Applicant: Kirklees Council
Building: George Hotel
L054-AHR-XX-XX-RP-A-08801
Noise Impact Assessment (With addendum)
Revision P1 (Planning and LBC)

April 2025

Kirklees Council
George Hotel

Noise Impact Assessment
(With Addendum)

Revision P1

Addendum Statement

This report was originally prepared on behalf of Kirklees Council to accompany application ref: 2023/65/90112/E

We confirm there are no substantive changes required and as a result resubmit with this application on behalf of the Applicant.

MOTT MACDONALD

George Hotel - Planning Report

Noise Impact Assessment

November 2022

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Mott MacDonald
Spring Bank House
33 Stamford Street
Altrincham WA14 1ES
United Kingdom

T +44 (0)161 926 4000
mottmac.com

George Hotel - Planning Report

Noise Impact Assessment

November 2022

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Contents

1 Introduction

Kirklees Council proposes to restore the Grade II* Listed George Hotel, and reinstate the George as a thriving, sustainable, hotel and hospitality development.

Mott Macdonald has been appointed to provide acoustic design advice to RIBA Stage 3, Spatial Coordination for the proposed redevelopment of the George Hotel, which is situated in Huddersfield Town Centre. This report presents the noise impact assessment that has been undertaken in support of the planning application for the scheme.

The George Hotel is located on St. George's Square adjacent to Huddersfield railway station, which is a relatively busy station with a steady flow of passengers.

The proposed development will consist of the following:

- Part retention of the original building ('Block A' that faces St George's Square);
- minor interventions to the retained building to facilitate a revised hotel room architectural layout;
- demolition of remaining buildings (with retention of listed façade facing onto John William Street); and,
- construction of new build hotel over the existing footprint of the demolished buildings (Blocks 'B' and 'C').

The hotel will be required to achieve compliance with Part E of the Building Regulations 2010 for control of noise[1] and will consist of both new build and refurbished elements.

Acoustic design issues related to the building will be considered in a separate report.

Results of a noise survey are presented. Relevant noise criteria for the assessment of noise impacts upon the proposed hotel and potential noise impacts resulting from the development have been assessed.

[1] HMSO, 2010. 'Statutory Instruments 2010 No.2214 Building and Buildings, England and Wales, The Building Regulations 2010'

2 Noise Related Planning Policies and Guidance

2.1 National Planning Policy

2.1.1 National Planning Policy Framework (NPPF)

The NPPF[2] advises that significant adverse impacts on health and quality of life due to adverse noise from noise development should be avoided. It also advises that other adverse impacts on health and quality of life arising from noise from new development should be reduced to a minimum.

Paragraph 174 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by, (amongst other considerations): "P*reventing 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*.*"*

In considering decision making, Paragraph 185 states that, *"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:*

- *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."*

2.1.2 The Noise Policy Statement for England (NPSE)

The NPSE[3] document does not refer to any other policy documents specifically regarding noise other than the NPSE. Its purpose is to promote *"good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."* The three main aims are to:

- *"avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.";*
- *mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development"; and,*
- *where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development."*

The NPSE does not however set any specific limits for either external or internal noise levels impacting upon or resulting from a new development.

[2] Department for Levelling Up, Housing and Communities, 2021. 'The National Planning Policy Framework'
[3] Department for Environment, Food and Rural Affairs, 2010. 'Noise Policy Statement for England'

2.1.3 Planning Practice Guidance

The Planning Practice Guidance (PPG)[4] is a web based resource that provides guidance on how the policy set out in NPPF may be interpreted in practice for a wide range of issues. There is a subsection of PPG relating specifically to noise:

"Plan-making and decision making need to take account of the acoustic environment and in doing so consider:

- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur.*
- *whether or not a good standard of amenity can be achieved.*

2.2 Local Planning Policy

The Kirklees Local Plan was adopted in February 2019[5]. Although it is a high-level document, the following section is stated with regards to noise impacts from a proposed new development:

Policy LP52:

"Proposals which have the potential to increase pollution from noise, vibration, light, dust, odour, shadow flicker, chemicals and other forms of pollution or to increase pollution to soil or where environmentally sensitive development would be subject to significant levels of pollution, must be accompanied by evidence to show that the impacts have been evaluated and measures have been incorporated to prevent or reduce the pollution, so as to ensure it does not reduce the quality of life and well-being of people to an unacceptable level or have unacceptable impacts on the environment.

Such developments which cannot incorporate suitable and sustainable mitigation measures which reduce pollution levels to an acceptable level to protect the quality of life and well-being of people or protect the environment will not be permitted.

Where possible, all new development should improve the existing environment."

2.3 Technical Standards

2.3.1 British Standard 4142:2014+A1:2019

British Standard 4142 "Methods for rating and assessing industrial and commercial sound" (2014, amended 2019)[6] provides a means of assessing likely adverse impacts from the introduction of a new sound source to an area.

The level of sound from proposed new plant, the 'rating level', is predicted in terms of the A-weighted equivalent continuous sound level $L_{Aeq,T}$ in decibel (dB) units and compared to the existing background sound level, in terms of dB $L_{A90,T}$. If the new source is impulsive, intermittent or tonal in nature, then the 'rating level' includes a penalty of between +3 dB and +18 dB, to account for the character of the sound.

The following conclusions may be drawn based upon the difference between the rating level and background sound level:

- *"Typically, the greater this difference, the greater the magnitude of the impact.*

[4] Department for Levelling Up, Housing and Communities, updated 2019. 'Planning Practice Guidance - Noise' accessed at https://www.gov.uk/guidance/noise--2 November 2022

[5] Kirklees Council, 2019. 'Kirklees Local Plan – Strategy and Policies'

[6] British Standards Institution, 2019. 'BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound'

- *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 around +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 of the specific sound source having a low impact, depending on the context."*

2.3.2 British Standard 8233:2014

British Standard 8233 "Guidance on sound insulation and sound reduction for buildings" (2014) [7] provides information on the design of rooms and buildings so that they have internal acoustic environments appropriate to their functions. It deals with control of noise from outside the building, noise from plant and services within it, and room acoustics for non-critical situations.

The BS 8233:2014 states desirable internal ambient noise levels to be achieved within dwellings, **Table 2.1** below details these levels.

Table 2.1: Indoor ambient noise levels for dwellings

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Room	35 dB $L_{Aeq,16hr}$	N/A
Dining	Dining Room/ Area	40 dB $L_{Aeq,16hr}$	N/A
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

Source: BS 8233:2014, Section 7, Table 4

Where it is not possible to meet the external levels stated above, a development should be designed so that the external areas achieve the lowest practicable noise levels.

