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Ambient Noise and Building Envelope Assessment

Crown House, Huddersfield

REPORT REFERENCE NO. J004090-5836-02-CW

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	Name	Position
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This report has been prepared based upon a scope of works and associated resources agreed between the client and Philip Dunbavin Acoustics Ltd (PDA). This report has been prepared with all reasonable skill, care and diligence and has been based upon the interpretation of data collected. This has been accepted in good faith as being accurate and valid at the time of the collection. This report has been based solely on the specific design assumptions and criteria stated herein.

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1.0 SUMMARY

PDA Ltd have been commissioned by Abode Residences to carry out an ambient noise and building envelope assessment for the proposed student development at Crown House off Southgate in Huddersfield, HD1 1DE. The proposal is to convert the former office block to student accommodation with communal spaces including a gym and cinema (non-commercial) on the ground floor. The immediate surrounding area comprises a mixture of existing residential, office and commercial uses typical of a town centre location.

In order to determine the existing ambient noise climate in the vicinity of the proposed development a noise survey was undertaken by PDA Ltd. The noise climate in the vicinity of the site is dominated by road traffic noise. Southgate was found to be the dominant road traffic source and included cars, motorbikes, buses and HGV's as well as occasional sirens due to passing emergency vehicles.

The results of the noise survey were used to inform a SoundPLAN noise model such that the noise propagation across the proposed development site can be predicted. Based on the predicted façade noise levels recommendations are given for the glazing, ventilation and building façade elements that will be required to achieve the internal noise level requirements.

Our calculations suggest that the noise criteria of BS8233:2014 and WHO Guidelines can be achieved within the dwellings and therefore, in accordance with the requirements of the National Planning Policy Framework, we see no reason why the application should be refused on the grounds of noise. Further, our assessment suggests that in accordance with The Building Regulations Approved Document O, open windows are likely to be suitable as a means to mitigate against overheating in some areas however, for the majority of the development an alternative strategy will be required to mitigate overheating.

In addition, we have undertaken an assessment to determine the likely noise levels within student bedrooms associated with use of the non-residential uses on the ground floor. The gym and cinema are considered to be worst-case in terms of noise generation within the non-residential uses and our assessment suggests that the criteria of BS 8233 and the WHO guidelines can be achieved within the student bedrooms. Therefore the use of the non-residential spaces is unlikely to have an adverse impact on the occupants. Advice is given in Section 6 with regards to noise limits in the ground floor spaces and isolating gym equipment from the building structure.

2.0 SITE DESCRIPTION

The site is located at the former Crown House office block off Southgate in Huddersfield. The site is bound by Southgate to the west, Old Leeds Road to the south with vacant land to the north and east. The immediate surrounding area comprises a mixture of existing residential, office and commercial uses typical of a town centre location. Southgate is located approximately 20m to the west of the site and is a heavily trafficked main route around Huddersfield town centre. Old Leeds Road is a no through route providing access to the adjacent office building.

The proposal is to convert the former office building to form student accommodation with communal spaces including a gym on the ground floor.

.The site location and its surroundings can be seen in Figure 1 below:

