

Talbot Mill Castlefield Manchester

Environmental Noise Impact Assessment Report

24057/ENIA1

5 September 2017

For:
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1.0 Introduction

The following is proposed for the development of the Talbot Mill site in Castlefield, Manchester:

Conversion of the Talbot Mill complex to create 114 residential apartments (Use Class C3), including rooftop extensions to Mill 1 and 2, and rear extension to Mill 1; demolition of Buildings A, B and C; retrospective application for demolition of Building E; erection of a 9 storey building plus 1 basement level, to provide 88 residential apartments (Use Class C3); and creation of new landscaped courtyard, lighting and other associated works.

An environmental noise survey has been undertaken by Hann Tucker Associates in order to establish the prevailing noise climate at the site.

The data obtained has subsequently formed the basis of our assessment of the suitability of the site for residential use, and to determine the preliminary sound insulation requirements for the glazing and ventilators.

Our findings and recommendations are presented herein.

2.0 Objectives

To establish, by means of fully automated environmental noise monitoring, the existing A-weighted (dBA) L_{90} , L_{eq} and L_{max} environmental noise levels at selected accessible positions around the site.

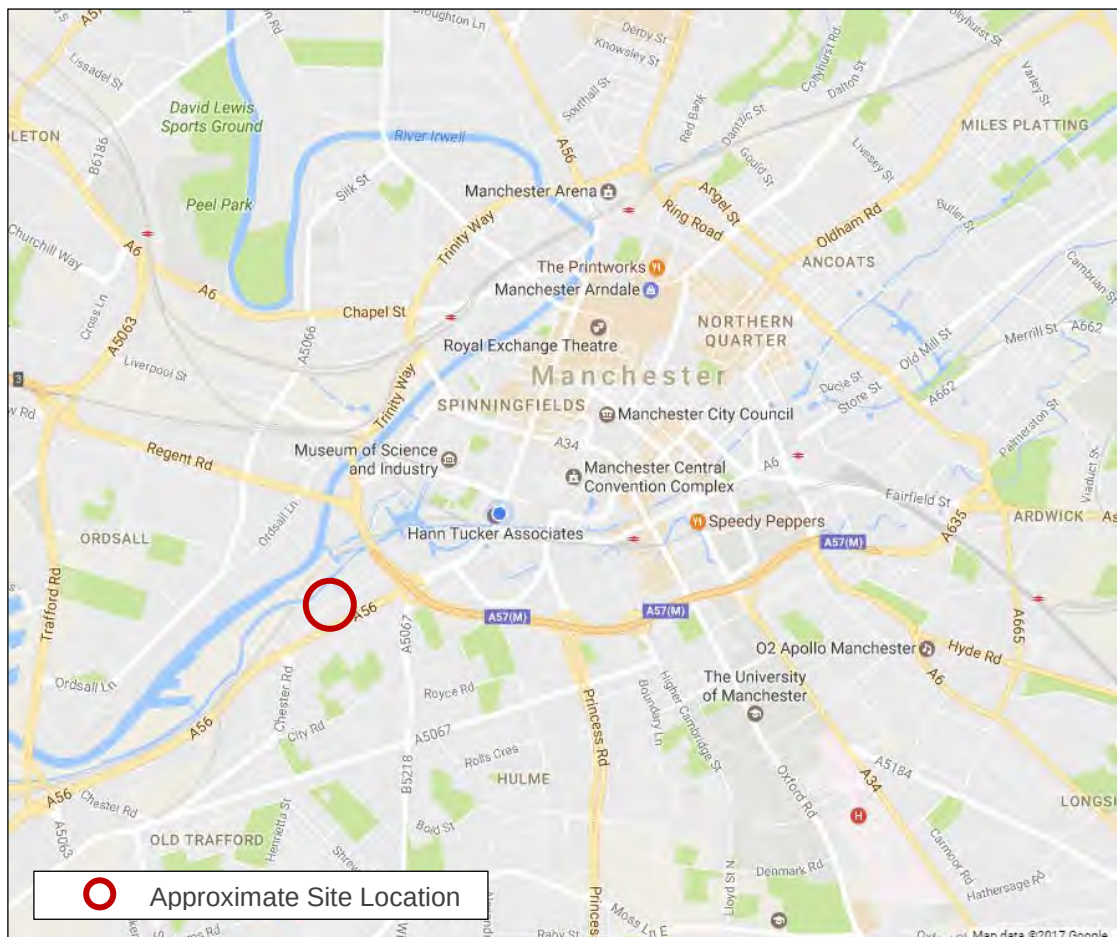
To undertake detailed acoustic analysis of road traffic and other noise intrusion into the building through the external building fabric.

To subsequently prepare preliminary sound reduction performance specifications for the external building fabric in order to achieve the specified internal acoustic design criteria.

