

Holiday Inn Express Planning Noise Assessment

Oxford Road

Manchester

M1 5QA

Stroma Built Environment Ltd.

SBE Ref: OP-A635 – AC - 1v1

I. Revision History

Revision	Date	Description	
1v1	24/01/2024	Initial Issue	
		Compiled By	Authorised By
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III. Contents

I.	Revision History	2
III.	Contents	3
1.	Introduction	4
2.	Noise Assessment Guidance and Criteria	5
	Client Specific Requirements – Holiday Inn	5
	Manchester City Council	5
	BS 4142:2014 <i>Methods for rating and assessing industrial and commercial sound</i>	6
3.	Noise Survey	7
	Site Description	7
	Baseline Noise Conditions	8
	Noise Climate	8
4.	Noise Impact Assessment	12
	Assessment Noise Levels	12
	Façade Sound Insulation	13
	Noise Emissions from the Site	13
5.	Conclusions	15
Appendix I.	Noise Survey Details	16
	Measurement Locations	16
Appendix II.	Acoustic Glossary	20
Appendix III.	SBE Acoustic Credentials	23
Appendix IV.	Report Conditions	24

1. Introduction

- 1.1 Stroma Built Environment (SBE) have been appointed by August Consulting Group to provide a planning noise impact assessment for a three-storey extension to the Holiday Inn Express at Oxford Road, Manchester.
- 1.2 The proposal is to construct three floors on top of the existing building to provide an additional 24 bedrooms for use by the hotel. These bedrooms will form two floors of the proposed development, with the other being dedicated to building services plant.
- 1.3 The purpose of this assessment is to consider the existing and future noise climate around the proposed development site in order to determine the suitability of the proposals. The assessment will also consider the potential noise impacts this development would have on nearby noise sensitive receptors.
- 1.4 This document has been prepared for the sole use, benefit and information of the client for the purposes set out. The liability of SBE in respect of any information contained herein shall not extend to any third party.
- 1.5 Whilst every effort has been made to ensure that this report is easy to understand, it is technical in nature. A glossary of acoustic terms is included as Appendix III.

2. Noise Assessment Guidance and Criteria

Client Specific Requirements – Holiday Inn

- 2.1 The Client Specific requirements for Holiday Inn Express hotels are detailed in the *Brand Standards Manual* published by IHG on 3rd August 2023. This document details the acoustic requirements for a new Holiday Inn Express in the *Build Journey – Base Build* chapter.
- 2.2 The relevant criteria for this report are shown in Table 1.

Table 1: Holiday inn Express internal Noise Level requirements

Application	External noise intrusion levels to be achieved
Guest Rooms	Daytime 35 dB $L_{Aeq,1hr}$
	Night-time 30 dB $L_{Aeq,15min}$
	Night-time 45 dB L_{AFMax} (Excluding infrequent & irregular sources such as sirens or car alarms)
Hotel Lobby/Atria	50 dB $L_{Aeq,T}$

- 2.3 The criteria shown above match the criteria found in BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' and WHO:1999 'Guidelines for Community Noise'.

Manchester City Council

- 2.4 The site for the proposed generator lies within the jurisdiction of Manchester City Council (MCC).
- 2.5 MCC detail their planning requirements for noise in their technical guidance document, '*Planning and Noise: Technical Guidance*' (October 2022).
- 2.6 For internal noise levels, MCC have adopted the following noise limits for residential properties:
- Bedrooms (night-time 23:00-07:00) 30 dB $L_{Aeq,8hr}$ (individual noise events should not normally exceed 45 dB L_{AFMax} by more than 10 times),
 - Living Rooms (daytime 07:00-23:00) 35 dB $L_{Aeq,16hr}$.
- 2.7 These requirements match the Client Specific requirements. Satisfying the Client Specific requirements would therefore achieve the planning requirements for MCC.
- 2.8 In addition to their internal noise planning requirements, MCC also have requirements for the noise emissions from items of fixed building services plant.

- 2.9 The guidance document states that any new items of fixed building services plant must be design so that the Rating Level from the plant be at least 5 dB below the typical background noise level at the nearest noise sensitive premises.
- 2.10 MCC also state that a BS 4142:2014 assessment must be undertaken to determine whether the installed plant can meet the above requirement.

BS 4142:2014 Methods for rating and assessing industrial and commercial sound

- 2.11 BS 4142 describes a method for assessing the adverse impact from noise sources that are of an industrial nature (e.g. fans, pumps, chillers, air handling units etc). The assessment methodology is based upon determining a 'rating level' for the equipment being assessed, which is the level of noise from an item or items of plant being assessed (measured as an $L_{Aeq,T}$). the is then compared to the typical background sound level at the nearby noise sensitive receptor (measured as an $L_{A90,T}$).
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact depending on the context.
 - A difference of +5 dB 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 that the specific sound source has a low impact, depending on the context.
- 2.12 BS 4142 states that a penalty should be added for any plant that have noise features that may increase disturbance, such as tonal, impulsive, or intermittent characteristics. With respect to acoustic feature correction, BS 4142 states:
- "Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level."*
- 2.13 A rating penalty for a sound may be based on a subjective assessment of its characteristics or using objective methods to determine tonality.