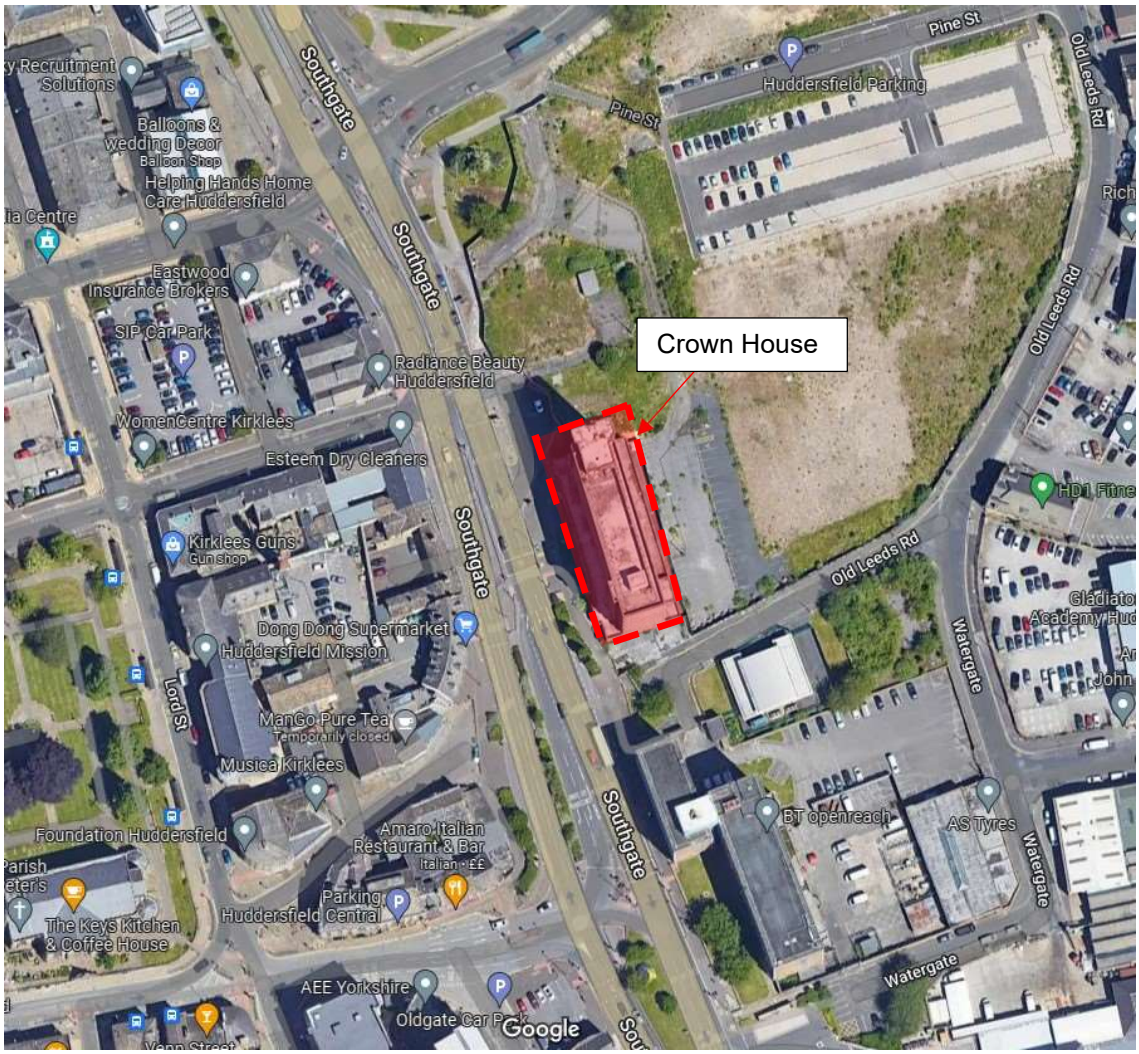


Figure 1 – Site location and surroundings

3.0 ASSESSMENT CRITERIA

3.1 National Planning Policy Framework

National Planning Policy is guided by the National Planning Policy Framework (NPPF) updated in July 2021. With regard to Noise the Framework states the following;

Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.*

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

The terms '*significant adverse impact*' and '*adverse impact*' are defined in the explanatory notes of the 'Noise Policy Statement for England (NPSE) which states;

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The notes also offer an explanation of the term 'other adverse impacts' as follows;

… refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

Although no specific noise limits for LOAEL and SOAEL have been defined, in 2014 the UK Government published a planning practice guidance document for noise which indicates where these limits fall with relation to the perception of noise. A summary is reproduced in Section 3.2 below; the full document is published at https://www.gov.uk/guidance/noise--2.

3.1.1 Planning Practice Guidance – Noise

The UK Planning Practice Guidance on noise offers further guidance on the typical levels which constitute the NOEL, LOAEL and SOAEL and is reproduced in the table below;

Table 1: Planning Practice Noise Level Guidance

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

3.2 BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

British Standard 8233:2014, *Guidance on Sound Insulation and noise reduction for buildings*, gives guidance on internal noise levels within dwellings, flats and rooms in residential use when unoccupied. The following criteria are for Living and Dining Rooms for daytime use and Bedrooms for night time.