3.0 Site Description

3.1 Location

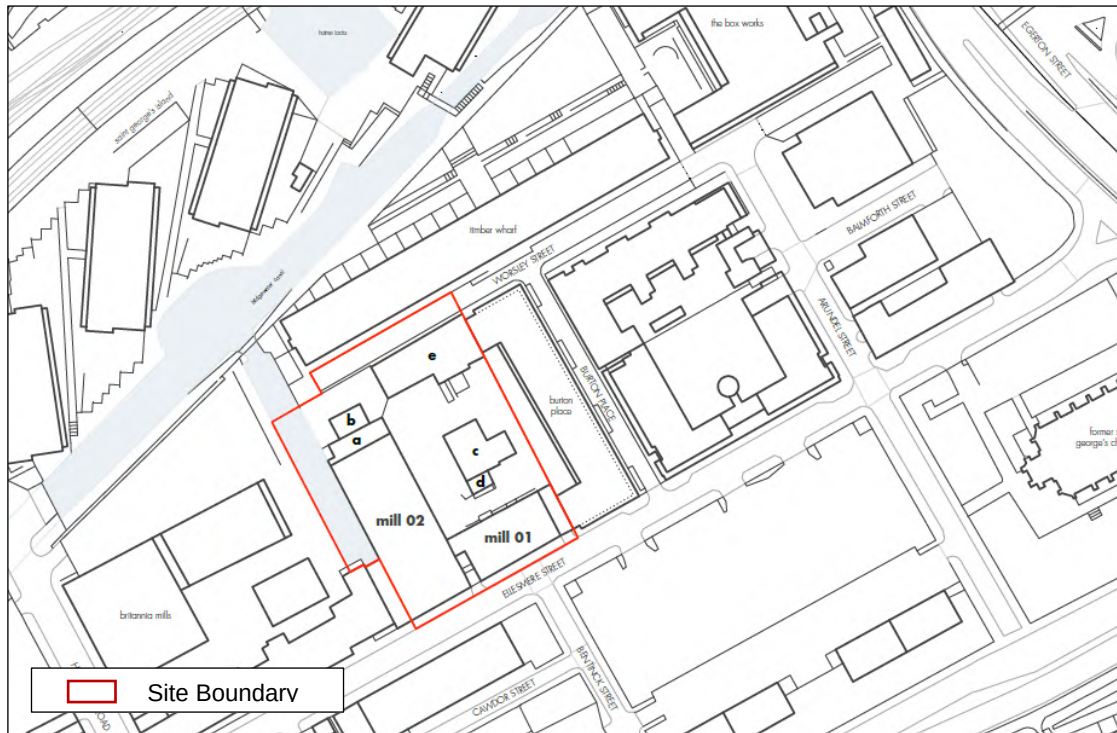
The site is located on Ellesmere Street in Castlefield, Manchester. The location is shown in the Location Map below.



Location Map (maps.google.com)

3.2 Description

The site comprises ground plus 3No. storey building (with basement) situated on the corner of a row of residential and commercial properties. The site is bound by Hulme Hall Road to the East and Ellesmere Street to the South. To the northwest of the site lies the Bridgewater Canal Towpath and a Railway line. The nearest noise sensitive windows are understood to be located to the east of the site, approximately 7m from the nearest boundary of the site. See site plan below.



Site Plan (c/o ShedKM)

4.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

5.0 Planning Policy/Guidance

5.1 Noise Policy Statement for England

The Government's Noise Policy Statement for England (NPSE, March 2010) sets out the long term vision for Government noise policy, which is 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 NPSE includes three primary aims to be achieved through effective management of environmental, neighbour and neighbourhood noise; (1) avoid "significant adverse" impacts on health and quality of life, (2) mitigate and minimise "adverse" impacts on health and quality of life, and (3) where possible, contribute to the improvement of health and quality of life.



5.2 National Planning Policy Framework

The National Planning Policy Framework (NPPF, March 2012) sets out the Government's planning policies for England and how these are expected to be applied.

It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

Prior to the NPPF, Planning Policy Guidelines (PPG) 24: 1994 'Planning & Noise' was the general guidance document for assessing the suitability of a site for residential use.

5.3 Planning Practice Guidance

The Department for Communities and Local Government's Planning Practice Guidance (PPG) website was launched in 2014 and provides guidance on 'Noise' for new developments in line with NPPF policies.

Notably, the website provides a table to help recognise when noise could be a concern relevant to the NOEL, LOAEL and SOAEL effect levels described in NPSE, as below:-

- Significant observed adverse effect level: This is the level of noise exposure above which significant adverse effects on health and quality of life occur.
- Lowest observed adverse effect level: this is the level of noise exposure above which adverse effects on health and quality of life can be detected.
- No observed effect level: this is the level of noise exposure below which no effect at all on health or quality of life can be detected.

There are no numeric values to reference in this guide; everything is descriptive and so cannot inform an objective assessment of noise.

5.4 ProPG: Planning & Noise

ProPG: Planning & Noise '*Professional Practice Guidance on Planning & Noise*' was issued in May 2017 with the primary goal of assisting the delivery of sustainable residential development by promoting good health and well-being 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.

It is applicable to noise from existing transport sources (noting that good professional practice should have regard to any reasonably foreseeable changes in existing and/or new sources of noise). The recommended approach is also considered suitable where some industrial or commercial noise contributes to the acoustic environment provided that is "not dominant".



ProPG 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 ProPG considers suitable guidance on internal noise levels found in BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings' with the addition of an "ideal" $L_{Amax,f}$ requirement for bedrooms at night of 45 dB (10th highest).

5.5 Local Authority Requirements

Manchester City Council requirements are outlined in Section 3.0 of Manchester City Council's Planning & Noise Technical Guidance document (December 2015).

