

Charles Street

Construction Noise and Vibration Assessment



Charles Street Manchester

Construction Noise and Vibration Assessment

31020/CNIA1

7 December 2023

For:

Jadebricks (Charles Street) Ltd
Apartment 2.2
19 Trevor Square
Knightsbridge
London
SW7 1DZ



Hann Tucker Associates

Consultants in Acoustics Noise & Vibration

Head Office: Duke House, 1-2 Duke Street, Woking, Surrey, GU21 5BA (t) +44 (0) 1483 770 595

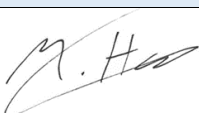
Manchester Office: First Floor, 346 Deansgate, Manchester, M3 4LY (t) +44 (0) 161 832 7041

(w) hanntucker.co.uk (e) enquiries@hanntucker.co.uk



Construction Noise and Vibration Assessment 31020/CNIA1

Document Control

Rev	Date	Comment	Prepared by	Authorised by
2	07/12/2023	Updated to align with a contractor CEMP for this scheme.		
			Michael Hartley Senior Consultant MEng(Hons), MIOA	Tom Bonnert Senior Associate BEng(Hons), MIOA
1	05/12/2023	Updated following team coordination.	Michael Hartley Senior Consultant MEng(Hons), MIOA	Tom Bonnert Senior Associate BEng(Hons), MIOA
0	01/12/2023	-	Michael Hartley Senior Consultant MEng(Hons), MIOA	Tom Bonnert Senior Associate BEng(Hons), MIOA

This report has been prepared by Hann Tucker Associates Limited (HTA) with all reasonable skill, care and diligence in accordance with generally accepted acoustic consultancy principles and the purposes and terms agreed between HTA and our Client. Any information provided by third parties and referred to herein may not have been checked or verified by HTA unless expressly stated otherwise. This document contains confidential and commercially sensitive information and shall not be disclosed to third parties. Any third party relies upon this document at their own risk.



Construction Noise and Vibration Assessment Report 31020/CNIA1

Contents	Page
1.0 Introduction	2
2.0 Objectives	2
3.0 Acoustic Terminology	3
4.0 Site Description	3
5.0 Baseline Noise Survey	4
6.0 British Standards & Guidance	5
7.0 Construction Noise Impact Assessment	9
8.0 Conclusions	16

Attachments

Appendix A – Acoustic Terminology

Appendix B – Construction Timeslices/Processes

Appendix C – Noise Impact Assessment Report



1.0 Introduction

Hann Tucker Associates Limited (Hann Tucker) has been commissioned by Jadebricks (Charles Street) Ltd to undertake a noise assessment for a site on Charles Street, Manchester.

The site, which is located on the junction of Charles Street and York Street, is being considered for residential development. The proposals are for the Full planning permission for the erection of 15-storey purpose-built student accommodation building, including site preparation works, works over the public highway and associated works.

As part of the assessments being undertaken by Hann Tucker noise and vibration calculations have been undertaken with regards to the construction/demolition phases.

Ultimately, it is envisaged that a detailed management plan shall be prepared by the appointed contractor, but this report discusses potential impacts on neighbouring sensitive receptors and sets out mitigation/management options for consideration given the sites locality to nearby noise sensitive receptors.

2.0 Objectives

To establish by means of an unattended survey the existing L_{Amax} , L_{Aeq} and L_{A90} environmental road, rail and air traffic noise levels secure and accessible on-site positions, using fully computerised noise monitoring equipment.

Measurement procedures shall be in general accordance with British Standard BS 7445 "Description and measurement of environmental noise".

To establish suitable construction noise and vibration limits in line with the guidance set out in BS 5228 and the above.

Based on information on proposed construction phasing, methodologies, and equipment types, to carry out construction noise predictions for the various phases of construction and comment on the likely acceptability with reference to the established limits.

To provide preliminary guidance on suitable mitigation measures and advise on best working practices to minimise noise and vibration impact at the nearest sensitive receivers.



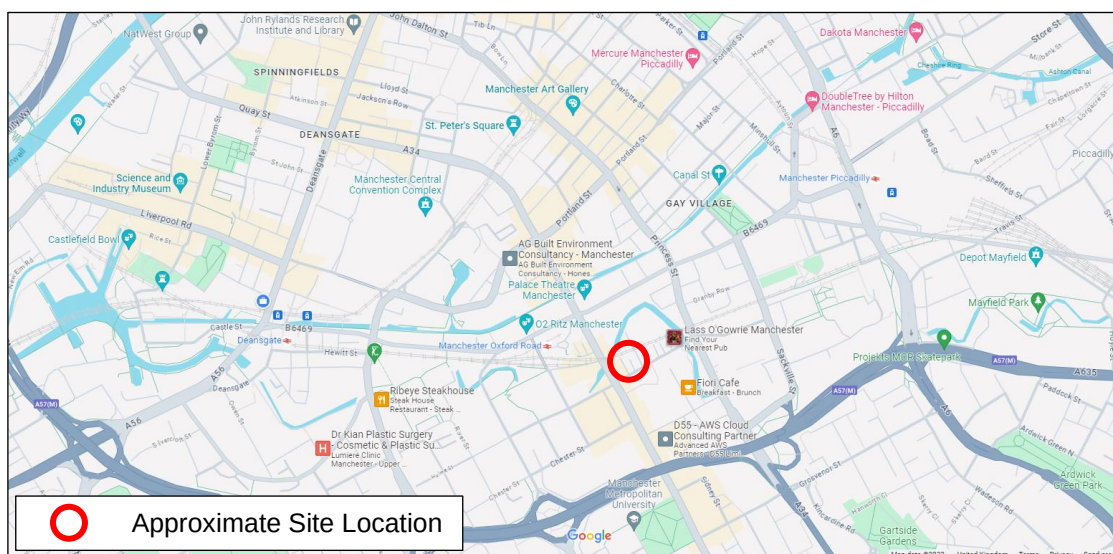
3.0 Acoustic Terminology

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

4.0 Site Description

4.1 Location

The site is located in Manchester city centre on an area of land located at the junction of Charles Street and York Street. The site falls under the jurisdiction of Manchester City Council and the location is shown in the Location Map below.



Location Map (Map Data © 2023 Google)

4.2 Description

The site is bound by Charles Street to the south, York Street to the west, and the rail line running between Manchester Oxford Road and Manchester Piccadilly train stations. The site is adjacent to Bracken House (residential) to the east, a nursery to the east located within Bracken House, Circle Square (residential) to the south, and The Maldron Hotel to the west.

There is a small MOT car garage located under the arches of the railway line viaduct, approximately 5m north of the site boundary. There are a number of late-night entertainment venues located east of the site location, Yes Bar is approximately 45m east, Joshua Brooks and FAC251 are both approximately 95m east of the site location.

The site and the surrounding notable premises are shown in the Site Plan below.



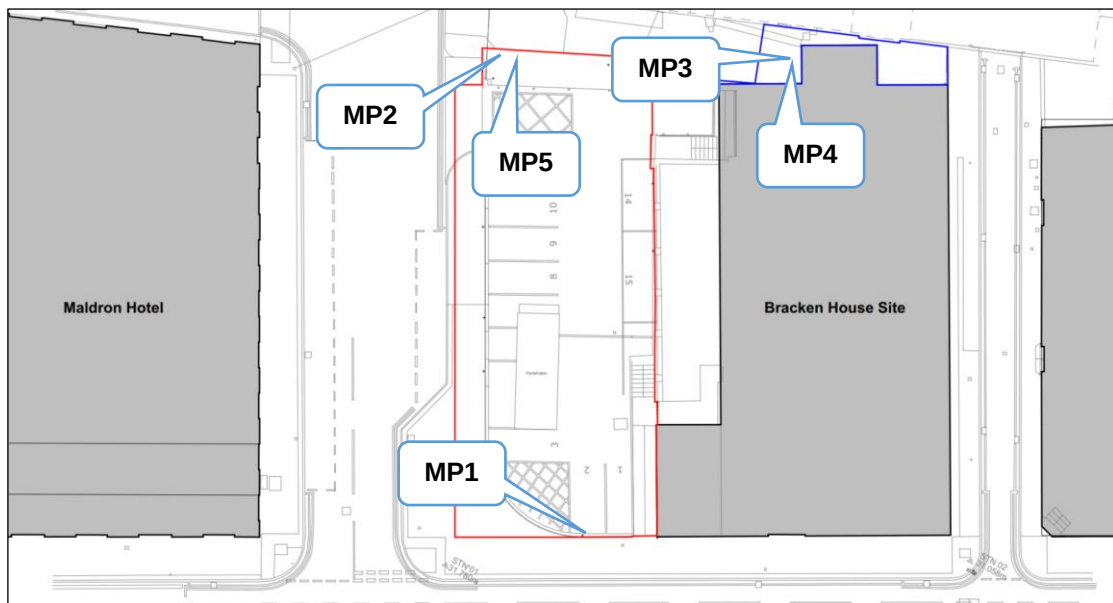
5.0 Baseline Noise Survey

Fully automated environmental noise monitoring was undertaken by Michael Hartley MEng (Hons) MIOA from approximately 12:00 hours on Friday 6th October 2023 to 17:30 hours on Tuesday 10th October 2023 to establish full daytime and night-time noise levels over a typical weekday and weekend period. Measurements were taken continuously of the A-weighted (dBA) L_{90} , L_{eq} , and L_{max} sound pressure levels over discrete 2 and 15-minute periods.

The noise level measurements were undertaken at 5 positions as described in the table below.

Position	Type	Description
MP1	Unattended	To the south of the site, approx. 4m from the nearside edge of Charles Street. Microphone in free-field conditions approx. 3 m above ground.
MP2	Unattended	To the north west corner of the site, approx. 3m from the nearside edge of York Street. Microphone in free-field conditions approx. 3 m above ground.
MP3	Unattended	To the north east of the site, approx. 3m from the nearside edge of the rail line. Microphone in façade conditions approx. at sixth floor level, approximately 18m above ground level.
MP4	Unattended	To the north east of the site, approx. 3m from the nearside edge of the rail line. Microphone in façade conditions approx. at ninth floor level, approximately 27m above ground level.
MP5	Attended	To the north of the site at the site boundary, approximately 1.5m above ground level, and approximately 5m from DC Motor Engineers commercial/industrial unit.

The position(s) is/are shown on the plan below.



Plan Showing Measurement Positions (insert copyright info - see above)

In the interest of brevity, the full measured results have been excluded from this Report, and can be found in the Hann Tucker Report, titled, “31020-RP-NIA1-Rev1-MFH Noise Impact Assessment”. This Report has been appended under Appendix C. Notwithstanding, the following table sets out the key findings as used to inform the assessment within this Report.

Position	Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)		
	$L_{Aeq,16hr}$	L_{A90}	$L_{Aeq,8hr}$	L_{A90}	L_{Amax}
MP1	66	54	64	50	85
MP2	61	51	58	47	78
MP3*	65	53	62	48	82
MP4*	63	52	61	47	79

*3dB correction from façade level measurements to free-field level has been applied.

