URBANIZE HOMES

TATTON ARMS, NORTHENDEN

NOISE ASSESSMENT FOR PLANNING PURPOSES

14 October 2022

AEC REPORT: P3331/R02/PJK

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1.0 INTRODUCTION

1.1 Acoustic & Engineering Consultants Limited (AEC) has been instructed by Urbanize Homes Ltd to undertake a noise assessment in relation to the proposed residential development located at Tatton Arms, Northenden.

1.2 This report details the baseline noise levels measured on site and discusses the implications on the building design to achieve the internal noise level limits presented in Planning Condition 22 of the Manchester City Council (MCC) Notice of Planning Permission for Application Number 125635/FO/2019.

1.3 Noise levels were measured around the development site in July 2016. It has been agreed with Shannon McAndrew, an Environmental Health Office at MCC, that as the main noise source in the area is the M60 motorway, these noise levels can be used to determine the requirements of the glazing and ventilation strategy to comply with Condition 22.

1.4 Acoustic terminology is discussed in brief in Appendix A.

2.0 SITE AND PROPOSED DEVELOPMENT DESCRIPTION

Existing Site Layout

2.1 The site is currently occupied by the former Tatton Arms public house, its car park and grounds. The site location is presented on Figure 2.1.

Figure 2.1 – Existing Site Location



2.2 The site is bound by the River Mersey to the north and beyond the river is the M60 motorway. The motorway is elevated at this location and it crosses the River Mersey on two bridges near the site, one to the northwest and one to the east. The motorway is approximately 110m away from the nearest part of the development site.

2.3 To the west of the site is Boat Lane which is a quiet one way residential street.

2.4 The rest of the site is surrounded by residential properties, including the Riverside Residential Caravan Park to the east.

The Proposed Scheme

2.5 The scheme involves renovating the former public house into apartments and the construction of a new apartment block which is a stepped 2 to 3 storey building.

2.6 The proposed layout is presented on Figure 3.1.

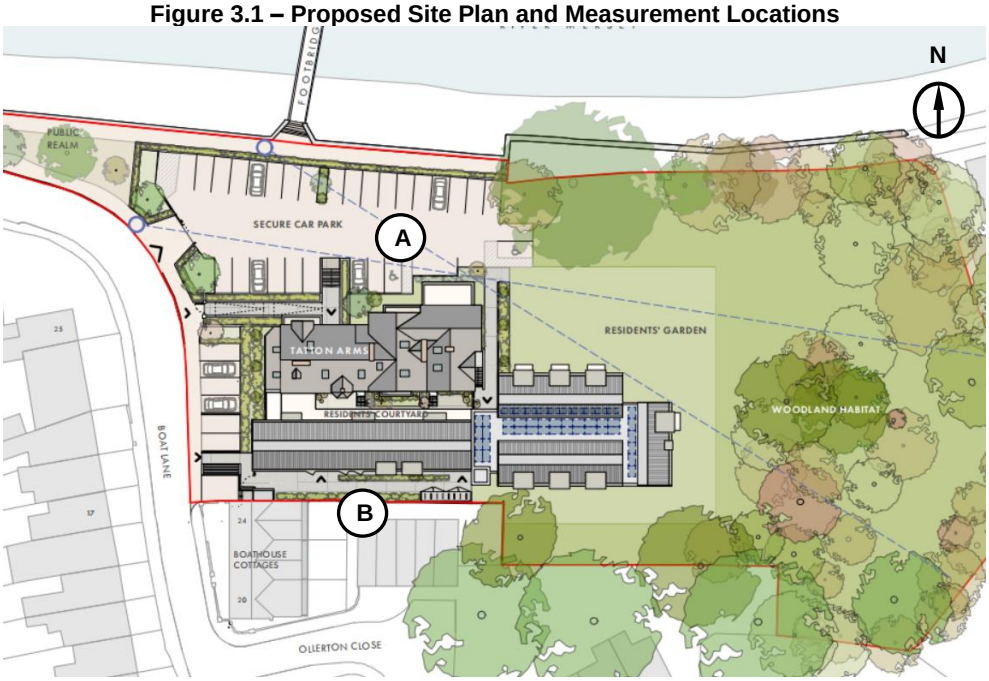
3.0 NOISE CLIMATE

3.1 Daytime noise levels were measured by AEC between 0830 and 1300h on Wednesday 6 July 2016 in accordance with MCC's requirements for measurements to include a '*rush hour'* and the shortened measurement procedure in presented in the Department of Transport Welsh Office document '*Calculation of Road Traffic Noise'* issued in 1988 (CRTN).

