



LEASING OPTIONS LTD

ST JOHN STREET, MANCHESTER

NOISE ASSESSMENT FOR PLANNING PURPOSES

6 December 2022

AEC REPORT: P4768/R1/NRS

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CONTENTS

	Page
1.0 INTRODUCTION	3
2.0 BACKGROUND AND SITE DESCRIPTION	3
3.0 NOISE CLIMATE	5
4.0 BASIS OF ASSESSMENT	6
5.0 ASSESSMENT OF PROPOSED DEVELOPMENT	10
6.0 SUMMARY & CONCLUSIONS	12
APPENDIX A – Acoustic Terminology in Brief	14
APPENDIX B – Noise Survey Details	16
TABLE B1 – Measurement Procedure	16

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1.0 INTRODUCTION

- 1.1 Acoustic & Engineering Consultants Limited (AEC) has been instructed by Paul Butler Associates on behalf of Leasing Options Ltd to undertake a noise assessment in relation to the proposed conversion of a former office block into residential development located at St John Street, Manchester. It is understood that the building is Grade II listed.
- 1.2 This report details the baseline noise levels measured at the development site, presents the assessment criteria and discusses the implications on the building design, to achieve acceptable internal noise levels as required by the Local Authority.
- 1.3 Acoustic terminology is discussed in brief in Appendix A.

2.0 BACKGROUND AND SITE DESCRIPTION

Site Location

- 2.1 The proposed development is bound by St John Street to the south, Byrom Street to the west and commercial units to the north and east, as identified in Figure 2.1, below.
- 2.2 About 60m north off the site is Quay Street, which is a busy road but screened by surrounding buildings.

Figure 2.1 – Proposed Site Location



Proposed Scheme

- 2.3 Based on the drawings provided to AEC, the proposed development includes conversion of a former three-storey office block (plus basement) into residential development comprising of three apartments as indicated in Figure 2.2, below.
- 2.4 It is understood that the existing sash windows, with single 4mm thick windowpane to the residential apartments must be retained as part of the development.