6.0 British Standards & Guidance

6.1 British Standard BS5228

The relevant industry standard which should be considered for all demolition and construction activities is BS5228:2009. British Standard BS5228:2009 - “*Code of Practice for Noise and Vibration Control on Construction and Open Sites*”. This document has two parts with Part 1 relating to noise control and Part 2 vibration (BS5228:2009 +A1-2014). The sections below summarise important parts of the document, and it is also regarded as best practice for a copy of said documents to be kept on site and be understood and regularly referred to by site management.



6.1.1 Part 1 - Noise

British Standard BS5228:2009 +A1-2014 - "*Code of Practice for Noise and Vibration Control on Construction and Open Sites*" - Part 1, is recognised as the industry standard guidance for assessing, quantifying and controlling the effects of noise on site.

BS5228 details mitigation techniques widely recognised as Best Practicable Means (BPM). BPM is outlined in Section 72 of the Control of Pollution Act 1974.

BS5228 gives guidance on the assessment of noise and suggests particular attention be paid to the following:

- a) Existing environmental noise levels;
- b) Site location and distance to neighbouring sensitive receptors;
- c) Management of site operations and timings of certain works;
- d) Hours of site operation;
- e) Suitable plant items;
- f) Frequent liaison with neighbours;
- g) Noise characteristics of certain operations.

In accordance with modern working practices the principles of 'best practicable means' (BPM), as defined in the Control of Pollution Act 1974, should be used to reduce noise emissions throughout the works. This would incorporate the use of environmental management methods to control noise, so that it does not unreasonably inhibit work, and endorse the use of working methods that result in minimum noise effects compatible with normal working practices.

Owing to the nature of the building processes it is inevitable that a temporary increase in noise will be experienced during the works. All works are to be carried out in accordance with any agreed limitations as imposed by the Local Authority and following best practice guidance contained within BS 5228: 2009 Parts 1 and 2.

On receipt of complaints method reviews should be undertaken to see if the operation cannot realistically be modified under the 'best practicable means' principle and with consideration to BS5228. If reduction of this noise level is unavoidable using BPM the next actions should include contacting a named person within neighbouring affected property to inform them of the activities and resulting noise risk and its likely duration. A record of all actions/correspondence should be kept.



It should be recognised that any excessive restriction applied to noise levels and hours of work, will result in a longer time period over which noisy works will be required, and as such this will result in a longer period of disturbance to the neighbours.

If significant items of percussive/noisy plant are required, it might be productive to undertake a 'worst case' test on site well in advance of these items being used. This test could be used to inform the contractor and neighbours to likely noise levels, and to ensure and refine BPM.

6.1.2 Part 2 - Vibration

British Standard BS5228:2009+A1-2014 - "*Code of Practice for Noise and Vibration Control on Construction and Open Sites*" - Part 2, provides detailed advice on the assessment of vibration from demolition and construction sites.

BS5228 gives guidance on the assessment of vibration and suggests particular attention be paid to the following:

- a) Existing environmental vibration levels;
- b) Site location and distance to neighbouring sensitive receptors;
- c) Structural connections to neighbouring property;
- d) Management of site operations and timings of certain works;
- e) Site operating hours;
- f) Suitable plant items;
- g) Frequent liaison with neighbours;
- h) Vibration characteristics of certain operations;
- i) Likelihood of structure borne noise resulting from vibration.

BS 5228 provides the following guidance with regard to human perception and disturbance relating to vibration:

- 0.14mm/s - Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction.
- 0.30mm/s - Vibration might be just perceptible in residential environments.
- 1.00mm/s - It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning / explanation is given to residents.
- 10.00mm/s - Vibration is likely to be intolerable for any more than a brief exposure to this level.



6.2 Department of Environment Advisory Leaflet 72 (1976) Noise Control on Building Sites

The Department of Environment (DoE) Advisory Leaflet (AL) 72 (1976) 'Noise Control on Building Sites', gives advice on the maximum levels of construction site noise at residential locations during daytime hours based on levels associated with speech interference. This publication states that during daytime hours (08:00 hours to 18:00 hours) the sound pressure level at the building façade should not exceed:

- 75dBA in urban areas near to main roads in heavy industrial areas; or
- 70dBA in rural, suburban and urban areas away from main road traffic and industrial noise.

6.3 Guidelines for Noise Effect Assessments

The draft 'Guidelines for Noise Effect Assessments', published by the Institute of Acoustics (IOA) and Institute of Environmental Management and Assessment (IEMA), gives guidance on describing the effect of noise based on the change in noise level. It is considered appropriate to adapt this guidance for this assessment with consideration for the 'construction noise level' as opposed to the 'total noise level'. In light of this, however, it is Hann Tuckers' professional view that any exceedance of the limit due to construction noise alone should be regarded as of greater than negligible significance. The table below presents the significance criteria for construction induced noise.

Construction Noise Level	Adverse Significance
Assessment criterion is exceeded by 0 to 3dBA;	Negligible
Assessment criterion is exceeded by 3 to 5dBA;	Minor
Assessment criterion is exceeded by 5 to 10dBA; and	Moderate
Assessment criterion is exceeded by over 10dBA	Major

Despite the above, consideration should also be given to the duration of the noise generating activity. If the activity is for a short duration (e.g. a few weeks), the significance of the effect could be reduced by one level. For example, an effect of moderate adverse significance could be reduced to an effect of minor adverse significance.



6.4 Description of Effect Categories

The following terminology has been used in the assessment to define effects:

- **Adverse** – detrimental or negative effects to an environmental resource or receptor;
- **Negligible** – imperceptible effects to an environmental resource or receptor; or
- **Beneficial** – advantageous or positive effect to an environmental resource or receptor.

Where adverse or beneficial effects have been identified, these have been assessed against the following significance scale:

- **Minor** – slight, very short or highly localised effect of no significant consequence;
- **Moderate** – limited effect (by extent, duration or magnitude), which may be considered significant; or
- **Major** – considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

7.0 Construction Noise Impact Assessment

7.1 Overview

The site is surrounded by residential properties to the east and south and a nursery to the east at ground floor level within Bracken House, each could be sensitive to noise and vibration from construction activities.

At this early stage of the project, details of construction methods and working practices, likely plant and site vehicles, and a detailed construction programme are not available. In the absence of this we have made reasonable assumptions based on previous experience on similar projects with similar construction materials (i.e. concrete frame supported on piles). Ultimately, it is envisaged that a detailed Construction Environmental Managements Plan will be prepared by the appointed contractor, but this report discusses possible initial impacts on neighbouring sensitive receptors and sets out mitigation/management options for consideration given the sites locality to nearby noise sensitive receptors.



Our assessment will be undertaken in two parts:

- The first part shall consider a worst-case “*do nothing*” style assessment where noise activities are located at/close to the boundary of the site nearest to the sensitive receptors. This shall not consider any self-screening from the development as it progresses. In addition, little to no best practicable means being implemented and generous on-times being shall be considered.
- The second part shall consider a “*do something*” style approach, which will adopt typical best practicable means methods, consider self-screening, take an average distance from the site to receptors, and consider a longer construction period than typical for a development of this size to allow on-times for periods of work to be reduced.

Further mitigation measures could be implemented in addition to what is considered in our “*do something*” assessment, and whilst this is a level of detail that is not readily available for us to assess at this stage of the scheme, we have set out a section of “steps to minimise noise and vibration”.

7.2 Receptors

The following plan highlights the receptor and active construction areas considered in our assessment.



Site Map (Map Data © 2023 Google)

**Surrounding Building Key:**

1. Circle Square Apartments
2. Bracken House (Nursery Located at ground floor)
3. The Maldron Hotel
4. Oxford Place
5. Kimpton Clocktower

The approximate distances from the nearest, average, a furthest distances to the various noise receptors (i.e. neighbouring properties) are detailed in the table below.

Noise Receptor	Approximate Distances, (m)		
	Nearest (Site Boundary)	Average	Furthest
1 Circle Square Apartments	16	21	26
2 Bracken House (Nursery Located at ground floor)	5	10	15
3 The Maldron Hotel	14	19	24
4 Oxford Place	50	55	60
5 Kimpton Clocktower	28	33	38

7.3 Do Nothing Assessment

At this early stage of the project details of working practices, likely site vehicles and a detailed construction programme are not available. Therefore, Hann Tucker has assumed a preliminary list of plant machinery required for the works with associated noise emission data.

Our assessment is based on the suggested noise criteria set out in BS 5228 Annex E.2 and E.4, which is 75dBA $L_{eq,10\text{hour}}$ at nearby noise sensitive receptors. It is important to note that this would not represent an absolute limit for construction noise, rather, it would be considered as a level against which to assess the significance of noise effects associated with construction activities, plant, equipment and haulage vehicles (i.e. ref Section 6.3).

The tables in the following sections summarise the results of our assessment. Please see Appendix B for details on the typical worst case assumptions regarding construction equipment selections, usages, and programme phasing.



Impact on Nearby Noise Sensitive Receptors					
Receptor	Construction Period	Calculated Construction Noise Level L _{Aeq,10hr} (dB)	Criterion L _{Aeq,10hr} Noise Level (dB)	Exceedance (dB)	Adverse Significance
1 Circle Square Apartments	Substructure	82	75	7	Moderate
	Superstructure	81	75	6	Moderate
2 Bracken House (Nursery Located at ground floor)	Substructure	92	75	17	Major
	Superstructure	91	75	16	Major
3 The Maldron Hotel	Substructure	83	75	8	Moderate
	Superstructure	82	75	7	Moderate
4 Oxford Place	Substructure	62	75	-15	Negligible
	Superstructure	61	75	-14	Negligible
5 Kimpton Clocktower	Substructure	72	75	-3	Negligible
	Superstructure	71	75	-4	Negligible

7.3.1 Discussion

Noise

We have undertaken a construction noise impact assessment to highlight any potential adverse impact the proposed construction activities may have on nearby noise sensitive receptors.

Based on the list of equipment, predicted on-times and noise levels set out in Appendix B, our assessment indicates that total cumulative noise levels, may exceed the suggested noise criterion of 75 L_{Aeq,10hr} dB.

Construction is a temporary source and our predictions are based on typical worst-case activities; however, Receptor 2 may see an exceedance of around **17dB** and Receptor 3 may see an exceedance of around **8dB** if no consideration is given to mitigation/best practice measures.

This is due to the loudest equipment such as impact hammers, skips, concrete cutters, breakers, and excavators, all of which are “mobile items” in which utilising the effective and considered site management / layout could be investigated to achieve localised screening to receptors. The calculations set out in the “do nothing” assessment make no account for this attenuation.



Our assessment is for the worst-case activities and noise levels are presented without mitigation measures in place. Mitigation measures should significantly reduce noise levels across the site. While it may not be possible to mitigate noise from all equipment e.g. piling rig, measures such as barrier screening for concrete cutting and other handheld equipment are likely to be effective. It is however important that workers on site consistently review the need for different mitigation measures as the project develops. At this early stage it is not possible to accurately predict the noise impact for all future activities and phases of the project.

