 Figure 1 of the guidance provides a useful graphical overview of the Stage 1 risk assessment considerations, reproduced as Figure 3.

¹ ANC, IOA & CIEH (2017) *Pro PG: Planning & Noise Professional Practice Guidance on Planning & Noise: New Residential Development*

Figure 4: ProPG Stage 1 risk assessment info-graphic



2.16 The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:

- Element 1 – demonstrating a “*Good Acoustic Design Process*”;
- Element 2 – observing internal “*Noise Level Guidelines*”;
- Element 3 – undertaking an “*External Amenity Area Noise Assessment*”; and
- Element 4 – consideration of “*Other Relevant Issues*”.

2.17 “The approach is underpinned by the preparation and delivery of an “*Acoustic Design Statement*” (ADS). An ADS for a site assessed as high risk should be more detailed than for

a site assessed as low risk. An ADS should not be necessary for a site assessed as negligible risk”.

2.18 With respect to noise affecting residential amenity, BS 8233: 2014 *Guidance on sound insulation and noise reduction for buildings* gives recommendations for external and internal noise levels for residential dwellings in order to protect residential amenity, based on health-based research, as follows:

- Living rooms during the day 35 dB $L_{Aeq,16hour}$
- Dining rooms during the day 40 dB $L_{Aeq,16hour}$
- Bedrooms during the day 35 dB $L_{Aeq,16hour}$
- Bedrooms during the night 30 dB $L_{Aeq,8hour}$

2.19 These values can be taken to be broadly equivalent with the LOAEL in the PPG. Note that these are not specific criteria or ‘target’ noise levels, merely indicative recommendations which will be context-dependant. However, most Local Authorities tend to apply the recommended noise levels as strict criteria.

2.20 In most standard modern properties, the walls and roof provide relatively high levels of sound insulation of greater than 40 dB; the weakest part of a building facade, with respect to noise, is generally the windows. Modern construction methods for new residential properties incorporate standard thermal double-glazing which, the standard suggests, will provide approximately 30 dB R_w of sound attenuation when closed. The standard does not specifically give sound attenuation values for partially open windows, although the worked example (G.1) at Annex G of the Standard indicates that a partially open window would provide 15 dB of sound attenuation.

2.21 With regard to maximum (L_{AFmax}) noise levels, BS 8233 (Note 4) states the following:

“Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values”.

2.22 A study undertaken by Vallet & Vernet (1991)² suggests that for good sleep, indoor sound pressure levels in bedrooms should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night. The findings of this research are conventionally accepted as being suitable for use in the assessment of other forms of noise.

² Vallet M. & Vernet I. (1991) *Night noise index for aircraft noise and sleep disturbance*. Proceedings Internoise 1991, Sydney, Vol. 1 pp 207-210

3 METHODOLOGY

- 3.1 The assessment incorporated a noise measurement survey over a number of days between 10:30am on Friday 26 February and 10:30am on Monday 1 March 2021.
- 3.2 The survey consisted of continuous, consecutive 15-minute noise measurements as well as 1-second noise measurement.
- 3.3 The measurement location was at the front corner of the development area, at the junction of Manchester Street and Well Street, as presented in Figure 5.

Figure 5: Noise measurement position



- 3.4 The two partial day time measurements at position 1 were combined to produce a single 16-hour day time (7:00am – 11:00pm) measurement data set.
- 3.5 The weather during both surveys was dry, cold (9 Celsius during the day to 1 Celsius overnight) and with negligible wind.

4 RESULTS, ASSESSMENT AND DISCUSSION

- 4.1 The results of the noise measurement survey are summarised in Table 2; the 2 part-day measurements for the Monday and Friday were combined to provide a single 16-hour data set. The full 15-minute data and 1-second data are too numerous to include in this report but are available on request.