Table 2: BS8233 Recommended Indoor Ambient Noise Levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 $L_{Aeq,16hour}$	–
Dining	Dining room/area	40 $L_{Aeq,16hour}$	–
Sleeping (daytime resting)	Bedrooms	35 $L_{Aeq,16hour}$	30 $L_{Aeq,8hour}$

It should however be stressed that the above criterion relates to steady noise, in this case from road traffic etc., excluding unusual noise events departing from the typical noise character of the area.

In addition, BS 8233 suggests, '*regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values'.*

With regard to gardens and external areas, BS 8233:2014 (Section 7.7.3.2) gives the following advice:

For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

3.3 WHO Guidelines for Community Noise

In 1999, the WHO (World Health Organisation) published Guidelines for Community Noise, stating the following noise levels are applicable to residential dwellings.

Table 3: WHO Guidelines for Community Noise Criteria

Specific Environment	Critical Health Effect(s)	L_{Aeq} dB	Time Base (hours) *	L_{AFMAX} dB
Dwelling, indoors	Speech intelligibility & moderate annoyance, daytime & evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45

* Typically taken to be daytime/evening - 07:00 – 23:00 hours and night time 23:00 – 07:00 hours.

The WHO guidelines state that, *"it is recommended that $L_{Aeq,T}$ be used to evaluate more-or-less continuous environmental noises. Where the noise is principally composed of a small number of discrete events, the additional use of L_{Amax} or SEL is recommended."* The guidelines recommend that for a good sleep, the indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10 – 15 times.

3.4 Approved Document O (ADO)

Approved Document O (APO) 2021, provides guidance on meeting the requirements of the Building Regulations 2010, part 'O1 Overheating mitigation'. The aim of the Building Regulations part O1 is to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures.

Building Regulations part O1 requires that dwellings, institutions or any other buildings containing one or more rooms for residential purposes (other than a room in a hotel) to:

(a) Limit unwanted solar gains in summer:

(b) Provide an adequate means to remove heat from the indoor environment

However in meeting the obligations of ADO the buildings overheating mitigation strategy for use by occupants must consider 'Noise at night' in addition to other non-noise related considerations.

In regards to 'Noise at night', ADO stipulates the following.

In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

(a) 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).

(b) 55dB L_{AFmax}, more than 10 times a night (between 11pm and 7am)

It should be noted that the above noise limits are with reference to internal noise levels within a bedroom. BS 8233 advises that based on a partially opened window noise at the external façade of the building will reduced by approximately 15 dB. Therefore ADO infers that windows will be required to remain closed when the external noise climate exceeds the following external noise limits.

55dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am)

70dB L_{AFmax}, more than 10 times a night (between 11pm and 7am)

Subsequently, where windows are required to be closed at night (due to the above noise limits being exceeded), the overheating mitigation strategy as required by ADO must provide an alternative method to removing heat other than relying on windows remaining open.

4.0 SURVEY DETAILS & RESULTS

4.1 Measurement Time & Location

In order to determine the existing ambient noise climate in the vicinity of the proposed development a noise survey was undertaken by PDA Ltd. Measurements were undertaken at 2 positions as summarised below:

- Position 1 – Approximately 9m above ground level from a 2nd storey window on the western facade. It was ensured that the microphone had a clear line of sight to Southgate.
- Position 2 – Approximately 12m above ground level from a 2nd storey window on the eastern facade overlooking Old Leeds Road and the vacant land to the east.

The measurement positions are illustrated in Figure 2 below:

Figure 2 – Noise Survey Measurement Positions

The measurements at both locations were made continuously over a period of approximately 23 hours periods between 11:54 hours on Monday 24th and 10:45 hours on Tuesday 25th October 2022. The measurement period was chosen such that both the morning and evening rush-hour periods were captured in addition to a full night-time.