Furthermore, it should be noted that these potential construction noise impacts are temporary in nature and their occurrence will be limited by the use of appropriate mitigation measures, and confined only to within the designated working hours that can be agreed with Manchester City Council in advance of the commencement of works.

Vibration

There are no recognised standards presenting methodologies for calculating the transfer of vibration levels through the ground due to construction and demolition activities. In addition, we have no manufacturer's vibration data which could be assessed.

Based upon the assumed construction methods it is considered possible that some localised and temporary adverse vibration effects could occur. In the absence of any assessment methodology or data it might be necessary to undertake trial works test vibration measurements of proposed worse case activities.

7.4 Mitigation Measures

To minimise the risk of adverse impact to existing off-site and potentially phased on-site receptors, best practicable means should be adhered to at all times. A selection of the most common is presented below for consideration.

- All vehicles and mechanical plant used for the purpose of the work shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order.
- All machines in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum.
- Items of plant shall be maintained in good workmanlike condition so that extraneous noises from mechanical vibration, creaking and squeaking are reduced to a minimum.
- Barriers should be located as close to the plant as possible to provide adequate attenuation.



- Lorry engines will be switched off when not in use.
- Equipment and materials will be delivered, and waste will be removed during the day/evening time, where practical (shoulder hours of 07.00 to 08.00 and/or 18.00 to 19.00).
- Temporary noise barriers (i.e. acoustic blankets) will be used to reduce noise levels where appropriate and practicable. Such measures can be particularly appropriate for stationary or near-stationary plant such as pneumatic breakers and compressors.
- Care will be taken when loading or unloading vehicles, dismantling scaffolding or moving materials etc. to reduce impact noise.
- Prefabricated components will be used, where practicable, to avoid on-site fabrication of components.
- Occupiers who may be affected by noise or vibration for a specific phase of works shall be notified of the nature of the works, a contact telephone number and address to which any enquiries should be directed.
- Materials will be handled in a manner which minimises noise.

Also consider, it is widely recognised that people are more likely willing to accept a significant increase of noise for a shorter period of time, verses a 'medium' noise nuisance for a long period of time. It might therefore be beneficial to increase (maybe double) the workforce and number of plant items, for some activities for brief periods of time, to significantly speed up the worst-case processes but with a minimal noise increase penalty.

7.5 Do Something Assessment

At this early stage of the project details of working practices, likely site vehicles and a detailed construction programme are not available. Therefore, Hann Tucker Associates has assumed the same as for the "do nothing" assessment, though considering the adoption of best practicable means methods, consider self-screening, take an average distance from the site to receptors, and consider a longer construction period to reduce on-times of construction activities.

The tables in the following sections summarise the results of our assessment.



Impact on Nearby Noise Sensitive Receptors					
Receptor	Construction Period	Calculated Construction Noise Level L _{Aeq,10hr} (dB)	Criterion L _{Aeq,10hr} Noise Level (dB)	Exceedance (dB)	Adverse Significance
1 Circle Square Apartments	Substructure	74	75	-1	Negligible
	Superstructure	72	75	-3	Negligible
2 Bracken House (Nursery Located at ground floor)	Substructure	75	75	0	Negligible
	Superstructure	79	75	4	Minor
3 The Maldron Hotel	Substructure	74	75	-1	Negligible
	Superstructure	73	75	-2	Negligible
4 Oxford Place	Substructure	55	75	-20	Negligible
	Superstructure	54	75	-21	Negligible
5 Kimpton Clocktower	Substructure	65	75	-10	Negligible
	Superstructure	63	75	-12	Negligible

7.5.1 Discussion

We have undertaken a construction noise impact assessment with consideration to best practicable means and the potential adverse impact the proposed construction activities may have on nearby noise sensitive receptors.

Our assessment indicates that total cumulative noise levels may still exceed the suggested noise criteria of 75 L_{Aeq,10hr} dB; however with the implementation of mitigation measures and best practice, Receptor 2 sees an exceedance of around 4dB during the superstructure time slice, which could be described as a Minor impact and all other receptors at all time slices do not exceed 0dB which could be described as a Negligible impact.

Ultimately, it is envisaged that a detailed management plan shall be prepared by the appointed contractor, but this report is an indication that impacts on neighbouring sensitive receptors can be attenuated to a level that be deemed suitable with reference to the appropriate guidance.



8.0 Conclusions

A detailed environmental noise survey has been undertaken to establish the currently prevailing noise climate around the site.

Potential impacts due to construction noise and vibration have been considered on nearby noise sensitive receptors. Given the early stage of the project details of construction methods and working practices, likely plant and site vehicles, and a detailed construction programme are not available. In the absence of this we have made reasonable assumptions based on previous experience on similar projects with similar construction materials (ie concrete frame supported on piles).

Our assessment has considered two key parts; the first being a worst-case “do nothing” style assessment where noise activities are located at/close to the boundary of the site nearest to the sensitive receptors, and the second being a “do something” style approach which adopts typical best practicable means methods, considers self-screening, takes an average distance from the site to receptors, and considers a longer construction period than typical for a development of this size.

Further mitigation measures could be implemented in addition to what is considered in our “do something” assessment, and so we have set out “steps to minimise noise and vibration”.

Whilst construction noise and vibration have the potential to cause impact, with consideration towards noise and vibration mitigation, and implementation of best practical measures, this report is an indication that impacts on neighbouring sensitive receptors can be attenuated to a level that could be deemed suitable with reference to the appropriate guidance.

A detailed management plan should be prepared by the appointed contractor to develop the assessment as presented within this Report.

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. $30\text{dB} + 30\text{dB} = 33\text{dB}$, 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.

L_p Sound Pressure Level (SPL) 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).

L_w Sound Power Level (SWL) 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

Construction Timeslices/Processes

Pre-Mitigation

Step 1 : Identifying plant per phase & assigning source noise levels from BS 5228

List of plant and machinery to be used during each phase/stage of the programme.								
Item	Substructure	Superstructure	Substructure	Superstructure	dBA at 10m	BS 5228 Source	Substructure	Superstructure
	typical on times (1 = 100%) - worst case = 2 X these values up to max of 1 (100%)		For Demo/Piling/Subst the number of items is for the ENTIRE SITE. For superstr and later, it is PER BUILDING (< 1 = item is shared between sites)		From manufactures data (if applicable), if generic leave as is	For specific items (e.g. low noise piling rig) input the name of the item and the source of the noise data (e.g. manufacturer) For generic items (e.g. wheel wash station) leave as is	Resultant DAILY (10-hr) Noise Level at 10m Per Item	
Tower crane (Tower Crane 12t)	0%	60%	0	1	77	C4.49	0	75
Passenger/goods hoists (Site lift for workers)	0%	50%	0	1	66	C4.62	0	63
Cutters, drills, and small tools (hand held gas cutter)	40%	40%	2	2	65	C3.35	64	64
Pulveriser on Excavator (pulveriser mounted on excavator 30t)	60%	0%	1	0	76	C1.4	74	0
Fork lift truck (telescopic handler 3.7t)	15%	25%	1	1	70	C4.55	62	64
Lorries and vans	20%	20%	1	2	73	-	66	69
Mobile crane (mobile telescopic crane 50t)	0%	0%	0	0	67	C4.46	0	0
Mobile lorry mounted concrete pump (17t)	30%	30%	1	1	79	C4.30	74	74
Poker vibrator	50%	50%	1	1	78	C4.33	75	75
Ready mixed concrete lorry (216KW)	40%	40%	1	1	77	C4.21	73	73
Concrete splitters/saws (handheld Pneumatic)	40%	40%	2	2	83	C1.6	82	82
Scaffolding and hydraulic access platforms (lifting platform idling)	0%	25%	0	1	63	C4.58	0	57
Tipper lorries (articulated dump truck tipping fill 23t)	50%	0%	1	0	74	C2.32	71	0
Flatbed articulated vehicle	20%	20%	1	2	73	-	66	69
Large rigid lorries	20%	20%	1	2	75	-	68	71
Track mounted piling rigs (tracked drilling rig with hydraulic drifter 12.5t)	70%	0%	1	0	82	C3.15	80	0
Water pumps (6 in)	30%	30%	1	1	65	C2.45	60	60

Step 2 : Calculating dB correction from each building site to the receptor

TYPICAL CASE

Receptors	Plot01				All
	Dist (m)	Adjustments (dB)			
Existing		Distance	Screening	Reflection	
Circle Square	16	-4	0	0	
Bracken House	5	6	0	0	
Maldron Hotel	14	-3	0	0	
Oxford House	50	-14	-10	0	
Kimpton Clocktower	28	-9	-5	0	

Step 3 : Splitting the project programme into 'Timeslices' & indentifying the works occuring per building in each timeslice

TS.	Period	Substructure	Superstructure
1	Substructure	P01	P01
2	Superstructure	x	x

Step 4 : Summarising Worst-case Noise Levels at each receptor during each Timeslice

TYPICAL CASE

TS.	Period	Receptor	Receptor	Receptor	Receptor	Receptor
		Circle Square	Bracken House	Maldron Hotel	Oxford House	Kimpton Clocktower
1	Substructure	82	92	83	62	72
2	Superstructure	81	91	82	61	71

Do something 25% - Percentage Correction

Step 1 : Identifying plant per phase & assigning source noise levels from BS 5228

List of plant and machinery to be used during each phase/stage of the programme.								
Item	Substructure	Superstructure	Substructure	Superstructure	dBA at 10m	BS 5228 Source	Substructure	Superstructure
	typical on times (1 = 100%) - worst case = 2 X these values up to max of 1 (100%)		For Demo/Piling/Subst the number of items is for the ENTIRE SITE. For superstr and later, it is PER BUILDING (< 1 = item is shared between sites)		From manufactures data (if applicable), if generic leave as is	For specific items (e.g. low noise piling rig) input the name of the item and the source of the noise data (e.g. manufacturer) For generic items (e.g. wheel wash station) leave as is	Resultant DAILY (10-hr) Noise Level at 10m Per Item	
Tower crane (Tower Crane 12t)	0%	15%	0	1	77	C4.49	0	69
Passenger/goods hoists (Site lift for workers)	0%	13%	0	1	66	C4.62	0	57
Cutters, drills, and small tools (hand held gas cutter)	10%	10%	2	2	65	C3.35	58	58
Pulveriser on Excavator (pulveriser mounted on excavator 30t)	15%	0%	1	0	76	C1.4	68	0
Folk lift truck (telescopic handler 3.7t)	4%	6%	1	1	70	C4.55	56	58
Lorries and vans	5%	5%	1	2	73	-	60	63
Mobile crane (mobile telescopic crane 50t)	0%	0%	0	0	67	C4.46	0	0
Mobile lorry mounted concrete pump (17t)	8%	8%	1	1	79	C4.30	68	68
Poker vibrator	13%	13%	1	1	78	C4.33	69	69
Ready mixed concrete lorry (216KW)	10%	10%	1	1	77	C4.21	67	67
Concrete splitters/saws (handheld Pneumatic)	10%	10%	2	2	83	C1.6	76	76
Scaffolding and hydraulic access platforms (lifting platform idling)	0%	6%	0	1	63	C4.58	0	51
Tipper lorries (articulated dump truck tipping fill 23t)	13%	0%	1	0	74	C2.32	65	0
Flatbed articulated vehicle	5%	5%	1	2	73	-	60	63
Large rigid lorries	5%	5%	1	2	75	-	62	65
Track mounted piling rigs (tracked drilling rig with hydraulic drifter 12.5t)	18%	0%	1	0	82	C3.15	74	0
Water pumps (6 in)	8%	8%	1	1	65	C2.45	54	54