3.2 The night-time ambient and maximum noise levels were measured between 2300 and 0030h on Tuesday 5 and Wednesday 6 July 2016.

3.3 Noise levels were measured at two locations around the development site, Location A on the edge of the car park and Location B which was to the rear of the existing building. Both locations are identified on Figure 3.1.

Figure 3.1 – Proposed Site Plan and Measurement Locations



3.4 All measurements were undertaken under free-field conditions and in general accordance with BS7445-1: 2003 '*Description and measurement of environmental noise. Guide to quantities and procedures*'. A full measurement procedure for the survey is presented in Table B.1 in Appendix B and the measured data is presented in Tables B.2 and B.3.

3.5 Location A has full line of sight of the M60 motorway and was chosen to represent the northern elevations of the properties. During the daytime the daytime simultaneous measurements were undertaken at a height of 4m and 1.5m to represent the ground and first-floor noise levels.

3.6 During the daytime the noise climate due to road traffic on the M60 motorway was relatively consistent. The measured levels at ground floor level were 63dB$L_{Aeq,T}$ and 64dBL_{A10}, with the noise levels measured at a height of 4m being approximately 3dB higher.

3.7 At night, the ambient noise level at ground floor level was no greater than 57dB$L_{Aeq,T}$ with maximum noise levels not exceeding 71dB$L_{Amax,F}$.

3.8 In relation to the elevations of the properties which will be partially screened from the M60 motorway, the daytime ambient noise level at Location B was 54dB$L_{Aeq,T}$. The night-time ambient and maximum noise levels were around 51dB$L_{Aeq,T}$ and 64dB$L_{Amax,F,}$ respectively.

4.0 BASIS OF ASSESSMENT

Planning Condition 22

4.1 Planning Condition 22 states:

"Before the development commences a scheme for acoustically insulating the proposed residential accommodation against noise from the M60 motorway 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. 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}*

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 consultants' 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."

4.2 This report outlines the noise insulation scheme to achieve the required noise criteria. A further assessment will be undertaken once the scheme has been completed to demonstrate the required internal noise criteria has been achieved.

4.3 The noise levels presented in the planning condition above are in accordance with guidance presented in BS8233 BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings'* (BS8233) and the Association of Noise Consultants (ANC) document *'ProPG: Planning and Noise - New Residential Development*', 2017 (ProPG) for transportation noise sources.

4.4 It is assumed that in addition to achieving the internal noise criteria presented in Planning Condition 22, the whole dwelling ventilation requirements outlined in Approved Document F (ADF) '*Ventilation*' (2010) of the Building Regulations should also be met.

4.5 ADF requires that continuous whole dwelling (background) ventilation be provided to limit the accumulation of moisture and other pollutants originating within a building. This is typically achieved either via a partially opened window, or by a whole building ventilation system through the provision of trickle ventilators or mechanical ventilators.

4.6 ProPG notes that the attenuation of external to internal noise levels provided by a window partially open for whole dwelling ventilation is no more than 15dB.

4.7 Therefore, for rooms to have whole dwelling ventilation via a partially open window, external noise levels outside habitable rooms should not exceed 50dB$L_{Aeq,16h}$ during the daytime, and 45dB$L_{Aeq,8h}$ and 60dB$L_{Amax,F}$ at night.

5.0 ASSESSMENT OF PROPOSED DEVELOPMENT

5.1 As the daytime noise levels are relatively consistent and the ambient noise level is only 1 to 2dB lower than the L_{A10} levels, it has been deemed appropriate to use the measured ambient noise levels as the basis of the assessment.

5.2 In relation to the night-time noise levels, as the noise levels decreased after 0000h, the ambient noise levels measured during the period between 2300 and 0000h has been used to determine the entire 8-hour night-time period. In relation to the maximum noise level, the highest measured at both locations has been used in this assessment.

5.3 In relation to the first/second floor apartments facing the M60 motorway, as per the simultaneous measurements, a +3dB correction has been applied to determine the external noise levels above ground level.

5.4 Based on the noise levels measured on-site, the external daytime ambient and night-time ambient and maximum noise levels have been determined on each elevation taking into account distance attenuation and screening where applicable, and they are presented on Figure 5.1 and in Table 5.1, below.