5.5.1 Achieving Suitable Internal Noise Levels

Section 3.6.1.1 sets out the following noise levels to be achieved for residential developments:

"BS 8233 and the World Health Organisation (WHO) have recommended specific limits for internal noise levels inside residential properties to allow appropriate living and sleeping conditions. MCC has adopted the following internal noise limits for residential properties:

- *Bedrooms (Night time - 23:00 to 07:00): 30dB LAeq and individual noise events should not normally exceed 45 dB (LAmax).*
- *Living Rooms (Day time 07:00 to 23:00): 35 dB (LAeq).*
- *Gardens and terraces (daytime) 55 dB (LAeq).*

Section 5.3.1.3.1.2 of the *Planning & Noise – Technical Guidance December 2015* document states the following with regards to maintaining internal ambient noise levels when it desired to keep windows closed but provide adequate ventilation:

"Occupants should be provided with a supply of fresh air in habitable rooms without having to open windows (whilst also having the option to do this for purge ventilation, or at the occupant's discretion.

Where ambient noise levels are high a scheme of ventilation will need to be provided that does not compromise the acoustic attenuation afforded by glazing. This may come in the form of individual window trickle vents or acoustic trickle vents."

5.5.2 Noise From Fixed Building Services Plant.

Section 3.6.1.5.1 outlines that the noise assessment for fixed plant should be based on BS 4142:2014 and the assessment must demonstrate that:



“Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.”

5.6 BS 8233: 2014

British Standard 8233: 2014 “Sound insulation and noise reduction for buildings” recommends design criteria for internal ambient noise levels for dwellings providing a reasonable or good level of protection from external noise. It states that it is desirable that internal ambient noise levels do not exceed the following guidelines:

Activity	Location	Desirable Internal Ambient Criteria	
		07:00 – 23:00	23:00 – 07:00
Resting	Living Rooms	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 $L_{Aeq,8hour}$

For sites subject to scheduled impulsive events at night-time (such as train or aircraft passbys), BS 8233 would suggest peak noises during the night-time (23:00-07:00) should not regularly exceed 45 dB L_{Amax} in affected bedrooms.

The document goes on to state that all of the above target levels may be relaxed by 5 dB and “reasonable” internal conditions would still be achieved.

For outdoor living spaces, a desirable upper guideline value of 55dB $L_{Aeq, T}$ is quoted.

5.7 BS 4142:2014 – Method for rating and assessing industrial and commercial sound

BS 4142: 2014 describes methods for rating and assessing the effects of outdoor sound levels, of an industrial and/or a commercial nature, *“on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident”*.

The impact of a specific sound is indicated by subtracting the existing background noise level from the rating level (i.e. noise level from the proposed items of plant/machinery/etc plus any acoustic feature corrections). The standard states that:

- *“a difference of around +10dB or more is likely to be an indication of a significant adverse impact”;*
- *“a difference of around +5dB is of marginal significance is likely to be an indication of an adverse impact”;*



- *“where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact”.*

The noise from the new development is expressed in terms of a rating level and given as a $L_{Aeq, T}$ noise level. The existing background noise level is expressed in terms of a $L_{A90, T}$ noise level. T is the assessment time interval, which is 1-hour for operations during daytime hours (07:00 to 23:00 hours) and 15-minutes for operations during night-time hours (23:00 to 07:00 hours).

BS 4142:2014 states that if a noise source contains an 'acoustic feature', such as tonality, intermittency or impulsiveness, a penalty should be applied.

6.0 Baseline Noise Survey

6.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 15:00 hours on Wednesday 8 February 2017 to 12:00 hours on Friday 10 February 2017 in order to establish continuous 24 hour noise readings on a typical weekday. Measurements were taken continuously of the A-weighted (dBA) L_{90} , L_{eq} and L_{max} sound pressure levels over 15 minute periods.

Due to the lack of secure locations to install unmanned monitoring equipment overlooking the southern façade of the site, supplementary manned noise level measurements were undertaken between 12:00 and 15:00 hours on Wednesday 22 February 2017 and 04:00 and 07:00 hours on Thursday 23 February 2017. Since road traffic is the dominant sound source at the site, daytime noise level measurements were undertaken in accordance with the shortened measurement procedure detailed in the Department of Transport document Calculation of Road Traffic Noise (CRTN) 1988.

This involves the measurement of L_{A10} noise levels over representative time periods during any three consecutive hours between 10:00 and 17:00 hours. The three hourly L_{A10} values are then arithmetically averaged to give a 3-hour L_{A10} value. From this the 18-hour L_{A10} can be calculated by subtracting 1 dB. The 18-hour L_{A10} value can then be converted to provide the daytime 16-hour L_{Aeq} value by subtracting 2 dB as stated in BS 8233.

For the night-time period there is no established shortened measurement procedure. However, it is accepted that for sites where road traffic is the dominant sound source, sound levels are typically at their highest at the start and end of the night-time period (23:00 to 07:00 hours). Furthermore, the decrease and increase in sound levels at the start and end of the night-time



period respectively are approximately symmetrical over time.

As such, the measurement of the L_{Aeq} noise levels over representative time periods during three consecutive hours at either the start or end of the night-time period provides a good representation of the night-time 8-hour L_{Aeq} value when logarithmically averaged. Of the three possible periods, measurements in the early morning may be considered 'worst case' since they will include early morning delivery vehicle movements and the beginning of the morning commuter traffic period.

