

Bracken House Manchester

Noise Impact Assessment Report

27924/NIA2/R1

For:
White Hindle & Partners
Class Wharf
2 The Calls
Leeds
LS2 7JU



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



Noise Impact Assessment Report 27924/NIA2/R1

Document Control

Rev	Date	Comment	Prepared by	Reviewed by	Authorised by
1	16/06/2023	-			
			Will Robertson Assistant Consultant BSc (Hons)	Jake Howarth Senior Associate BEng(Hons), MIOA	
0	28/02/2023				
			James Hardacre Consultant BEng (Hons), AMIOA	Jake Howarth Senior Associate BEng(Hons), MIOA	



Noise Impact Assessment Report 27924/NIA2/R1

Contents	Page
1.0 Introduction	1
2.0 Objectives	1
3.0 Acoustic Terminology	2
4.0 Site Description	2
5.0 Planning Policy, Standards & Guidance	3
6.0 Baseline Noise Surveys	8
7.0 Incident Noise Levels	14
8.0 Internal Ambient Noise Assessment	16
9.0 Conclusions	20

Attachments

Appendix A – Acoustic Terminology

Appendix B – Nation Planning Policies

Time History Plots - 27927/TH1, 2, 5, and 8



1.0 Introduction

It is understood that the existing cladding of Bracken House in Manchester was not originally approved by Manchester City Council (MCC) and as such is being replaced. It is understood that MCC will be looking to ensure that the internal noise levels within residential areas of Bracken House are in-line with their adopted noise criteria.

As such, Hann Tucker have been commissioned to produce a Noise Impact Assessment to assess the proposed and existing (retained) façade elements to ensure the internal noise levels will be compliant with Local Authority requirements.

Our assessment findings are presented herein.

2.0 Objectives

To inspect the site to familiarise ourselves with its layout and surroundings in order to identify suitable accessible locations for environmental noise measurements.

To establish by means of an unmanned 3-day survey the existing L_{Amax} , L_{Aeq} and L_{A90} environmental road, rail and air traffic noise levels at up to 4No 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".

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.

Based on the results of the 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 (ProPG), British Standard BS8233:2014 and Local Authority guidance/requirements.

Detailed facade specifications will be provided for new windows along with advice relating to ventilation measures will be provided.



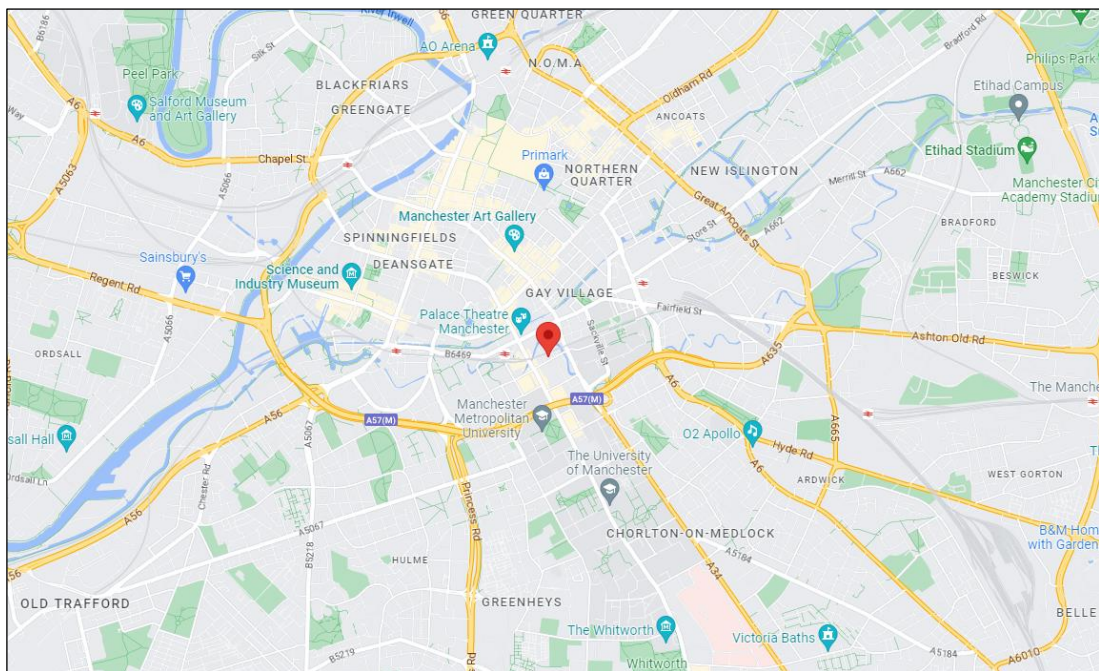
3.0 Acoustic Terminology

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

4.0 Site Description

4.1 Location

Bracken House is located on Charles Street and falls within the jurisdiction of Manchester City Council. See Location Map below.



Location Map (Map data © 2023 Google)