2.3.3 British Standard 5228-1:2009+A1:2014

British Standard 5228 "Code of practice for noise and vibration control on construction and open sites – Part 1: Noise" (2009, amended 2014)[8] provides a methodology for predicting and assessing noise levels generated by fixed and mobile plant used in a range of typical construction operations. The standard recommends procedures for noise and vibration control in respect of construction operations for stake holders. Annex E of the Standard gives example criteria on how to determine significance of noise effects.

2.3.4 British Standard 5228-2:2009+A1:2014

British Standard 5228 "Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration" (2009, amended 2014)[9] provides guidance on the effect of vibration in terms of Peak Particle velocity (PPV) and the likelihood it will cause complaint and cosmetic damage to buildings. Vibration, even of very low magnitude, can be perceptible to people. It is generally tolerated, at low magnitudes, if prior notification has been issued. Vibration from construction activity can affect the occupiers or the structure itself.

BS 5228-2:2009+A1:2014 states:

[7] British Standards Institution, 2014. 'BS 8233:2014 Guidance on sound insulation and sound reduction for buildings'

[8] British Standards Institution, 2014. 'BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'

[9] British Standards Institution, 2014. 'BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'

"Vibrations above these levels [PPV 0.14 mm/s to 0.3 mm/s] can disturb, startle, cause annoyance or interfere with work activities. At higher levels they can be described as unpleasant or even painful. In residential accommodation, vibrations can promote anxiety…."

In addition, the standard provides the following guidance on vibration effects:

- At a vibration level of 0.14 mm/s, *"Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction"*;
- At a vibration level of 0.3 mm/s, *"Vibration might be just perceptible in residential environments"*;
- At a vibration level of 1.0 mm/s, *"It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents"*; and,
- At a vibration level of 10 mm/s, *"Vibration is likely to be intolerable for any more than a very brief exposure to this level"*.

2.3.5 CIBSE Guide A Environmental Design 2015

CIBSE Guide A[10] is a reference source for designers of building services for low energy sustainable buildings. Table 1.5 of the Guide provides recommended comfort criteria for specific room applications. These include noise criteria in terms of the equivalent continuous noise level $L_{Aeq,T}$ (dB) and Noise Rating (NR).

2.3.6 Calculation of Road Traffic Noise

The Calculation of Road Traffic Noise (CRTN)[11] describes the procedures for calculating noise from road traffic given as $L_{A10,18hr}$ between 06:00 and 00:00 using parameters such as the traffic flow, percentage of heavy goods vehicles and traffic speed.

2.4 Consultation

An enquiry was made to Kirklees Council (KC) environmental protection team by telephone and E-mail on 06 October 2022, to discuss terms of reference for the noise assessment. The assessment was subsequently discussed in a telephone call with an Environmental health Office from KC on 11 October 2022. The following key points were agreed during the discussion:

- Rating level $L_{Ar,Tr}$ limit for noise emission from building services plant should not exceed the typical background sound level $L_{A90,T}$ prevailing prior to implementation of the development;
- Internal ambient noise level criteria applied to hotel bedroom should be those for sleeping and daytime resting from Table 4 of BS 8233:2014;
- The assessment should cover the proposed approach for deliveries and collections from the Hotel; and
- KC preferred construction hours are 07:30 – 18:00 Monday to Friday, and 08:00 – 14:00 Saturdays. Exceptions to these hours should be agreed in advance with KC.

[10] Chartered Institute of Building Services Engineers, 2015. 'CIBSE Guide A Environmental Design (2015, updated 2021)'

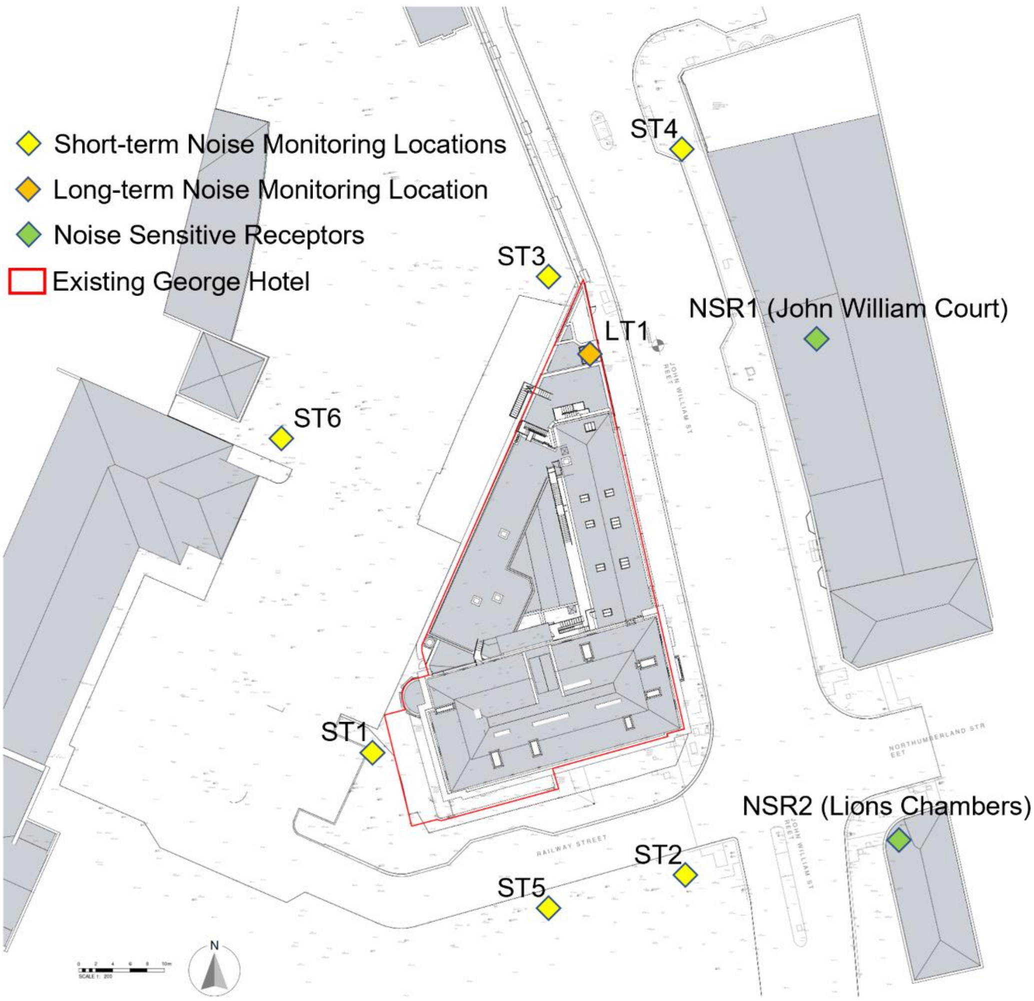
[11] Department for Transport and Welsh Office, 1988. 'Calculation of Road Traffic Noise'

3 Site Description

The George Hotel is located on St. George's Square, adjacent to Huddersfield Railway Station, in a predominantly commercial area which includes offices and retail facilities, as well as residential buildings in the vicinity of the site boundary. The site is bounded by John William Street to the east and St. George's Square to the south. The south and east façades of the hotel face towards buildings that are used as residential and retail properties. The Huddersfield Railway Station is also located to the West of the site, and the car park associated with the station is to the northwest.