Figure 2.2 – Proposed Floor Plans

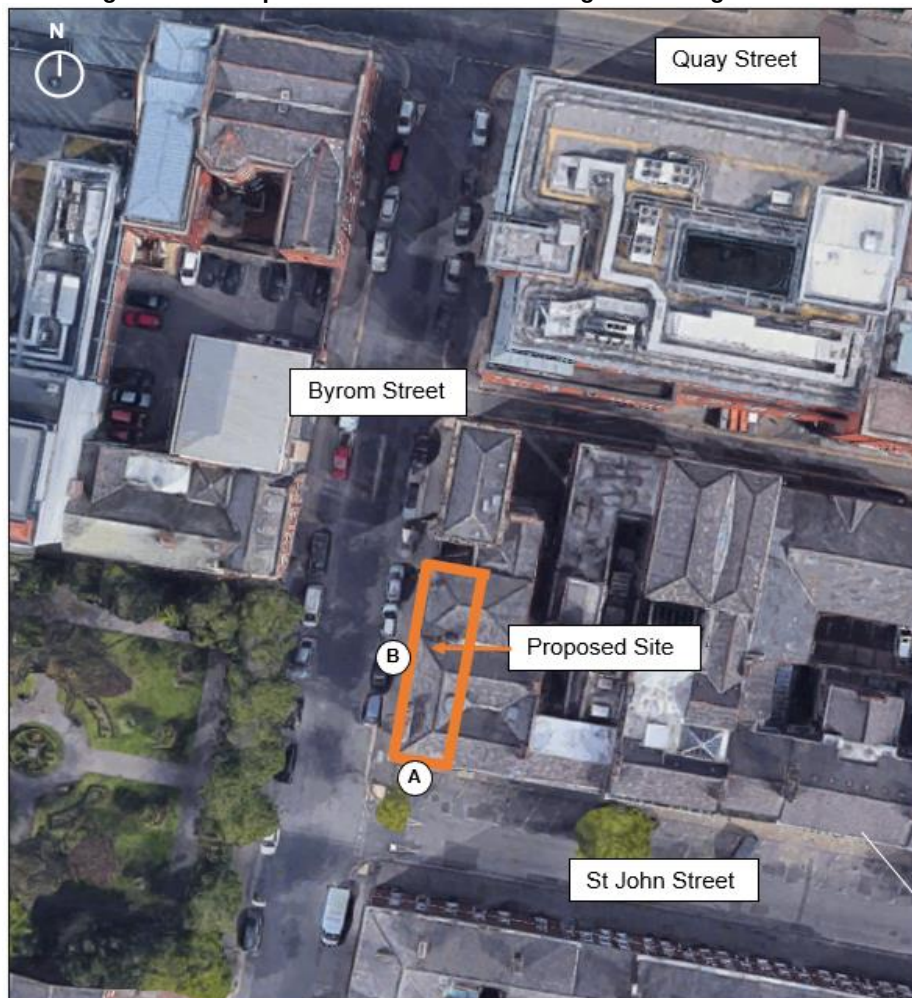


- 2.5 There is no new external amenity area and no proposed external building services plant associated with the development.

3.0 NOISE CLIMATE

- 3.1 An attended daytime noise level survey was undertaken by AEC between 1430h and 1730h on Tuesday 22 November 2022. A night-time noise level survey was undertaken from Tuesday 22 November 2022, 2300h to 0100h on Wednesday 23 November 2022.
- 3.2 Measurements were undertaken at two locations around the development site identified as A and B on Figure 3.1, below. Measurements at Location A and B were undertaken under façade conditions i.e. 1 metre from a building facade.
- 3.3 As the noise levels at Locations A and B were undertaken under façade conditions, a correction of -3dB is applied in order to convert them to free-field noise levels, as per guidance in BS7445-2: 1991 'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use'.
- 3.4 A full measurement procedure for the survey is presented in Table B1 of Appendix B and the measured data is presented in Tables B2 and B3.

Figure 3.1 – Proposed Site Location Showing Monitoring Locations



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- 3.5 A summary of the corrected free-field daytime ambient and night-time ambient and maximum noise levels is presented in Table 3.1, below. The daytime dB_{LA10} and night-time background, dB_{LA90} noise levels are also presented.

Table 3.1 – Summary of the Summary of Corrected Free-field External Noise Levels

Location (Street)	Noise Level, dB				
	Daytime		Night-time		
	Ambient, $L_{Aeq,T}$	$L_{A10,T}$	Ambient, $L_{Aeq,T}$	Background, $L_{A90,T}$	Maximum, $L_{Amax,F}$
A (St John Street)	54	56	49-53	45	70
B (Byrom Street)	58	61	54-56	47	73

- 3.6 The daytime and night-time ambient noise levels measured at Location A were predominantly due to intermittent road traffic on St John Street. The night-time maximum noise levels measured at Location A were due to car pass-bys on St John Street.
- 3.7 The daytime and night-time ambient noise levels measured at Location B were predominantly due to intermittent road traffic on Byrom Street. The night-time maximum noise levels measured at Location B were due to car pass-bys on Byrom Street.

4.0 BASIS OF ASSESSMENT

Determining of External Noise Levels

- 4.1 BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*' (BS8233) describes how noise levels can be determined and assessed from different sources in chapters 6.2 to 6.7.
- 4.2 In relation to road traffic noise, BS8233 states that the noise from road traffic can be determined using the Department of Transport Welsh Office document '*Calculation of Road Traffic Noise*' issued in 1988 (CRTN). CRTN presents the shortened measurement procedure which can be used to convert the arithmetic mean of the measured $L_{A10,T}$ levels (measured over 3 consecutive hours during the period 1000h to 1700h) into an 18-hour L_{A10} level by subtracting 1dB.
- 4.3 BS8233 suggests that the conversion of the $L_{A10,18h}$ to $L_{Aeq,16h}$ can be achieved by the (approximate) relationship of $L_{Aeq,16h} = L_{A10,18h} - 2dB$. Therefore, the daytime ambient noise level can be determined by subtracting 3dB from the arithmetic mean of the $L_{A10,T}$ levels measured on-site over 3 consecutive hours (between 1000 and 1700h).