4.2 Description

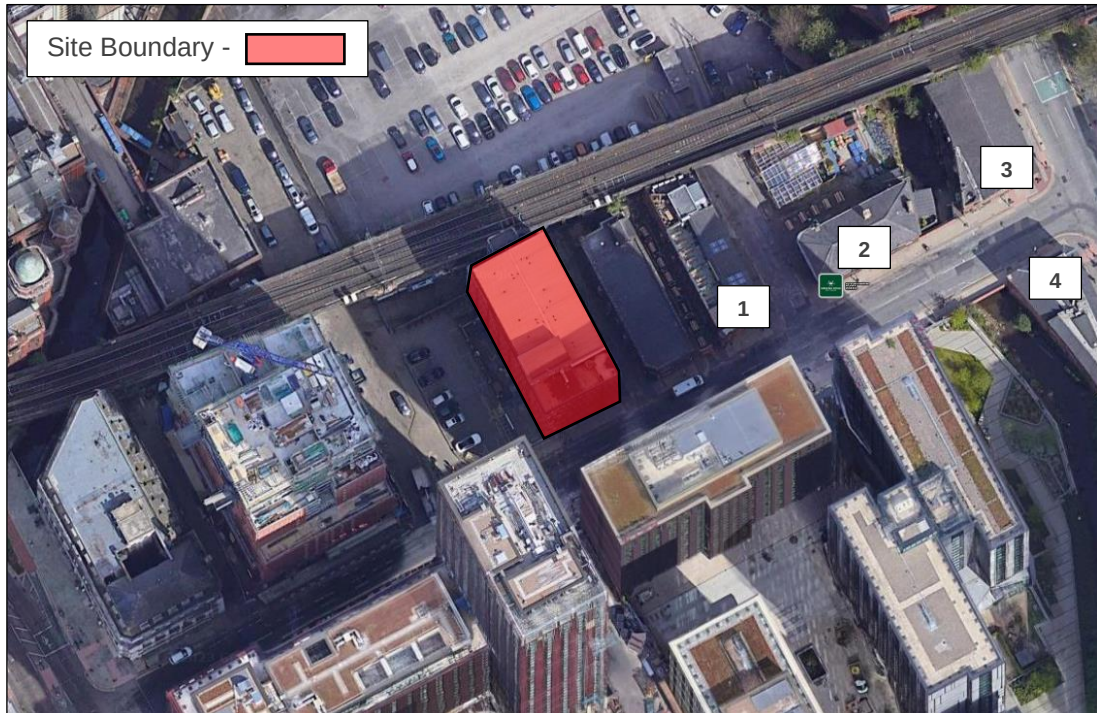
Bracken House is located on Charles Street in Manchester. Oxford Road is located approximately 90m to the west of the site and a train viaduct is located approximately 10m from the nearest façade of Bracken House.

The site in relation to its surroundings is shown overleaf: The surrounding area is a mix of residential developments and pubs and clubs. The table below highlights the nearest pubs and clubs.

Reference	Venue
1	YES
2	Lass O'Gowrie



Reference	Venue
3	Joshua Brooks
4	Factory 521



Site Plan (Imagery © 2023 Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map Data © 2023 Google)

5.0 Planning Policy, Standards & Guidance

5.1.1 National Planning Policies

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

- The National Planning Policy Framework (NPPF), 2021
- 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 and guidance s as detailed in the following sections.

A detailed summary of each of the above National Planning Policies is provided in Appendix B for reference.



5.2 Standards & Guides

5.2.1 ProPG: Planning & Noise

ProPG: Planning & Noise ‘Professional Practice Guidance on Planning & Noise’ was issued in May 2017 with the primary goal of assisting the delivery of sustainable residential development by promoting good health and well-being through the effective management of noise. It seeks to do that through encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise.

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

ProPG advocates a systematic, proportionate, risk based, 2-stage, approach. The approach encourages early consideration of noise issues, facilitates straightforward accelerated decision making for lower risk sites, and assists proper consideration of noise issues where the acoustic environment is challenging.

The 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.
 - 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 BS 8233 (see below) with the addition of an $L_{Amax,f}$ requirement for bedrooms at night, as below.

“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 45 dB $L_{Amax,F}$ 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.”



5.2.2 BS 8233:2014

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

Activity	Location	Desirable Internal Ambient Noise Levels	
		07:00 – 23:00	23:00 – 07:00
Resting	Living Rooms	35 dB $L_{Aeq,16hour}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Note 1: the above provides recommended levels for overall noise in the design of a building. However, 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: 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.

Note 3: 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.

Note 4: The levels detailed in the table above are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise and are not appropriate in all locations. Where atypical external noise levels are measured (ie high levels of traffic during certain times of the night) an appropriate alternative assessment period (eg 1 hour) and an assessment of individual night time events in terms of SEL or $L_{Amax,F}$ may be more suitable.

For outdoor living spaces, BS 8233 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 $L_{Aeq,T}$, 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 and 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.



5.2.3 World Health Organisation (WHO)

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.

Noise Source	CNG guideline indoors all sources	ENG guideline outdoors noise from specific source only
Road traffic	35 dB $L_{Aeq, 16h}$	53 dB L_{den}
	30 dB $L_{Aeq, 8h}$	45 dB L_{night}
Railway	35 dB $L_{Aeq, 16h}$	54 dB L_{den}
	30 dB $L_{Aeq, 8h}$	44 dB L_{night}
Aircraft	35 dB $L_{Aeq, 16h}$	45 dB L_{den}
	30 dB $L_{Aeq, 8h}$	40 dB L_{night}

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_{Amax}) 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.”

5.2.4 BS 4142:2014

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

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

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



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

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

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

5.3 Local Planning Guidance

Manchester City Council requirements are outlined in Section 3.0 of Manchester City Council's Planning & Noise Technical Guidance document (October 2022).

Achieving Suitable Internal Noise Levels

Section 3.7.1.1 sets out the following noise levels to be achieved for residential developments:

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

NB We understand there are no gardens or terraces associated with Bracken House and as such external noise levels at the site have not been assessed with respect to the final point above.

Section 5.3.1.6 of the Planning & Noise – Technical Guidance October 2022 document states the following with regards to maintaining internal ambient noise levels when it is desired to keep windows closed but provide adequate ventilation:

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

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



5.3.1 Music Noise

Section 3.7.1.2 offers the following guidance regarding entertainment noise, which may be applicable for the retail/ commercial spaces within the proposed development.

“Noise from entertainment venues e.g. noise from recorded music, live bands, or karaoke, can be particularly annoying for local residents and businesses if it is not adequately contained within the venue. When considering the potential impact of a proposal for an entertainment venue consultants should consider the overall noise level (Leq) and the 63 Hz and 125 Hz octave band noise levels (Leq).”

The document then proposes the following assessment criteria for structurally connected uses, however, this criteria is often adopted for non-structurally connected dwellings also:

“Music noise levels in the 63Hz and 125Hz octave centre frequency bands (Leq) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (Leq) respectively”.

6.0 Baseline Noise Surveys

6.1 Procedure

6.1.1 February 2023 Survey

Unattended noise monitoring was undertaken on site over a 5-day period to establish full daytime and night-time noise levels over a typical weekday and weekend period covering a period of time where nearby entertainment venues, namely YES, were in operation. The monitoring was carried out between 10:30 hours on Wednesday 15 February 2023 and 10:30 hours on Monday 20 February 2023 with equipment set up to record broadband and spectral (octave band) sound pressure levels over discrete 2 and 15-minute periods.

