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WATERLOO INVESTMENTS 1984 LIMITED

NOISE IMPACT ASSESSMENT REPORT

13-15 CHAPEL HILL, HUDDERSFIELD HD1 3ED

Client: Waterloo Investments 1984 Limited

Report Ref: P9707-NA1-V1

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REPORT VERSION CONTROL:

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			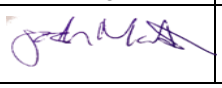	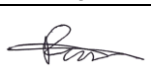

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APPENDICES

1 INTRODUCTION

1.1 Overview

1.1.1 By instruction from Waterloo Investments 1984 Limited ('the client'), NoiseAir was commissioned to undertake a Noise Impact Assessment (NIA) in support of a planning application (ref: 2025/62/90958/W) for proposed residential development at the location: 13-15 Chapel Hill, Huddersfield HD1 3ED, herein referred to as the 'development site'.

1.1.2 General limitations with respect to this NIA are outlined in **Appendix A**.

1.2 Site Description

1.2.1 At the time of writing, the development site comprises an existing 2 storey property with brownfield land to the rear located within a wider commercial/ industrial area. It is understood that the existing premises was originally office use space but currently the ground floor is unused takeaway reception space and kitchen/store backroom and the first floor is fitted as residential. The first floor is accessible via a separate entrance.

1.2.2 The development site is bound to the north by Milford Street, a single carriage way road trafficked by vehicles restricted to 30 miles per hour (mph), beyond which are commercial use properties and associated parking.

1.2.3 To the east the development site is bound by a car park. To the south, the development site is bound by a mixed-use property and a commercial use building, beyond which is car parking. To the west, the development site is bound by Chapel Hill (A616), a single carriageway main throughfare A-road through Huddersfield trafficked by vehicles restricted to 30 mph.

1.2.4 **Figure 1** shows an aerial photograph of the development site boundary with respect to the local area and its context.

Figure 1: Development site aerial photograph.

1.3 Development Proposals

1.3.1 Proposals for the development site outline the conversion of the first floor and part of the ground floor into a self-contained residential property.