4.2 Measurement Equipment and Personnel

The noise survey was conducted using 2 NTI XL2 sound level meters. In accordance with IEC 61672-1:2002 the NTi XL2 has a class 1 frequency response and can operate as an integrating sound level meter with frequency analysis and statistical functions. The meters were set to measure 'A' weighted, broadband and octave band sound pressure levels and various statistical parameters. The meters were field calibrated to 1kHz at 94dB both before and after the measurement during which time no

significant deviation was observed. In addition, a valid calibration certificate is held for both the meters and the calibrator. All measurements were made and partially attended by Mr C Wright BSc (Hons) MIOA of PDA Ltd.

A summary of the weather conditions during the survey period is given in Table 5 below:

Table 5: Weather Conditions

Measurement Date	Temperature	Windspeed	Events
Monday 24th October 2022	11 - 15°c	1 - 6 m/s	Dry
Tuesday 25th October 2022	10 - 12°c	1 - 6 m/s	Dry

4.3 Measured Noise Results

Full details of the measured results can be seen in the appendix included at the end of this report. A summary of the results is given in Table 6 below, all values have been rounded to the nearest dB.

Table 6: Summary of noise measurements

Measurement Location	Period	Average dB $L_{Aeq,T}$	Night-time L_{AFMax} [1]
Position 1 (Southgate)	Daytime	66	n/a
	Night-time	59	75
Position 2 (Rear / Old Leeds Road)	Daytime	51	n/a
	Night-time	45	60

Notes:

1 The WHO Guidelines for Community Noise state that sleep disturbance may occur where the specified 45dB L_{Amax} is exceeded internally 10 to 15 times over the 8-hour night-time period. The L_{Amax} recorded for these positions is the LAmax exceeded no more than 10 times over the full night-time-period or equivalent.

4.4 Description of Noise Sources

The noise climate in the vicinity of the site is dominated by road traffic noise. Southgate was found to be the dominant road traffic source and included cars, motorbikes, buses and HGV's as well as occasional sirens due to passing emergency vehicles.

It was noted that vehicle movements on Old Leeds Road were relatively infrequent and not considered to significantly contribute to the ambient noise climate. Traffic from Southgate was dominant at both measurement locations.

5.0 NOISE IMPACT ASSESSMENT AND MITIGATION

The noise climate in the vicinity of the site is dominated by local and distant road traffic noise. The character of the noise is considered to be typical for a town centre environment and in our experience, sites with noise levels similar to those measured are suitable for residential development provided that adequate acoustic attenuation is provided to habitable areas. The acoustic weak points of a building façade are typically the glazing and ventilation elements, calculations have been undertaken to determine building fabric specifications to ensure that suitable internal noise levels can be achieved within the dwellings.

5.1 Noise Modelling

In order to calculate the noise propagation around the proposed development, the site and its surroundings have been modelled in SoundPLAN noise propagation software. The software uses the method of ISO 9613 '*Acoustics – attenuation of sound during propagation outdoors – general method of calculation' and* takes into account geometric spreading, ground effects, air absorption, barrier attenuation and reflections from the surroundings to calculate the noise levels incident at various points.

The model was calibrated to the noise levels measured on-site subsequently, the proposed layout of new building and landscaping features were added. A ground absorption coefficient of 0 has been used to take into account the pre-dominantly hard surfaces (roads, hard-standing, etc.). This would likely provide a worse case assumption. The noise map is based on the sound pressure levels in Section 4 and shows good correlation with the survey data. An overview of the model can be seen in Appendix B.

5.2 Calculations

Based upon the measured and predicted noise levels, calculations have been undertaken to determine acoustic specification requirements for the proposed residential dwellings. Calculations have been undertaken in octave bands from 63 Hz to 8kHz inclusive, for the night-time L_{eq}, day-time L_{eq} and night-time L_{max} levels. The calculated internal noise levels are dependent on the size of room, location and relative glazing area. Room and glazing dimensions are taken from the following drawings provided to us by the client.

The sound insulation provided by the building envelope is a combination of the sound reduction indices of the individual façade elements and the area of the façade they cover. The result is a composite sound insulation value for the whole façade.

The calculation of noise break-in to the residential rooms has been undertaken in accordance with the calculation methods of BS EN 12354-3:2000 *Building Acoustics – Estimation of acoustic performance of buildings from the performance of elements. Part 3: Airborne sound insulation against outdoor sound*, in octave bands. Reverberation time is 0.5 seconds as per the BS EN 12354-3 reference time for dwellings.