Additional attended measurements were performed between 13:45 hours and 14:15 hours on Friday 10 February 2023 with the purpose of establishing specific noise levels in the vicinity of the site.

The surveys were performed by James Hardacre BEng(Hons). All measurements were collated in general accordance with BS 7445-1:2003 *Description and Measurement of Environmental Noise*.



6.1.2 June 2023 Survey

Unattended noise monitoring was undertaken on site over a 5-day period to establish full daytime and night-time noise levels over a typical weekday and weekend period covering a period of time where nearby entertainment venues, namely YES, were in operation. The monitoring was carried out between 15:00 hours on Friday 2nd June 2023 and 12:00 hours on Tuesday 6th June 2023 with equipment set up to record broadband and spectral (octave band) sound pressure levels over discrete 2 and 15-minute periods.

Additional attended measurements were performed between 14:35 and 14:40 on Tuesday 6th June 2023 with the purpose of establishing specific noise levels overlooking the trainline.

The surveys were performed by Jake Howarth BEng (Hons) and Will Robertson BSc (Hons). All measurements were collated in general accordance with *BS 7445-1:2003 Description and Measurement of Environmental Noise*.

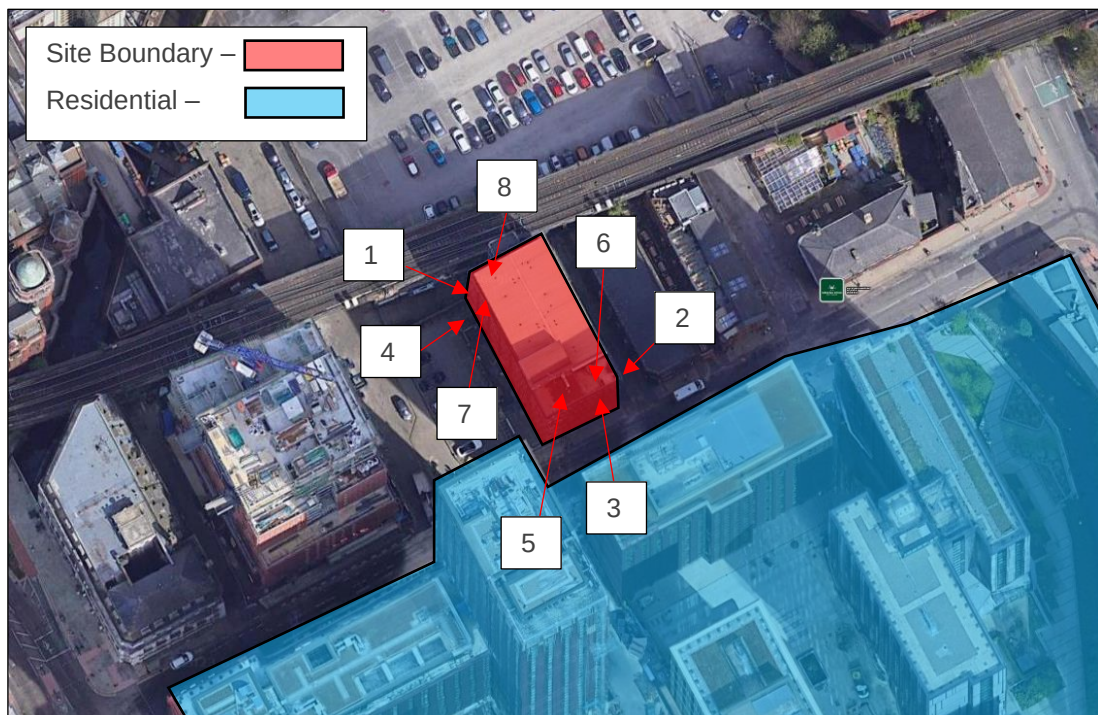
6.2 Measurement Positions

The measurement positions were as described and illustrated below. It should be noted that the 8th floor is called the 9th floor onsite, as there is no “4th floor” to this building.

Position	Date(s)	Type	Description
1	Feb 2023	Unattended	The microphone was positioned out of a 6 th floor flat window overlooking the train line to the north of site. The noise levels measured in this location are considered to be facade levels .
2	Feb 2023	Unattended	The microphone was positioned out of a 7 th floor flat window overlooking Charles Street at Façade level. In order to determine levels incident from Charles Street and YES nightclub. The noise levels measured in this location are considered to be facade levels.
3	Feb 2023	Attended	The microphone was positioned approximately 1.5m above ground level directly below position 2. The noise levels measured in this location are considered to be façade levels
4	Feb 2023	Attended	The microphone was positioned approximately 1.5 above ground level directly below position 1. The noise levels measured in this location are considered to be façade levels.
5	Jun 2023	Unattended	The microphone was positioned in the centre of Apartment 106 on the 8 th floor. The noise levels measured in this location are considered to be free field levels.
6	Jun 2023	Unattended	The microphone was positioned on the balcony of apartment 106, adjacent to Charles Street. This was to determine levels incident from Charles Street and YES nightclub. The noise levels measured in this location are considered to be free field levels.



Position	Date(s)	Type	Description
7	Jun 2023	Attended	The microphone was positioned overhanging the balcony railing, facing and overlooking the railway tracks. The noise levels measured in this location are considered to be free field levels.
8	Jun 2023	Unattended	The microphone was positioned in the centre of apartment 110 on the 8 th floor. The noise levels measured in this location are considered to be free field levels.



Site Plan (Imagery © 2023 Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map Data © 2023 Google)

6.3 Weather Conditions

For the unattended survey between Friday 2nd June 2023 and Tuesday 6th June 2023, local weather reports indicated no notable periods of prolonged and/or heavy rainfall, with temperatures ranging from 6 °C (night) to 21 °C (day). For the survey between Wednesday 15 February 2023 and Monday 20 February 2023, local weather reports indicated no notable periods of prolonged and/or heavy rainfall, with temperatures ranging from 5 °C (night) to 13 °C (day).

Wind speeds for both surveys were typically less than 5 m/s. During our time on site, skies were largely clear with patchy cloud cover, wind conditions were calm and road surfaces were dry.

Weather conditions were deemed suitable for obtaining representative noise readings.