Step 2 : Calculating dB correction from each building site to the receptor

TYPICAL CASE

Receptors	Plot01				
	Dist (m)	Adjustments (dB)			All
		Distance	Screening	Reflection	
<i>Existing</i>					
<i>Circle Square</i>	21	-6	0	0	-6
<i>Bracken House</i>	10	0	0	0	0
<i>Maldron Hotel</i>	19	-6	0	0	-6
<i>Oxford House</i>	55	-15	-10	0	-25
<i>Kimpton Clocktower</i>	33	-10	-5	0	-15

Step 3 : Splitting the project programme into 'Timeslices' & indentifying the works occuring per building in each timeslice

TS.	Period	Substructure P01	Superstructure P01
1	Substructure	x	
2	Superstructure		x

Step 4 : Summarising Worst-case Noise Levels at each receptor during each Timeslice

TYPICAL CASE

TS.	Period	Receptor	Receptor	Receptor	Receptor	Receptor
		Circle Square	Bracken House	Maldron Hotel	Oxford Place	Kimpton Clocktower
1	Substructure	74	75	74	55	65
2	Superstructure	72	79	73	54	63

Appendix C

Noise Impact Assessment Report

Charles Street Manchester

Environmental Noise Survey and Noise Impact Assessment Report

31020/NIA1

5 December 2023

For:
Jadebricks (Charles Street) Ltd
Apartment 2.2
19 Trevor Square
Knightsbridge
London
SW7 1DZ



Hann Tucker Associates

Consultants in Acoustics Noise & Vibration

Head Office: Duke House, 1-2 Duke Street, Woking, Surrey, GU21 5BA (t) +44 (0) 1483 770 595

Manchester Office: First Floor, 346 Deansgate, Manchester, M3 4LY (t) +44 (0) 161 832 7041

(w) hanntucker.co.uk (e) enquiries@hanntucker.co.uk



Environmental Noise Survey and Noise Impact Assessment Report 31020/NIA1

Document Control

Rev	Date	Comment	Prepared by	Authorised by
1	05/12/2023	Updated following team co-ordination and latest plan drawings.		
			Michael Hartley Senior Consultant MEng(Hons), MIOA	Tom Bonnert Senior Associate BEng(Hons), MIOA
0	17/11/2023	Draft Issue.		

Environmental Noise Survey and Noise Impact Assessment Report 31020/NIA1

Contents	Page
1.0 Introduction	1
2.0 Objectives	1
3.0 Acoustic Terminology	2
4.0 Site Description	2
5.0 Proposed Development	3
6.0 Planning Policies, Standards & Guidance	4
7.0 Baseline Noise Survey	7
8.0 Existing Industrial Noise Impacts	11
9.0 Incident Noise Levels	12
10.0 Achieving Internal Noise Levels	13
11.0 External Amenity Area	18
12.0 Operational Noise Impacts	19
13.0 Conclusions	21

Attachments

Appendix A – Acoustic Terminology

Appendix B – Relevant Planning Policies and Guidance

Appendix C – Time History Graphs



1.0 Introduction

Hann Tucker Associates Limited (Hann Tucker) has been commissioned by Jadebricks (Charles St) Ltd to undertake a noise assessment for a site on Charles Street, Manchester.

The site, which is located on the junction of Charles Street and York Street, is being considered for residential development. The proposals are for the Full planning permission for the erection of 15-storey purpose-built student accommodation building, including site preparation works, works over the public highway and associated works.

The site is subject to road noise from Charles Street and York Street, rail noise from the raised rail line running on a viaduct to the north of the site between Manchester Oxford Road and Manchester Piccadilly stations, as well as industrial noise from a small MOT garage located under a rail arch to the north, within the viaduct. There are nearby bars/clubs open into the night, however following night-time site inspection on a Friday night these were not noted to be audible at the proposed development.

Baseline noise conditions have been established by means of a detailed noise survey, presented herein. The findings have subsequently been used to assess the suitability of the site for residential use. Measures required to mitigate noise impacts for the proposed development (when operational) have been discussed in context with relevant national & local planning policies, design standards and good practice guides.

2.0 Objectives

To establish by means of an unattended survey the existing L_{Amax} , L_{Aeq} and L_{A90} environmental road, rail and air traffic noise levels secure and accessible on-site positions, using fully computerised noise monitoring equipment.

To establish by means of night-time, out of hours (ie Friday / Saturday evening and night-time) site visit any potential music noise impact on the development.

Measurement procedures shall be in general accordance with British Standard BS 7445 "Description and measurement of environmental noise".

The survey will enable noise emission limits from the development to be identified with reference to the requirements of the Local Authority and/or the application of BS 4142: 2014 and to minimise the possibility of noise nuisance to neighbours.



A 3-Dimensional noise model shall be created to establish noise propagation across the development (i.e attenuation with height/building massing).

Based on the results of the unmanned survey, to undertake a noise assessment to assess the suitability of the proposed development for residential use in accordance with the Noise Policy Statement for England (NPSE), National Planning Policy Framework (NPPF), Planning Practice Guidance (PPGN), British Standard BS8233:2014, Building Regulations Part O, and Local Authority guidance/requirements.

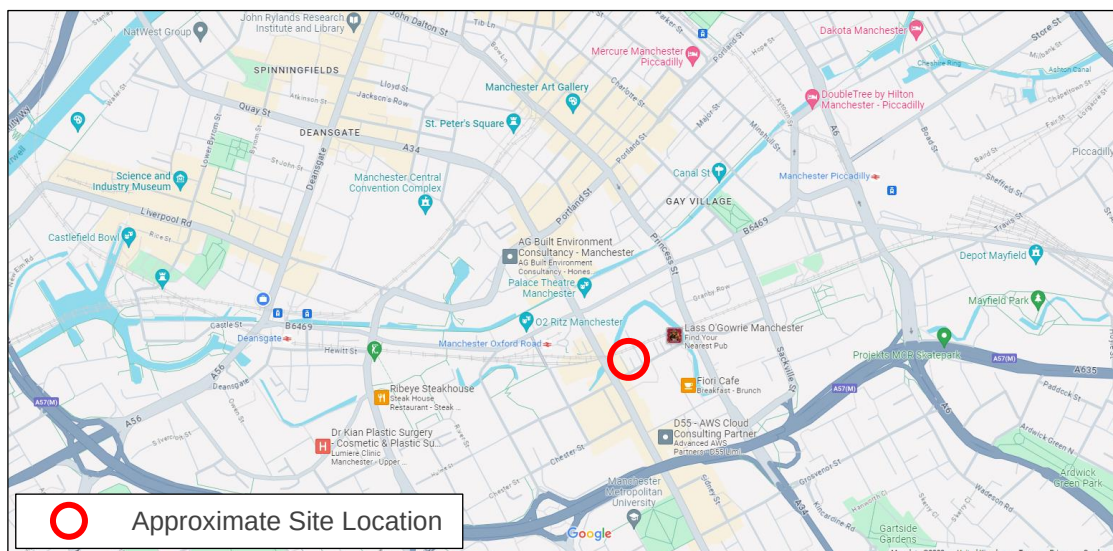
3.0 Acoustic Terminology

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

4.0 Site Description

4.1 Location

The site is located in Manchester city centre on an area of land located at the junction of Charles Street and York Street. The site falls under the jurisdiction of Manchester City Council and the location is shown in the Location Map below.



Location Map (Map Data © 2023 Google)



4.2 Description

The site is bound by Charles Street to the south, York Street to the west, and the rail line running on the viaduct to the north between Manchester Oxford Road and Manchester Piccadilly train stations. The site is adjacent to Bracken House (residential) to the east, a nursery to the east located within Bracken House, Circle Square (residential) to the south, and The Maldron Hotel to the west.

There is a small MOT car garage located under the arches of the railway line viaduct, approximately 5m north of the site boundary. There are a number of late night entertainment venues located east of the site location, Yes Bar is approximately 45m east, Joshua Brookes and FAC251 are both approximately 95m east of the site location.

The site and the surrounding notable premises are shown in the Site Plan below.



Site Map (Map Data © 2023 Google)

5.0 Proposed Development

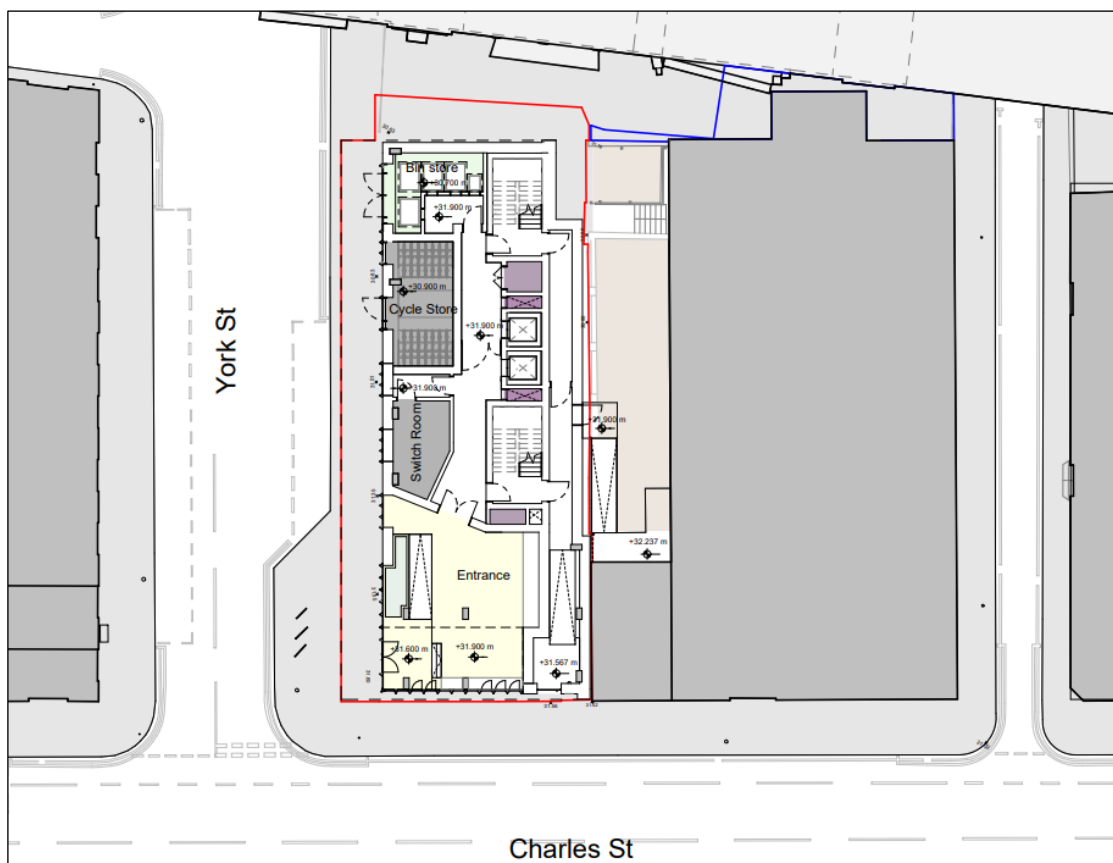
The proposed development is understood to be a purpose built student residential accommodation building of ground plus 15 storeys. The ground floor shall comprise an entrance/amenity area entrance through an enclosed walled garden (for use by residents only) that has double height and single height portions. The entrance/amenity space is technically classified as an external space due to a porous/perforated façade to the façade. There are also plant rooms, a bin store and a cycle store.