Information on the sound insulation properties for specific element details has been sourced from either manufacturer's literature or Insul® Sound insulation prediction software.

5.3 Design Assumptions

5.3.1 Walls

The exact wall construction has not been confirmed however for the purposes of this assessment, it is assumed that the proposed façades for the buildings will be typical cavity masonry construction comprising brickwork outer leaf with 100mm cavity fully filled with mineral wool insulation and 100mm blockwork inner leaf with an internal plasterboard lining. From acoustic test data for similar constructions, it is assumed that the build-up has an acoustic performance of at least 53 dB R_W.

If any extensions are proposed to the existing building using a lightweight construction or otherwise, it should be ensured that the facade achieves a minimum of 53 dB R_w

Please note that the external façade should have no unsealed penetrations, and any openings for ventilation should meet the specifications for ventilators as discussed below.

5.3.2 Ventilation

Our calculations suggest that suitable internal noise levels can be achieved using acoustically attenuated trickle vents. It is noted however, that during periods when windows are open internal noise levels will likely exceed the criteria of Section 3.

With regard to purge ventilation BS 8223:2014 states:

> *"The Building Regulations' supporting documents on ventilation recommend that habitable rooms in dwellings have background ventilation. Where openable windows cannot be relied upon for this ventilation, trickle ventilators can be used and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.*

5.4 Glazing and Ventilation Specification

The dominant paths for noise transfer to the interior of buildings are generally the glazing and ventilation elements of the façade constructions. Based on this premise, to achieve the required internal noise levels as discussed in Section 3 the development would require the following glazing and ventilation specifications. Note that the following specification apply to habitable rooms only.

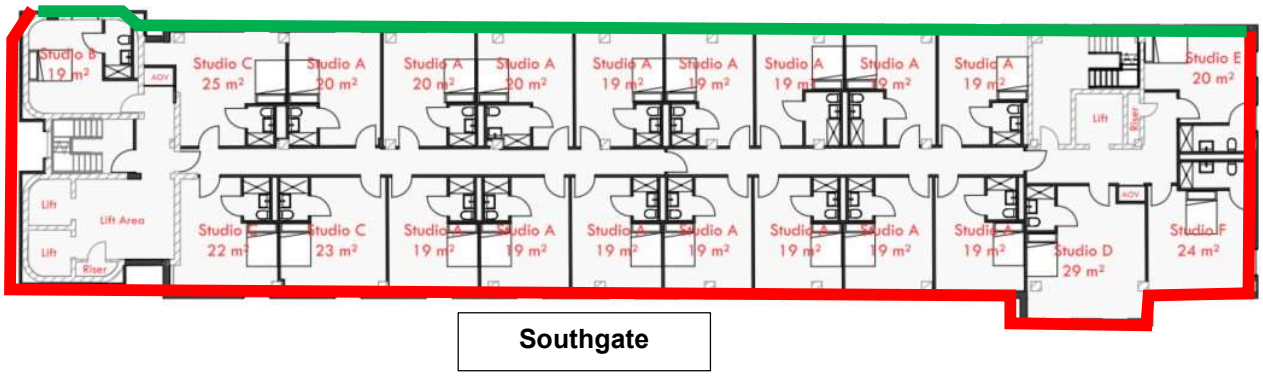


Figure 3 – Glazing and ventilation specification

Our calculations indicate that with the façade treatments specified in Table 8 the internal noise criterion given in Section 3 can be achieved within the habitable rooms of the proposed development.

Table 8: Glazing and Ventilation Schedule (with reference to Figures 3 & 4)

Facade	***Room Type***	***Level***	***Minimum Glazing Rating R_w dB***	***Minimum combined Ventilator Rating $D_{n,e,w}$ dB***	***Calculated Highest Internal Noise Level dBA (Day/Night/Max)***
Red	All	All	38	38	34/26/43
Green	All	All	33	29[1]	32/23/39

Notes:

1 A standard non-acoustic trickle vent is likely to achieve 29 dB $D_{n,e,w}$

5.5 Glazing Specification and Installation

For the glazing specification in Table 8 (above), all sound insulation values quoted above must be achieved by the overall combination of frame and glazing, and not just by the glazing alone. The frame should not reduce the performance of the system overall. Where spandrel panels are proposed these should achieve a sound insulation performance equivalent to the specified glazing.