1.3.2 This assessment is based on the proposed site layout as presented in **Figure 2**.

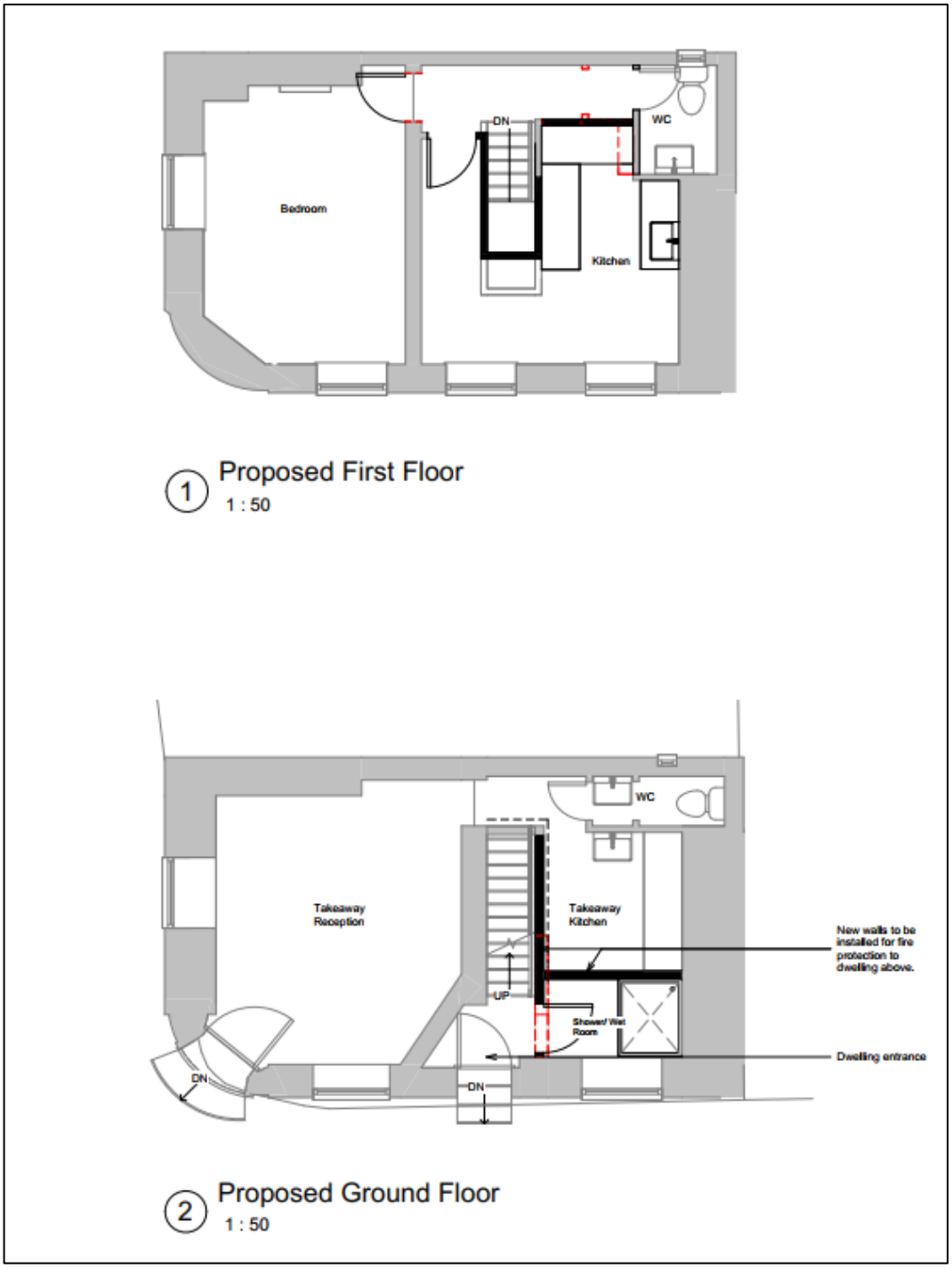

Figure 2: Proposed development site layout – Site Plan

2 SCOPE OF WORKS AND RELEVANT GUIDANCE

2.1 Consultation with the Local Planning Authority

2.1.1 Upon submission of the planning application (ref: 2025/62/90958/W) to Kirklees Council on 3rd April 2025, a response was received from the planning officer. Regarding noise, it states:

> *"**NA2 Noise Assessment Report Required Before Determining the Application (new noise sensitive use next to existing noise sources)***
>
> *Before the application determined/the development is brought into use, details of an assessment of all significant noise sources likely to affect the proposed development including road traffic/commercial premises etc. by a suitably competent person (see note) must be submitted in writing to the Local Planning Authority. The report shall:*
>
> *a. Determine the existing noise climate*
>
> *b. Predict the noise climate in the living rooms (daytime), bedrooms (night-time) and other habitable rooms of the development*
>
> *c. Detail the proposed attenuation/design necessary to protect the amenity of the occupants of the new residences. If the noise attenuation measures include windows being kept closed, then details of alternative ventilation over background ventilation will be required.*
>
> ***Reason**: To ensure that the proposed use(s) does not give rise to the loss of amenity to future occupiers, by reason of noise or disturbance and to accord with the aims of Policies LP24 and LP52 of the Kirklees Local Plan and Chapters 12 and 15 of the National Planning Policy Framework.*
>
> ***NC6 For use where proposed commercial and residential share a party structure (floor / ceiling or wall etc) – Condition***
>
> *Before the development is brought into use the developer shall provide written evidence to the Local Planning Authority to demonstrate that the airborne sound insulation performance of the party floors/walls/ceiling of the development is of a minimum of 53dB $D_{ntw} + C_{tr}$. If it cannot be demonstrated that the aforementioned airborne sound insulation performance has been achieved, a scheme incorporating further measures to achieve the sound insulation performance shall be submitted for the written approval of the Local Planning Authority. All works comprised within those further measures shall be*

completed and written evidence to demonstrate that the aforementioned sound insulation performance level has been achieved shall be submitted to and approved in writing by the Local Planning Authority before the development is first brought into use.