A number of Noise Sensitive Receptors (NSRs) are located within a distance where potential impacts could occur from noise from the proposed development. **Figure 3.1** illustrates the site boundary, the nearest NSRs and the measurement locations.

Figure 3.1: Site plan of the existing George Hotel site outline



Source: Annotated excerpt from Bowman Riley Architects drawing 8662-BOW-ZZ-ZZ-DR-A-P003

4 Noise Survey

A noise survey was undertaken both to determine the ambient noise levels incident upon the hotel façades, informing building envelope design and ventilation strategy, and to determine day and night-time background sound levels representative of the NSRs. The NSRs are residential apartments situated above commercial premises along John William Street.

One long-term measurement (LT1) was undertaken between the 23rd of September 2022 and the 27th of September 2022, over a 72-hour period, using a sound level meter. The position of LT1 was chosen to be representative of the surrounding NSRs. Further attended short-term measurements were carried out around the perimeter of the hotel site boundary (referenced as ST1 to ST6). The noise monitoring locations are shown in **Figure 3.1** and further details about the locations are provided in **Table 4.1**.

Table 4.1: Noise monitoring locations

Label	Location	Representation
LT1	Free-field measurement situated on scaffolding on the second-floor level at the north-western extent of the existing George Hotel building. 7 m from the carriageway of John William Street.	Nearest noise sensitive receptors and eastern façade
ST1	Free-field measurement situated on St. George's Square. 10 m from the carriageway of Railway Street.	Western façade
ST2	Free-field measurement situated on St. George's Square. 7 m from the junction of Railway Street and John William Street.	Southern façade
ST3	Free-field measurement situated in the Huddersfield station car park. 10 m from the carriageway of John William Street.	Northern façade
ST4	Façade measurement situated on the road pavement. 5 m from the carriageway of John William Street.	Eastern façade
ST5	Free-field measurement situated on St. George's Square. 7 m from the carriageway of Railway Street.	Additional southern façade
ST6	Free-field measurement situated in the Huddersfield station car park. 10 m from the carriageway of Railway Street.	Additional western façade

Source: Mott Macdonald

All measurements were undertaken by engineers competent in environmental noise monitoring and completed in accordance with the principles of BS 7445:2003[12]. All acoustic measurement equipment used during the noise survey was designed to be in conformance with the BS EN 61672:2013[13] to the requirements of the Class 1 standard.

All meters and field calibrators used held current calibration certificates obtained under laboratory conditions traceable to UK and International Standards. Before and after the measurement session the reference calibration level of the sound level meter was checked using a field calibrator. Variation of no more than 0.2 dB in the reference level was identified over any measurement session.

An inventory of the equipment used is shown in **Table 4.2**.

[12] British Standards Institution, 2003 'British Standard 7445 Description and measurement of environmental noise. Guide to quantities and procedures'

[13] British Standards Institution, 2013 'British Standard EN 61672-1:2013 Electroacoustics. Sound level meters. Specifications'

Table 4.2: Noise measurement equipment details

Item	Make & model	Serial number	Calibration date
Calibrator	Rion NC75	34913593	21/02/2022
Sound Level Meter 1	RION NL-52	1176427	21/02/2022
Sound Level Meter 2	RION NL-52	1143538	05/02/2022

Source: Mott Macdonald

All sound level meters recorded the equivalent continuous noise level ($L_{Aeq,T}$), statistical noise level indicators such as the background noise level ($L_{A90,T}$), one-percentile statistical noise level ($L_{A01,T}$), ten-percentile statistical noise level ($L_{A10,T}$) and maximum noise level (L_{Amax}).

4.1 Noise Survey Results

The dominant noise source surrounding the site was road traffic noise from John William Street and vehicles driving up to the Huddersfield Station car park. Other contributory noise sources included occasional aircraft flyovers at high altitude, pedestrians, building services noise and train movement noise from Huddersfield railway station, construction noise from repair works to the external façade of the George Hotel.

The dominant noise source incident upon the western façade of the George Hotel was vehicles accessing the station car park and station drop off locations. Road traffic noise from John William Street was the dominant noise source at the southern, eastern and northern façades. Other contributory noise sources included noise from construction works at the George Hotel which were audible on occasion but not considered influential to the measurement results. noise from Huddersfield station (trains stopping and pulling off, building services noise and noise from the PA system), aviation noise from high altitude helicopters and aircraft and noise from pedestrians accessing the station.

At the time of the noise survey, construction works were ongoing on the existing George Hotel. This noise was audible during measurements but not considered to be influential of the measurement results.

4.1.1 Short-term noise monitoring results

The purpose of the attended short-term noise measurements was to determine the likely noise levels that will be incident on the proposed development façades. **Table 4.1** summarises the George Hotel façade representations of the multiple short-term noise measurements.

Table 4.3: Summary of short-term monitoring results

Position	Measurement start date and time	Duration (min)	$L_{Aeq,15min}$ (dB)	L_{Amax} (dB)	Modal $L_{A90,5min}$ (dB)
ST1	23/09/2022 13:55	15	61	76	55
ST2	23/09/2022 14:15	15	64	78	57
ST3	23/09/2022 14:35	15	58	73	53
ST3	27/09/2022 11:05	15	59	79	53
ST4*	27/09/2022 10:45	15	62	76	54
ST5	27/09/2022 11:30	15	59	71	54
ST6	27/09/2022 11:50	15	56	81	53

*Façade correction (−3 dB) applied to evaluate the free field results

Source: Mott Macdonald

A summary of the results from the short-term monitoring locations are provided in **Table 4.3**. **Table 4.4** also provides the A weighted octave band data for each monitoring location. Photographs of the measurement locations can be found in **Appendix B**.