Figure 5.1 – Free-Field External Noise Levels

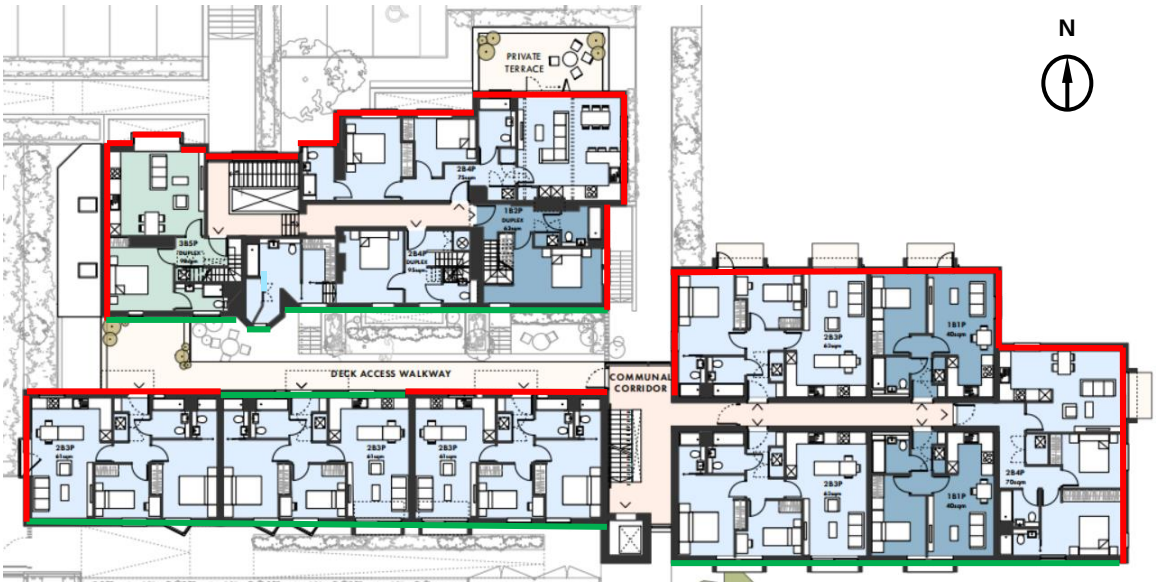


Table 5.1 – Determined Free-Field External Noise Levels

Elevation	Storey	Noise Level, dB		
		Daytime Ambient, $dBL_{Aeq,16h}$	Night-time	
			Ambient, $dBL_{Aeq,8h}$	Maximum, $dBL_{Amax,F}$
Red	Ground	63	57	71
	First/Second	66	60	74
Green	All	54	51	64

Glazing and Ventilation Requirements

5.5 As stated in Section 4.0, for habitable rooms to have whole dwelling ventilation provided via a window partially open, external noise levels should not exceed $50dBL_{Aeq,T}$ during the daytime and $45dBL_{Aeq,T}$ and $60dBL_{Amax,F}$ at night.

5.6 A comparison between these levels and the determined noise levels presented in Table 5.1, indicates that windows would need to be closed to all habitable rooms and whole dwelling ventilation provided by an alternative means such as acoustic trickle ventilators.

5.7 The minimum sound insulation performances of the glazing and ventilators to meet the required internal noise level limits for each noise source have been calculated based on the measured noise spectra and the provided drawings. The minimum sound insulation performances are presented in Table 5.2, below.

Table 5.2 – Outline Requirements of Glazing and Ventilation to Achieve Internal Noise Levels in Habitable Rooms

Elevation	Storey	Sound Insulation Performance			
		Daytime (Living rooms etc.)		Night-time (Bedrooms only)	
		Glazing	Ventilator	Glazing	Ventilator
Red	Both	$35dBR_w$ / $29dBR_w + C_{tr}$	$38dBD_{n,e,w}$	$37dBR_w$ / $32BR_w + C_{tr}$	$38dBD_{n,e,w}$
Green	Both	$29dBR_w$ / $25dBR_w + C_{tr}$	$33dBD_{n,e,w}$	$29dBR_w$ / $25dBR_w + C_{tr}$	$33dBD_{n,e,w}$

5.8 Example glazing build-ups, to achieve the required sound insulation performances presented in Table 5.2, are provided in Table 5.3 below.

Table 5.3 – Example Glazing Constructions

Sound Insulation Performance	Example Construction
$37dBR_w$ / $32dBR_w + C_{tr}$	6mm Glass / 6-16mm Thermal Cavity / 10mm Lami Glass
$35dBR_w$ / $29dBR_w + C_{tr}$	8mm Glass / 6-16mm Thermal Cavity / 6mm Glass
$29dBR_w$ / $25dBR_w + C_{tr}$	4mm Glass / 6-16mm Thermal Cavity / 4mm Glass

5.9 Prior to any glazing being installed, octave band sound insulation performance data of the glazing build-ups and ventilators selected must be verified by AEC or others.