6.4 Instrumentation

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

Position	Description	Manufacturer	Type	Serial Number	Last Laboratory Calibration
1,3 & 4	Type 1 Data Logging Sound Level Meter	Larson Davis	LXT	4568	10/06/2022
2	Type 1 Data Logging Sound Level Meter	Larson Davis	LXT	4086	10/06/2022
5	Type 1 Data Logging Sound Level Meter	Larson Davis	LXT	4569	30/05/2023
6	Type 1 Data Logging Sound Level Meter	Larson Davis	LXT	5104	30/05/2023
7	Type 1 Data Logging Sound Level Meter	Larson Davis	LXT	4568	30/05/2023
8	Type 1 Data Logging Sound Level Meter	Larson Davis	LXT	4086	26/05/2023
All	Type 1 Sound Level Meter Calibrator	Larson Davis	Cal200	3083	27/03/2023

Each unattended sound level meter was housed in a weatherproof case with the microphone connected via an extension cable. All microphones were fitted with a windshield.

Each sound level meter was calibrated prior to and on completion of the surveys. No significant deviations occurred (not more than 0.3 dB).

6.5 Results

6.5.1 Unattended Survey

The results of the first unattended survey have been plotted on Time History Graphs 27924/TH1 and 27924/TH2 enclosed. The results of the second unattended survey have been plotted on Time History Graphs 27924/TH5 and 27924/TH8. These graphs present the 15-minute A-weighted (dBA) L_{90} , L_{eq} and L_{max} levels at Position 1, 2, 5, and 8 throughout the duration of the survey.

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.

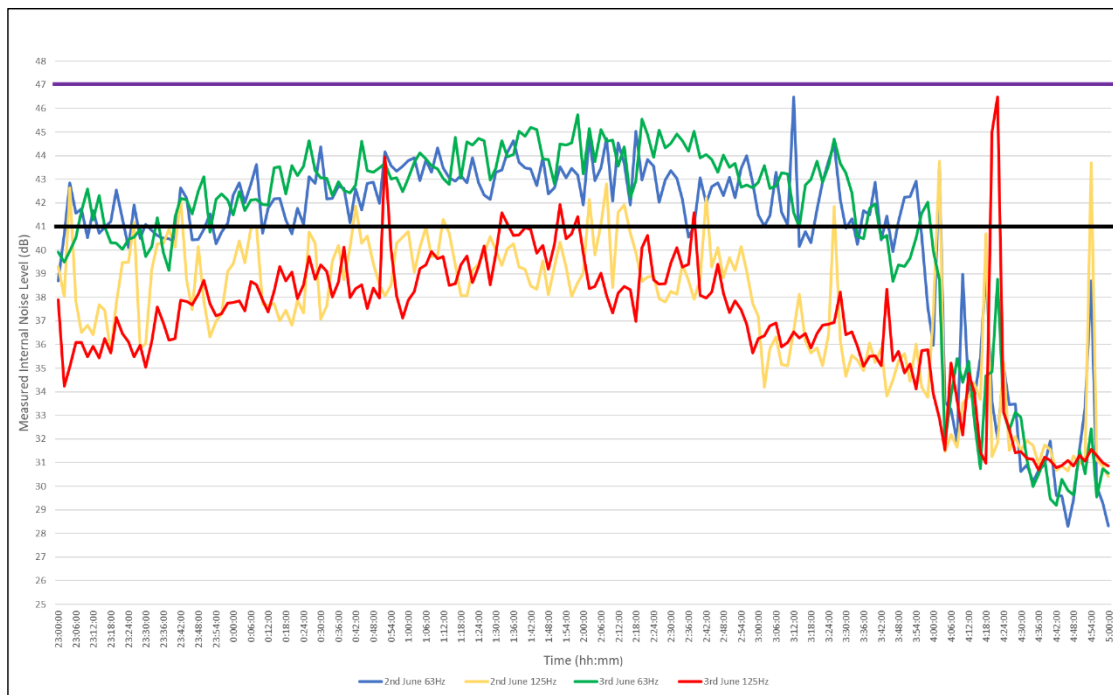


Position	Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)		
	L _{Aeq,16hr}	L _{A90}	L _{Aeq,8hr}	L _{A90}	L _{Amax} ¹
1	63	55	64	48	85
2	65	54	64	50	86
5	28	24	27	22	53
8	39	32	36	32	61
¹ External L _{AFmax} noise level not normally exceeded more than 10 times a night. This is considered to be the ventilation design case.					

From inspection of the time history plots for Position 1 there is a clear increase in external noise levels when YES is in operation. The following table presents the worst case measured music noise levels on the Friday and Saturday of the survey.

Day	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) At Octave Band Centre Frequencies (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
Friday	68	60	57	60	65	71	70	60	75
Saturday	73	66	61	67	67	62	55	44	70

For the June 2023 survey, internal noise measurements were carried out. The results below show time history for the 63 Hz and 125 Hz octave bands (L_{eq}) between 22:00 and 05:00 on the Friday and Saturday nights at Position 5. These results will be used to establish if the existing façade on level 8 is suitable in achieving the MCC internal noise criteria.



63Hz and 152Hz Leq levels over a Friday and Saturday in Position 5

6.5.2 Attended Survey

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

Position	Date	Period	Sound Pressure Level (dB)		
			$L_{Aeq,T}$	$L_{A90,T}$	$L_{Amax,T}$
3	10/02/2023	13:45 – 14:00	65	62	81
4	10/02/2023	14:00 – 14:15	60	54	78
7	02/06/2023	14:38 – 14:50	63	-	79

6.6 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 the noise climate was noted to be predominantly road traffic noise from Charles Street including cars and buses at Position 1 and train noise and light industrial noise at Position 2.



From an inspection of the measured noise levels there is a noticeable increase in broadband noise levels in Position 1 during Friday and Saturday nights when YES is in operation. There is also a slight increase in low frequency noise levels during YES operation, however, this is not as a significant increase as the broadband noise levels. As such, it is likely that some level of music noise break-out from YES would be audible at the façade of Bracken House.

It should also be noted that a lesser increase during the same time period at Position 2 has been noted, however, this is likely due to an increase in pedestrian noise as the low frequency content of the noise does not increase. The main source of noise at Position 2 is understood to be trains passing. The 10th highest night-time maximum noise level ($L_{AFmax,2min}$) is in the region of 86 dB.