Table 4.4: Summary short-term monitoring A weighted octave band results

		A-weighted octave bands for the $L_{Aeq,15min}$ (dB)						
Position	**Measurement start data and time**	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1 kHz**	**2 kHz**	**4 kHz**
ST1	23/09/2022 13:55	42	46	50	54	56	54	48
ST2	23/09/2022 14:15	44	49	55	58	60	57	51
ST3	23/09/2022 14:35	41	42	46	52	55	52	44
ST3	27/09/2022 11:05	43	42	48	53	55	53	49
ST4*	27/09/2022 10:45	43	45	51	55	59	56	49
ST5	27/09/2022 11:30	44	46	50	52	55	52	47
ST6	27/09/2022 11:50	44	41	45	48	53	49	41

*Façade correction (−3 dB) applied to evaluate the free field results

Source: Mott Macdonald

4.1.2 Long-term noise monitoring results

The long-term noise monitor (LT1) was used for the purposes of determining the background sound levels with reference to BS 4142:2014+A1:2019. For this reason, the results are expressed in L_{A90} dB and are presented in **Table 4.5** and **Figure 4.1**. LT1 was also used to confirm noise levels incident upon the east façade (John William Street) during the night-time. Due to the relative positions of LT1 and the existing hotel building, the field of view from LT1 to John William Street is partially restricted. For the purposes of defining noise levels incident upon the eastern façade, a +3 dB correction has therefore been applied to allow for this. The corrected noise levels from LT1 are presented in **Table 5.2**.

Figure 4.1: Long-term noise time history

Source: Mott Macdonald

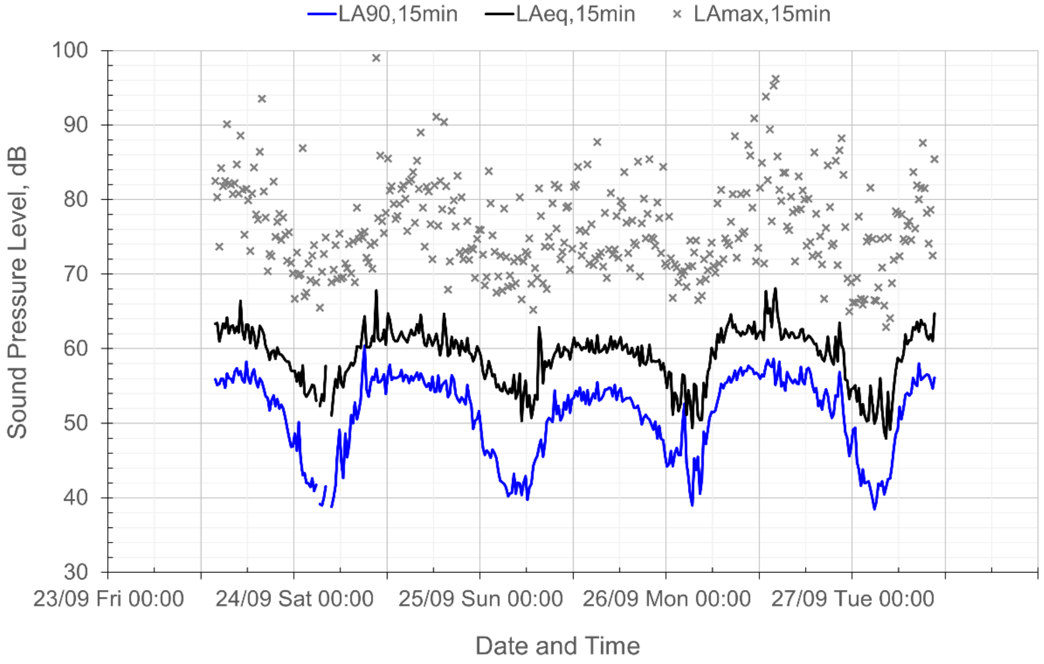


Table 4.5: Long-term noise monitoring results

Time period	$L_{Aeq,T}$ (dB)	Modal $L_{A90,15\ min}$ (dB)
Weekday daytime (07:00 – 23:00)	62	56
Weekday night-time (23:00 – 07:00)	55	42
Weekend daytime (07:00 – 23:00)	61	53
Weekend night-time (23:00 – 07:00)	56	46

Source: Mott Macdonald

5 Assessment of Noise Impacts

5.1 Noise Break-in

To facilitate specification of glazing, noise break-in calculations have been undertaken for a sample of rooms on the eastern façade (facing John William Street), southern façade (facing St. George's Square) and the western façade (facing Huddersfield railway station). The methodology set out in Annex G of BS 8233:2014 has been applied to the calculation.

Noise break-in calculations have been undertaken using the external noise levels defined in terms of $L_{Aeq,T}$ in **Section 4** for both daytime and night-time. These predictions are summarised below.

The calculations were done for a select number of rooms considered to represent the varying conditions around the proposed hotel (incident noise level at the façade, floor height, room dimensions and room sensitivity). The rooms considered in the calculation are detailed in **Table 5.1**. The room, door and window dimensions have been determined from Bowman Riley Drawings No 8662-BOW-A1-01-DR-A-0015, No 8662-BOW-A1-02-DR-A-0016 and No 8662-BOW-A1-04-DR-A-0020.

The short-term measurements at ST1, ST2 and ST4 were used in the daytime calculations for rooms located on the western, southern and eastern façades respectively, as detailed in **Table 5.1**. These short-term monitoring locations were regarded to be the most representative of the free-field noise levels incident at the respective façades. The long-term measurements at LT1 for the weekday average night-time $L_{Aeq,8hr}$ were used in the night-time calculations because they reasonably represent the typical free-field noise levels at the façades during the night. The acoustic field of view of the road traffic noise from John William Street was restricted by 90° at LT1 due to the building façade, so a +3 dB field of view correction was applied to the LT1 measurements as per the guidance in Chart 10 of the CRTN.

Table 5.1: Rooms considered in noise break-in calculations

Room	Floor	Façade	Façade description	Daytime / night-time sources
Bedroom 1.08	First	Eastern	1 window facing John William Street	ST4 / LT1
Bedroom 2.02	Second	Western	1 window facing Huddersfield railway station	ST1 / LT1
Bedroom 2.04	Second	Southern	1 window facing St. George's Square	ST2 / LT1
Bedroom 2.06	Second	Southern	2 windows facing St. George's Square	ST2 / LT1
Bedroom 2.10	Second	Eastern	1 window facing John William Street	ST4 / LT1
Conference / private dining room	First	Southern	3 windows facing St. George's Square	ST2 / LT1

Source: Mott Macdonald

The A-weighted octave band results used for the daytime and night-time sources in the noise break-in calculations are presented in **Table 5.2**.