Glazing framing systems must be fully sealed with any gaps around the perimeter to be stuffed with dense mineral wool to full frame depth and sealed both sides with acoustic non-setting mastic, with additional weathering protection to be applied external to this. No gaps should be left unsealed.

The minimum performance requirements for the combination of glazing and framing recommended in the above tables are as follows:

Table 9: Required Minimum Sound Insulation of Combined Glazing and Framing

Typical Product	***Minimum Sound Reduction Index R (dB) at Octave Band Centre Frequency (Hz)***							***R_w***
	63	***125***	***250***	***500***	***1000***	***2000***	***4000***	
6/12/6mm	18	20	19	29	38	36	45	33
10/12/6mm	22	26	27	34	40	38	46	38

Figures stated in the table above unless otherwise stated are based on Pilkington manufacturer quoted data. Acoustic ratings should be checked with the manufacturer and supported by laboratory test reports where necessary. Note that the specifications are interchangeable provided the minimum sound reduction values are achieved e.g. if desired 10/12/6mm (38 dB R_w) could be used in place of 6/12/6mm (33 dB R_w).

5.6 Ventilator Requirements

The ventilator inlets described in the following table are calculated to provide adequate sound insulation to maintain internal noise levels compliant with the guidance criteria when used in conjunction with the selected glazing. Selected ventilation inlets should provide equal or greater sound insulation performance across the frequency range to the values in Table 10; example products are noted below.

The acoustic specification relates to the combined performance of all ventilation elements. Where two or more ventilators are required to meet the ventilation requirement, the acoustic performance for a single ventilator must be selected so that the combined performance is as stated in the table below, e.g. for 2 no. ventilators, the acoustic performance of each will need to be $D_{n,e,w}$ 45 dB to meet a combined $D_{n,e,w}$ 42 dB specification. Requirements should be checked with the manufacturer.

Table 10: Required Minimum Sound insulation of Ventilators

Example Product	***Minimum Normalised Element Level Difference $D_{n,e}$ (dB) at Octave Band Centre Frequency (Hz)***						***$D_{n,e,w}$***
	125	***250***	***500***	***1000***	***2000***	***4000***	
Standard Trickle Vent (Simon Airstrip 300 or similar)	28	26	26	29	29	29	29
Simon Acoustic EHAS	40	36	34	35	44	40	38

It should be noted that inclusion of ventilators alone does not ensure compliance with Building Regulations or other regulatory requirements for ventilation. The ventilation strategy should be checked by others.

5.7 Approved Document O (ADO), Method of Removing Heat

With reference to the noise survey results and noise modelling around site our assessment has indicated that generally noise at the façade of the proposed development (north, west and south) is predicted to exceed the following criteria.

55dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am)

70dB L_{AFmax}, more than 10 times a night (between 11pm and 7am)

Consequently based on a 15 dB reduction for a partially open window, noise within bedrooms is predicted to exceed the following ADO limits above which windows are expected to remain closed to control the ingress of external noise.

40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).

55dB L_{AFmax}, more than 10 times a night (between 11pm and 7am)

Therefore, in accordance with the requirements of ADO an alternative method to remove heat other than relying on open windows will be required.

Note that for rooms to the rear of the development (on the eastern side) the results of our noise survey and the results of our noise model suggest that the external noise limits of ADO will be achieved. Therefore, in accordance with ADO open windows are likely to be suitable as a means to mitigate overheating.

6.0 NON-RESIDENTIAL SPACES

The drawings provided to us indicate that there are a number of non-residential areas on the ground floor of the development. These uses include a gym, communal cinema area, study lounge, cafe and administration area on the ground floor.