National Planning Policy Framework

- 4.4 Current national planning policies are set out in the National Planning Policy Framework (NPPF) published by the Department for Communities and Local Government, dated March 2012, and revised in February 2019.
- 4.5 The planning policies which relate specifically to noise, were updated in July 2021, and are presented in paragraphs 174, 185 and 187 which are reproduced below:
- “174. Planning policies and decisions should contribute to and enhance the natural and local environment by:*
- (e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.*
- 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.*
- 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.”*

- 4.6 Further to the above, the Governments 'Planning Practice Guidance' (PPG) published on 6 March 2014 and updated on 22 July 2019 states:

'Noise needs to be considered when development may create additional noise, or would be sensitive to the prevailing acoustic environment (including any anticipated changes to that environment from activities that are permitted but not yet commenced). When preparing plans, or taking decisions about new development, there may also be opportunities to make improvements to the acoustic environment. Good acoustic design needs to be considered early in the planning process to ensure that the most appropriate and cost-effective solutions are identified from the outset.'

- 4.7 In addition, the guidance indicates that, whilst noise can override other planning concerns, it is important to look at noise in the context of the wider characteristics of a development proposal, its likely users, and its surroundings, as these can have an important effect as to whether or not noise is likely to pose a concern.

Internal Noise Level Limits due to External Noise Ingress

- 4.8 Manchester City Council (MCC) has outlined their requirements for noise assessments to accompany planning applications in 'Planning & Noise – Technical Guidance' (October 2022) (PNTG).
- 4.9 Section 3.7.1.1 of PNTG states "The Council has adopted the following noise limits for residential properties:
- Bedroom (night-time – 23.00 – 07.00) 30dB_{LAeq} (individual noise events should not normally exceed 45dB_{LAmax,F} by more than 10 times);
 - Living Rooms (daytime – 07.00 – 23.00) 35dB_{LAeq}."
- 4.10 These levels are based on guidance presented in BS8233 and The Association of Noise Consultants (ANC) document Professional Practice Guidance (ProPG) on Planning and Noise 'New Residential Development' (2017).

Ventilation Provision

Whole Dwelling Ventilation

- 4.11 The above internal noise level limits need to be achieved with whole dwelling ventilation, as defined in Approved Document F 'Ventilation' (2021) of the Building Regulations (ADF).
- 4.12 Whole dwelling ventilation is typically achieved either via passive ventilators (e.g., an open window or trickle ventilators) or mechanical means.
- 4.13 The ANC document ProPG states that the attenuation of external to internal noise levels provided by a window partially open for ventilation is no more than -15dB.
- 4.14 Therefore, for whole dwelling ventilation to be provided via a partially open window, the external noise levels presented in Table 4.1 should not be exceeded.

Table 4.1 – Allowable External Free-field Noise Levels for Whole Dwelling Ventilation via a Partially Opened Window

Activity	Location	Noise Level Limit, dB		
		Daytime 0700 – 2300h $L_{Aeq,16h}$	Night-Time 2300 – 0700h	
			$L_{Aeq,8h}$	$L_{Amax,F}$
Resting	Living Room	50	-	-
Dining	Dining Room/Area	55	-	-
Sleeping (daytime resting)	Bedroom	50	45	60

Purge Ventilation

- 4.15 In relation to purge ventilation, ProPG suggests that as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food etc.), the internal desired noise levels are not generally applicable. Therefore, internal noise levels due to windows being opened for purge ventilation has not been discussed further.

Overheating Strategy

- 4.16 ADF states that information about overheating is given in Approved Document O (ADO) 'Requirement 01: Overheating Mitigation Regulations: 40B' (2021 edition).
- 4.17 Section 0.3 of ADO states that the guidance in the document applies to new residential buildings only. As this is an existing building, and listed, ADO is not considered further in this assessment – however, AEC should be notified if ADO does need to be complied with.
- 4.18 With regard to consideration of internal noise levels whilst residents have windows open for the control of overheating, guidance can also be found in ANC document, 'Acoustics Ventilation and Overheating – Residential Design Guide' (AVO), issued in January 2020 (guidance only).
- 4.19 In relation to proposing appropriate internal noise level limits and the control of overheating in residential properties during the daytime and night-time periods, AEC has considered the guidance presented in AVO. It is important to note that AVO is a design guide only and not a statutory document and the Local Authority may have their own requirements.
- 4.20 Whilst AVO does not specify specific limits in relation to allowable internal noise levels, it does suggest a Level 1 risk assessment should be undertaken considering the magnitude of external noise levels. Table 3.2 of AVO provides an indicative risk category assessment for different free-field external noise levels and states that above a free-field external noise level of approximately $63dBL_{Aeq,16h}$ for daytime period and $55dBL_{Aeq,8h}$ & $78dBL_{Amax,F}$ for night-time period, there is 'increasing risk of adverse impact'. Therefore, this has been chosen as the upper limit for external daytime and night-time noise levels above which opening windows cannot be relied upon for the control of overheating.