Table 5.2: A weighted octave band results used in the break-in calculations

		A-weighted octave bands for the $L_{Aeq,T}$ (dB)						
Position	**Date and time period**	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1 kHz**	**2 kHz**	**4 kHz**
ST1	23/09/2022 (13:55 – 14:10)	42	46	50	54	56	54	48
ST2	23/09/2022 (14:15 – 14:30)	44	49	56	58	60	57	51

		A-weighted octave bands for the $L_{Aeq,T}$ (dB)						
ST4*	27/09/2022 (10:45 – 11:00)	43	45	51	55	59	56	49
LT1**	Weekday average night-time (23:00 – 07:00)	41	43	50	55	56	52	47

*Façade correction (−3 dB) applied for the noise break-in calculations
**Field of view correction (+3 dB) applied for the noise break-in calculations

Source: Mott Macdonald

At the time of writing this report, design details of the building envelope were yet to be finalised and therefore, realistic assumptions have been made based on the proposed plans. Separate calculations were done using typical float glass (thermal) glazing and enhanced glazing (manufacturer's sound reduction indices for 6mm-16mm argon-6.8mm Pilkington Optiphon have been assumed for prediction purposes) with a higher acoustic performance. The assumed acoustic properties of these façade elements, and the external wall, are summarised in **Table 5.3**. We understand that the building will be mechanically ventilated. No allowance has therefore been made in the noise break-in calculations for natural ventilation openings such as trickle vents. It is further assumed that the mechanical ventilation system is acoustically treated so that ductwork to inlets or discharge openings in the façade does not form a path for noise intrusion into the guest rooms.

Table 5.3: Sound insulation performance of façade elements

Building element	Description	Source	Sound reduction index at octave band centre frequency (dB)						
			63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
External wall	Brick and block wall*	BS 8233:2014	40**	40	44	45	51	56	100
Typical float glass glazing	Double 6:(6-16):6 mm	BS12758:2019	24**	24	24	32	37	37	44
Acoustically enhanced glazing	6mm-16mm argon-6.8mm Pilkington Optiphon	Pilkington Brochure	21**	21	28	37	48	48	54

*Most representative data available for a stone and mortar external façade
**Assumed for 63 Hz band (not in the literature) for a more conservative acoustic design approach

Source: Mott Macdonald

For calculation purposes, the assumptions for reverberation time within bedrooms and conference spaces are presented in **Table 5.4**. These are consistent with the typical finishes and furnishings for these types of rooms.

Table 5.4: Assumed reverberation times for the bedrooms and conference room

	Reverberation time with octave band frequency (s)							
Room	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	Tmf** (s)
Bedroom 1.08	1.5*	1.5	0.8	0.5	0.5	0.5	0.4	0.5
Bedroom 2.02	1.4*	1.4	0.8	0.4	0.4	0.4	0.3	0.4
Bedroom 2.04	1.4*	1.4	0.8	0.4	0.4	0.4	0.3	0.4
Bedroom 2.06	1.5*	1.5	0.8	0.4	0.4	0.4	0.3	0.4
Bedroom 2.10	1.4*	1.4	0.8	0.4	0.4	0.4	0.3	0.4
Conference / private dining room	1.9*	1.9	1.0	0.5	0.5	0.5	0.4	0.5

*Assumed for 63 Hz band (not in the literature) for a more conservative acoustic design approach

Reverberation time with octave band frequency (s)
**Mid-frequency reverberation time is the arithmetic average of reverberation time in the 500 Hz, 1 kHz and 2 kHz octave bands

Source: Mott Macdonald

The results from the internal noise level calculations are presented in **Table 5.5** for daytime and **Table 5.6** for night-time. Since the window framing design is yet to be finalised, it was assumed the frame would cause a reduction in acoustic performance. Thus, an uncertainty of +3 dB was added to all the indoor ambient noise level (IANL) predictions.

Table 5.5: Daytime internal noise break-in

Room	Free field noise level at façade $L_{Aeq,8hr}$ (dB)	IANL prediction with typical thermal glazing $L_{Aeq,8hr}$ (dB)	IANL prediction with acoustically enhanced glazing $L_{Aeq,8hr}$ (dB)	BS 8233:2014 IANL criteria for hotel bedrooms $L_{Aeq,T}$ (dB) – daytime
Bedroom 1.08	62	34	29	≤35
Bedroom 2.02	60	30	26	≤35
Bedroom 2.04	63	35	30	≤35
Bedroom 2.06	63	38	32	≤35
Bedroom 2.10	62	31	26	≤35
Conference / private dining room	63	39	34	≤35*

*Criteria provided by CIBSE Guide A

Source: Mott Macdonald

Table 5.6: Night-time internal noise break-in

Room	Free field noise level at façade $L_{Aeq,T}$ (dB)	IANL prediction with typical thermal glazing $L_{Aeq,8hr}$ (dB)	IANL prediction with acoustically enhanced glazing $L_{Aeq,8hr}$ (dB)	BS 8233:2014 IANL criteria for hotel bedrooms $L_{Aeq,T}$ (dB) – night-time
Bedroom 1.08	59	33	28	≤30
Bedroom 2.02	59	30	25	≤30
Bedroom 2.04	59	30	25	≤30
Bedroom 2.06	59	33	27	≤30
Bedroom 2.10	59	30	25	≤30

Source: Mott Macdonald

For bedrooms with windows on the southern and western façades, the prediction results in **Table 5.5** and **Table 5.6** show that the BS 8233:2014 IANL criteria is not exceeded when typical thermal glazing is used.

However, typical thermal glazing is not adequate for Bedroom 2.06 (for both daytime and night-time) and Bedroom 1.08 (for night-time). The IANL criteria is likely exceeded in Bedroom 2.06 because it has two windows on the southern façade facing St. George's Square, and the room is close to the junction of Railway Street and John William Street. The predicted IANL in Bedroom 1.08 is also high because it has one window on the eastern façade facing John William Street. Most of the road traffic noise from John William Street will be incident on rooms located along the eastern façade. It is also important to note that the night-time IANL predictions for the Bedrooms 2.02, 2.04 and 2.10 are 30 dB $L_{Aeq,8hr}$, which is equivalent to the upper bound of the BS 8233:2014 IANL criteria at night-time.

When acoustically enhanced glazing is considered in the building envelope, the prediction results in **Table 5.5** and **Table 5.6** show that the BS 8233:2014 IANL criteria at all the considered rooms is not likely to be exceeded based on the current incident noise levels at the façade.

Therefore, it is recommended that acoustically enhanced glazing with an equivalent sound insulation performance to the 6mm-16mm argon-6.8mm Pilkington Optiphon should be used for bedrooms along the eastern façade that have windows exposed onto the John William Street. These rooms will be exposed to the road traffic noise from John William Street, which was regarded to be the most dominant noise source during the noise survey. It is also advised that a similar acoustically enhanced glazing is used for rooms on the southern façade that are on the west side of the hotel entrance, as these rooms are closer to the junction of Railway Street and John William Street.