3. Noise Survey

Site Description

- 3.1 The proposal is to construct additional storeys on top of the existing Holiday Inn Express, Oxford Road. The Holiday Inn Express lies adjacent to Oxford Road, which is a busy inner city road. At a junction near to the Holiday Inn, the road turns buses and taxis only, which means that there is a significant amount of bus traffic on Oxford Road. The south of the site is bounded by Hulme Street. The traffic here was observed to be mainly cars and vans. The rest of the site is bounded by the River Medlock.
- 3.2 Oxford Road Station lies approximately 100m to the north, with an east-west rail line that goes to Manchester Piccadilly. Due to the height of the surrounding buildings, there would be a direct line of sight from the top floors of this development to Oxford Road Station.
- 3.3 The nearest noise sensitive receptor to the site is a student hall, Unite Students – Artisan Heights.
- 3.4 The site is shown in Figure 1.

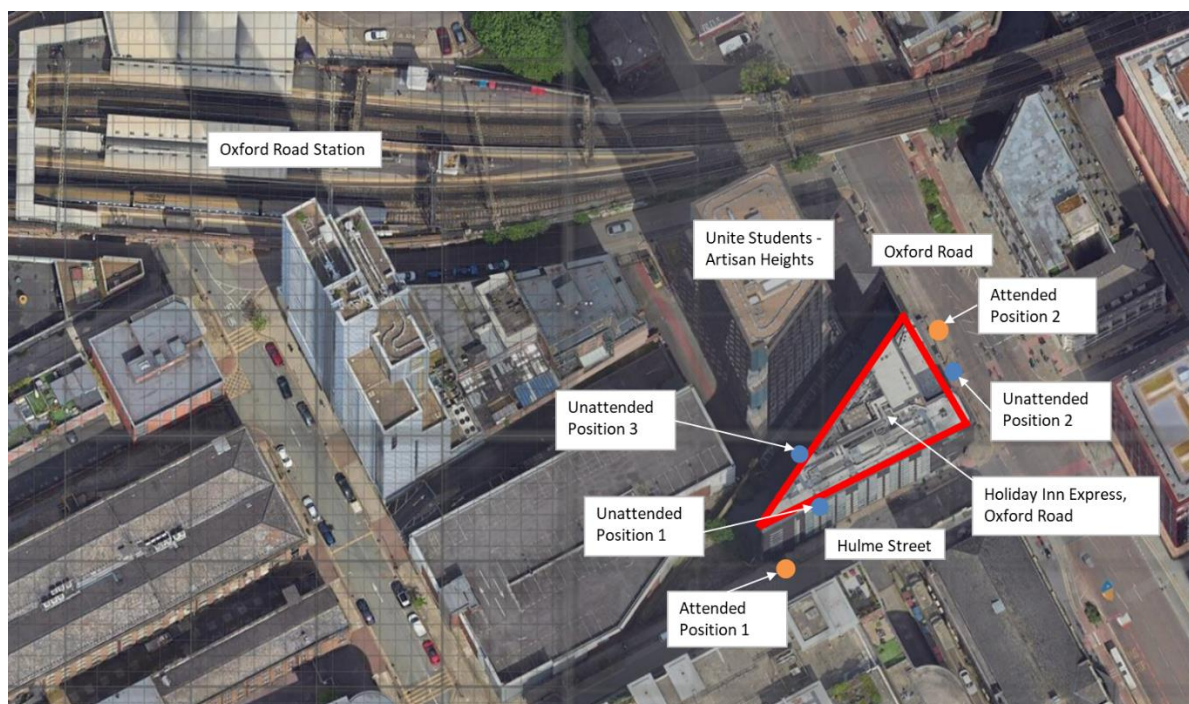


Figure 1: Site and Surrounding Area

Baseline Noise Conditions

- 3.5 To assess the impact of the existing noise sources on the site, a noise survey was conducted. A mixture of both attended and unattended measurements were taken. Long term unattended measurements were taken at Unattended positions 1 and 2, from approximately 11:00 on Thursday 11th January to approximately 09:00 on Monday 15th January 2024. A further two hours of unattended measurements were taken at Unattended measurement position 3 on Monday 15th January.
- 3.6 The microphones for the unattended measurement positions were positioned approximately 1m over the edge of the façade on the roof. For Unattended measurement positions 1 and 3, this was the roof on the 11th floor, and for unattended measurement position 2, this was the roof on 8th floor. Due to the proximity of the microphone to the existing façade of the building, these measurements cannot be considered as in the free field.
- 3.7 The existing building services plant on the roof of the Holiday Inn Express was not audible at any of the unattended measurement positions.
- 3.8 Attended measurements were taken at two locations between 10:00 and 12:00 on Monday 15th January 2024. Photographs of the measurement locations are shown in Appendix I.
- 3.9 Attended position 1 was at the southwestern tip of the current building on the kerb of Hulme Street. The location was approximately 45m from the junction with Oxford Road. Attended position 2 was at the northwestern tip of the current building on the kerb of Oxford Road. The location was approximately 25m from the junction with Hulme Street.
- 3.10 Noise levels were measured using NTi XL2 Class 1 sound level meters fitted with weather protection kits. The sound level meters were field calibrated before and after the survey periods with no significant drift detected. Broadband noise was measured A-weighted and third octave band measurements were taken.
- 3.11 The weather throughout the measurement period was dry and cold, between 0°C & 5°C. Wind was lower than 4 m/s throughout the measurement period.

Noise Climate

- 3.12 The audio taken during these measurements and the on-site observations show that the ambient noise climate of the area is dominated by road traffic noise from Oxford Road, with background noise being due to distant road traffic. Trains move slowly into and out of Oxford Road Station and so are not clearly audible, however, brake squeals were audible across the site. The main source of maximum noise events was found to be bus and HGV movements on Oxford Road and Hulme Street. Emergency services sirens were also audible at night on Oxford Road, due to the movements of emergency vehicles.