During the June 2023 survey, it was noted that the same noise climate from the previous survey was present. For example, predominantly road traffic noise from Charles Street including cars and buses, and train noise and light industrial noise on the west side of the site.

By assessing the data from Position 5, there is an increase in the low-frequency noise when “YES” is in operation. However, the 63Hz octave band is sufficiently attenuated by the current façade over the captured weekend period as it does not exceed 47 dB internally at any point during the night. The 125Hz octave band occasionally exceeds the 41dB threshold by up to 2dB for a short duration. There was a single instance where the threshold was exceeded by 5dB, however, this appears to be from a single event rather than music noise. As such, for the majority of the measured weekend this frequency band stays situated below the recommended criterion.

The main noise source for Positions 7 and 8 was the railway and the trains that pass by. The 10th highest night-time maximum noise level ($L_{AFmax,2min}$) is 79 dB. The measured internal noise levels measured at Position 8 exceeded the MCC criteria, mainly due to maximum noise events at night.

7.0 Incident Noise Levels

Based on the results of the noise survey discussed in Section 6.0, we have estimated the incident noise levels at Bracken House as per the table and marked up plan below.

From further interrogation of the survey, it can be assumed that low frequency noise from music has been sufficiently attenuated at source and should not adversely affect the noise levels incident at Bracken House.

Façade	Estimated External Incident Noise Level (dB)				
	Daytime	Night-time		Night-time Low Frequency	
	L _{Aeq,16h}	L _{Aeq,8h}	L _{AFMax} [*]	63 Hz	125 Hz
A	65	54	85	69	67
B	63	55	86	70	64
C	63	55	86	70	64
D	65	54	85	69	67
E	58	59	80	71	62
F	58	59	80	71	62
G	60	60	79	62	58
H	60	60	79	62	58



Façade Zones – Ground to Level 7



Façade Zones – Level 8



8.0 Internal Ambient Noise Assessment

8.1 Proposed Criteria

With reference to the acoustic standards and guidelines as reviewed in Section 5.0, we propose external noise intrusion levels from environmental sources be controlled so as to not exceed the following criteria.

Activity	Location	Desirable Ambient Criteria	
		07:00 – 23:00	23:00 – 07:00
Resting	Living Rooms	L _{Aeq,16hour} 35 dB	-
Dining	Dining Room/Area	L _{Aeq,16hour} 40 dB	-
Sleeping (Daytime Resting)	Bedroom	L _{Aeq,16hour} 35 dB	L _{Aeq,8hour} 30 dB L _{Amax} 45 dB ^[1]

[1] regular noise events such as trains, aircraft (10-15th highest)

The above shall be subject to the final approval of Manchester City Council

Furthermore, Manchester City Council provide the following criteria for music noise intrusion within residential properties.

Space	Maximum Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) At Octave Band Centre Frequencies (Hz)	
	63	125
Habitable Room	47	41

8.2 Assessment of Open Windows

In order to assess the ventilation requirements for the site, we have calculated the internal noise levels with the windows open taking into account the measured incident noise levels set out in Section 7.0 and the typical level of attenuation provided by an open window.

In this regard, BS 8233:2014 states that: "If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB". Taking this reduction into account the calculated internal noise levels are set out for each measurement position below:



Façade Zone	Calculated Internal Noise Levels (Windows Open) (dB)		
	Day-time $L_{Aeq,16h}$	Night-time $L_{Aeq,8h}$	L_{Aamx}
1	48	49	70
2	50	49	71

Based on the above, a reliance upon opening windows as a means of background ventilation is unlikely to be suitable across the development as internal noise levels in all facade zones would likely exceed the proposed criteria in Section 8.1.

As such, suitable façade specifications for glazing and ventilators would be required to achieve suitable internal noise levels with windows closed whilst maintaining suitable ventilation rates. These are discussed in Section 8.4.

8.3 Façade Elements (Retained and Proposed)

The design proposals allow for the following façade construction:

- Internal Plaster board assumed dot and dab
- Block inner wall
- 50mm cavity
- Brick outer wall
- 150mm Rockwool Duo slab
- Aluminium support frame 25mm ventilation gap
- 3mm aluminium panel

Checks should be made to ensure this is the correct build-up for the whole of Bracken House as the assessment in the following section is based on this façade construction only. The overall sound reduction afforded by the external wall construction is expected to be at least **50 dB $R_w + C_{tr}$** , which should outperform the existing glazing and ventilators significantly.

8.4 Minimum Glazing and Ventilator Performances

8.4.1 Windows

The following specification and façade mark-ups detail our recommended minimum octave band sound reduction indices for window systems. In all cases, it is essential that the system is tested in accordance with BS EN ISO 10140-2 and that the quoted minimum octave band sound reduction specifications are met by the system as a whole (not just the glass). The weighted overall performance figures are presented for guidance only.

The table below should be read in conjunction with the façade mark-ups below:



Façade		Minimum Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							Overall Min $R_w + C_{tr}$ (dB)
		63	125	250	500	1k	2k	4k	
A	Red	28	32	41	44	48	50	50	43
B	Green	24	25	27	38	48	47	55	35
C	Blue	Existing glazing likely suitable							

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



Façade Specification Mark-up (All Levels)



Façade Specification Mark-up (Level 8)



It is essential that prospective suppliers can demonstrate compliance with the acoustic performance detailed in our specification rather than simply offering a generic glazing configuration, however example glazing configurations that could be capable of achieving the specifications set out are outlined below.

Façade		Example Glazing Configuration
A	Red	High performance double glazed system or secondary glazed unit
B	Green	High performance double glazed system
C	Blue	Current arrangement/no specification

8.4.2 Ventilators

The specification below and façade mark-ups in Section 8.4.1 provide our recommended minimum octave band element normalised level difference for in wall ventilators. In all cases, it is essential that the system is tested in accordance with BS EN ISO 10140-2 and that the quoted minimum octave band sound reduction specifications are achieved. The weighted overall performance figures are presented for guidance only.