Typical thermal glazing can be used for the building envelope of other rooms located along the southern and western façades because it offers adequate noise mitigation.

5.1.1 Consideration of L_{Amax} during the night

Review of **Figure 4.1** reveals a significant incidence of $L_{Amax,15min}$ of the order 70–80 dB during the night-time period measured at LT1, and therefore representative of the eastern façade. It is likely that many of the noise events responsible for these levels emanated from sources on John William Street. Such events pose a risk of disturbance to sleeping hotel guests which is not captured in the $L_{Aeq,T}$ based analysis presented above.

There is no definitive guidance on thresholds for disturbance due to L_{Amax}, however a level of 45 dB L_{Amax} is the lower bound of the range of example criteria used by some hotel groups cited in Annex H of BS 8233:2014.

Additional noise break-in calculations have therefore been undertaken using an L_{Amax} spectrum. The spectrum presented in **Table 5.7** was derived using the modal value for $L_{Amax,15min}$ at each octave band from data on the worst-case night during the noise survey. Based on **Figure 4.1**, the worst case for the night-time noise levels was the night of Sunday 25th September. The calculations were repeated using the same assumptions for the acoustically enhanced glazing as those reported above for the evaluation based on $L_{Aeq,T}$.

Table 5.7: A weighted octave band L_{Amax} incident upon the hotel façade

		A-weighted octave bands for the modal $L_{Amax,15min}$ (dB)						
Position	**Date and time period**	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1 kHz**	**2 kHz**	**4 kHz**
LT1*	25/09/2022 (23:00 – 07:00)	57	56	63	61	65	67	65

*Field of view correction (+3 dB) applied for the noise break-in calculations

Source: Mott Macdonald

Table 5.8: Night-time noise break-in predictions based on the modal $L_{Amax,15min}$

Room	Modal $L_{Amax,15min}$ free field noise level at façade (dB)	Modal $L_{Amax,15min}$ indoor noise level prediction (dB)	Lower bound threshold for indoor noise level for hotel bedrooms $L_{Amax,T}$ (dB) – night-time
Bedroom 1.08	75	44	≤45*
Bedroom 2.10	75	40	≤45*

*As cited in Annex H of BS 8233:2014

Source: Mott Macdonald

Table 5.8 presents the prediction results of the night-time modal L_{Amax} indoor noise levels in Bedrooms 1.08 and 2.10, which both have windows exposed to John William Street. The results of the analysis for L_{Amax} break-in show that the acoustically enhanced glazing provides reasonable mitigation such that the internal noise break-in is below the lower bound threshold cited in Annex H of BS 8233:2014.

5.2 Construction Noise and Vibration

Noise and vibration from construction activities will usually be tolerated by the occupiers of nearby residential NSRs provided the following: prior notice is given, the impacts are restricted to reasonable times, and they are kept to a minimum level. Limits for preferred construction working hours (07:30 – 18:00 Monday to Friday, and 08:00 – 14:00 Saturdays) have been agreed in a consultation with KC environmental protection team (refer to **Section 2.4**) and will be incorporated into the specification for the proposed development.

Best Practicable Means (BPM) for control of noise and vibration will be applied at all times. BPM will be based upon guidance provided within BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014, and the BPM should include the selection of the most appropriate method and plant for the job, adequate maintenance of plant, optimum siting of stationary plant, local screening, and the education of the workforce. Restrictions may also be placed on early/late delivery times. Potentially affected residents and retailers near the redevelopment site will be kept informed in advance of the noisy works and contacts details be provided to request further information or to report disturbance.

Incorporated mitigation related to construction noise and vibration will be set out within the Construction Environmental Management Plan (CEMP). This will identify the series of measures to reduce the environmental effects, including noise and vibration, during the construction period and covers environmental and safety aspects affecting the interests of residents, businesses, road users and the general public in the vicinity of the works.

The approach described above will satisfy the aims set out in Paragraph 185 of the NPPF and the first two aims of NPSE.

5.3 Emission of Noise from Fixed Plant Installations

There will be building services plant installations, which may emit noise externally to the building.

Plant noise emissions will be controlled to ensure that the Rating Level achieves the Local Authority requirement that it should not exceed the pre-existing background noise level expressed in terms of L_{A90}.

Should plant noise include tonal, impulsive or other features that are likely to attract the attention of off-site noise sensitive (e.g. residential) receptors, a character penalty, from 2–18 dB (although unlikely to exceed 10 dB) is added to the specific sound level to derive the Rating Level. Plant that contain these character features should therefore be avoided where practical. Generally, plants should not be located close to noise sensitive receptors.

Review of the L_{A90} measurements for position LT1 indicates that appropriate typical free-field reference background sound levels representative of the railway station near the hotel would be 56 dB during the daytime (07:00 – 23:00) and 42 dB during the night-time (23:00 – 07:00). These reference sound levels are based upon modal values of measured L_{A90} during these times. These sound levels are proposed as Rating Sound Level limits for building services plant.

Application of these noise limits will satisfy the aim from paragraph 185 of the NPPF to *"avoid noise giving rise to significant adverse impacts on health and the quality of life"* and will satisfy the first aim of NPSE to *"avoid significant adverse impacts on health and quality of life from* *environmental, neighbour and neighbourhood noise…"*. These limits will also comply with the guidance of the BS 4142:2014+A1:2019 for noise from fixed plant.

5.4 Emission of Noise from Pedestrians Accessing the Building

Pedestrians entering and leaving the redevelopment site building and railway station, and those congregating around St George's Square, will potentially generate noise due to speech and footfall. Pedestrian activity is currently present at the site, as observed during the noise survey.

Noise impacts generated by pedestrians cannot be directly controlled and there is no accepted methodology to determine significance of changes in such noise which is sporadic and highly variable. The noise survey has shown that generally during the daytime (07:00 – 23:00) noise levels around the area of the proposed development are of the order 62 dB $L_{Aeg,T}$ and during the night-time (23:00 – 07:00) noise levels are typically around 56 $L_{Aeg,T}$. This is consistent with the urban location, as it is close to significant roads. This will lessen the degree to which any noise from pedestrians is perceived by nearby residents and the guests and staff of the proposed hotel.

The site has previously operated as a hotel, so the project is unlikely to introduce new noise sources from pedestrians accessing the building. The entrance to the site building does not face towards the residential receptors, so any noise emission from pedestrians entering and leaving the building will be screened from these NSRs. Thus, there is no adverse impact due to noise from pedestrians as it is not anticipated for there to be a net increase in these noise sources.