Level 01 shall provide space for a small office, meeting room, resident amenity lounge space, laundry room and a plant room. Level 02 provides space for a larger amenity area and 5No en-suite studio rooms.

The remaining levels provide 102No rooms across the remaining twelve levels. The roof level will provide plant space.

The site is shown in the Plan below.



Plan showing Project Proposals, Ground Floor (c/o Simpsonhaugh)

6.0 Planning Policies, Standards & Guidance

6.1 Policies & Guides

In order to provide a suitable assessment a number of national planning policies have been considered, including:

- The National Planning Policy Framework (NPPF), 2023
- The Noise Policy Statement for England (NPSE), 2010
- Planning Practice Guidance – Noise (PPGN), 2019



The above documents highlight the importance of considering the potential noise effects on any new residential development and provide a qualitative approach to assessment. However, each of the above does not provide any quantitative guidance. As such, all quantitative guidance used to form a noise impact assessment is taken from various other standards, guidance, and Local Authority requirements as summarised below:

- World Health Organisation: 2018
- British Standard BS8233: 2014
- ProPG : Planning & Noise: 2017
- Building Regulations Approved Document O: 2021
- British Standard 4142:2014 + A1:2019

Detailed information for relevant planning policies and guidance can be found within Appendix B.

6.2 Specific Local Authority Criteria

Manchester City Council requirements are outlined in Manchester City Council's Planning & Noise Technical Guidance document (June 2022).

The document aims to provide help and advice in relation to noise in a planning context to encourage good acoustic design. It outlines what is expected in relation to current guidance and policy with the aspiration that new developments achieve the highest possible standards without compromising the health and wellbeing of people that live and work within the City of Manchester.

The following sections summarise the relevant section of the above document that relate to this site.

6.2.1 Residential Developments

Section 7.3.1.1 states that The Council has adopted the following noise limits for residential properties:

- *“Bedrooms (night time - 23.00 - 07.00) 30 dB L_{Aeq} (individual noise events should not normally exceed 45 dB $L_{Amax,F}$ by more than 10 times)*
- *Living Rooms (daytime - 07.00 - 23.00) 35 dB L_{Aeq}*
- *Gardens and terraces (daytime) 55 dB L_{Aeq} ”*



6.2.2 Entertainment Venues

Section 3.7.1.2 discusses the potential impact of introducing a new music venue or introducing new residential near a premises that plays music. The document states that *“when considering the potential impact of a proposal for an entertainment venue, consultants should consider the overall noise level (L_{Aeq}) and the 63 Hz and 125 Hz octave band noise levels (L_{eq}).”*

With respect to the above, the MCC guidance on controlling music noise is to ensure *“music noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB ($L_{eq,5min}$), respectively”*

6.2.3 Noise and vibration from fixed plant / equipment

Section 3.7.1.5 states that *“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 (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location”.*

6.2.4 Ventilation & Overheating

Section 5.3.1.7 relates to ventilation and overheating and states that *“an overheating assessment might not always be undertaken for a project and without this information it is difficult to identify noise impacts that may occur during the overheating condition. It is recommended that either where a condition has been imposed to control internal noise levels for residential development or where overheating may be an issue, the guidance provided in the AVO Guide is followed.”*

6.3 Manchester Core Strategy

Currently the future use and development of land and buildings in Manchester is guided by the Manchester Core Strategy (Adopted March 2012) and the saved policies of the Unitary Development Plan for the City of Manchester (1995).

The site is identified as an ‘Purpose Built Student Accommodation’ in the Core Strategy. Development proposals therefore should be in accordance with Policy H 12. Therefore, *“Consideration should be given to the design and layout of the student accommodation and siting of individual uses within the overall development in relation to adjacent neighbouring uses. The aim is to ensure that there is no unacceptable effect on residential amenity in the surrounding area through increased noise, disturbance or impact on the street scene either from the proposed development itself or when combined with existing accommodation.”*



Consideration should also be given to; Policy C 10 (Leisure and the Evening Economy) and Policy DM 1 (Development Management),

7.0 Baseline Noise Survey

7.1 Procedure

Fully automated environmental noise monitoring was undertaken by Michael Hartley MEng (Hons) MIOA from approximately 12:00 hours on Friday 6th October 2023 to 17:30 hours on Tuesday 10th October 2023 to establish full daytime and night-time noise levels over a typical weekday and weekend period. Measurements were taken continuously of the A-weighted (dBA) L_{90} , L_{eq} , and L_{max} sound pressure levels over discrete 2 and 15-minute periods.

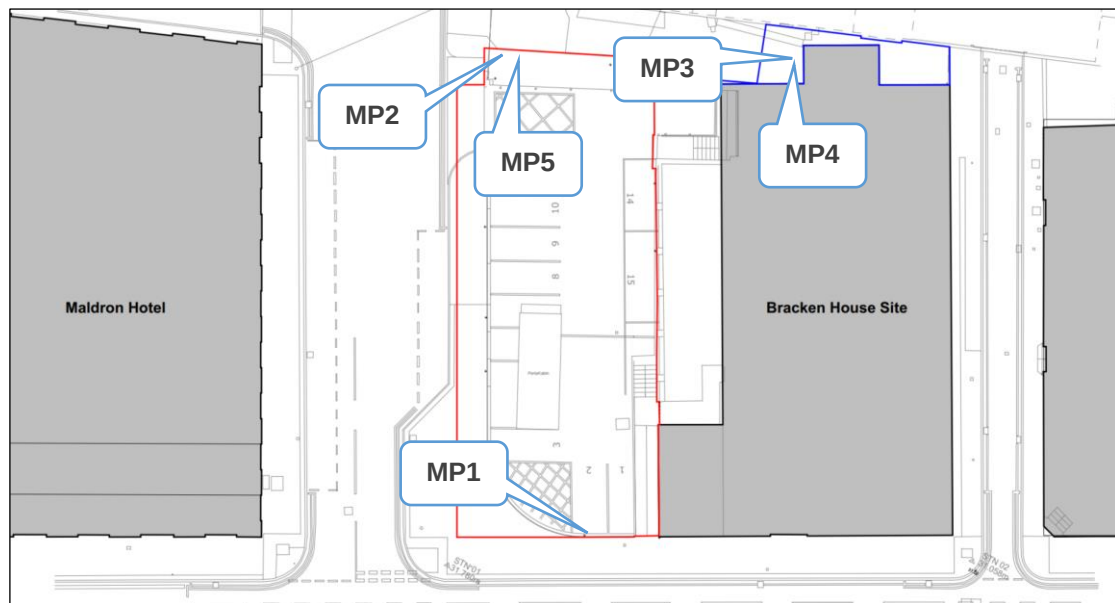
An additional attended site visit was also undertaken between 23:30 hours and 01:00 hours on Friday 6th October 2023 with the purpose of establishing if music would impact the future development.

7.2 Measurement Position(s)

The noise level measurements were undertaken at 5 positions as described in the table below.

Position	Type	Description
MP1	Unattended	To the south of the site, approx. 4m from the nearside edge of Charles Street. Microphone in free-field conditions approx. 3 m above ground.
MP2	Unattended	To the north west corner of the site, approx. 3m from the nearside edge of York Street. Microphone in free-field conditions approx. 3 m above ground.
MP3	Unattended	To the north east of the site, approx. 3m from the nearside edge of the rail line. Microphone in façade conditions approx. at sixth floor level, approximately 18m above ground level.
MP4	Unattended	To the north east of the site, approx. 3m from the nearside edge of the rail line. Microphone in façade conditions approx. at ninth floor level, approximately 27m above ground level.
MP5	Attended	To the north of the site at the site boundary, approximately 1.5m above ground level, and approximately 5m from DC Motor Engineers commercial/industrial unit.

The position(s) is/are shown on the plan below.



Plan Showing Measurement Positions (c/o SimpsonHaugh)

7.3 Weather Conditions

For the unattended survey between 11:00 hours on Friday 6th October 2023 to 17:30 hours on Tuesday 10th October 2023, local weather reports indicated no notable periods of prolonged or heavy rainfall, with temperatures ranging from 9 °C (night) to 21 °C (day) and wind speeds less than 5 m/s. During our time on site, skies were overcast cloud cover, wind conditions were, and road surfaces were dry.

During the attended survey on Friday 6th October 2023, the weather was generally clear and dry with no periods of rainfall and calm wind conditions.

7.4 Instrumentation

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

Position	Description	Manufacturer	Type	Serial Number	Calibration
1	Type 1 Data Logging Sound Level Meter	Larson Davis	824	3157	30/05/2023
2	Type 1 Data Logging Sound Level Meter	Larson Davis	LxT	4568	30/05/2023
3	Type 1 Data Logging Sound Level Meter	Larson Davis	824	3838	30/05/2023
4	Type 1 Data Logging Sound Level Meter	Larson Davis	LxT	4086	26/05/2023



Position	Description	Manufacturer	Type	Serial Number	Calibration
5	Svantek	971	72540	31/05/2023	Svantek
All	Type 1 Calibrator	Larson Davis	CAL200	3083	27/03/2023

Each sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant changes were found to have occurred (no more than 0.3 dB).

Each sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. Each microphone was fitted with a windshield.

7.5 Results

The results have been plotted on Time History Graphs 31020/TH1 to 31020/TH4 enclosed presenting the 15 minute A-weighted (dBA) L_{90} , L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

In order to compare the results of our survey with the relevant guidelines it is necessary to convert the measured $L_{Aeq(15\text{ minute})}$ noise levels into single figure daytime $L_{Aeq(16\text{-hour})}$ (07:00-23:00 hours) and night-time $L_{Aeq(8\text{-hour})}$ (23:00-07:00 hours) levels.