During the periods we were on site the wind conditions were light and the sky was generally overcast. We understand that generally throughout the survey period the weather conditions were mostly dry with some very light precipitation, nevertheless these conditions are considered suitable for obtaining representative measurement results.

6.2 Measurement Positions

Automated monitoring was undertaken at a single free-field position, overlooking the courtyard area, at the northern façade of the southernmost mill building. The microphone was attached to a pole and secured approximately 1.5 meters above roof level.

Manned measurements were recorded at four further free-field positions with the sound level meter mounted on a tripod at 1.3 metres from the ground. These positions are described in the table below:

Position	Description
A	To the southwest of the site, approximately 2 metres from Ellesmere Street.
B	To the west of the site, approximately parallel with the northern site boundary, approximately 2 metres from Hulme Hall Road.
C	To the southwest of the site, approximately 3 metres from Chester Road (A56).
D	To the northeast of the site, approximately 3 metres from Mancunian Way (A57(M))

All measurement positions are illustrated on the site plan below:



Plan Showing Measurement Positions (maps.google.com)

6.3 Instrumentation

The instrumentation used during the survey is presented in the Table below:

Description	Manufacturer	Type	Serial Number	Calibration
Type 1 Data Logging Sound Level Meter	Larson Davis	824	3053	Calibration on 18/10/2016
Type 1 Hand Held Sound Level Meter	Larson Davies	LXT	4568	Calibration on 09/11/2015
Type 1 Calibrator	Larson Davis	CAL200	3083	Calibration on 18/04/2016



The automated sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. The microphones was fitted with a Larson Davis windshield.

All equipment was calibrated prior to and on completion of the survey. No significant deviations occurred (no more than 0.1 dB).

6.4 Results

6.4.1 Automated Survey (Position U)

The results of the automated survey have been plotted on Time History Graph 24057/TH1 enclosed, presenting the 15 minute A-weighted (dBA) L_{90} , L_{eq} , and L_{max} noise levels recorded throughout the duration of the survey.

The following table summarises the daytime (07:00 – 23:00) and night-time (23:00 – 07:00) L_{Aeq} noise levels recorded and the typical highest night-time L_{Amax} noise levels recorded.

Period	Measured Noise Levels (dB re 2×10^5 Pa)	
	$L_{Aeq,T}$	Typical Highest L_{Amax}
Daytime (07:00 – 23:00)	59	-
Night-time (23:00 – 07:00)	54	72

The lowest $L_{A90,15min}$ measurements recorded during the survey are presented in the table below:

Period	Typical Lowest Background Sound Pressure Level, $L_{A90,15min}$ (dB)
Daytime (07:00-19:00)	51
Evening (19:00-23:00)	42

6.4.2 Manned Survey (Positions A, B, C, & D)

The following tables summarise the relevant readings taken from the manned surveys at positions A, B, C, and D, which we selected in order to assess noise levels from the specific noise sources in the vicinity of the site.



Position	Principle Noise Source(s)	Time	Sound Pressure Level (dB)		
			$L_{Aeq,10min}$	L_{Amax}	L_{A10}
A	Ellesemere Street	12:00 – 13:00	63	77	65
		13:00 – 14:00	64	80	67
		14:00 – 15:00	65	84	67
		04:00 – 05:00	57	74	60
		05:00 – 06:00	56	66	59
		06:00 – 07:00	63	81	65
B	Hulme Hall Road Rail/Tram	12:00 – 13:00	60	79	61
		13:00 – 14:00	62	81	63
		14:00 – 15:00	61	80	62
		04:00 – 05:00	50	62	52
		05:00 – 06:00	50	63	52
		06:00 – 07:00	62	78	65
C	Mancunian Way	13:00 – 14:00	73	88	76
		05:00 – 06:00	76	85	79
D	Chester Road	13:00 – 14:00	78	94	80
		05:00 – 06:00	75	87	79

Based on the data above, we can extrapolate from the representative hourly L_{A10} values using the shortened measurement procedure detailed in section 6.1 to obtain an approximate $L_{Aeq,16hr}$ along Ellesemere Street at the southern façade of the site.

6.5 Discussion Of Noise Climate

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period, the dominant noise sources were noted to be traffic noise from the surrounding road network, and noise from nearby construction sites.

Our attended measurement positions were selected to exclude extraneous noise from nearby construction as far as reasonably possible. Subsequently, the dominant noise sources during these measurement periods were noted to be road traffic from Ellesemere Street and Chester Road, with some contribution from rail and tram passbys observed at position B to the northwest of the site boundary.

During the daytime measurement period we observed tram passbys at a frequency of approximately 1 per minute, and infrequent passenger train passbys. We also witnessed a number of slow moving freight passbys, which we understand can occur day or night.



7.0 Assessment of Noise Levels within Apartments

7.1 Overview

This section aims to assess the impact of the prevailing environmental noise sources on the residential development in order to determine preliminary acoustic performance specifications for critical residential façade elements (namely glazing and ventilators).