5.5 Noise from Staging of Events within the Hotel.

There is a proposed banqueting and event space at the basement level on the eastern side of the hotel. It is assumed that permission will be sought to hold events such as weddings which may extend beyond 23:00 and may include amplified music. The basement level does not have any windows and the proposed fire escape route is effectively lobbied so there are no doors opening directly from the event space onto John William Street. Therefore, noise generated within the event space will be contained and is unlikely to result in noise break-out to residences opposite. No significant adverse impact due to noise from events is anticipated.

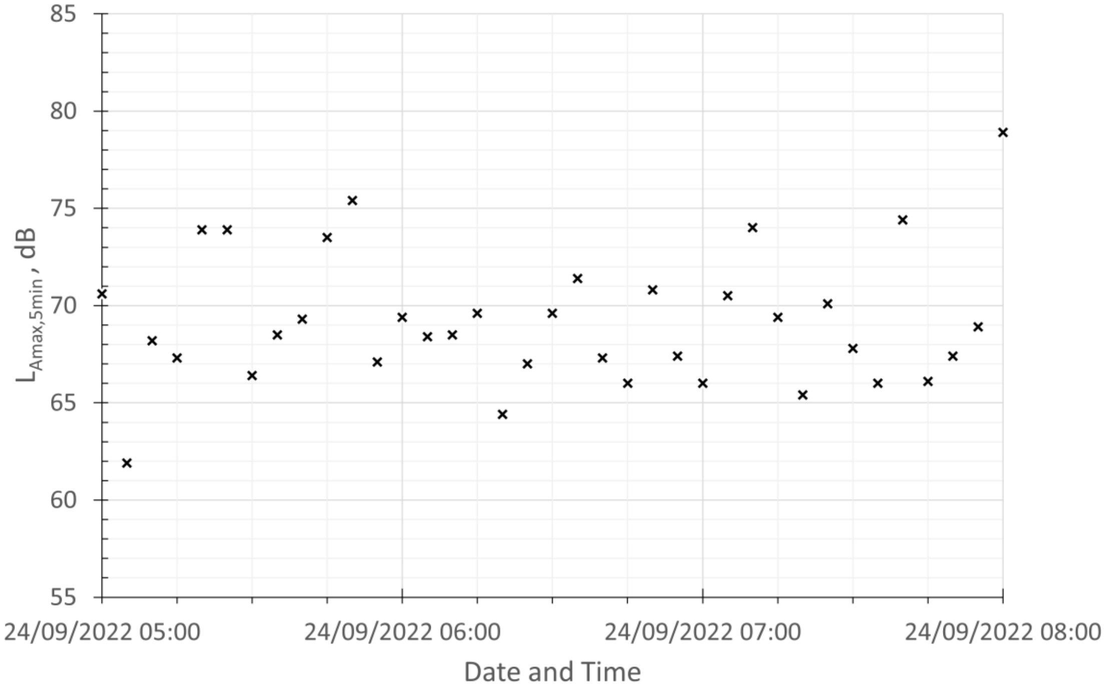
5.6 Emission of Noise from Collections/Deliveries

It is understood that deliveries and collections associated with the operation of the hotel, including for example, food and beverage deliveries and laundry collections, will access the western side of the hotel via the Railway Street access. This is remote from noise sensitive receptors and is not anticipated to result in noise disturbance.

For operational reasons, bin collections will be made on John William Street directly from an internal bin store at the northern extent of the hotel via doors leading directly onto John William Street. These collections are understood to occur once per day and will occur in the early morning. These collections are likely to be audible at residences situated across John William Street from the hotel. It is important however to consider the context of residences in this location. This part of John William Street is in a predominantly commercial district within Huddersfield Town Centre, with the railway station, Huddersfield Open Market and Tesco Superstore in close proximity. These facilities will have existing regular early morning deliveries and heavy vehicle movements resulting in loud noise events. This is borne out my review of maximum noise events for the early morning period measured at LT1 which is directly opposite the residences.

Figure 5.1 shows the $L_{Amax,5min}$ time history at LT1 over the early morning period (05:00 –07:00) on Monday 24th September 2022. It is clear that in almost all 5 minute periods, there was at least one noise event which fell within the range 65–75 dBA with a small number of excursions above that (note that only the loudest event in each 5 minute interval is recorded). A single bin delivery visit on John William Street will fall within the existing pattern of noise events that would be typical of this area. It is therefore considered that bin collections would not result in a significant adverse impact or associated effect at the noise sensitive receptors on John William Street.

Figure 5.1: $L_{Amax,5min}$ time history during the early morning on a weekday



Source: Mott Macdonald

5.7 Emission of Noise from Vehicles Accessing the Site and the Station Car Park

The proposed scheme will not introduce changes to the parking provisions near the site, which include the taxi ranks/bus stops beside Huddersfield railway station. The development is not anticipated to increase the traffic on local roads by a significant level that would change the noise levels experienced by the nearby residential NSRs. No adverse impacts and effects due to traffic change on the local road network or vehicles accessing parking provision are anticipates as a result of operation of the hotel.

6 Conclusions

Planning policy and guidance relevant to the assessment of noise impacts upon and generated by the proposed George Hotel development have been presented. Details of the consultation between the consultant and Kirklees Council has been summarised.

The results of a noise survey at the site have been presented.

The potential for noise and vibration impacts from construction of the Scheme has been considered along with proposals for mitigation by implementation of best practicable means.

Appropriate criteria for internal ambient noise for the new hotel have been identified. The measured noise levels indicate that appropriate internal ambient noise levels can be achieved with typical façade constructions, however acoustically enhanced glazing is recommended for the eastern façade facing John William Street, and part of the southern façade facing onto St George’s Square.

With reference to BS 4142:2014+A1:2019, limits for rating level have been proposed for the fixed plant associated with the development. Limits were based upon measured background sound levels representative of the nearest noise sensitive receptors.

The potential for noise emissions from pedestrians accessing the building, events held within the hotel, collection/delivery vehicles and road traffic associated with the proposals have been considered. None of these are anticipated to result in significant adverse impacts and associated effects at the closest noise sensitive receptors.

The proposed hotel development is therefore considered to be consistent with the aim set out in Paragraph 185 of the NPPF, the first two aims of NPSE and local policy as stated in LP52 of The Kirklees Local Plan.