***Reason**: To protect the amenity of occupiers of the proposed development from noise or disturbance from nearby noise generating premises to accord with the aims of Policies LP24 and LP52 of the Kirklees Local Plan and Chapters 12 and 15 of the National Planning Policy Framework."*

2.2 Scope of Works

2.2.1 The location of the development site is in close proximity to Chapel Hill (A616) and Milford Street with road traffic being the dominant source of noise at the development site. There is mechanical plant associated with a nearby industrial premises. However, any associated emission noise was not observed to be audible at the development site. Furthermore, an analysis of the measured noise data shows no indication of influence from mechanical plant noise. Therefore, it is considered that the NIA should consider noise primarily from traffic noise sources.

2.2.2 The scope of this assessment includes consideration of noise at each facade of the development where noise sensitive areas might be located in terms of the potential impact of local noise sources. No external amenity has been proposed as part of this development; therefore, it has not been considered within this assessment.

2.2.3 As the residential development proposed is formed via conversion, it is considered that the noise assessment and subsequent criteria should be undertaken in reference to British Standard 8233:2014 - Guidance on sound insulation and noise reduction for buildings (BS 8233:2014).

2.2.4 A summary of the above documentation is provided below.

2.3 British Standard 8233:2014 (BS 8233:2014)

2.3.1 British Standard 8233:2014 – Guidance on sound insulation and noise reduction for buildings (BS 8233:2014) provides guidance on internal ambient noise levels, resulting from break-in of external environmental noise that should not be exceeded in various locations within dwellings.

2.3.2 Guidelines for buildings in terms of internal noise level are reported in **Table 1**.

Table 1: Summary of Internal Noise Guidelines.			
Activity	**Location**	**0700 – 2300 hours**	**2300 – 0700 hours**
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room / area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

2.3.3 The standard clarifies that these values are based on the existing guidelines issued by the World Health Organisation (WHO). In addition, it states that the internal noise levels may be relaxed by up to 5 dB whilst maintaining a reasonable living condition. Conversely, in terms of internal maximum levels to be achieved during the night, the standard does not recommend any limits for individual noise events. However, a guideline value may be set in terms of SEL or L_{AFmax}, depending on the type and the number of events per night.

3 ACOUSTIC SURVEY

3.1 Acoustic Survey Details

3.1.1 NoiseAir conducted unattended noise monitoring between 12th March 2026 and 15th March 2026 at the development site.

3.1.2 Noise monitoring was undertaken at one monitoring location (ML1), the position of which is shown in **Figure 3** below.

Figure 3: Approximate noise monitoring location.

3.1.3 The noise measurement was made using a Class 1, integrating sound level meter (SLM).

3.1.4 The acoustic equipment was calibrated to comply with Section 4.2 of BS 7445-1:2003[1], before and after the noise monitoring periods.

3.1.5 Details of the SLM and associated field calibration can be found in **Table 2**.

Table 2: Summary of SLM Used for Survey and Associated Field Calibration

SLM (Serial No.)	Preamp (Serial No.)	Microphone (Serial No.)	Calibrator (Serial No.)	Start Calibration	End Calibration	Drift
NOR140 (1406247)	NOR1209 (12739)	NOR1225 (96123)	SVAN SV30A (10818)	-24.8	-25.6	0.8 dB

3.1.6 The weather conditions were noted to be as outlined in **Table 3** at the start and end of the monitoring period.

[1] BS 7445-2003 "Description and measurement of environmental noise – Part 1: Guide to quantities and procedures.