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- 3.13 Typically 2-3 emergency services sirens were noted during night time periods, however regular emergency services sirens were noted during the night time period of 12th / 13th January attributed to emergency services vehicle movements along Oxford Road. Due to the location of the development sirens during the night time period are considered to be a typical noise source and have therefore been considered within the assessment,
- 3.14 Noise from pedestrians was also noted during the weekend night time periods associated with local bars. Entertainment and music noise was not audible.
- 3.15 A summary of the unattended measured noise levels is shown in Table 1, below. The measurements were taken within 1.5m of a façade and reflections from the façade increase the measured noise level. To account for this, the values presented have been corrected by -3 dB so that they can be assessed in the free field.
- 3.16 To calculate the typical background noise levels shown in Table 2, a statistical analysis of the data has been done. This has been done following guidance in BS 4142. The histograms are available upon request.
- 3.17 Graphs showing the full measurements are shown in Appendix I.

Table 2: Summary of Unattended measurements – free field levels

Position	Date	Period	Ambient Noise Level (dB $L_{Aeq,T}$)	Typical Maximum Noise Level ^[1] (dB L_{AFmax})	Typical Background Noise Level ^[2] (dB $L_{A90,T}$)
Unattended Measurement Position 1	11/01/2024	Daytime (11:00 – 23:00)	58	-	55
		Night-time (23:00 – 07:00)	55	73	47
	12/01/2024	Daytime (16:30 – 23:00)	59	-	55
		Night-time (23:00 – 07:00)	57	77	52
	13/01/2024	Daytime (07:00 – 23:00)	59	-	55
		Night-time (23:00 – 07:00)	57	75	49
	14/01/2024	Daytime (07:00 – 23:00)	57	-	55
		Night-time (23:00 – 07:00)	54	71	47
Unattended Measurement Position 2	11/01/2024	Daytime (11:00 – 23:00)	63	-	56
		Night-time (23:00 – 07:00)	60	80	48
	12/01/2024	Daytime (16:30 – 23:00)	65	-	56
		Night-time (23:00 – 07:00)	63	85	49
	13/01/2024	Daytime (07:00 – 23:00)	63	-	55
		Night-time (23:00 – 07:00)	62	83	55
	14/01/2024	Daytime (07:00 – 23:00)	61	-	55
		Night-time (23:00 – 07:00)	58	78	49
Unattended Measurement Position 3	14/01/2024	Daytime (09:40 – 12:20)	57	-	54

Notes to Table 1:

[1] Typical maximum noise levels have been taken as the 10th highest maximum noise event with 1 minute periods.

[2] Typical background noise levels have been calculated using the statistical method outlined in BS 4142:2014. 1-hour periods have been used for the daytime background noises levels. 15-minute periods have been used for the night-time background noise levels.

3.18 A summary of the attended measurements is shown in Table 3.

Table 3: Summary of Attended measurements

Position	Date	Period	Ambient Noise Level (dB $L_{Aeq,T}$)	Maximum Noise Level (dB L_{AFmax})
Attended Measurement Position 1	14/01/2024	10:00 – 10:15	63	87
		10:33 – 10:49	63	91
		11:06 – 11:21	64	83
		11:38 – 11:53	64	85
Attended Measurement Position 2		10:18 – 10:33	69	90
		10:50 – 11:05	71	90
		11:22 – 11:37	70	89

4. Noise Impact Assessment

Assessment Noise Levels

- 4.1 To rationalise the measured noise data, daytime and night-time ambient noise levels were selected for each unattended measurement position. As a 'worst-case' assessment, the loudest ambient noise level from each period was selected. For the maximum noise levels, the loudest typical night-time maximum noise level was also selected.
- 4.2 The noise levels used to assess the noise climate at each of the measurement positions is shown in Table 4.