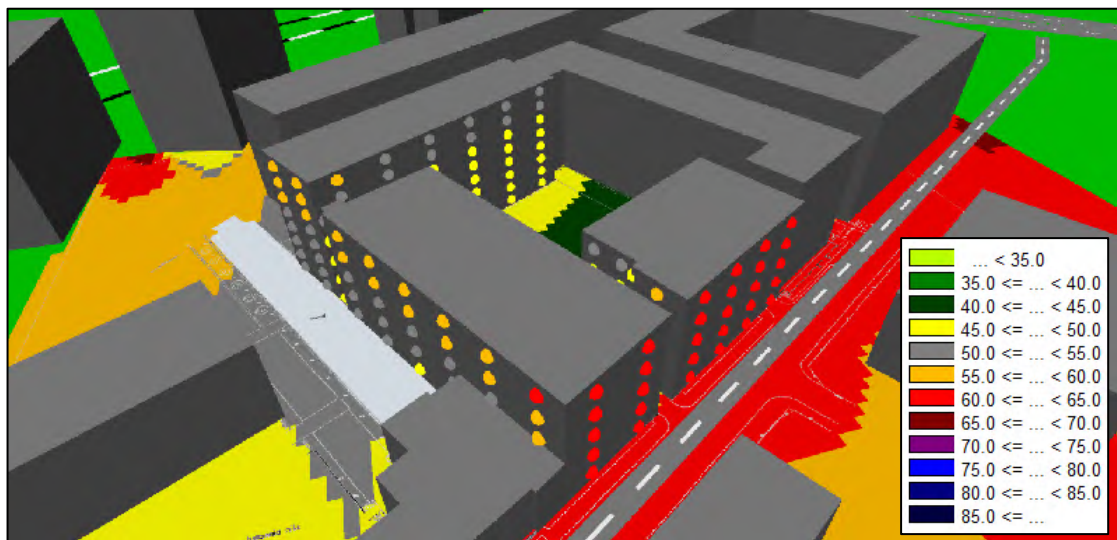
The development will be subject to many design changes and thus it is important that these are classed as indicative specifications at this stage. Detailed acoustic façade specifications must be produced through design; the specifications presented herein must not be adopted within final design tender documents.

Our preliminary calculations are based on BS 8233 procedures and consider typical apartment bedroom/living room dimensions and window sizes. Our assessment considers the proposed background ventilation strategy of constant MEV in bathrooms and the need for a single 2,500 mm² (min) free area trickle ventilator to each habitable room. If larger (or a greater number of) ventilators are proposed, the specifications and our guidance would be subject to change.

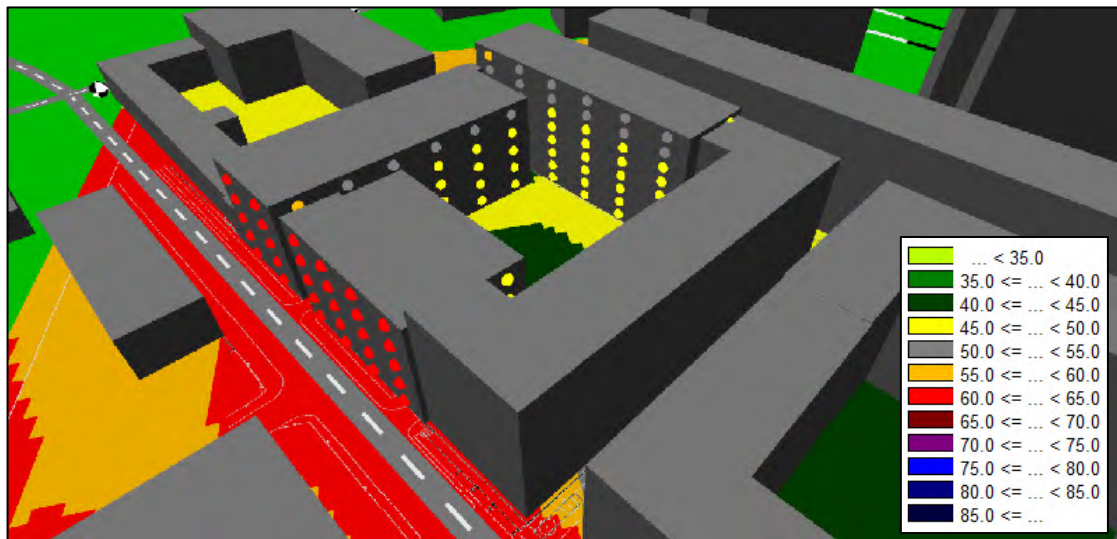
7.2 Incident Noise Levels

In order to accurately determine the spread of noise across the entire site, we have constructed a computer-based 3-dimensional model of the development. The software produces a 'noise map' of the site using ISO 9613 sound dissipation principles (including distance loss, screening, ground absorption, etc.) and is calibrated based on the results of our baseline environmental noise survey. All buildings have a reflection loss of 0dB (i.e. fully reflective).