Façade		Minimum Element Normalised Level Difference (dB) at Octave Band Centre Frequency (Hz)							Overall Min D _{new} + C _{tr} (dB)
		63	125	250	500	1k	2k	4k	
A	Red	36	45	48	47	51	50	50	49
B	Green	33	45	44	40	35	34	34	36

It is essential that prospective suppliers can demonstrate compliance with the acoustic performance detailed in our specification, however, example products that could be capable of achieving the specifications set out above are outlined below:

Façade		Example Product
A	Red	Greenwood in wall vent - AIRVAC MA3051
B	Green	DB-2500EA AC1 Vent

8.5 Overheating

As this scheme is a refurbishment project there is no requirement to achieve Part O of the Building Regulations or the guidance set out in the AVO Guide.



8.6 Conclusions

Two detailed environmental noise surveys have been undertaken in order to establish the currently prevailing environmental noise climate around the site.

The environmental noise impact upon the proposed dwellings has been assessed in the context of national and local planning policies.

Mitigation advice, including the use of suitably specified glazing and acoustically attenuated ventilation, have been recommended to reduce to a minimum the adverse impact on health and quality life arising from environmental and entertainment noise. The majority of building will ultimately require updated glazing in order to meet the criteria set out by the council, however, the east side of the 8th floor could be acceptable in its current state.

The assessment shows the reliance upon openable windows for ventilation purposes is not suitable. In terms of overheating, as this scheme is a refurbishment the requirements of Part O or the AVO guide are not relevant.

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. 30dB + 30dB = 33dB, not 60dB).
dBA	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.
L _{90,T}	L ₉₀ is the noise level exceeded for 90% of the period <i>T</i> (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, <i>T</i> .
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 –National Planning Policies

National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) was first published in 2012, replacing the existing Planning Policy Guidance Note 24 (PPG24) “Planning and Noise”, and sets out the government’s planning policies for England and how these are expected to be applied.

The latest revision of the NPPF (July 2021) states that planning system should contribute to, and enhance, the natural and local environment by (amongst others) *“preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability.”*

NPPF advises that planning policies and decisions should ensure:

“...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] *“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”* and *“identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

“...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.”

The NPPF makes reference to the Noise Policy Statement for England.

Noise Policy Statement for England (NPSE)

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 the NPPF as 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.

Planning Practice Guidance on Noise (PPG)

Planning Practice Guidance (PPG) under the NPPF has been published by the Government as a web based resource. This includes specific guidance on Noise although, like the NPPF and NPSE, the PPG does not provide any quantitative advice. It seeks to illustrate a range of effect levels in terms of examples of outcomes as set out in the following table:

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

Bracken House

Position 1

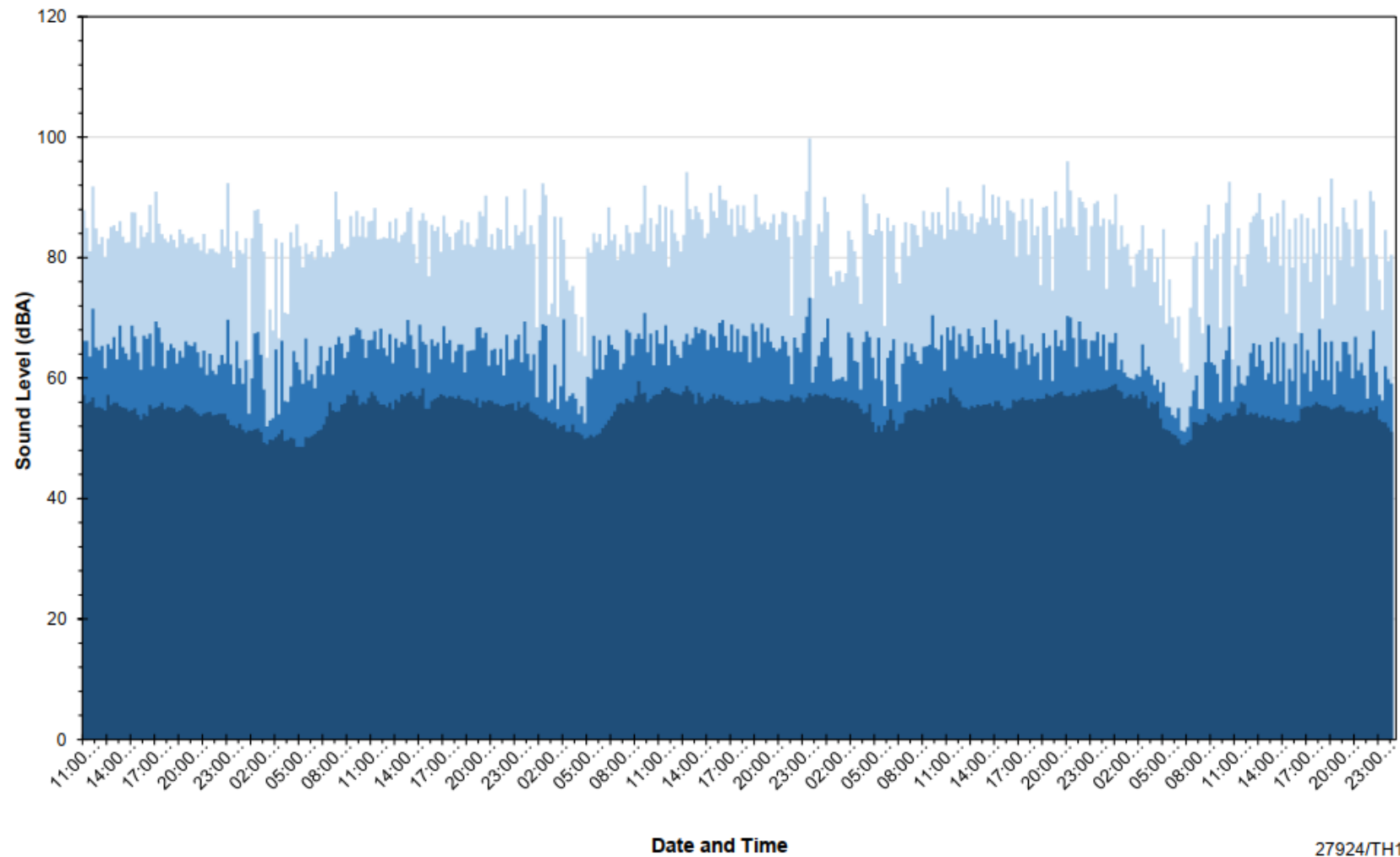
L_{eq} , L_{max} and L_{90} Noise Levels