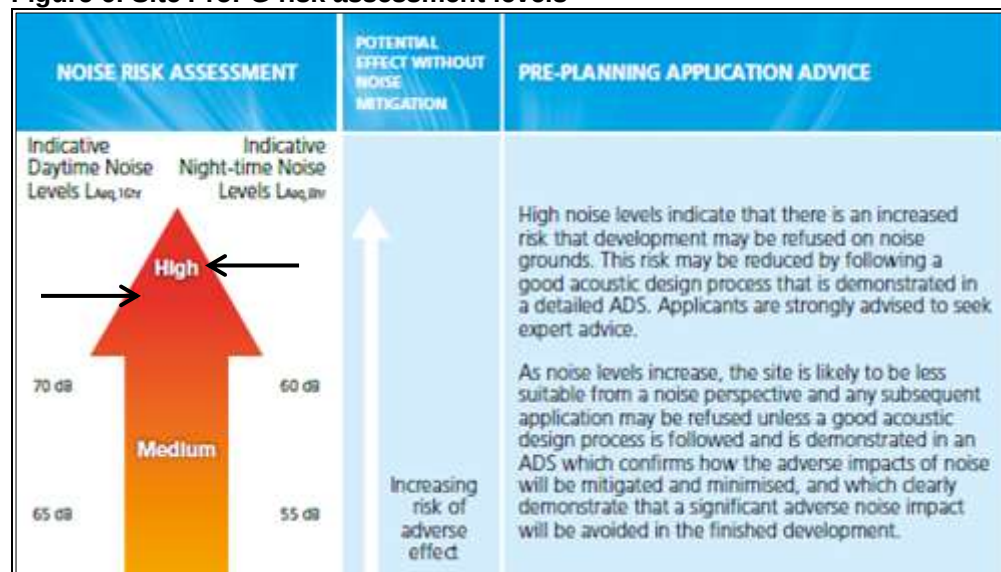
Table 2: Summarised noise measurement data

Date	Period	Measured noise (dB)	
		L _{Aeq}	L _{Amax}
Saturday	Night (23:00 - 07:00)	66.6	76.0
	Day (07:00 - 23:00)	73.5	-
	Night (23:00 - 07:00)	66.3	74.5
Sunday	Day (07:00 - 23:00)	73.5	-
	Night (23:00 - 07:00)	67.9	79.0
	Day (07:00 - 23:00)	74.6	-

Pro-PG risk assessment

- 4.2 With respect to the Pro PG Stage 1 risk assessment (Figure 4), the front of the site was deemed to be a “high” risk site during both the day and night time, as indicated in Figure 6; this assessment is provided as the Acoustic Design Statement (ADS) for the development and further detailed, technical assessment is required to ensure that a “*good design process*” is followed such that any adverse effects of noise, on future occupants, can be suitably mitigated.

Figure 6: Site ProPG risk assessment levels



BS8233 noise assessment

- 4.3 The current design layout indicates that open-plan dining living rooms will be located at the front of the development, with windows facing Manchester Street, and with bedrooms to the rear with no windows facing Manchester Street, either directly or obliquely.

External amenity areas:

- 4.4 The apartments at ground floor level will be provided with small yard/garden areas at the back of the development whilst the first-floor apartments will have small balconies at the rear.

- 4.5 BS 8233 recommends that *“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 recognized 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.*

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space”.

The gardens/yards will be generally protected from noise by the building itself but those at the two ends of the building may be exposed *obliquely* to noise from Manchester Road; mitigation measures will be required.

Internal noise in habitable rooms:

- 4.6 The data in Table 2 were used to calculate internal noise levels in habitable rooms closest to and facing Manchester Street. The calculation assumed 15 dB and 30 dB R_w of sound attenuation through an open and closed window, respectively. The results of this are presented in Table 3.

Table 3: Calculated internal noise levels

Date	Period	Calculated noise (dB)	
		L _{Aeq}	L _{Amax}
Windows closed			
Saturday	Night (23:00 - 07:00)	36.6	46.0
	Day (07:00 - 23:00)	43.5	-
Sunday	Night (23:00 - 07:00)	36.3	44.5
	Day (07:00 - 23:00)	43.5	-
Friday & Monday	Night (23:00 - 07:00)	37.9	49.0
	Day (07:00 - 23:00)	44.6	-
Windows open			
Saturday	Night (23:00 - 07:00)	51.6	61.0
	Day (07:00 - 23:00)	58.5	-
Sunday	Night (23:00 - 07:00)	51.3	59.5
	Day (07:00 - 23:00)	58.5	-
Friday & Monday	Night (23:00 - 07:00)	52.9	64.0
	Day (07:00 - 23:00)	59.6	-