- 4.21 To consider the likely internal noise levels based on the above external noise levels, AVO indicates that a reduction in noise levels of around 13dB can be expected across a window that is partially open for ventilation purposes (approximately 2% of the floor area for a room).
- 4.22 Based on the above guidance from AVO, the free-field external noise level limits for which openable windows cannot be relied upon as an overheating strategy are presented in Table 4.2, below.

Table 4.2 – Noise Level Limits Above Which Openable Windows Should Not be Used for the Control of Overheating

Period	Resulting External – Internal Level Difference, dB	Noise Level Limit, dB	
		External Free-field	Internal
Daytime Ambient, $L_{Aeq,16h}$	-13	63	50
Night-time Ambient, $L_{Aeq,8h}$		55	42
Night-time Maximum, $L_{Amax,F}$		78	65

5.0 ASSESSMENT OF PROPOSED DEVELOPMENT

Determining of External Noise Levels

- 5.1 As stated above, the main source of noise affecting the site was road traffic on St John Street and Bryom Street. The daytime ambient noise levels affecting the elevations facing St John Street and Bryom Street have been determined using the calculation method presented in Section 4.0 to convert the arithmetic average of the three LA_{10} noise levels measured at Location A into a 16-hour L_{Aeq} level.
- 5.2 The night-time ambient and maximum noise levels at each of the elevations facing St John Street and Bryom Street have been determined by using the typically measured noise level in each of the locations.
- 5.3 Based on the above, the determined free-field daytime ambient and night-time ambient and maximum noise levels affecting the proposed development are presented in Table 5.1, below.

Table 5.1 – Determined Free-Field External Noise Levels

Elevation	Noise Level, dB		
	Daytime	Night-time	
	Ambient, dBL _{Aeq,16h}	Ambient, dBL _{Aeq,8h}	Maximum, dBL _{Amax,F}
Southern (Facing St John Street)	≤ 53	≤ 52	≤ 70
Western (Facing Bryom Street)	≤ 58	≤ 55	≤ 73

Glazing and Ventilation Requirements

- 5.4 As stated in Section 4.0, for habitable rooms to have whole dwelling ventilation provided via a window partially open, external noise levels should not exceed 50dBL_{Aeq,T} during the daytime and 45dBL_{Aeq,T} and 60dBL_{Amax,F} at night.
- 5.5 A comparison between these levels and the determined noise levels presented in Table 5.1, indicates that alternate means of whole dwelling (background) ventilation would need to be provided to all habitable rooms in the development.
- 5.6 As identified above, the existing single pane sash windows to the residential apartments are being retained as part of the scheme. Therefore, to meet the required internal noise level limits presented in Section 4.0, a secondary glazed screen formed from a pane of 4-6mm toughened glass should be installed internally.
- 5.7 The cavity between the existing and new pane of glass should be at least 50mm deep. It is important that the existing glazing is well sealed and made good (cracks and gaps repaired / sealed), where required.
- 5.8 In relation to whole dwelling ventilation, the internal noise level limit in all habitable rooms would be achieved with acoustic trickle vents which have a sound insulation performance of at least 33dBD_{n,e,w}. These trickle vents could be located in the both primary sash and internal secondary glazing, above the glazing, or as a through the wall vent. However, if the listed building status cannot accommodate this, then the secondary glazing should have the ability to open at the top and bottom, such that a restricted 'periscope style' path is created for the noise ingress. Such an arrangement could provide around 20-25dB of sound attenuation from outside to inside and internal levels would only be slightly (3-5dB) above the MCC internal noise limits in the worst effected ground floor rooms.
- 5.9 Prior to any glazing being installed, octave band sound insulation performance data of the glazing build-ups and ventilators selected must be verified by AEC or others.
- 5.10 The background ventilation sound insulation requirement has been based on the use of a single ventilator per room. If more than one unit is required, such as may be required to satisfy Building Control requirements, the performance of each unit might need to be increased.

Purge Ventilation

- 5.11 Windows can be openable for purge ventilation provided that they are effectively acoustically sealed when closed, and it is important that any frames and seals do not downgrade the sound insulation performance of the glazing.