Table 3: Summary of Weather Conditions Noted at the Start and End of the Monitoring Duration		
	12th March 2026	**15th March 2026**
Roads	Wet	Dry
Temperature (˚C)	10	11
Wind speed (ms^{-1})	Up to 6.2 WSW	Up to 5.8 SW
Cloud Cover (Approx. %)	100	10
Humidity (%)	87	72

3.2 Measured Sound Levels

3.2.1 Data is shown in **Figure 4** detailing a level vs time graph of the recorded L_{Amax}, L_{Aeq} and L_{A90} sound level over 15-minute time periods for the entire measurement duration for ML1.

3.2.2 The results for the monitoring locations during the daytime and night-time periods are presented in **Table 4** below.

Table 4: Average Measured Daytime and Night-time Noise Levels		
Monitoring Location	**Time**	**Measured Noise Level**
		dB $L_{Aeq,16hour}$ / dB $L_{Aeq,8hour}$/ dB $L_{AF(max),2min}$
ML1	07:00-23:00	72.3 – 75.0
	23:00-07:00	66.4 – 68.2
	23:00-07:00	86[1]
[1] Maximum night-time noise levels exceeded more than 10 times in a single night-time period.		

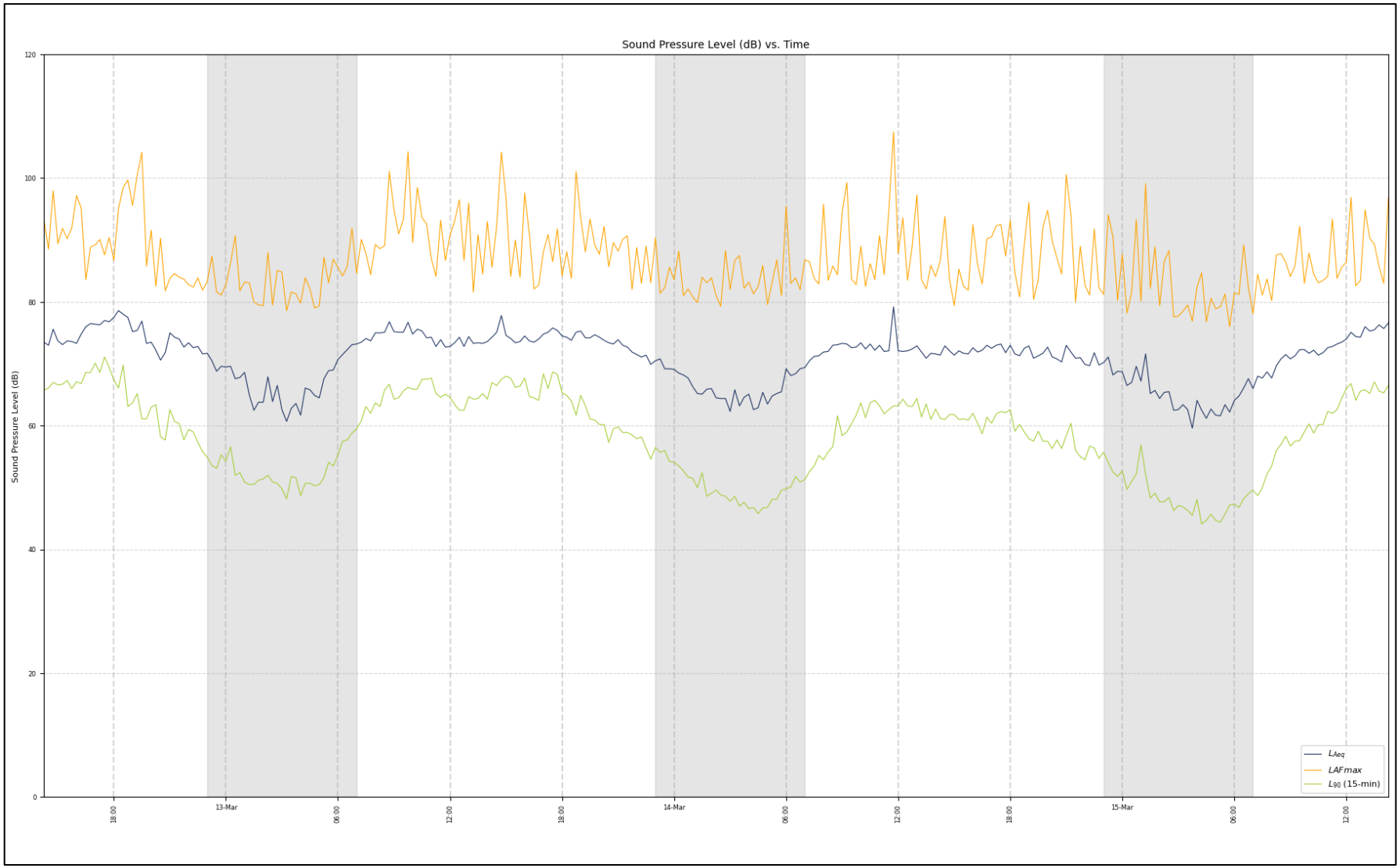

Figure 4: Level vs. time graph showing L_{Amax}, L_{Aeq} and L_{A90} sound levels – ML1.

4 NOISE IMPACT ASSESSMENT

4.1 Overview

4.1.1 The development site is in close proximity to road traffic noise sources. Therefore, the measured noise levels at the development site have been assessed against the criteria stated in BS 8233:2014.

4.2 Assessment of Daytime Noise Levels in Living Rooms and Bedrooms

4.2.1 The measured noise levels at the façades of the proposed building structures, for the daytime and night-time period, together with the level of attenuation required in accordance with BS 8233:2014 are presented in **Table 5**.

Table 5: Level of Attenuation Required to Achieve the Internal Noise Guideline Levels.

ML	Period	Worst Case Noise Level at the Façade (dB(A))	BS 8233:2014 Target Internal Level (dB(A))	Level of Attenuation Required (dB(A))
1	Daytime $L_{Aeq,16hours}$	75	35	40
	Night-Time $L_{Aeq,8hours}$	68	30	39
	Night-Time $L_{AF(max),2min}$	86	45	41

4.3 Building Envelope Performance – Windows Open