A summary of the results, as used to inform subsequent assessments against current guidelines, is presented in the table below. The L_{A90} values presented are the 'representative' levels determined through statistical analysis of the 15-minute readings in line with BS 4142. L_{Amax} values are the '10th highest' 2-minute value in line with Approved Document O (Part O) requirements.

Position	Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)		
	$L_{Aeq,16hr}$	L_{A90}	$L_{Aeq,8hr}$	L_{A90}	L_{Amax}
MP1	66	54	64	50	85
MP2	61	51	58	47	78
MP3*	65	53	62	48	82
MP4*	63	52	61	47	79

*3dB correction from façade level measurements to free-field level has been applied.

The following table summarises noise levels recorded at the attended measurement positions.



Position	Date	Period	Sound Pressure Level (dB)		
			L _{Aeq,T}	L _{A90,T}	L _{Amax,T}
MP5	6/10/2023	10:30 – 11:30	61	56	87
		11:30 – 12:30	58	57	88
		12:30 – 13:30	57	54	85

7.6 Discussion of Noise Climate

Due to the nature of the survey, i.e. unattended, 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, and the duration of the attended measurements, the noise climate was noted to be dominated by intermittent train pass by along the elevated rail line to the north and vehicle pass bys along Charles Street to the south.

During lulls in traffic distant building service noise was just audible from buildings in the surrounding area.

During the attended noise survey of the MOT garage the noise climate was noted to comprise of general talking from workers, occasional traffic noise from vehicles being driven in/out of the MOT unit. During the time on site undertaking our measurements the main sliding door to the MOT garage was open while staff were working on the vehicles, impulsive noise from hammering of metal was heard as well as the mechanical whirring from car lifts operating and general less noticeable bangs from equipment/tools being moved about within the unit.

Upon collection of our unattended monitoring equipment it was noted that noise emanating from the MOT garage was largely of the same character however, the main sliding door into the unit was closed too and noise emanating from the unit was subjectively less audible than during our initial attended survey. As such measured noise level from the first attended survey will be utilised in the assessment as a worst-case/robust scenario.

An additional site visit was undertaken during the night of Friday 13 October 2023 between the hours of 23:30 – 01:00 to assess the potential music noise impact from the entertainment venues east of the site. Whilst on site it was noted that music noise was not audible at the site boundary and could not be heard over the prevailing noise levels from traffic/pedestrians. However, an increase in pedestrian activity comprising talking and shouting in the street was observed when compared to daytime activity in the area. There was also significant traffic on Charles Street, primarily due to taxis. The above is also visible in our unattended survey as 63Hz and 125Hz octave band noise levels did not increase notably during Friday and Saturday nights compared to Monday and Tuesday nights.



8.0 Existing Industrial Noise Impacts

8.1 Overview

This section considers the potential noise impact of the existing adjacent commercial premises and associated activities on proposed residential receptors. The assessment follows methodology set out within BS 4142:2014 +A1:2019.

Our assessment has been carried out to 1 m from the worst affected window of the proposed development. The MOT garage is understood to only operate during daytime hours, as such our assessment will be in reference to daytime time period only.

8.2 Assessment

Based on the measured data and observations made on site, the table below provides an initial BS4142:2014 assessment.

Results		Relevant Clause	Commentary
Measured Ambient Level	L _{Aeq,1hour} 61 dB	7.3.2	Specific sound source on.
Measured Residual Level	L _{Aeq,1hour} 54 dB	7.3.3	Representative level during times the source was not operating.
Assessment made during the daytime so reference period is 1 hour		7.2	
Specific Sound Level at Measurement Location	L _{Aeq,1hour} 60 dB	7.3.8 7.3.9 7.3.10	Specific level of source corrected for residual level and on-time.
Specific Sound Level Calculated at Future Resident Window Location	L _{Aeq,1hour} 55 dB	7.3.6	Accounting for propagation, air absorption, ground absorption, and screening from building massing.
Acoustic feature correction	+6 dB	9.2	The noise emanating from the industrial premises was noted to be intermittent and impulsive in nature that was clearly audible over the noise climate.
Rating level	61 dB	9.2	Calculated by adding acoustic feature corrections to the specific sound level.
Background sound level	L _{A90,1hour} 54 dB	8.1.1 8.1.3 8.3	Typical background sound level measured at the proposed development site during the day.
Excess of rating over background sound level	7 dB	11	
Assessment indicates likelihood of a significant adverse impact to residents without noise mitigation measures.		11	The excess of the rating level over the background level is very high, mitigation measures must therefore be assessed further to ensure good internal acoustic conditions.
Uncertainty of the assessment	Low	10	The background sound level is based on repeatable measurements made over the duration of a number of days. The measurements of noise from the industrial remained consistent throughout measurement period and was subjectively dominant above road/rail/aircraft sources at proposed development site.



The above indicates a likelihood of a significant adverse impact to proposed residents without noise mitigation measures, however, the context of the site must be considered to enable a full assessment.

Where the initial estimate of the impact needs to be modified due to the context, BS 4142:2014 states that all pertinent factors should be taken into consideration, including the following:

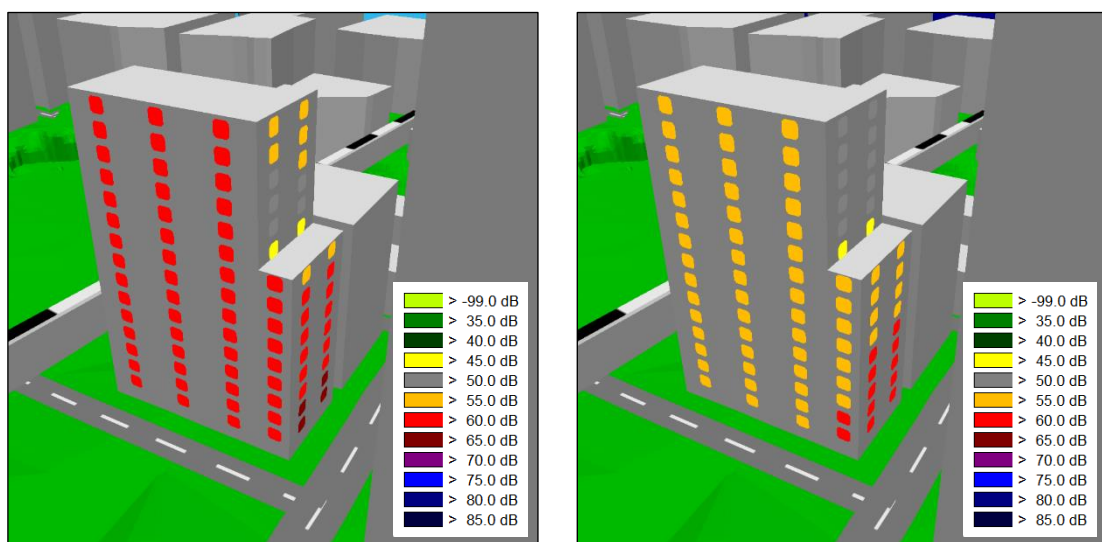
- The sensitivity of the receptor and whether dwellings will already incorporate design measures that secure good internal acoustic conditions.

Clearly, therefore, an initial estimate of a significant adverse impact does not imply that development may not be permitted, provided that proposed development can incorporate design measures (i.e. embedded mitigation) that secure good internal acoustic conditions.

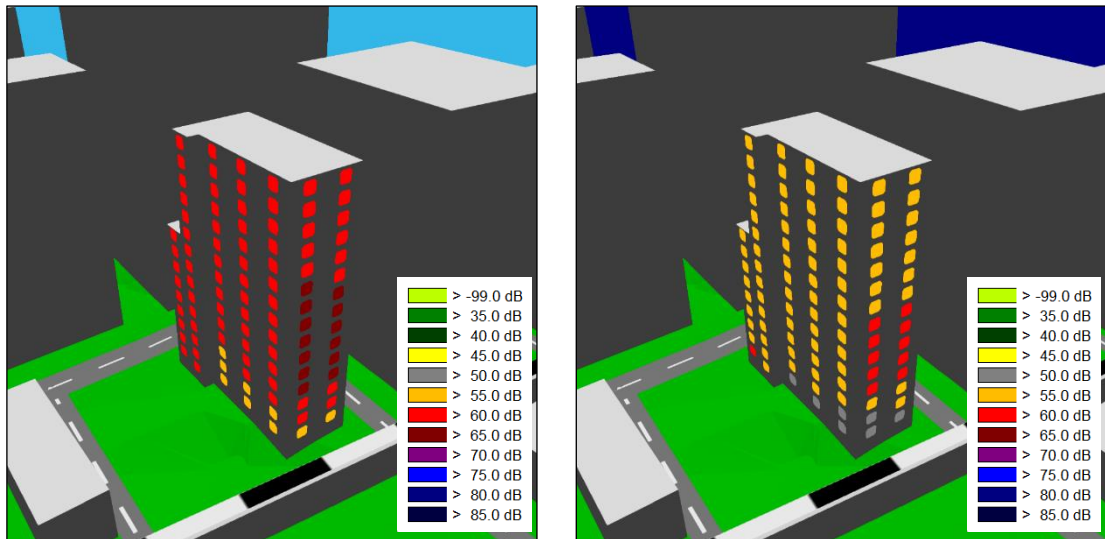
In light of the above, we recommend that appropriate mitigation measures are incorporated into the design of proposed development to control noise from the proposed facilities to a suitable level internally to future residential demise.

9.0 Incident Noise Levels

Using the survey data, we have created a 3D noise model in CadnaA® to predict the incident noise levels upon each elevation of the proposed development. A screenshot of the model is provided below.



Incident Levels looking northeast (Daytime 07:00-23:00 left, and Night-time (23:00-07:00) right



Using the above model, the following table and associated mark-ups outline the free-field incident noise levels across the development. For purposes of any subsequent assessment, these zones are considered to be the “Façade Zones”.

Façade zone	Calculated Incident Noise Levels			
	Daytime $L_{Aeq,16h}$ (dB)	Industrial	Night $L_{Aeq,8h}$ (dB)	10 th Highest Night $L_{max,2min}$ (dB)
York Street (Level 1-8)	64	61	61	78
York Street (Level 9+)	63	58	58	76
Charles Street (Level 1-8)	66	-	64	85
Charles Street (Level 9+)	56	-	54	79

10.0 Achieving Internal Noise Levels

There are 3No ventilation conditions applicable to proposed residential rooms. These are Background Ventilation as described in Approved Document F (Part F), Overheating as described in Approved Document O (Part O), and Purge Ventilation (odour and smells).

10.1 Purge Ventilation

It should be noted that the internal noise level guidelines are generally not applicable under “*purge ventilation*” conditions as defined by Part F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food). As such, acoustic conditions are generally not a concern during purge ventilation.



10.2 Background Ventilation Condition

10.2.1 Criteria

With reference to the acoustic standards and guidelines as reviewed in Appendix B, the external noise intrusion levels from environmental sources should be controlled so as to not exceed the following criteria.