Control of Overheating

- 5.12 If it is determined by others that there is a need to control overheating within the development, a comparison between the noise levels presented in Table 5.1 and those presented in Table 4.2, indicates that windows can be opened to aid with the control of overheating in habitable rooms facing St John Street and Bryom Street during both the daytime and night-time periods.

External Envelope

- 5.13 To maintain the sound insulation performance of the external envelope the remainder of the façade construction should have a sound insulation performance of at least 10dB higher than the glazing.
- 5.14 Therefore, the external walls and roof would need to achieve a sound insulation performance of at least around 43dB_{R'w}. This would be readily achievable with the existing solid masonry walls and the tiled roof structure.

6.0 SUMMARY & CONCLUSIONS

- 6.1 Acoustic & Engineering Consultants Limited (AEC) has been appointed by Paul Butler Associates on behalf of Leasing Options Ltd, to undertake a noise assessment for the proposed conversion of a former office block into residential development located at St John Street, Manchester.
- 6.2 The proposed development includes conversion of a former three-storey office block (plus basement) into residential development comprising of three apartments. The building is Grade II listed.
- 6.3 Based on AEC's experience of noise assessments with Manchester City Council (MCC), it is understood that that internal noise levels in new residential properties should comply with guidance presented in BS8233:2014 '*Guidance on sound insulation and noise reduction for buildings*' (BS8233) and the Association of Noise Consultants (ANC) document '*ProPG: Planning and Noise - New Residential Development*', 2017 (ProPG). This is discussed further in Section 4.0.
- 6.4 A daytime and night-time noise survey was undertaken by AEC in November 2022 and the main noise source in the area was road traffic on St John Street and Byrom Street. Full details of the noise level survey are presented in Appendix B. A summary of the noise levels measured and the sources of noise affecting the proposed development are discussed in Section 3.0.

- 6.5 An assessment of the noise levels measured and affecting the proposed development is presented in Section 5.0. Based on this assessment, the sound insulation requirements of the building envelope and ventilation have been determined and are also presented in Section 5.0. In summary, windows would need to remain closed to achieve the required internal noise level limits and, as such, alternative ventilation will be required to comply with the requirements of Approved Document F (ADF) for whole house (background) ventilation.
- 6.6 It is assumed that acoustic trickle vents can be used to comply with the requirements of ADF, whilst meeting internal noise limits, and appropriate acoustic performances have been identified in Section 5.0. Alternately, if the building cannot accommodate trickle vents based on its listed status, an appropriately designed secondary glazed system can be used to provide a restricted path for sound ingress, provided MCC will accept slightly (3-5dB) higher noise levels in some of the ground floor rooms.
- 6.7 Based on the above, appropriate planning conditions can be applied to the proposed development to ensure internal noise levels compliant with MCC's requirements in the proposed accommodation are achieved.
- 6.8 Based on this assessment, noise should not be considered a determining factor in relation to any planning permission being sought.

APPENDIX A – Acoustic Terminology in Brief

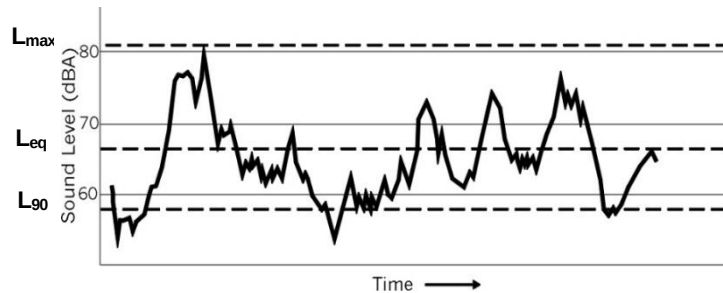
General

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

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

Sound / Noise Units

The figure below shows an example of sound level varying with time. Because of this variation over time the same period of noise can be described by several different levels. The most common of these are described below.