Table 4: Selected assessment noise levels

Measurement Reference	Period	Ambient Noise Level (dB $L_{Aeq,T}$)	Typical Maximum Noise Level (dB L_{AFmax})
Unattended position 1	Daytime (07:00 – 23:00)	59	-
	Night-time (23:00 – 07:00)	57	77
Unattended position 2	Daytime (07:00 – 23:00)	63	-
	Night-time (23:00 – 07:00)	65	85
Unattended position 3	Daytime (07:00 – 23:00)	57	-
Attended position 1	Daytime (07:00 – 23:00)	64	-
Attended position 2	Daytime (07:00 – 23:00)	71	-

- 4.3 Any noise emissions from the proposed site will need to be assessed against the typical background noise level during the day and night. In the assessment, the lowest typical background noise level from either Unattended position 1 or Unattended position 2 has been used. Given the proximity of the site to the nearest noise sensitive receptor, the measurements taken at these locations have been considered as representative of the noise climate at the NSR. The selected background noise levels are shown in Table 5.

Table 5: Assessment Background Noise Levels

Noise Sensitive Receptor	Daytime Background Noise Level (dB $L_{A90,1hr}$)	Night-time Background Noise Level (dB $L_{A90,15min}$)
Unite Students – Artisan Heights	55	47

Façade Sound Insulation

- 4.4 To meet the Client Specific requirements and the planning requirements for MCC, the internal ambient noise levels need to be controlled to 35 dB $L_{Aeq,16hr}$ during the daytime period and 30 dB $L_{Aeq,15min}$ at night. Typical maximum noise events also need to be controlled to 45 dB L_{AFMax} at night.
- 4.5 The building envelope is required to provide adequate sound reduction of external noise levels in order to achieve these criteria. It is understood that the building is and will continue to be mechanically ventilated, meaning that ventilation will be provided with windows closed.
- 4.6 The sound insulation requirements for the glazing on each façade of the building is shown in Table 6. Please note that the stated glazing sound insulation is required to meet both the Client Specific requirements and the planning requirements for MCC.

Table 6: Minimum Glazing Sound Insulation Requirements

Room	Minimum Airborne Sound Insulation Performance (dB R_w / dB R_w+C_{tr})	Example Glazing Construction
Residential Bedrooms	43 / 38	10mm Float Glass / 16mm Cavity / 17.5mm Laminated Glass

- 4.7 The specified glazing would also achieve the Client Specific noise level requirements in the lobby/corridor areas of the proposed development.
- 4.8 In addition to the glazing, the surrounding façade and roof must achieve a sound insulation performance at least 5 dB higher than the glazing. This would be a sound insulation performance of at least 48 dB R_w .

Noise Emissions from the Site

- 4.9 At the time of writing, the exact building services plant that are to be installed are not yet finalised.
- 4.10 MCC require that the rating level of noise emissions from all new building services be at least 5 dB below the typical background noise level at the nearest noise sensitive receptor.
- 4.11 As the exact units are not yet finalised, a full noise impact assessment cannot be undertaken. BS 4142:2014 rating levels based on the MCC criteria can be set, however.
- 4.12 The rating level for noise emissions from the proposed development at Unite Students – Artisan Heights are shown in Table 7, below.

Table 7: Plant Noise Limits

Noise Sensitive Receptor	Daytime Background Noise Level (dB $L_{A90,1hr}$)	BS 4142:2014 Daytime Rating Level (dB $L_{Ar,Tr}$)	Night-time Background Noise Level (dB $L_{A90,15min}$)	BS 4142:2014 Night-time rating Level (dB $L_{Ar,Tr}$)
Unite Students – Artisan Heights	55	50	47	42

- 4.13 Please note that these limits are cumulative and applies to the noise emissions from all the plant and not for each item of plant individually.
- 4.14 It is recommended that mechanical engineers are made aware of the proposed plant noise limits in order to inform the plant unit specification and selection. The rating level should be assessed in accordance with BS 4142, including the appropriate consideration of any tonal or impulsive characteristics of the mechanical building services plant.