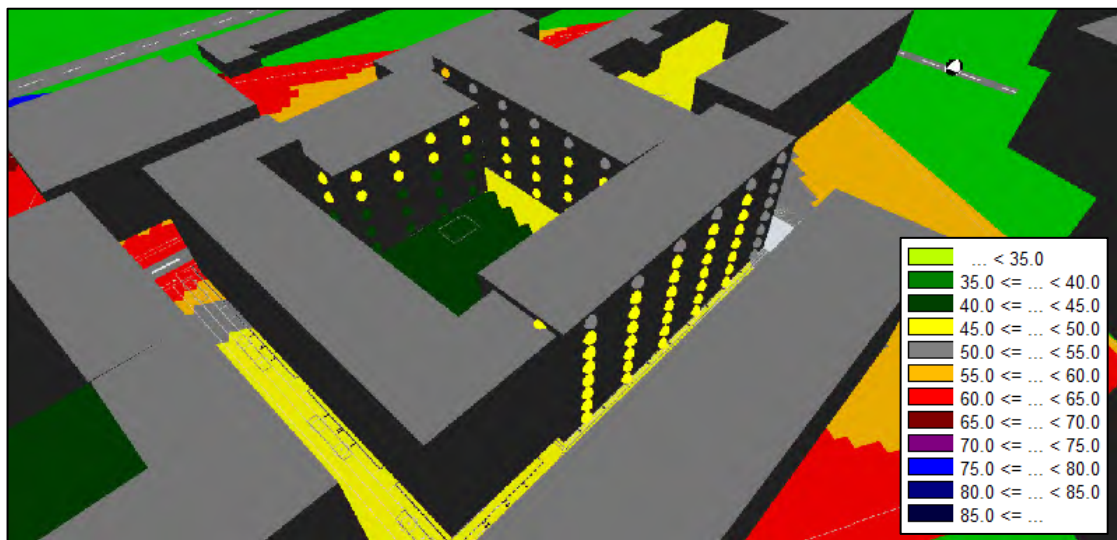
The following noise maps show incident of daytime (16-hr) and night-time (8-hr) L_{Aeq} external free-field noise levels on all facades.



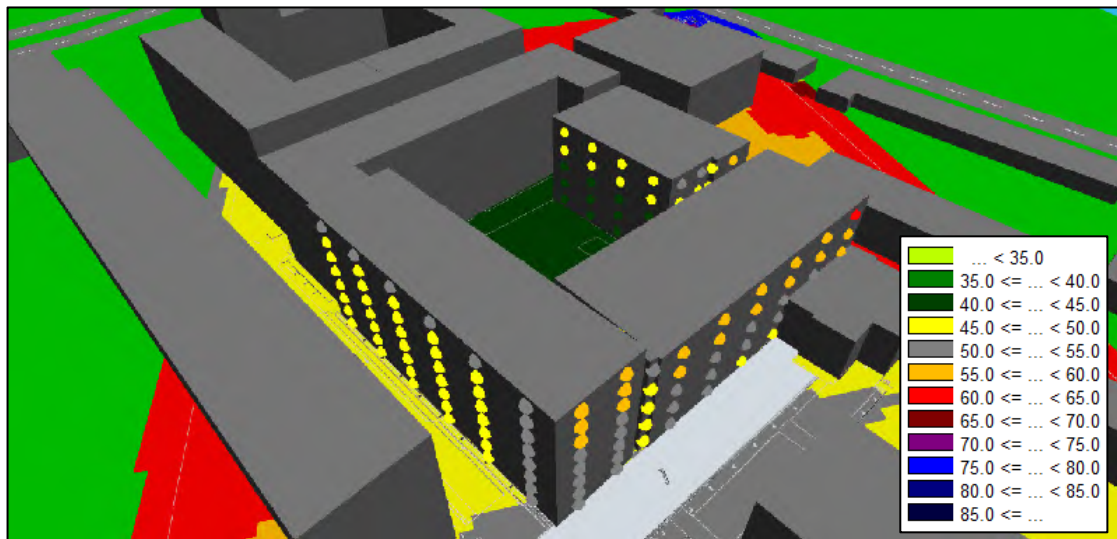
Daytime $L_{Aeq,16hr}$ Incident Noise Levels (from southeast)



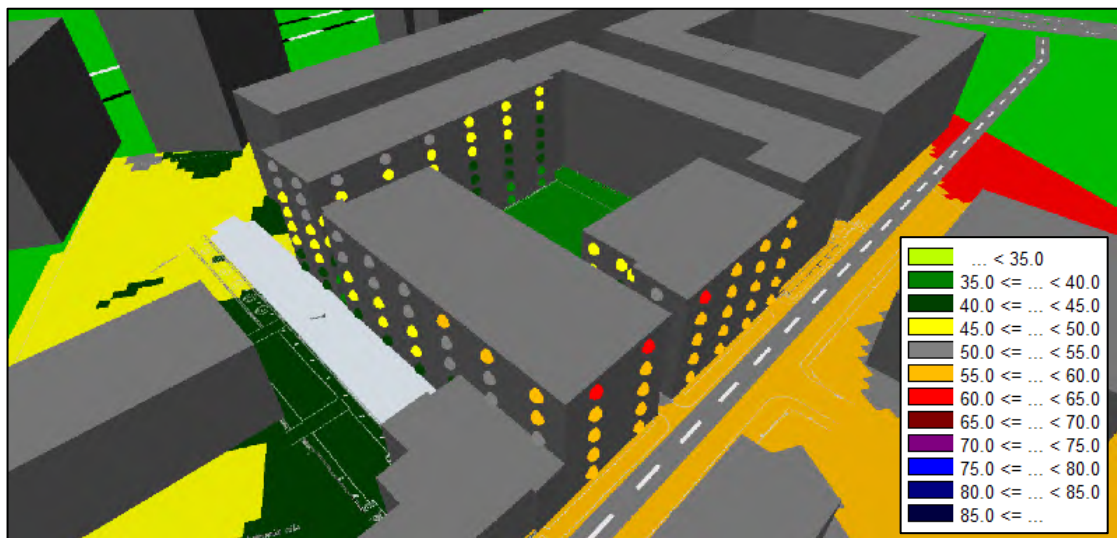
Daytime $L_{Aeq,16hr}$ Incident Noise Levels (from southwest)