5.10 All background ventilation sound insulation requirements have been based on the use of a single ventilator per room. If more than one unit is required, such as may be required to satisfy Building Control requirements, the performance of each unit might need to be increased.

External Envelope

5.11 To maintain the sound insulation performance of the external envelope the remainder of the façade construction should have a sound insulation performance of at least 10dB higher than the glazing. Therefore, the external walls and roof on the noisiest elevations would need achieve a sound insulation performance of at least around $37dBR'_w$. This can be achieved with a traditional cavity masonry construction.

External Noise Levels

5.12 Daytime noise levels in gardens would exceed the limits presented in the Planning Condition. However, due to the height of the M60 motorway, there is no way of reducing noise levels across the whole of the residents' garden. It would be feasible, through the use of the localised features such as fences or bunds, to provide areas where the requirement would be met.

Summary

5.13 Based on noise levels measured on-site by AEC in 2016, a glazing and ventilation strategy has been proposed to meet the internal noise level limits presented in Planning Condition 22.

5.14 In relation to external noise levels in the residents' gardens, due to the height of the M60 motorway, there is no way of reducing noise levels across the whole of the residents' garden. It would be feasible, through the use of the localised features such as fences or bunds, to provide areas where the requirement would be met.

APPENDIX A – Acoustic Terminology in Brief

Sound Description

Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air. The rate at which the pressure fluctuations occur determines the pitch or *frequency* of the sound. The frequency is expressed in Hertz *(Hz)*, that is, cycles per second. The human ear is sensitive to sounds from about 20 Hertz to 20,000 Hertz. Although sound can be of one discreet frequency - a 'pure tone' - most sound is made up of many different frequencies.

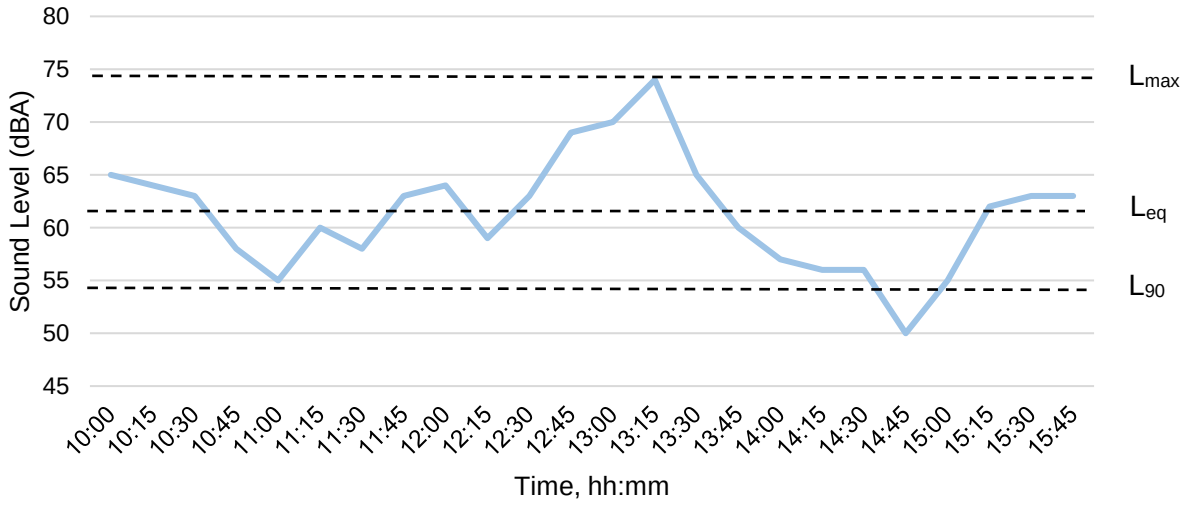
The human ear is more sensitive to some frequencies than others, and modern instruments can measure sound in the same subjective way. This is the basis of the A-weighted sound pressure level *dBA,* normally used to assess the effect of noise on people. The dBA weighting emphasises or reduces the importance of certain frequencies within the audible range.

Sound Units

In order to assess environmental noise, measurements are carried out by sampling over specific periods of time, such as fifteen minutes or one hour, the statistically determined results being used to quantify various aspects of the sound.

The figure below shows an example of sound level varying with time. Because of this time variation, the same period of sound can be described by several different levels. The most common of these are described below. It should be noted that in many instances in the main body of text, the unit will be proceeded by a dB descriptor in the report e.g., $L_{Aeq,T}$ could be written $dBL_{Aeq,T}$.