5. Conclusions

- 5.1 Stroma Built Environment has been appointed by August Consulting to provide a noise impact assessment for a three storey extension to the Holiday Inn Express at Oxford Road, Manchester. This report is to support a planning application to Manchester City Council for the development.
- 5.2 To assess the noise climate affecting the site, a noise survey using both attended and unattended measurements has been undertaken.
- 5.3 Minimum sound insulation requirements for the glazing, roof and external wall have been given. These minimum sound insulation requirements would ensure that both the Client Specific requirements and the planning requirements are met. The minimum sound insulation performances are also shown in an external façade markup in Appendix II.
- 5.4 As part of the development there will be new items of building services plant. As the unit specifications are not yet finalised, BS 4142:2014 rating limits have been set at the nearest noise sensitive receptor based on the results of the noise survey.
- 5.5 On this basis, noise should not be a limiting factor in any planning application.

Appendix I. Noise Survey Details

Measurement Locations

Figure A1: Attended measurement Location 1

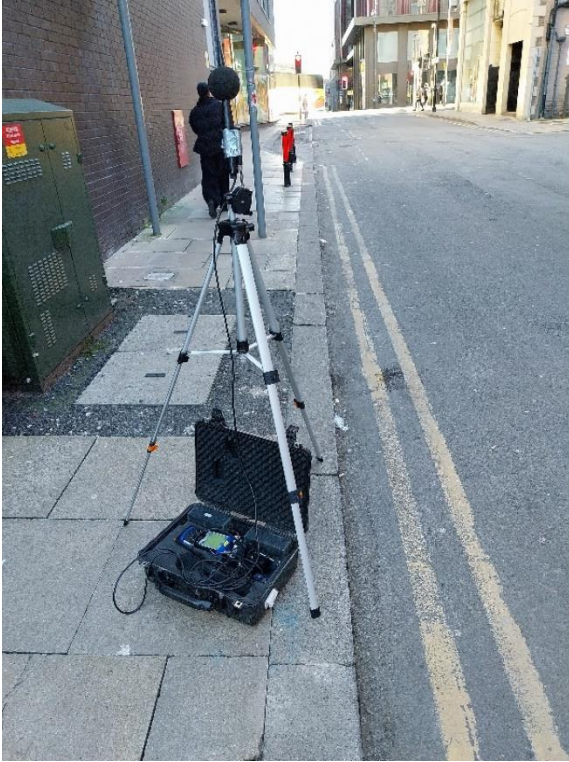


Figure A2: Attended Measurement Location 2



Figure A3: Unattended measurement Location 1



Figure A4: Unattended measurement Location 2

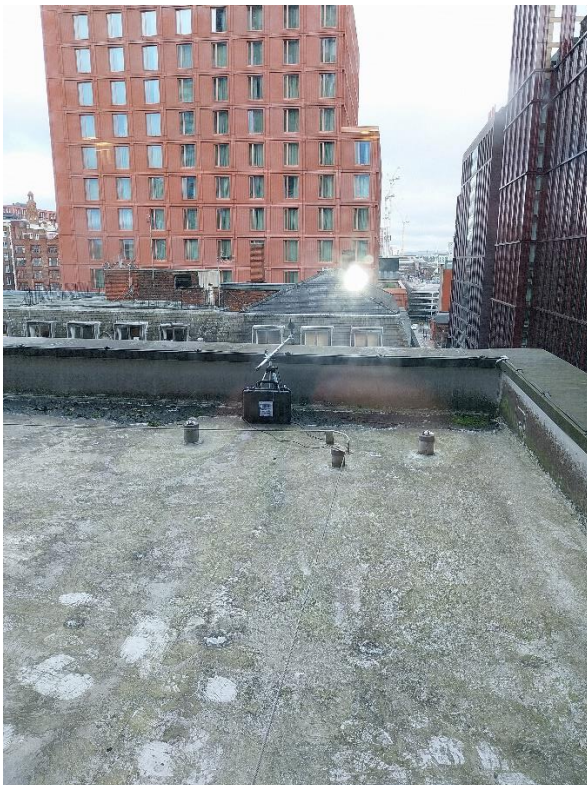


Figure A5: Unattended measurement position 1 data

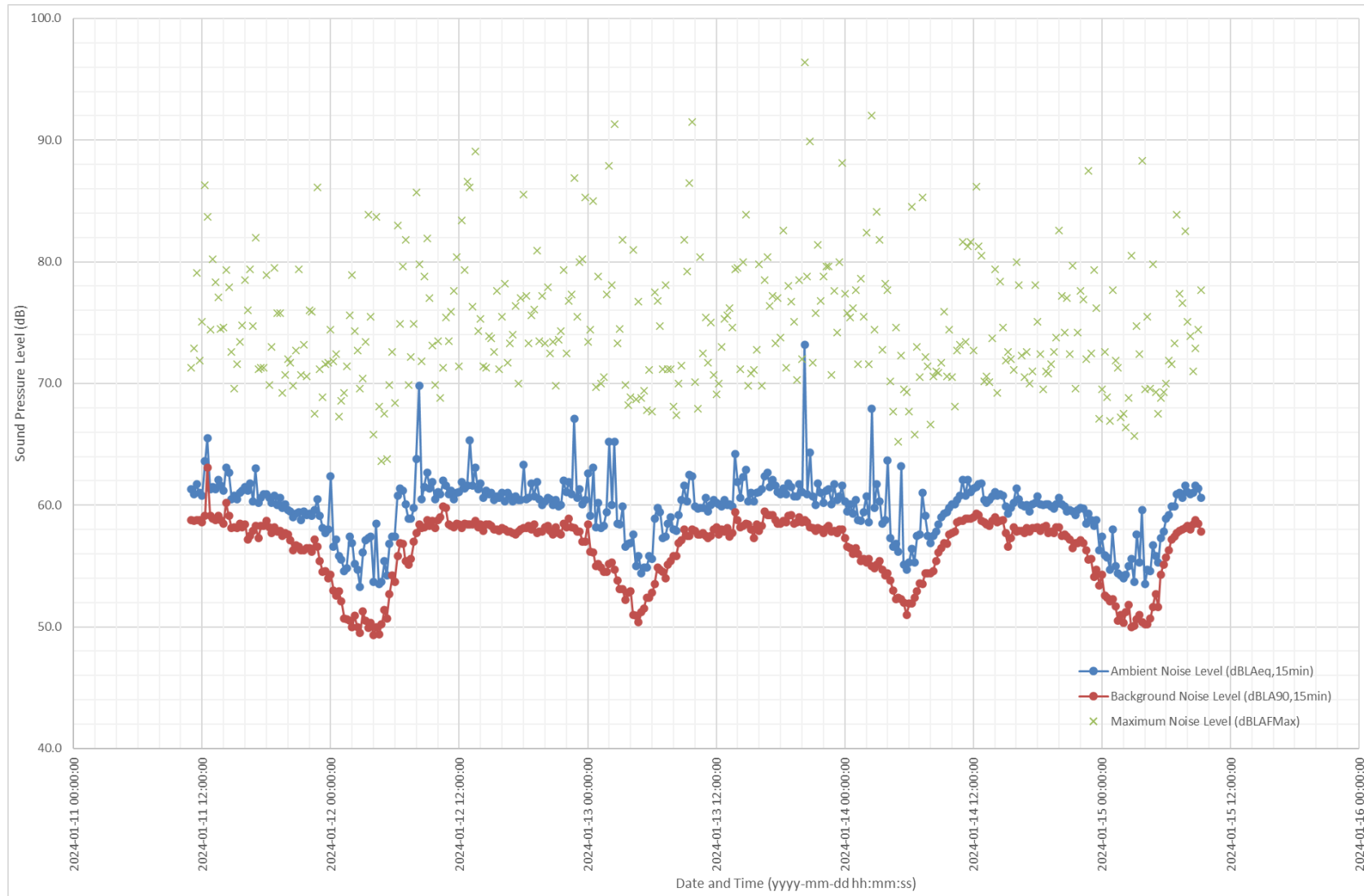
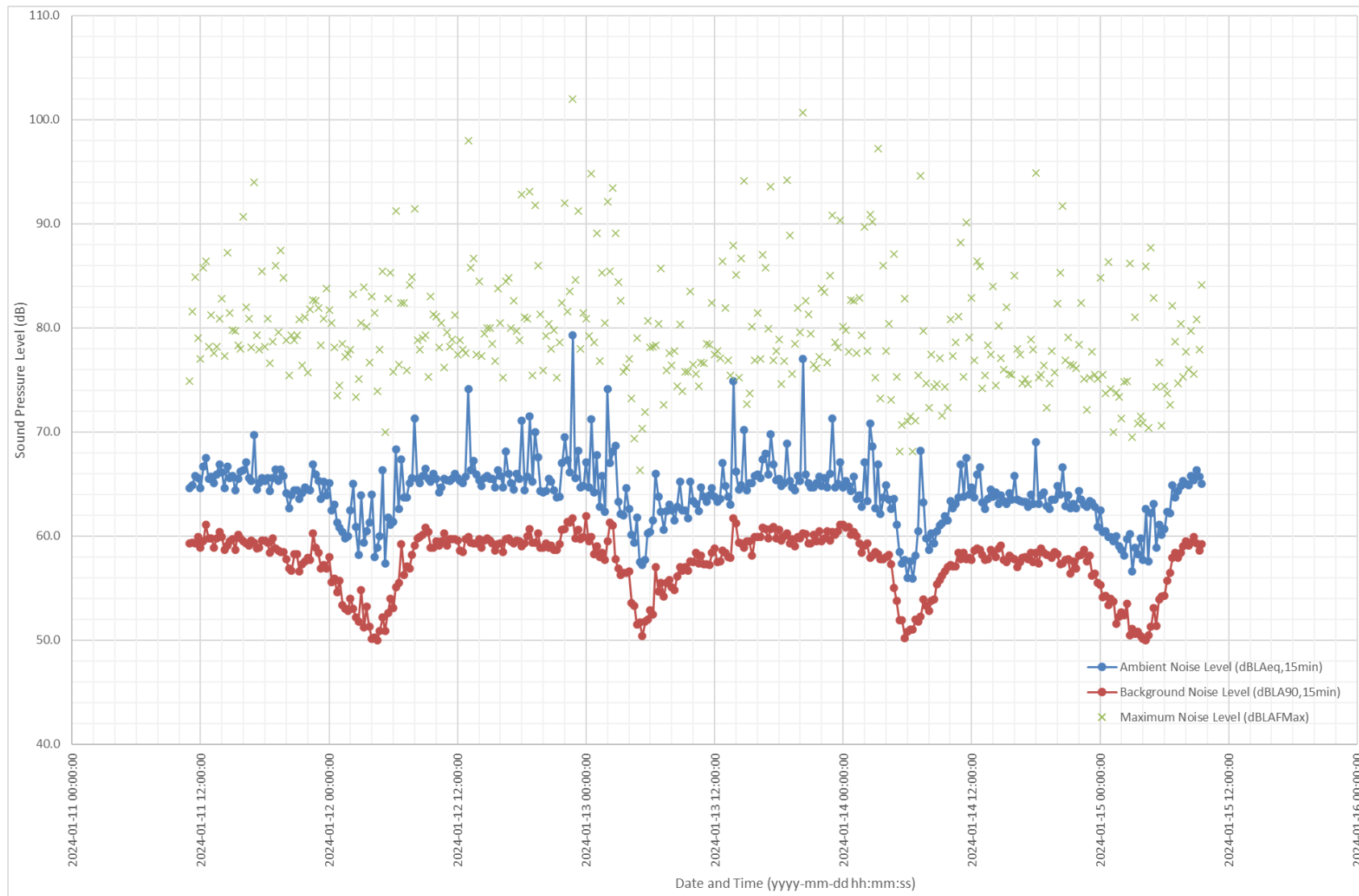