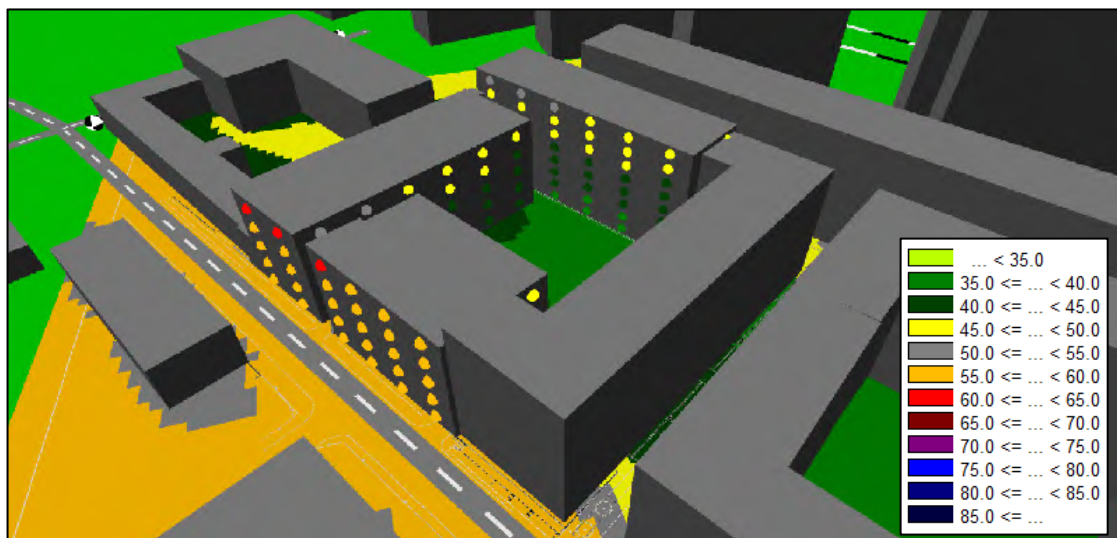
Daytime $L_{Aeq,16hr}$ Incident Noise Levels (from northwest)



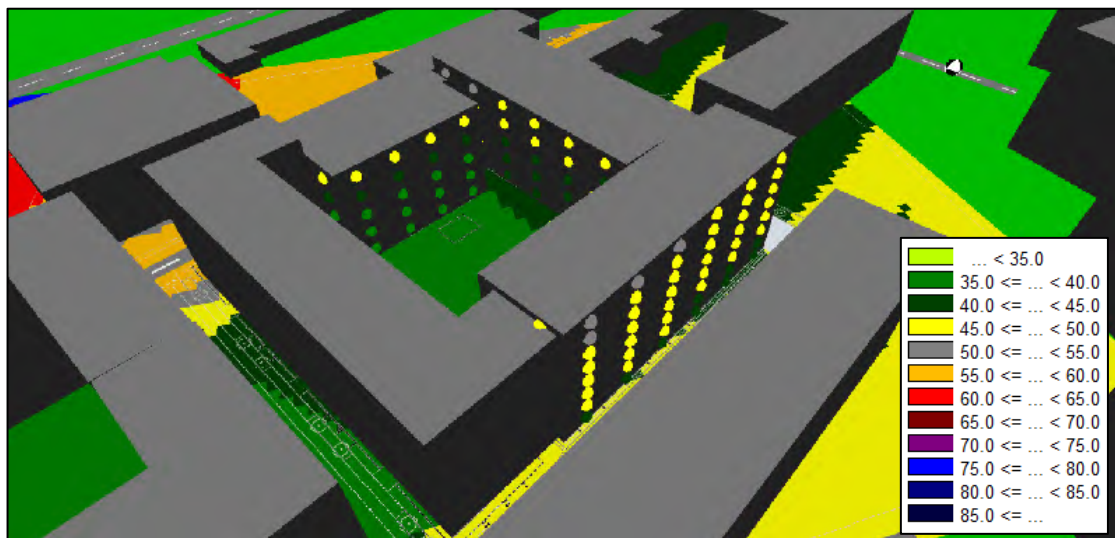
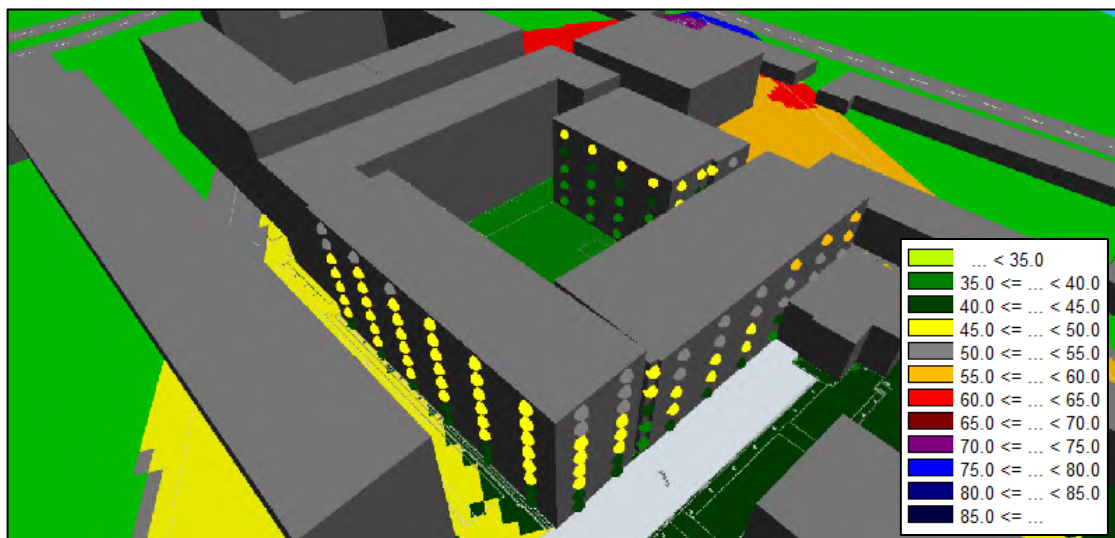
Daytime $L_{Aeq,16hr}$ Incident Noise Levels (from northeast)