Example of Sound Varying with Time



Unit Type	Acoustic Unit	Description
Ambient Sound Level	**$L_{Aeq, T}$**	The equivalent continuous (A-weighted) sound level. It may be thought of as the "average" sound level over a given time, T. It is used for assessing noise from various sources: industrial and commercial premises, construction sites, railways and other intermittent noises and can be considered as the "ambient" noise level.
Percentile Level	**L_{A10}**	The (A-weighted) sound level exceeded for 10% of a measurement period. It is the value often used to describe traffic noise.
	L_{A90}	The (A-weighted) sound level exceeded for 90% of a measurement period. It is the value often used to describe background noise.
Maximum Sound level	**$L_{Amax,F/S}$**	The maximum (A-weighted) sound level measured during a given time. 'Fast' or 'Slow' meter response should be cited.
Free-field Level	**-**	This refers to the sound level measured outside, away from reflecting surfaces.
Noise Rating	**NR**	A graphical method for assigning a single number rating to a noise spectrum and is often use to specify noise level limits for mechanical services.
Sound reduction index	**R_w**	Single number rating used to describe the laboratory airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.
Apparent sound reduction index	**R'_w**	Single number rating used to describe the sound reduction index of an on-site construction over a range of frequencies, typically 100-3150Hz.
A road traffic spectrum adaptation term	**C_{tr}**	Referenced to demonstrate the to the low frequency sound insulation performance of building elements. Makes reference to the A-weighted urban traffic noise spectrum.
Element normalized level difference	**$D_{n,e,w}$**	Single number rating used to describe the sound insulation performance of small elements.

APPENDIX B – Noise Survey Details

TABLE B.1 – Measurement Procedure

Date & Time of Survey:	Day: 0830 to 1300h, Wednesday 6 July 2016. Night: between 2300 and 0110h on Tuesday/Wednesday 5/6 July 2016.					
Personnel:	Paul Knowles(AEC).					
Equipment Used:	B&K 2260 Real Time Analyser (AEC Kit 2) Cirrus CR:171B Real Time Analyser (AEC Kit 3)					
Calibration:	The sound level analysers, which conforms to BS EN 61672-1: 2013 *'Electroacoustics – Sound level meters - Part 1 Specifications'* for Class 1 Type Z meters, was in calibration and check calibrated before and after the measurement periods using a Brüel & Kjær type 4231 (94dB) calibrator. There was no significant drift of calibration. Calibration certificates are available on request.					
Weather Conditions:	**Date**	**Period**	**Wet/Dry**	**Temp °C**	**Wind Speed & Direction**	**Cloud Cover**
	06.07.2016	Day	Dry	15°C	Calm	Clear skies
	05/06.07.2016	Night	Dry	8°C	Calm	Clear skies
Measurement Locations:	Measurements were undertaken at 2 locations around the development site. Identified as A and B on Figure 3.1 and described below. A – On the northern site boundary of the Tatton Arms car park. B – Behind Tatton Arms.					
Measurement Details:	Measurements were undertaken over various periods in terms of L_{eq}, L_{10}, $L_{90,}$ and L_{max}.					
Façade / Free-Field:	All measurements were free-field.					
	Full results for the attended measurements are given in Tables B.2 and B.3.					
Measured Data:	Full 1/3rd octave band centre frequency data was obtained for all measurements.					

TABLE B.2 – Measured Daytime Noise Levels

Location	Period, h	Noise Level, dB				Comments
		L_{Aeq}	L_{A10}	L_{A90}	$L_{Amax, F}$	
A	0903-0918	62.7	64.4	60.2	66.5	Noise climate and maximum noise levels due to road traffic on the M60 motorway.
	0919-0934	62.6	64.4	59.7	68.2	
	1035-1050	61.8	64.0	58.3	69.3	
	1136-1151	62.5	64.3	60.0	76.7	
	1241-1256	62.7	64.7	59.4	68.5	
B	1017-1032	53.2	54.2	50.4	70.0	Noise climate and maximum noise levels due to road traffic on the M60 motorway.
	1117-1132	54.2	55.6	50.9	67.4	
	1225-1240	54.2	55.7	51.2	70.1	

TABLE B.3 – Measured Night-Time Noise Levels

Location	Period, h	Noise Level, dB			Comments
		L_{Aeq}	L_{A90}	$L_{Amax, F}$	
A	2305-2315	56.2	54.0	66.4	Noise climate and maximum noise levels due to road traffic on the M60 motorway.
	2328-2338	56.5	54.1	71.3	
	2351-0001	54.6	52.1	58.9	
B	2317-2327	51.2	48.4	64.2	Noise climate and maximum noise levels due to road traffic on the M60 motorway.
	2340-2350	51.1	48.4	62.8	
	0002-0012	49.3	46.8	54.4	