4.3.1 With windows open, the attenuation provided by the façade will be approximately 10-15 dB(A). Given the incident noise levels, the noise level break-in at the development site facades would likely result in the recommended internal noise limit being exceeded in most rooms at the development during certain parts of a typical day/ night. It is therefore considered that acceptable noise levels within habitable rooms to all facades will rely on windows being in the closed position. This is typical of most development near transport noise sources.

4.3.2 The sound performance requirements for bedrooms, living and dining rooms at the development during the daytime and night-time in rooms with windows closed are summarised in Section 5.1 of this report.

4.3.3 Due to the elevated noise levels measured from Chapel Hill, the use of an active ventilation system for all habitable rooms at the development site is recommended to ensure that adequate internal noise levels can be achieved.

4.3.4 It must be noted that any ventilation requirements are to be designed by others and comply with the requirements of Approved Document F.

5 SOUND INSULATION SCHEME

5.1 Building Envelope Requirements – Windows Closed

5.1.1 Proposals for the development site at the time of writing outline residential use with noise sensitive rooms likely proposed to all facades of the property. Therefore, internal noise levels are required to not exceed 35 dB L_{Aeq} during the daytime hours in all rooms and 30 dB L_{Aeq} during the night-time hours in bedrooms. Additionally, in bedrooms during the night-time, the L_{AFmax} noise levels should not typically exceed 45 dB(A). Internal noise levels arising from mechanical plant should comply with lower limits.

5.1.2 When assessing sound levels in habitable areas of the proposed development, the sound attenuation provided by the overall building facade should be considered. To mitigate sound levels, the composition of the building facade can be designed to provide the level of attenuation required. Glazing is generally the building element which attenuates noise the least, so the proportion of glazing in a building facade is an important consideration when assessing overall sound attenuation. Additionally, any façade penetrations should also be considered such as for ventilation, e.g., trickle ventilation.

5.1.3 Given the elevated noise levels measured at the development site, calculations assuming an active ventilation strategy have been undertaken and a summary of the proposed elements presented in **Table 6**.