- 4.7 With respect to the open-plan dining/living rooms at the front of the development, the data in Table 3 indicate that, even with windows closed, internal ambient (L_{Aeq}) noise levels in the dining/living areas will be up to 9.6 dB greater than the BS 8233 guideline level for living rooms.
- 4.8 The opening of windows for ventilation would give rise to noise levels up 24.6 dB greater than the guideline value for living rooms.
- 4.9 This finding indicates that standard thermal double-glazed windows, even when closed, will provide insufficient protection from traffic noise for future residents of the development; a higher specification of glazing will be required.
- 4.10 Additionally, windows will need to remain closed in order to maintain any protection from traffic noise provided by the glazing. Consequently, alternative means of providing background ventilation *and* cooling will be required.
- 4.11 With respect to the bedrooms at the rear of the development, they will be protected from direct traffic noise, but will be subject to indirect noise reflected off the hard, metal-clad wall

of the adjacent commercial building (Celsius Air Conditioning): both ambient (L_{Aeq}) and maximum (L_{Amax}) noise levels are likely to be between 10 and 20 dB lower than at the front façade. Detailed quantitative calculation is difficult to undertake for this façade without creating a highly detailed computer noise model, but it is likely that standard thermal double-glazed units will not provide suitable levels of protection from low frequency noise associated with diesel-engined vehicles. Additionally, windows will need to remain closed in order to preserve residential amenity and protect sleep during the night time.

- 4.12 Consequently, as for the habitable rooms at the front of the development, uprated glazing (although to a lesser degree) and alternative means of providing background ventilation *and* cooling will be required.

5 MITIGATION MEASURES

- 5.1 The assessment indicates that the rear garden/yard areas and balconies at the two ends of the development may be exposed to noise greater than the guideline values recommended by BS 8233. It is recommended that the outer ends of the gardens and balconies be screened by either a solid block-work wall or other substantial acoustic screening which may be glazed (laminated glass) or wood. It is likely that, even with these measures in place, noise levels in these external amenity areas will be greater than the BS 8233 guideline values but that the additional guidance in BS 8233 should be considered, namely that development “*should not be prohibited*”.
- 5.2 With respect to internal noise in habitable rooms, the data show that, in order to achieve the recommended/guideline values in the open-plan dining/living rooms, the glazing provided will need to achieve approximately $39.6 \text{ dB } R_w + C_{tr}$ of sound insulation; C_{tr} is a ‘character correction’ factor that accounts for the presence of low frequency noise present in the noise emitted by diesel engines in larger vehicles.
- 5.3 Bedroom windows will need to achieve a sound insulation performance of $30 \text{ dB } R_w + C_{tr}$.
- 5.4 Examples of suitable glazing specifications are presented at Appendix B.
- 5.5 The requirement to keep windows closed, in all habitable rooms, requires the provision of alternative means of ventilation and cooling in these rooms: for the dining/living rooms, the ventilation units must be capable of achieving a minimum of $39 \text{ dB } D_{n,e,w} + C_{tr}$ of sound insulation; for the bedrooms, the ventilation units must be capable of achieving a minimum of $30 \text{ dB } D_{n,e,w} + C_{tr}$ of sound insulation.
- 5.6 Through-window trickle ventilation units will not be suitable in this location; the ventilation units must be capable of providing a higher volume of air exchange in hot weather to prevent over-heating. This can only be achieved through the use of acoustically-attenuating, mechanically-assisted, ventilation units. An example of a suitable system is the Titon Sonair through-wall filtered ventilation unit (https://www.titon.com/uk/products/ventilation-systems/supply_ventilation/sonair/). This unit would be suitable for use in the dining/living rooms all the habitable rooms.
- 5.7 Bedrooms can be provided with mechanically assisted ventilation units providing a minimum of $30 \text{ dB } D_{n,e,w} + C_{tr}$.
- 5.8 An alternative to the through-wall ventilation units are whole-house mechanical ventilation and heat recovery (MVHR); these would provide ventilation to all habitable rooms but are only likely to be suitable for use in the first-floor apartments as they require a larger space and are typically installed in the roof void.
- 5.9 With these measures in place it is concluded that the residential amenity of future occupants of the development will be suitably protected and that noise need not be a reason for refusal of planning permission.

6 SUMMARY & CONCLUSION

- 6.1 The assessment has shown that the site is principally affected, during both the day and night time, by elevated levels of noise from vehicles travelling on Manchester Street.
- 6.2 In order to achieve the guideline noise levels for the protection of residential amenity, screening of the external amenity areas is recommended, with up-rated glazing specifications for all habitable rooms alongside the provision of mechanical ventilation systems, negating the need for residents to open windows for ventilation and cooling.
- 6.3 The assessment concludes that, with the provision of these mitigation measures, the site can be suitably developed for residential use and that noise need not be a reason for refusal of planning permission.

6 APPENDICES

Appendix A: Glossary of acoustic terms

Ambient noise: the noise from all sources, both near and far, at any given time. Conventionally defined using the A-weighted equivalent continuous noise level (L_{Aeq}) [see below].