Commonly Used Descriptors for Sound / Noise

$L_{Amax,F/S}$	The maximum (A-weighted) sound level measured during a given time. 'Fast' or 'Slow' meter response should be cited.
$L_{Aeq,T}$	The equivalent continuous (A-weighted) sound level. It may be thought of as the "average" sound level over a given time, T. It is used for assessing noise from various sources: industrial and commercial premises, construction sites, railways and other intermittent noises. It can be considered as the "ambient" noise level.
$L_{A90,T}$	The (A-weighted) sound level exceeded for 90% of a measurement period. It is the value often used to describe the "background" noise.
$L_{A10,T}$	The (A-weighted) sound level exceeded for 10% of a measurement period. It is the value often used to describe traffic noise.
Free-field Level	This refers to the sound level measured outside, away from reflecting surfaces.

Façade Level	This refers to the sound level measured outside, at 1m from a hard reflecting surface, typically 3dB greater than the free-field level.
Other Common Acoustics Descriptors	
R_w	Single number rating used to describe the <u>laboratory</u> airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.
R'_w	Apparent sound reduction index - Single number rating used to describe the sound reduction index of an on-site construction over a range of frequencies, typically 100-3150Hz.
D_w	Single number rating used to describe the on-site airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.
D_{n,e,w}	Element normalised level difference. Single number rating used to describe the sound insulation performance of small elements
C_{tr}	A road traffic spectrum adaptation term which is used to describe the low frequency sound insulation performance of building elements.

APPENDIX B – Noise Survey Details

TABLE B1 – Measurement Procedure

Date & Time of Survey:	Tuesday 22 November 2022, 1430 to 1730h. Tuesday 22 November 2022, 2300h to 0100h, Wednesday 23 November 2022.					
Personnel:	David Terry (AEC).					
Equipment Used:	B&K 2250 Real Time Analyser (AEC Kit 2).					
Calibration:	The sound level analyser, which conforms to BS EN 61672-1: 2013 ' <i>Electroacoustics – Sound level meters - Part 1 Specifications</i> ' for Class 1 Type Z meters, was in calibration and checked calibrated before and after the measurement periods using a Brüel & Kjær type 4231 (94dB) calibrator. There was no significant drift of calibration. Calibration certificates are available on request.					
Weather Conditions:	Date	Period	Wet/Dry	Temp°C	Wind Speed & Direction	Cloud Cover
	22/11/22	Day	Dry	10°C	Negligible	60%
	22/11/22	Night	Dry	8°C	Negligible	70%
Measurement Locations:	Measurements were undertaken at two locations around the development site. Identified as A and B on Figure 1 and described below. A – 1m from façade facing St John Street. B – 1m from façade facing Byrom Street.					
Measurement Details:	Measurements were undertaken over various periods in terms of L_{eq} , L_{10} , L_{90} , and L_{max} .					
Façade / Free-Field:	A & B - façade.					
	Full results for the attended measurements are given in Tables B2 and B3.					
Measured Data:	Full octave band centre frequency data was obtained for all measurements.					

TABLE B2 – Measured Daytime Noise Levels

Location	Period, h	Noise Level, dB				Comments
		L _{Aeq}	L _{A10}	L _{A90}	L _{Amax, F}	
A	1425 – 1440	56.1	58.8	49.2	71.9	Ambient noise level due to road traffic on St John Street. Maximum noise level due to car pass by on St John Street.
	1510 – 1525	57.3	58.1	49.9	77.0	
	1600 – 1615	57.3	59.3	49.6	73.2	
	1701 – 1716	57.7	60.0	49.6	72.8	
B	1441 – 1456	58.3	61.6	51.8	71.7	Ambient noise level due to road traffic on Byrom Street. Maximum noise level due to car pass by on Byrom Street.
	1526 – 1541	61.4	64.6	51.8	82.1	
	1620 – 1635	62.7	65.6	53.6	80.7	
	1717 – 1727	61.6	64.7	52.3	77.5	

TABLE B3 – Measured Night-Time Noise Levels

Location	Period, h	Noise Level, dB			Comments
		L _{Aeq}	L _{A90}	L _{Amax, F}	
A	2301 – 2311	52.3	47.2	70.5	Ambient noise level due to intermittent road traffic on St John Street. Maximum noise level due to car pass by on St John Street.
	2341 – 2351	55.8	48.3	72.6	
	0013 – 0023	55.1	47.5	72.5	
B	2317 – 2327	58.7	51.4	75.5	Ambient noise level due to intermittent road traffic on Byrom Street. Maximum noise level due to car pass by on Byrom Street.
	2354 – 0004	57.9	49.7	75.8	
	0031 – 0041	57.0	49.5	70.9	