Table 6: Summary of Building Envelope Performance Requirements – Active Ventilation

Façade	Room Type	Wall R_w+C_{tr} (dB)	Glazing R_w+C_{tr} (dB)
All	All	50	47

5.1.4 It should be noted that the acoustic performance values stated are for guidance and based on information provided at the time of writing. Changes to location, size and orientation of rooms/ facades can have impacts on the calculated internal noise levels and subsequently the required acoustic performance criteria.

5.1.5 The final specification should comply with Approved Document F and should be checked by a qualified and competent acoustic consultant to ensure it meets the design requirements for noise.

5.1.6 **Table 7** below provides a typical example summary for each element type outlined in **Table 8** above.

Table 7: Summary of Building Element Type Typical Examples		
Element Type	**Acoustic Performance**	**Typical Example**
Wall	50 dB Rw+Ctr	50 dB R_w+C_{tr} 230mm brick, plaster 12mm each side
Window	Up to 47 dB R_w+C_{tr}	12.8 mm Pilkington Optiphon™ / 20 mm argon / 16.8 mm Pilkington Optiphon™

5.1.7 It should be noted that the examples provided in **Table 7** are for guidance only, however any adopted solution must achieve the acoustic performance values presented in **Table 8**.

5.1.8 The glazing elements outlined in **Table 8** are based on the performance of the glazing panes only. Advice should be sought from the manufacturer at detailed design stage to ensure that the window framing does not undermine the overall performance requirement recommended.

5.1.9 The building envelope final design should be confirmed through detailed design at the appropriate stage including the consultation of specialist manufacturers to confirm individual building element performance.

5.2 Ventilation Requirements

5.2.1 It is recommended that the acoustic ventilation proposed at the site should, as a minimum, comply with Building Regulations Approved Document F1 2021 Means of Ventilation and British Standard BS5925 1991: “Code of Practice for Ventilation Principles and Designing for Natural Ventilation”. Acoustic ventilation is only recommended for noise sensitive rooms, which are bedrooms and living/dining rooms.

5.2.2 The implementation of the recommended glazing would ensure that the required internal daytime and night-time noise limits are achieved.

5.2.3 It should be further noted that the glazing configurations within this report are for guidance only. Similar products to those used in NoiseAir calculations may achieve a similar level of sound reduction, however this should be verified by the manufacturer.

5.2.4 As detailed in Section 4.3, acceptable noise levels within habitable rooms at all facades will rely on windows being in the closed position and therefore appropriate ventilation design should be completed.

5.2.5 Due to the elevated noise levels measured from Chapel Hill, the use of an active ventilation system for all habitable rooms at the development site is recommended to ensure that adequate internal noise levels can be achieved.

5.2.6 Where a mechanical ventilation system is installed within habitable rooms at the development site, the cumulative ambient noise breakout within any room should not exceed NR25 during the daytime and NR20 during the night-time.

5.3 Sound Insulation Between Ground and First Floor

5.3.1 The council pre-application comments identify a separating floor performance requirement of 53 dB $D_{nT,w}+C_{tr}$.

5.3.2 At present, detailed internal design is not yet underway. While this report could provide possible designs that could meet 53 dB $D_{nT,w}+C_{tr}$, this would only be speculative at this stage and not necessarily representative of any final design implemented at the site.

5.3.3 Fundamentally, there is no indication of any limitations that would not make it possible to achieve the requirement set out and it is therefore not a barrier to making a planning decision based on the principle of whether or not the development is acceptable.

5.3.4 We would suggest that the local authority would be able to receive a more accurate and relevant information for review if this matter was secured by a suitably worded planning condition. This would also be in line with NPPF guidance on planning obligations, in that planning obligations may be used to secure information that is required to make the proposals acceptable in principle.

5.3.5 In our experience, the sound insulation of separating walls and floors is commonly secured by local authorities by means of a planning condition.