Figure A6: Unattended measurement position 2 data



Appendix II. Acoustic Glossary

Sound pressure level and the decibel, dB

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. The decibel is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Frequency and hertz, Hz

Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz. The human range of hearing is commonly accepted to be 20 Hz to 20,000 Hz. Additionally, an octave can be used to describe the interval between a frequency in Hz and either half or double that frequency.

Frequency weighting

Different weighting networks can be applied to a given sound level in each stated octave band by a specified amount, in order to better represent the response of the human ear. The most commonly used weighting network is the 'A' weighting, and the letter 'A' will be included within a descriptor to indicate that the value has been 'A' weighted, e.g. $L_{Aeq,T}$ or L_{A90} . An 'A' weighted noise level may also be written as dB(A). Other weightings less commonly used are 'C' and 'D' weighting.

Noise indices

When a noise level varies with time, the measured 'A' weighted dB level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple 'A' weighted dB value. In order to describe noise where the level is continuously varying, a number of other indices, including statistical parameters, are used. The various indices used are described as below:

$L_{Aeq,T}$	The 'A' weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period, T
L_{Amax}	The maximum 'A' weighted noise level that was recorded during the monitoring period.
L_{A10}	The 'A' weighted noise level that was recorded for at least 10% of the monitoring period.
L_{A90}	The 'A' weighted noise level that was recorded for at least 90% of the monitoring period, usually taken as the underlying 'background' noise level.

Sound level difference, D

The sound level difference between two internal spaces, or between internal and external spaces. The 'D' value is used to denote the differences at each third octave or octave band, with a single figure 'weighted' value to

describe an overall performance. Note that the 'D' value will always describe an in-situ or on-site acoustic performance. All values are described using the decibel.

D_w	Single figure weighted sound level difference, simply the measured source noise level minus receiver noise level, not adjusted to reference conditions
$D_{nT,w}$	Weighted normalised sound level difference – a single, weighted sound insulation value, normalised to a reference reverberation time using the measured reverberation time in the receive room
$D_{nT,w} + C_{tr}$	As above, with a spectral adaptation term applied to account for the effects of low frequency noise, and based on urban traffic noise
$D_{nf,w}$	Overall flanking normalised level difference - A parameter that defines the flanking transmission of sound from room to room where a dividing partition or floor construction abuts a flanking building element common to both rooms, such as the building façade or ceiling
$D_{n,e,w}$	Element normalised level difference. A level difference level derived transmission through the small technical element only, irrespective of area. This value is used to represent the sound insulation of façade ventilators.
$D_{n,e,w} + C_{tr}$	As above, with a spectral adaptation term applied to account for the effects of low frequency noise, and based on urban traffic noise

Sound reduction index, R

This describes the sound transmitted through a material or building element, such as a wall, door or window. It is measured in a laboratory with suppressed flanking transmission. The 'R' value is used to denote the differences at each third octave or octave band, with a single figure 'weighted' value to describe an overall performance. All values are described using the decibel.