Background noise level (dB L_{A90}): In the UK, the 90th percentile noise level (L_{A90}) is generally used to define 'background' noise. This is a statistical parameter describing the noise level that is exceeded for 90% of the measurement or assessment time. Its value lies in the fact that it is a statistical value, towards the lower end of a measured range of data, and which is relatively 'stable' i.e. not adversely affected by occasional high-energy noise events.

Decibel (dB): a unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 micro-Pascals (μPa), the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.

dB(A) / A-weighting: decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change (in steady noise) of 3 dB(A) is the minimum perceptible under normal conditions and a change of 10 dB(A) corresponds roughly to halving or doubling the *loudness* of a sound. The background noise level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).

$L_{Aeq,T}$: the equivalent continuous sound level - the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). L_{Aeq} is used to describe many types of noise and can be measured directly with an integrating sound level meter.

L_{Amax} : the maximum single-event noise level attained during a measurement period.

Noise: any audible sound. Often defined as unwanted sound. Can be damaging to hearing if it is too loud or can be just annoying if it interferes with the normal enjoyment of others.

Sound / sound pressure: a fluctuation in air pressure over the static ambient pressure.

Sound pressure level: the sound pressure relative to a standard reference pressure of 20 μPa (20×10^{-6}) on the decibel scale.

Appendix B: Example glazing specifications (Pilkington Spectrum-Online web site - <http://spectrum.pilkington.com>)

Figure 7: Example glazing to achieve 39 dB $R_w + C_{tr}$ (dining/living rooms)

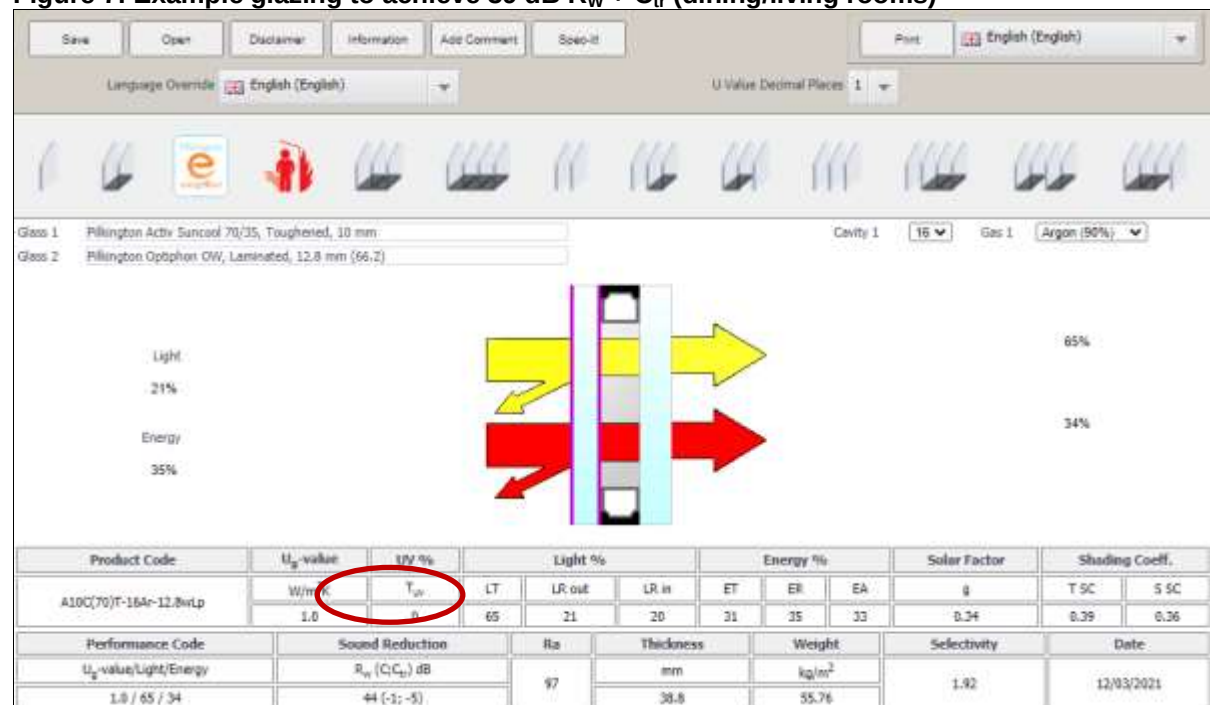


Figure 8: Example glazing to achieve 30 dB $R_w + C_{tr}$ (bedrooms)