Night-time $L_{Aeq,8hr}$ Incident Noise Levels (from southeast)



Night-time $L_{Aeq,8hr}$ Incident Noise Levels (from southwest)

Night-time $L_{Aeq,8hr}$ Incident Noise Levels (from northwest)Night-time $L_{Aeq,8hr}$ Incident Noise Levels (from northeast)

7.3 Achieving Internal Noise Levels

7.3.1 Overview

Provision exists to provide appropriate sound insulation solutions as required including, where necessary uprated acoustic glazing and attenuated ventilators.

Based on the above noise maps and calculation methods/assumptions discussed in Section 7.1 and 7.2, we would proposed the following minimum **preliminary** acoustic performance specifications for windows and ventilators to residential habitable rooms in order to satisfy BS 8233 internal noise limits.



Acoustic Performance Zones

Colour	Preliminary Minimum Sound Reduction Specification		Example Configurations (For Guidance Only)
	Window, $R_w + C_{tr}$	Ventilator, $D_{n,e,w} + C_{tr}$	
 Red	29 dB	35 dB	10 / 16 / 6 mm double glazing. 1 x 2,500 mm² <u>acoustic</u> trickle vent per habitable room.
 Blue	26 dB	32 dB	6 / 16 / 6 mm conventional double glazing. 1 x 2,500 mm² standard hit-miss trickle vent per habitable room.

The above presents solutions to satisfy the proposed internal ambient noise limits within apartments during normal ventilation conditions where windows are closed but ventilators (to meet Part F minimum ventilation requirements) are operational.

8.0 Assessment of Noise Levels in Outdoor Living Spaces

On this scheme, we understand the only outdoor living (associated entirely with the residential development) will be at ground floor level around the bases of the apartment blocks, and potentially apartment roof terraces. Small balconies are not generally considered as 'outdoor



living' due to their size. In this regard, BS 8233 states:-

"Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should 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... 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."

In light of this, our calculations indicate noise levels can be expected to achieve the desired 55 dB $L_{Aeq,16hr}$ across the majority of the private outdoor living spaces.

For rooftop terraces, where applicable, imperforate (e.g. solid glass) balustrades would be recommended.

9.0 Assessment of Development's Noise Impact on Surroundings

9.1 Plant Noise Emissions

9.1.1 Proposed Limits

On the basis of the Manchester City Council's guidance and the results of the environmental noise survey, we propose that the following cumulative plant noise emission criteria be achieved at 1 metre from the nearest noise sensitive residential windows.

Period	Plant Noise Emission Limit
Daytime / Evening (07:00-23:00)	46 dB $L_{Aeq,1hr}$
Night-time (23:00-07:00)	37 dB $L_{Aeq,15min}$

Noise shall be assessed in accordance with BS 4142: 2014 with corrections applied for any plant emitting noise of a tonal or irregular quality. Emergency plant items (e.g. standby generators, smoke extract equipment) should be subject to more relaxed criteria.

It should be noted that the above are subject to the final approval of the Local Authority.

9.1.2 Mitigation Measures

Given the nature of the development, there are unlikely to be any significant items of fixed building services plant introduced to the prevailing noise climate. Subsequently, at this stage it is envisaged that the risk of excessive building services noise can be mitigated by design and can be secured by a suitably worded condition of planning.



10.0 Conclusions

A detailed environmental noise survey has been undertaken in order to establish the prevailing environmental noise climate at the development site.

The acoustic requirements of national/local policies and current industry guidelines have been reviewed and used to inform a detailed noise impact assessment of incident noise affecting the development as well as potential noise output from the development.

Our assessment indicates that acceptable internal noise levels should be achievable within apartments with double glazed windows and standard/acoustic trickle ventilators within window heads in all areas.

Potential plant noise emissions have been reviewed and limits/measures to control these have been set.

Appendix A – Acoustic Terminology

The acoustic terms used in this report are defined as follows:

dB Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).

dBA The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted

It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

L_{90,T} L₉₀ is the noise level exceeded for 90% of the period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.

L_{eq,T} L_{eq,T} is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.

L_{max} L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

Sound Pressure Level (L_p) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).

Sound Power Level (SWL or L_w) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

Appendix B – Time History Graph

Talbot Mill

Automated Position (U)

L_{Aeq} , L_{Amax} and L_{A90} Noise Levels

Wednesday 8 February 2017 to Friday 10 February 2017