R_w	Weighted single figure sound reduction index
$R_w + C_{tr}$	As above, with a spectral adaptation term applied to account for the effects of low frequency noise, and based on urban traffic noise
R'_w	The 'apparent sound reduction index', a field measurement to obtain the sound reduction index of a material or element, with all effects of site installation accepted.

Standardised impact sound pressure level, $L'_{nT,w}$

$L'_{nT,w}$ is the single figure used to characterise the impact sound pressure level in a receiving room, normalised to a reference reverberation time. Impact noise can be classified as (but is not limited to) the result of footfall impact on a separating floor to a habitable space below. All values are described using the decibel.

Reverberation time, T and T_{mf}

The reverberation time of a space is a measure of the rate at which sound decays, measured in seconds. It is defined as the time taken for the sound pressure level to reduce by 60 dB from its original impulse level.

Reverberation time is commonly quoted in terms of the mid-frequency reverberation time, T_{mf} , the arithmetic average of the reverberation times in the 500 Hz, 1 kHz and 2 kHz octave bands.

Absorption Coefficient

The acoustic absorption provided by a surface is defined as the sound absorption coefficient α , which denotes the fraction of sound energy absorbed between 0 (no absorption) and 1 (no reflection). The absorption coefficient of a material varies with the frequency of incident sound waves, therefore is considered for different frequencies.

Absorption Class

Based on the absorption coefficients, the overall sound absorption of a material is classified from Class A to Class E as defined in BS EN ISO 11654:1997, with Class A providing the highest level of acoustic absorption.

Noise rating, NR

The noise rating or NR system is commonly used in the design of noise emitted by internal building services systems. The system is frequency dependent, and was empirically derived to prevent disturbance to occupants in habitable or working areas from building services noise that exhibits 'tonal' elements, e.g. rumbles, whines, whistles etc. There is no direct relationship between the average 'A' weighted noise level in dB and the NR. However, as a guide, and assuming the absence of strong low frequency content in a given noise, the NR could generally be said to be 6 dB less than the average 'A' weighted dB value.

Privacy

Privacy is the addition of the level of sound insulation between two rooms and the background noise within a receiving room. It can be used to assess the level of privacy afforded in the 'receiving room' for speech from the 'source room'. The 'privacy factor' is a unit-less value that is the combination of the average 'A' weighted background noise level in dB and the weighted sound level difference (D_w) in dB.

Appendix III. SBE Acoustic Credentials

SBE have specialised in providing the UK Construction Industry with a range of acoustics services since 2006. Specialising in Building Acoustics, all SBE acousticians are members of the Institute of Acoustics.

SBE is accredited for on-site acoustic testing by United Kingdom Accreditation Service (UKAS) (Testing Laboratory Number 2731).

SBE meet the relevant acoustic requirements typically required in the UK, including for sound insulation testing as defined in Approved Document E for the purposes of testing for Part E to the Building Regulations 2010.

This report has been authorised by Tom Chaffer, Associate Acoustic Consultant who meets the BREEAM requirements for a suitably qualified acoustician (SQA) as follows;

1. Holds an MSc degree in Audio Acoustics from the University of Salford
2. Has been an Acoustic Consultant for more than three year's (within the last five years). This experience includes a practical understanding of factors affecting acoustics in relation to construction and the built environment; including, acting in an advisory capacity to provide recommendations for suitable acoustic performance levels and mitigation measures.
3. Holds Membership of the Institute of Acoustics - MIOA membership.

This report has been read and reviewed by Tom Chaffer and has been found to;

1. Represent sound industry practice
2. Be appropriate given the building being assessed and scope of works proposed
3. Avoid invalid, biased and exaggerated recommendations.

Appendix IV. Report Conditions

This document has been prepared for the sole use, benefit and information of the Client. The liability of Stroma Built Environment Ltd. in respect of the information contained herein will not extend to any third party unless prior agreement is obtained in writing from Stroma Built Environment Ltd.

This report is limited to addressing the specific acoustic issues contained herein. Advice has been provided for acoustic reasons only and it is recommended that appropriate expert advice be sought on all the ramifications, e.g. safety, fire, structural, CDM etc., associated with any proposals contained herein.

The in-situ performance of acoustic measures is influenced to a large extent by the quality of workmanship and compliance with the specifications on-site during construction, as such, Stroma Built Environment Ltd. accepts no liability for issues with acoustic performance arising from such factors.

Acoustic survey and testing work carried out for the project is representative of the prevailing conditions at the time of the work. Conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

In particular, it should be noted that where calculations are carried out that are based on assumptions regarding certain aspects where information has not been supplied, these are provided for indicative purposes only and should be treated as such.