Activity	Location	Desirable Internal Ambient Criteria	
		07:00 – 23:00	23:00 – 07:00
Resting	Living Rooms	35 dB $L_{Aeq,16hour}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$ 45 dB ^[1] L_{Amax}

[1] regular noise events such as trains, aircraft (10th highest)

Section 8.0 considers existing industrial use impacts in line with BS 4142 and advises that adverse impacts on future occupants could be avoided with suitably specified façade elements to secure suitable internal noise levels. Where existing industrial/commercial noise could 'contribute' to incident external noise levels on a given façade but do not 'dominate', the BS8233 internal noise level targets should be met. However, where the industrial noise has the potential to dominate the external noise climate, that industrial noise intrusion should achieve limits 5 dB lower than the BS8233 levels.

10.2.2 Outline Specifications

Based on the prevailing noise climate at the site, open windows as a means of background ventilation would not be suitable on any façade across the development. As such, alternative ventilation measures would be required to ensure windows are shut (not sealed) whilst still providing adequate ventilation rates.

The ventilation strategy is for studios to be ventilated via a dedicated MVHR unit per room.

Allowance should be made to provide appropriate sound insulation solutions as required including, where necessary, suitably specified glazing and attenuated ventilators/mechanical ventilation systems. Preliminary calculations have been carried out to determine the likely façade sound insulation performance requirements for each façade. Calculation methods follow those outlined in BS 8233:2014 Section G.2 and are based on the following:

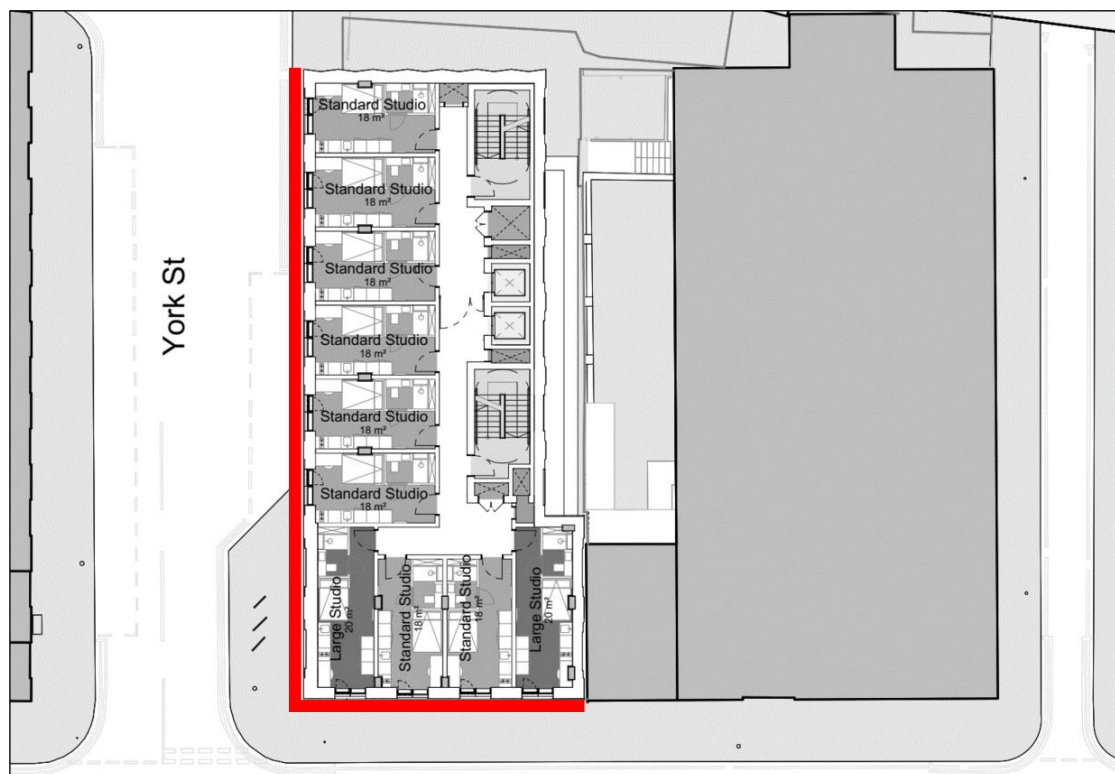


- Insulated SFS with rainscreen cladding/brick slip
- typical room volume as per latest drawings
- typical window area as per latest drawings
- Reverberation time of 0.5 seconds.

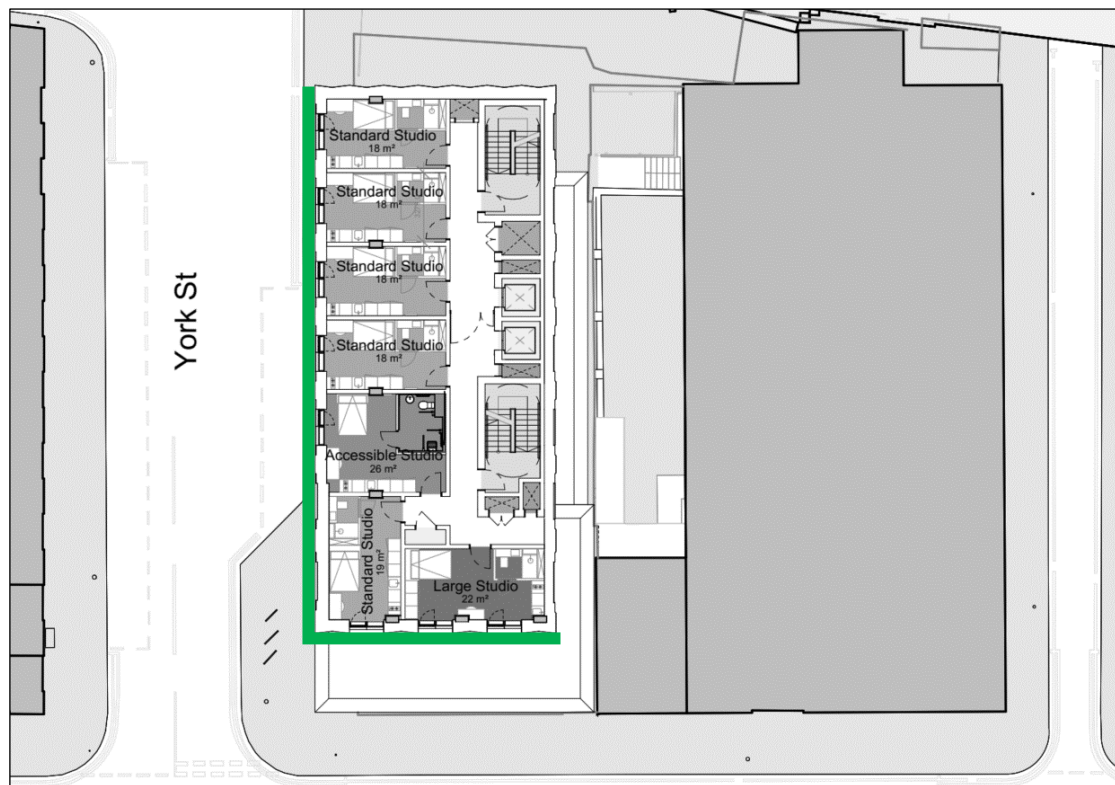
From the results of the assessment, the following minimum preliminary acoustic performance specifications are recommended. These are intended for planning use only, and detailed design stage octave band acoustic specifications will need to be developed for tender.

Façade Zone		Façade Element	Preliminary Minimum Sound Reduction Specification
A	Red	Window	33 dB $R_w + C_{tr}$
		Trickle Vent	39 dB $D_{new} + C_{tr}$
B	Green	Window	30 dB $R_w + C_{tr}$
		Trickle Vent	36 dB $D_{new} + C_{tr}$

The following plans show the location of each façade zone noted in the table above.



Glazing Specification mark-up, Level 1 – 8



Glazing Specification mark-up, Level 9+

10.2.3 Example Glazing Configurations

Example glazing configurations commensurate with achieving the sound insulation specifications noted in Section 10.2.2 are given below.

Glazing Specification, $R_w + C_{tr}$ (dB)	Example Configuration
33	Uprated double glazed system e.g. 10/16/6 mm.
30	double glazed system e.g 10/16/4 mm.

10.2.4 Example Ventilation Solutions

Example ventilation solutions commensurate with achieving the elemental sound insulation performances noted in Section 10.2.2 are discussed below.

Ventilator Specification, $D_{new} + C_{tr}$ (dB)	Example Configuration
39	High performance in-wall acoustic ventilator, or a mechanically assisted supply & extract solution (e.g. local MVHR).
36	1 x 2,500mm ² standard hit-miss trickle vent per habitable room, or a mechanically assisted supply & extract solution (e.g. local MVHR).



The preliminary performance specifications included above are based on the provision of either full MVHR for rooms or 1no. ventilator only per habitable room as required. If additional numbers of ventilators are required to achieve the ventilation rates, the performance requirement for the individual ventilators will need to increase.

The table below provides guidance on the increase in performance specification required for additional numbers of ventilators.

Number of Ventilators	Performance Increase on Ventilator Specifications Stated Above
1	+0 dB
2	+3 dB
3	+5 dB
4	+6 dB

10.3 Overheating Condition

Approved Document O 'Overheating' (ADO) was released in December 2021 and came into effect in England on 15 June 2022. It sets out the suitable methodologies to limit unwanted solar gains in summer and provide adequate means to remove heat from the indoor environment. Requirement O1(2)(a) contains criteria relating to noise with Sections 3.2 to 3.4 of ADO stating the following:

"In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- a) 40 dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).*
- b) 55 dB L_{AFmax} , more than 10 times a night (between 11pm and 7am)."*

Further to the above, the acoustic requirements of ADO relates to bedrooms and night and does not consider daytime hours or other living spaces.



To assess overheating ADO sets out two ways this can be done: These are by either using the simplified method or through dynamic thermal modelling (ie a TM59 assessment). For an acoustic assessment suitable to accompany a Planning Application, the simplified method is often used as it splits England into “Moderate” and “High” risk zones depending on the location of the site and provides “minimum free areas” for window openings in bedrooms. These are as follows:

- 13% of the floor area for “High Risk” locations
- 4% of the floor area for “Moderate Risk” locations

Based on the minimum free areas noted above, the IoA & ANC guidance note “Demonstrating Compliance with the Noise Requirements of Approved Document O” sets out the external noise levels above which the simplified method cannot be used and alternative overheating strategy should be developed. These are shown below:

Zone	Risk Category	Incident Noise Level (dB)		Notes
		L _{Aeq,8h}	L _{AFmax,2min}	
Red	High	>44	>59	Open windows based on simplified model not suitable. Detailed modelling via TM59 assessment advised. Limited area opening windows or closed windows may be required to comply with AD-O
	Moderate	>49	>64	

The site is located in Manchester and therefore falls into the “High” risk category.

Based on the measured environmental noise levels, bedrooms should be designed to avoid or severely restrict the reliance on opening windows to satisfy overheating targets in all locations.