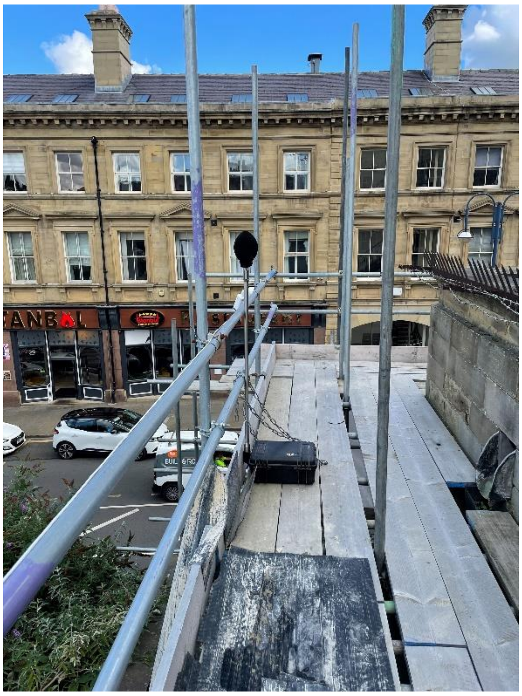
A. Glossary of Acoustic Terms

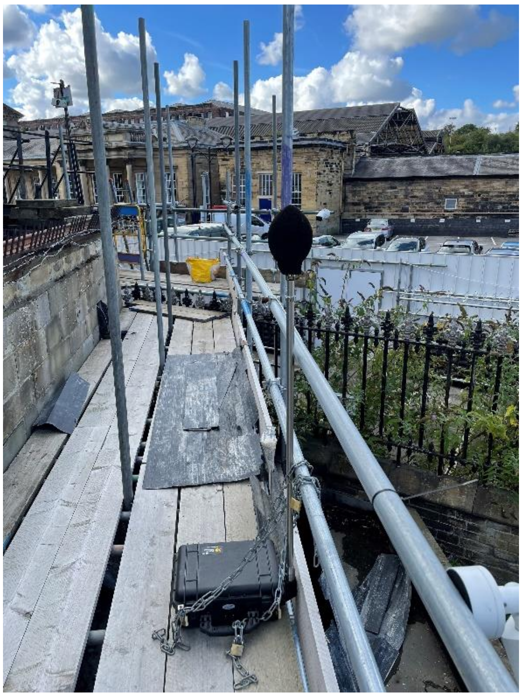
A-weighting	The human ear also has a non-linear frequency response, being most sensitive in the frequency range 1 kHz to 4 kHz and is less sensitive at higher and lower frequencies. The A-weighting is a frequency function commonly applied to the linear output of a microphone to simulate the subjective response of the ear. A-weighted levels are usually indicated by a subscript A or postscript (A).
Ambient noise	This is the total sound for a given scenario where the acoustic field is affected by a variety of sources.
Decibel	Sound and noise are commonly described using the decibel (dB) scale, which is logarithmic in nature to relate to the response of the human ear. The range of human hearing commonly varies from the threshold of audibility (0 dB) to the threshold of pain (120 dB). Such limits are seldom experienced in practice and typical levels might vary between 30 dB in a quiet bedroom at night to 90 dB at the kerbside of a busy road.
Equivalent continuous noise level L_{eq}	Time-varying noise such as that from industrial or construction operations may not best be described using the statistical approach described above. The equivalent continuous noise level, LAeq,T, may be used, which is the notional level of a steady sound which, at a given position and over the same period of time (T), would deliver the same sound energy as the fluctuating one.
Façade sound level	The received sound level which is measured or calculated immediately adjacent to a building façade, normally at 1m distance. Sound is reflected by the hard surfaces of a façade producing a slightly higher sound level (2.5 to 3.0 dB) than would occur in the absence of the building.
Free field sound level	The sound level which is measured or calculated within an acoustic field which is free of significantly reflective surfaces (except the ground plane).
Noise rating NR	Noise rating (NR) is a graphical method for assigning a single-number rating to a noise spectrum. It can be used to specify the maximum acceptable level in each octave band of a frequency spectrum, or to assess the acceptability of a noise spectrum for a particular application.
Maximum sound pressure level L(max)	The highest A-weighted sound level reached within the measurement period. “Fast” denotes that the level is weighted to the response time of the ear (125 ms) instead of to 1 second (denoted “Slow”).
Rating level	Noise level of an industrial noise source with any appropriate corrections applied for the presence of distinct acoustic features.
Sound power level	This is a measure of the sound energy radiated by an acoustic source per unit time. It is a characteristic of the source alone and independent of the properties of the acoustic field.
Statistical noise level L_N	Noise which fluctuates with time may be described using a statistical approach. The statistical level LAN is the level in dB exceeded for N % of the overall

	measurement period. L_{A90} is the noise level exceeded for 90 % of the sampling period and is a measure the lower levels in the absence of higher level transient events. It is commonly used to describe the ambient or background noise. The LA10 is the noise level exceeded for 10 % of the sampling period and is a measure the higher levels. In the UK, it is commonly used to describe road traffic noise and, when considered over the 18-hour period 06:00 to 24:00 is referred to as the traffic noise index.
Weighted Level Difference D_w	The noise level produced on each side of a building element under test (e.g. a wall) when noise is produced in a room on one side (or outdoors) and measured both in the room where the noise is produced and in the room on the other side of the element under test.
Weighted standardised level difference $D_{nT,w}$	A single-number quantity which characterises the airborne sound insulation between rooms measured in-situ.
Weighted sound reduction index R_w	Laboratory derived single-number rating for sound insulation performance of building elements obtained by comparing the results of a sound reduction index test with a reference curve allowing a maximum of 2.0dB for the mean unfavourable deviations.
Spectrum adaptation term – A-weighted urban traffic noise C_{tr}	The correction to a sound insulation quantity (such as $D_{nT,w}$) to take account of a specific sound spectra.

B. Photographs from Noise Survey

B.1 LT1

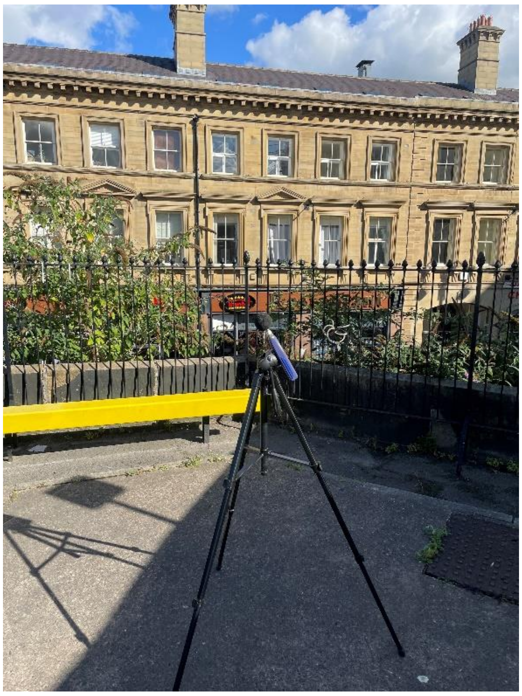




B.2 ST1

B.3 ST2

B.4 ST3



B.5 ST4

B.6 ST5

B.7 ST6