Wednesday 15 February 2023 to Sunday 19 February 2023

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



Bracken House

Position 2

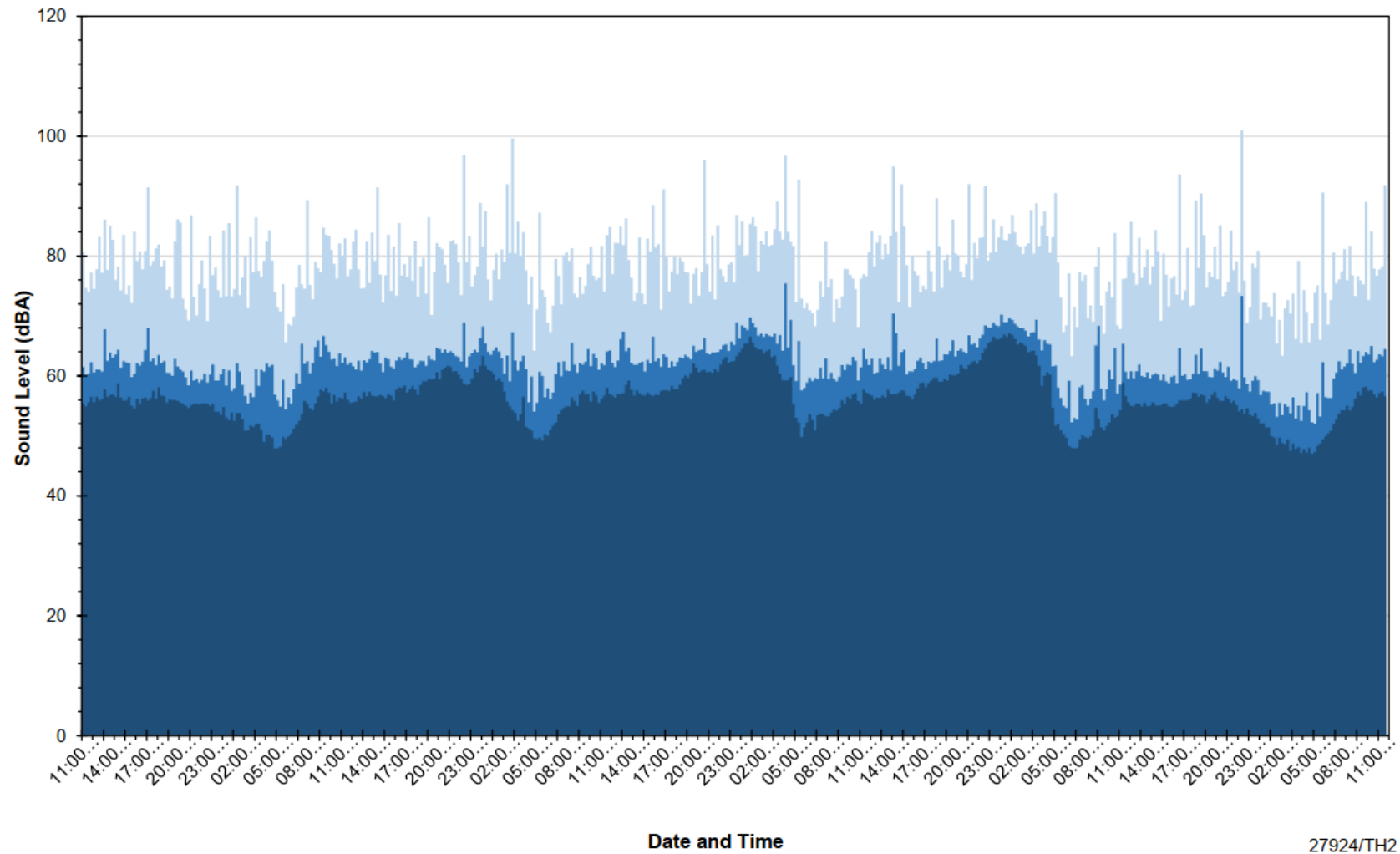
L_{eq} , L_{max} and L_{90} Noise Levels