It's understood that the current scheme is aiming to provide local cooling to each room, as such windows can remain shut whilst thermal comfort is maintained internally.

11.0 External Amenity Area

MCC's criteria states that noise levels in external amenity areas should ideally not be above the range 55 dB L_{Aeq,16hr}. It is acknowledged that noise levels within the private external entrance space for residents may be above this noise level, however, there are multiple documents/guides that provide derogation for desirable urban developments.



BS8233:2014 states:

“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.”

Also, PPGN states that where despite following a good acoustic design, adverse noise impacts remain on any private external amenity space (ie garden or balcony), then the impact may be partially off-set if the residents are provided through the design of the development or the planning process, with access to:

“a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different, protected, location)”

Considering that the scheme is in close proximity to Symphony Park (publicly accessible), located at the Circle Square development approximately 60m away from the site location, we would suggest that noise within the private external entrance space proposed is not unacceptable.

12.0 Operational Noise Impacts

12.1 Fixed Plant & Equipment

Based on the results of the noise survey and the requirements of the Local Authority, we propose that the following plant noise emission criteria be achieved incident at the nearest noise sensitive residential windows, in free-field conditions, with all plant operating simultaneously.

Plant Noise Emission Criteria ($L_{A,T}$ dB)	
Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
46	42

Noise shall be assessed in accordance with BS 4142:2014 +A1:2019 with corrections applied for any plant emitting noise of a tonal or irregular quality. The above limits shall be subject to the final approval of the Local Authority.



12.2 Amenity/Commercial Unit Operations

At first floor level 1No small residential amenity and at second floor level 1No larger residential amenity units are proposed as part of the development; these amenity. Considering the prevailing environmental noise climate at the site, we would expect that noise egress via the unit frontage from most general residential amenity uses should be readily controllable. However, for completeness we advise that operational noise break-out from any proposed use is controlled to no more than 5 dB below the existing background noise level in each octave band as follows, in line with Local Authority criteria:

Period	Commercial noise break-out Limit, L_{Aeq} (dB) At each Octave Band							
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Daytime (07:00-23:00)	45	47	43	41	40	37	29	15
Night-time (23:00-07:00)	40	44	42	39	37	33	25	13

Furthermore, noise transfer through the separating floor structure (and associated flanking paths) from the first and second floor residential amenity units to second and third floor apartments shall be considered.

For noise transfer to residential rooms above, as a minimum Building Regulations and Local Planning Authority criteria should be considered. However, we advise that the design intent should be to ensure operational L_{max} noise transfer to apartments does not exceed a level at least 5 dB lower than the anticipated background L_{90} noise level in each octave band.



13.0 Conclusions

A detailed environmental noise survey has been undertaken to establish the currently prevailing noise climate around the site.

The environmental and industrial noise impacts upon the proposed rooms has been assessed in the context of building regulations, and national and local planning policies.

Preliminary acoustic performance specifications for the external building fabric elements have been recommended such that appropriate internal noise levels should be achieved. These are intended for planning use only, and detailed design stage octave band acoustic specifications will need to be developed for tender.

The assessment shows the site, subject to appropriate mitigation measures, is suitable for residential development in terms of noise.

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. $30\text{dB} + 30\text{dB} = 33\text{dB}$, 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.

L_p Sound Pressure Level (SPL) 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).

L_w Sound Power Level (SWL) 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

Planning Policies, Standards & Guidance

B.1 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published in March 2010 (i.e. before the NPPF). The NPSE is the overarching statement of noise policy for England and applies to all forms of noise other than occupational noise, setting out the long term vision of 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.”

That vision is supported by the following NPSE noise policy aims which are reflected in three of the four aims of planning policies and decisions in paragraph 123 of the NPPF (see paragraph 8.2 (b) below):

“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.”*

The Explanatory Note to the NPSE has three concepts for the assessment of noise in this country:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observable Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

None of these three levels are defined numerically and for the SOAEL the NPSE makes it clear that the noise level is likely to vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research to investigate what may represent an SOAEL for noise is acknowledged in the NPSE and the NPSE asserts that not stating specific SOAEL levels provides policy flexibility in the period until there is further evidence and guidance.

The NPSE concludes by explaining in a little more detail how the LOAEL and SOAEL relate to the three NPSE noise policy aims listed above. It starts with the aim of avoiding significant adverse effects on health and quality of life, then addresses the situation where the noise impact falls between the LOAEL and the SOAEL when *“all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development.”* The final aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development which include the need to minimise travel distance between housing and employment uses in an area.

B.2 National Planning Policy Framework (NPPF)

The following paragraphs are from the NPPF (published September 2023):

185. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

Paragraph 185 also references the Noise Policy Statement for England (NPSE). This document does not refer to specific noise levels but instead sets out three aims:

- “Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.”

B.3 World Health Organisation

The current Environmental Noise Guidelines 2018 for the European Region (ENG) supersede the Guidelines for Community Noise from 1999 (CNG). Nevertheless, the ENG recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) remain valid.

A summary of the guidance from the ENG and CNG is shown in the table below.

Source	CNG guideline indoors all sources	ENG guideline outdoors noise from specific source only
Road traffic noise	35 LAeq, 16h	53 dB Lden
	30 LAeq, 8h	45 dB Lnight
Railway noise	35 LAeq, 16h	54 dB Lden
	30 LAeq, 8h	44 dB Lnight
Aircraft noise	35 LAeq, 16h	45 dB Lden
	30 LAeq, 8h	40 dB Lnight

With regard to single-event noise indicators, Section 2.2.2 of the WHO Environmental Noise Guidelines 2018 state:

“In many situations, average noise levels like the L_{den} or L_{night} indicators may not be the best to explain a particular noise effect. Single-event noise indicators – such as the maximum sound pressure level ($L_{A,max}$) and its frequency distribution – are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by $L_{A,max}$. Nevertheless, the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The guidelines therefore make no recommendations for single-event noise indicators.”

B.4 British Standard BS8233: 2014

British Standard 8233: 2014 “Guidance on sound insulation and noise reduction for buildings” provides guidance for the control of noise in and around buildings.

Internal Areas

BS8233:2014 Section 7.7.2 titled “Internal ambient noise levels for dwellings” states:

“In general for steady external noise sources, it is desirable that internal ambient noise levels do not exceed the following guideline values:

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

Note 1 The above table provides recommended levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Groundborne noise is assessed separately and is not included as part of these targets, as human response to groundborne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.

Note 2 The levels shown in the above table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the levels recommended in the above table.

Note 3 These levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.

Note 4 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.

Note 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.

If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.

Note 6 Attention is drawn to the Building Regulations.

Note 7 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."

External Amenity Areas

BS8233:2014 Section 7.7.3.2 titled "Design criteria for external noise" states:

"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 $L_{Aeq,T}^1$, 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 55dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

B.5 ProPG : Planning & Noise : 2017

The primary goal of the ProPG is to assist the delivery of sustainable 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”.

This 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 two sequential stages of the overall approach are:

- **Stage 1 – an initial noise risk assessment of the proposed development site; and**
- **Stage 2 – a systematic consideration of four key elements.**

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”.**

The ProPG considers suitable guidance on internal noise levels found in “BS8233:2014: Guidance on sound insulation and noise reduction for buildings”. Table 4 in Section 7.7.2 of the standard suggests that “in general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values”. The standard states (Section 7.7.1) that “occupants are usually more tolerant of noise without a specific character” and only noise without such character is considered in Table 4 of the standard.

Activity	Location	07:00 – 23:00 Hours	23:00 – 07:00 Hours
Resting	Living Room	35dB $L_{Aeq,16hr}$	-
Dining	Dining Room / Area	40dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,16hr}$ 45dB $L_{Amax,F}$

NOTE 1 the Table provides recommended internal L_{Aeq} target levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.

NOTE 2 The internal L_{Aeq} target levels shown in the Table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the L_{Aeq} target levels recommended in the Table.

NOTE 3 These internal L_{Aeq} target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.

NOTE 4 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. In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A).

NOTE 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to

the further advice in Note 7.

NOTE 6 Attention is drawn to the requirements of the Building Regulations.

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5dB, the more that most people are likely to regard them as “unreasonable”. Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10dB, they are likely to be regarded as “unacceptable” by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing “unacceptable” noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form (See Section 3.D).

B.6 Building Regulations Approved Document O

Building Regulations Approved Document O relates to setting standards for overheating in new residential buildings. It aims to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures.

Requirement O1 of Approved Document O is met by designing and constructing the building to achieve both of the following:

- a. Limiting unwanted solar gains in summer.
- b. Providing an adequate means of removing excess heat from the indoor environment.

Sections 3.2 to 3.4 of this document relate to noise and state the following:

“In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- a. 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).
- b. 55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am).

Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants' Measurement of Sound Levels in Buildings with the overheating mitigation strategy in use.

NOTE: *Guidance on reducing the passage of external noise into buildings can be found in the National Model Design Code: Part 2 – Guidance Notes (MHCLG, 2021) and the Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020).*

B.7 British Standard 4142:2014 + A1:2019

When setting plant noise emission criteria reference is commonly made to BS 4142:2014 *"Methods for rating and assessing industrial and commercial sound"*.

The procedure contained in BS 4142:2014 provides an assessment of the likely effects of sound on people when comparing the specific noise levels from the source with representative background noise levels. Where the noise contains "a tone, impulse or other characteristic" then various corrections can be added to the specific (source) noise level to obtain the "rating level".

BS 4142 states that: *"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs". An estimation of the impact of the specific noise can be obtained by the difference of the rating noise level and the background noise level and considering the following:*

- *"Typically, the greater this difference, the greater the magnitude of the impact."*
- *"A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context."*
- *"A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context."*
- *"The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant 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, depending on the context."*

The determination of the "rating level" and the "background level" are both open to interpretation, depending on the context.

In summary it is not possible to set plant noise emission criteria purely on the basis of BS 4142:2014+A1:2019. It is reasonable to infer from the above, however, that a difference of around -5dB corresponds to “No Observed Effect Level” as defined in the Noise Policy Statement for England. It is also reasonable to infer from the above that if the plant noise rating level does not exceed the existing background noise level outside any noise sensitive residential window then the plant noise is of “low impact”.

B.8 Defra NANR45: Assessment of Low Frequency Noise Complaints

This document aims to recommend an objective method for assessing low frequency noise suitable for use by Environmental Health Officers in the UK.

Criteria already in use in Germany, Sweden, Denmark, Netherlands and Poland were reviewed and compared against the experience from these countries in applying the criteria, which was found to be generally positive.

The above study was supplemented by field and laboratory studies to subsequently inform the proposed criteria (Moorhouse Curve) in 1/3 octave bands between 10 Hz and 160 Hz.

When logarithmically summed, the Moorhouse Curve provides limits at 63 Hz and 125 Hz of 47 dB L_{eq} and 41 dB L_{eq} , respectively, with a relaxation of 5 dB during daytime hours.

The above levels provide a good practical basis to assess low frequency noise and are now implemented as a criterion for planning applications across many Local Authorities.

Appendix C

Time History Graphs