5.3.6 We therefore recommend that this is secured by a suitably worded planning condition.

6 CONCLUSIONS

6.1 Overview

6.1.1 By instruction from Waterloo Investments 1984 Limited, NoiseAir was commissioned to undertake a NIA in support of a planning application (ref: 2025/62/90958/W) for proposed residential development at the location: 13-15 Chapel Hill, Huddersfield HD1 3ED.

6.1.2 Proposals for the development site outline the conversion of the first floor and part of the ground floor into a self-contained residential property.

6.1.3 NoiseAir conducted unattended noise monitoring between 12th March 2026 and 15th March 2026 at the development site.

6.2 Conclusions

6.2.1 An assessment to BS 8233:2014 internal noise level criteria has been undertaken to determine if acceptable internal noise levels can be achieved within in habitable rooms at the development site.

6.2.2 With windows open, internal noise levels are likely to exceed recommended guideline criteria and alternative ventilation will be required.

6.2.3 Active ventilation is recommended for all habitable rooms. Building envelope constructions should be selected to meet the sound reduction index values presented in **Table 6**.

6.2.4 Where a mechanical ventilation system is installed within habitable rooms at the development site, the cumulative ambient noise breakout within any room should not exceed NR25 during the daytime and NR20 during the night-time.

APPENDIX A - REPORT LIMITATIONS

This Report is presented to Waterloo Investments 1984 Limited and may not be used or relied on by any other person or by the client in relation to any other matters not covered specifically by the scope of this report.

Notwithstanding anything to the contrary contained in the report, NoiseAir Limited is obliged to exercise reasonable skill, care and diligence in the performance of the services required by Waterloo Investments 1984 Limited and NoiseAir shall not be liable except to the extent that it has failed to exercise reasonable skill, care and diligence, and this report shall be read and construed accordingly.

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The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from who it has been requested and that such information is accurate. Information obtained by NoiseAir Limited has not been independently verified by NoiseAir Limited unless otherwise stated in the report and should be treated accordingly.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

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APPENDIX B - GLOSSARY

A-weighted sound pressure, p_A	Value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network. *NOTE: The A-weighting network modifies the electrical response of a sound level meter with frequency in approximately the same way as the sensitivity of the human hearing system.*
A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure in decibels (dBA).
Acoustic environment	Sound from all sound sources as modified by the environment [BS ISO 12913-1:2013].
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far. *NOTE: The ambient sound comprises the residual sound and the specific sound when present.*
Ambient sound level, $L_a = L_{Aeq,T}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T *NOTE: The ambient sound level is a measure of the residual sound and the specific sound when present.*
Background sound	Underlying level of sound over a period, *T*, which might in part be an indication of relative quietness at a given location.
Background sound level, $L_{A90,T}$ (BS 4142:2014)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Break-in	Noise transmission into a structure from outside.
Break-out	Noise transmission from inside a structure to the outside.
Cross-talk	Noise transmission between one room and another room or space via a duct or other path.
C_{tr}	Correction term applied against the sound insulation single-number values (R_w, D_w, and $D_{nT,w}$) to provide a weighting against low frequency performance. *NOTE: The reference values used within the C_{tr} calculation are based on urban traffic noise.*
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T, has the same mean-squared sound pressure as the sound under consideration that varies with time.
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ (BS 4142:2014)	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time.
Equivalent sound absorption area of a room, A	Hypothetical area of a totally absorbing surface without diffraction effects, expressed in square metres (m2), which, if it were the only absorbing element in the room, would give the same reverberation time as the room under consideration
Facade level	Sound pressure level 1 m in front of the façade. *NOTE: Facade level measurements of L_{pA} are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the facade.*
Free-field level	Sound pressure level away from reflecting surfaces. *NOTE: Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e., not 3.5 m from the reflecting surface in the direction of the source). Estimates of noise from aircraft overhead usually include a correction of 2 dB to allow for reflections from the ground.*