Wednesday 15 February 2023 to Monday 20 February 2023

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



Bracken house

Position 5

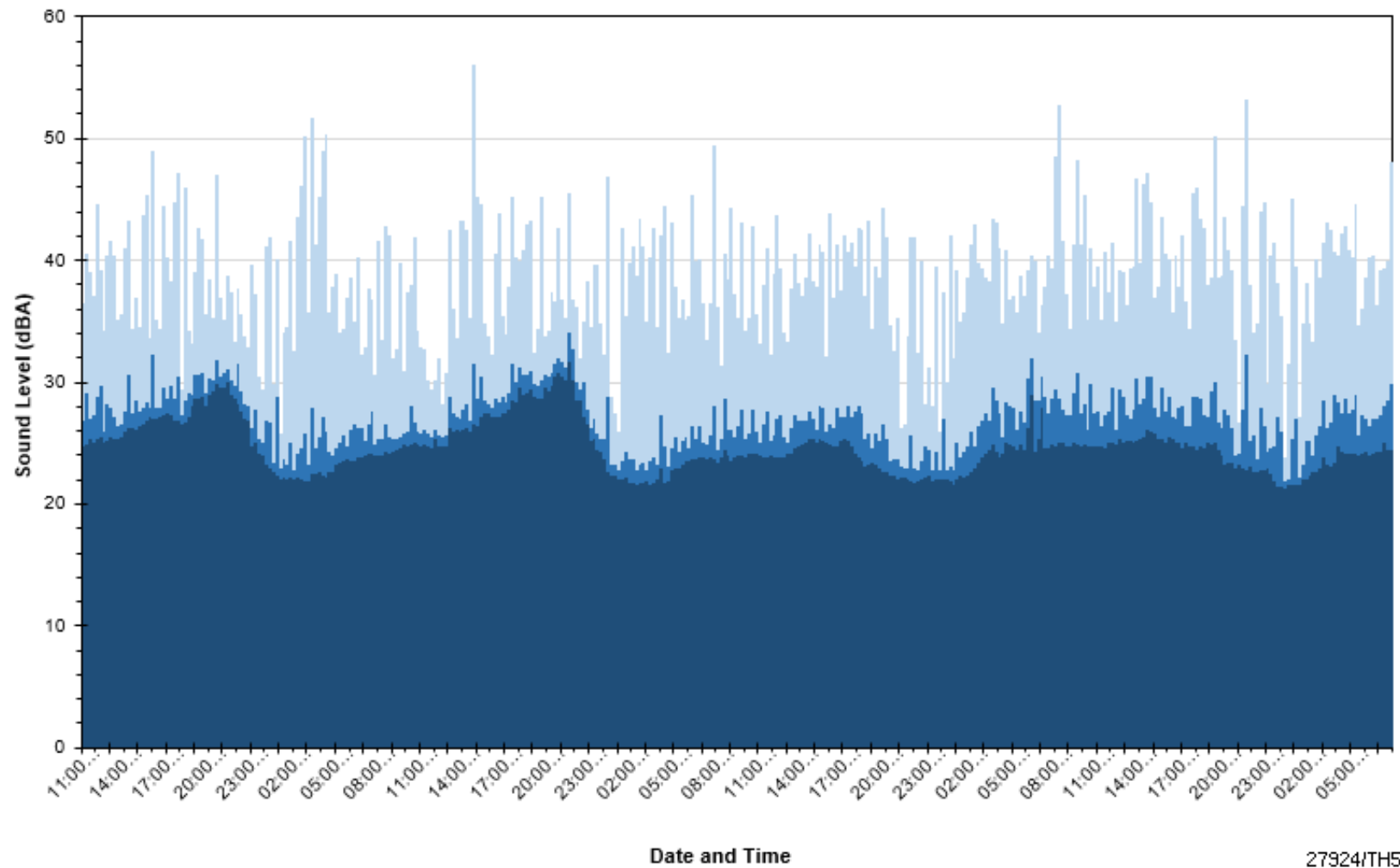
L_{eq} , L_{max} and L_{90} Noise Levels

Friday 2 June 2023 to Tuesday 6 June 2023

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



Bracken House

Position 8

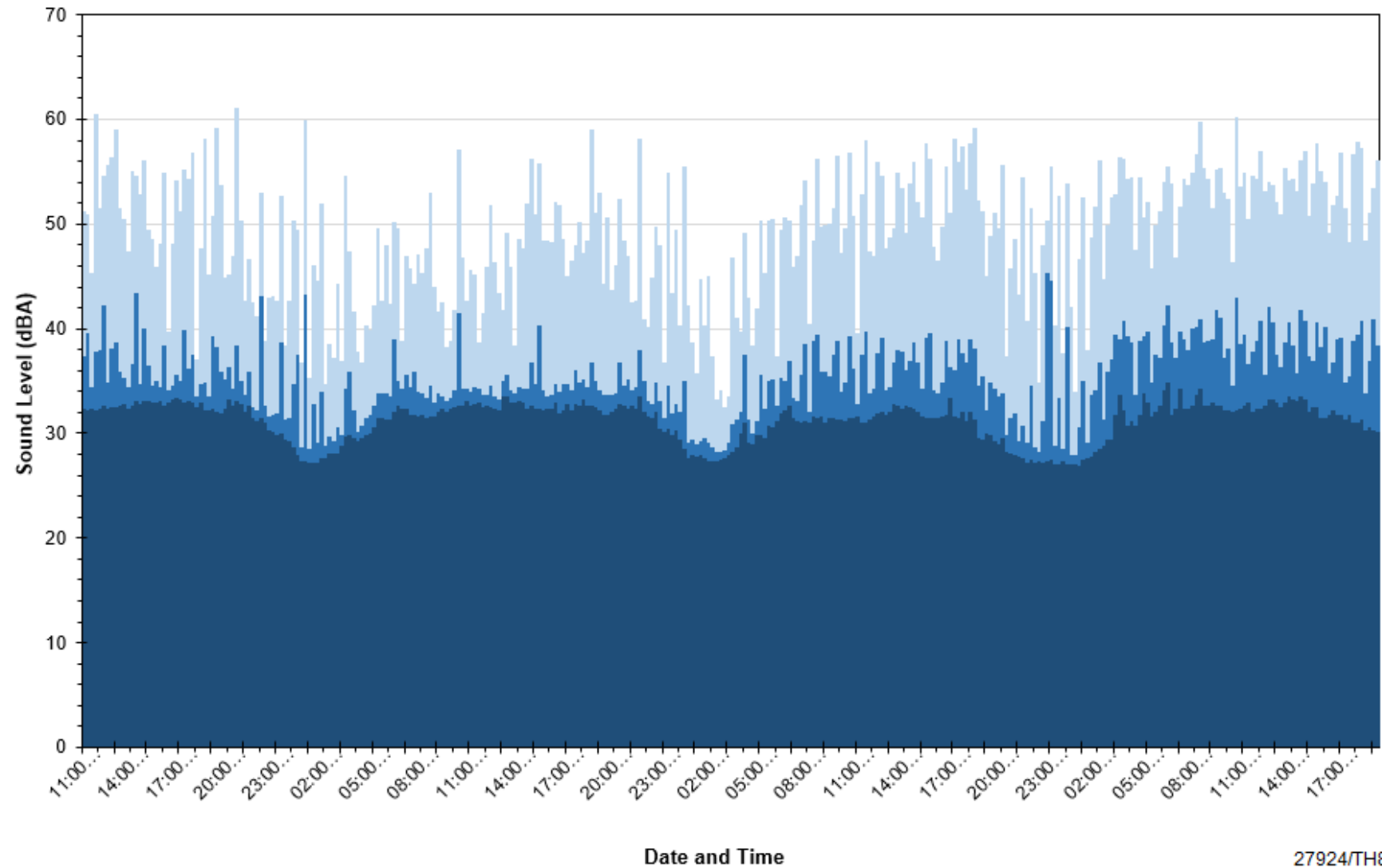
L_{eq} , L_{max} and L_{90} Noise Levels

Friday 2 June 2023 to Monday 5 June 2023

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



27924/TH8