Impact sound pressure level, L_i	Average sound pressure level in a specific frequency band in a room below a floor when it is excited by a standard tapping machine or equivalent.
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants. *NOTE: The location(s) within the room at which the ambient indoor noise is to be measured or calculated ought to be considered.*
Measurement time interval, T_m (BS 4142:2014)	Total time over which measurements are taken. *NOTE: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.*
Noise criteria	Numerical indices used to define design goals in a given space.
Noise rating, NR	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves.
Normalised impact sound pressure level, L_n	Impact sound pressure level normalized for a standard absorption area in the receiving room. *NOTE: Normalised impact sound pressure level is usually used to characterize the insulation of a floor in a laboratory against impact sound in a stated frequency band.*
Octave band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.
Percentile level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting “F”, which is exceeded for *N*% of a specified time interval.
Reference time interval, T_r (BS 4142:2014)	Specified interval over which the specific sound level is determined. *NOTE: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h.*
Residual sound (BS 4142:2014)	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level, $L_r = L_{Aeq,T}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.
Rating level, $L_{Ar,Tr}$	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise. *NOTE: This is used in BS 7445 and BS 4142 for rating industrial noise, where the noise is the specific noise from the source under investigation.*
Reverberation time, *T*	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped.
Sound exposure level, *L*AE	Level of a sound, of 1 s duration, that has the same sound energy as the actual noise event considered.
Sound level difference, *D*	Difference between the sound pressure level in the source room and the sound pressure level in the receiving room.
Sound pressure, *p*	Root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound.
Sound pressure level, L_p	Quantity of sound pressure, in decibels (dB).

Sound reduction index, *R*	Laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.
Specific sound level, $L_s = L_{Aeq,Tr}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.
Specific sound source (BS 4142:2014)	Sound source being assessed.
Standardised impact sound pressure level, L'_{nT}	Impact sound pressure level normalized to a reverberation time in the receiving room of 0.5 s.
Standardised level difference, D_{nT}	Difference in sound level between a pair of rooms, in a stated frequency band, normalized to a reference reverberation time of 0.5 s for dwellings.
Groundborne noise	Audible noise caused by the vibration of elements of a structure, for which the vibration propagation path from the source is partially or wholly through the ground. *NOTE Common sources of ground-borne noise include railways and heavy construction work on adjacent construction sites.*
Structure-borne noise	Audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements. *NOTE Common sources of structure-borne noise include building services plant, manufacturing machinery and construction or demolition of the structure.*
Third octave band	Band of frequencies in which the upper limit of the band is 2% times the frequency of the lower limit.
Weighted level difference, D_w	Single-number quantity that characterizes airborne sound insulation between rooms, but which is not adjusted to reference conditions. *NOTE Weighted level difference is used to characterize the insulation between rooms in a building as they are. Values cannot normally be compared with measurements made under other conditions (see BS EN ISO 717-1).*
Weighted normalised impact sound pressure level, $L'_{n,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or
Weighted standardised impact sound pressure level $L'_{nT,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted standardised level difference, $D_{nT,w}$	Single-number quantity that characterizes the airborne sound insulation between rooms.

Symbols

D_w	Weighted level difference (dB)
D_{nT}	Standardized level difference (dB)
$D_{nT,w}$	Weighted standardized level difference (dB)
L_{Amax}	Maximum noise level (dB)
$L_{Ar,Tr}$	Rating level (dB)
L_n	Normalised impact sound pressure level (dB)
L'_{nT}	Standardised impact sound pressure level (dB)
$L'_{nT,w}$	Weighted standardised impact sound pressure level (dB)
$L'_{n,w}$	Weighted normalised impact sound pressure level (dB)
L_p	Sound pressure level (dB)
L_{pA}	A-weighted sound pressure level (dB)
$L_{AN,T}$	Percentile level (dB)
L_{AE}	Sound exposure level (dB)
$LAeq,T$	Equivalent continuous A-weighted sound pressure level (dB)
p	Sound pressure (Pa)
p_A	A-weighted sound pressure (dB)
$p_{A(t)}$	Instantaneous A-weighted sound pressure (Pa)

R	Sound reduction index (dB)
R_w	Weighted sound reduction index (dB)
T	Time interval (also used for reverberation time) (s)
t_0	Reference time interval (s)

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