General Guidelines

Based on our understanding then there would be no noise intensive uses of the said communal areas. However, we would recommend typical measures to limit potential noise impacts as follows:

- Curfews are introduced such that shared areas can only be used in the daytime e.g. 07:00-23:00 hours.
- Alternatively, any sound amplifying equipment to be set to limits approved on installation and any loudspeakers / televisions etc. to be resiliently mounted from the building structure.
- Setting of noise limits in shared spaces typically as below:

  78 dBA - Day (07:00-23:00)
  73 dBA - Night (23:00-07:00)

- Note that these limits are just for guidance and assume that the separating floor achieves the minimum airborne sound insulation requirement of the Building Regulations Approved Document E 2003 (ADE). Where the performance of the floor is designed to exceed the requirements of ADE, higher limits may be suitable.

6.1.1 Impact Noise Due to Gym Equipment

Free Weights

Untreated gym equipment is liable to introduce impact noise into floors onto which the equipment is rigidly connected or into floors where weights are dropped.

In the case of weights being dropped these are very difficult to remediate in terms of impact noise and we would not recommend that 'free weights' are used in gyms within mixed used developments unless these are on an independent ground-bearing slab on the ground floor. Hence, for the Gym within the development considered here, we would recommend that the use of free weights is avoided.

Aerobic Exercise Machines

Exercise machines using bodyweight only such as running machines / treadmills / step machines etc should be isolated using either vibration pads or proprietary fixings between the machine and the floor. Typical products are Custom Audio Designs Treadmill Vibration Pads or equivalent, or Anti Vibration mounts such as available from AV Industrial Products. Mounts for isolation of the whole machine should be selected to provide isolation down to low frequencies with a relatively large static deflection (e.g. spring mounts or similar).

Weight Machines

Machines which use a stack of weights and pulleys in order to provide resistance when exercising will need treatment to the weight stack to ensure that impacts due to the weights dropping back into the resting position on the machine are not transmitted to the floor slab. Typically this requires a resilient 'Impact Washer' to be inserted below the stack of weights to prevent impacts when the weights drop back into position. Typical products are available from TVS Acoustics or CMS Danskin.

Loudspeakers / AV / HVAC Equipment

Any suspended loudspeakers, AV Equipment or HVAC equipment / ductwork must be suspended using proprietary anti-vibration hangers such as those available from AV Industrial Products or Christie & Grey or similar. Note that the selection and spacing of the hangers is dependent on the weight of the equipment and manufacturer's advice should be followed to ensure that the hangers are correctly loaded to give optimum vibration isolation.

In addition to the structure-borne sound transmission, we have assumed that noise levels will not be excessive within the Gym. As such any music noise or other entertainment noise should not be greater than typical noise levels would be in a domestic setting. For example, although music noise will be acceptable at reasonably loud levels without causing a disturbance to surrounding student bedrooms, the playback levels should not be louder than those typically associated with music played in the home.

6.1.2 Airborne Sound Insulation

We have calculated the likely noise transfer to the student bedrooms above from the gym and cinema which are likely to be the worst case in terms of noise generation in the non-residential spaces assessment assumes the following:

- The separating walls and floors will have a minimum airborne sound insulation of 43 dB $D_{nT,w}$ + C_{tr} as required by the Building Regulations Approved Document E 2003 (ADE).
- Flanking paths have been adequately treated.
- Music noise will be the dominant airborne noise source and although music will be acceptable at reasonably loud levels, the playback levels should not be louder than those typically associated with music played in the home. Music noise should be limited to 78 dBA.

- The gym and cinema will not be in use overnight (23:00 – 07:00).

On this basis, the noise level within student bedrooms adjacent to the gym and cinema on the ground floor is predicted to achieve 35 dB L_{Aeq} as recommended in BS822 and the WHO guidelines during the daytime and is therefore unlikely to have an adverse impact on the occupants.

7.0 CONCLUSION

PDA Ltd have been commissioned by Abode Residences to carry out an ambient noise and building envelope assessment for the proposed student development at Crown House off Southgate in Huddersfield, HD1 1DE. The proposal is to convert the former office block to student accommodation with communal spaces including a gym and cinema (non-commercial) on the ground floor. The immediate surrounding area comprises a mixture of existing residential, office and commercial uses typical of a town centre location.

In order to determine the existing ambient noise climate in the vicinity of the proposed development a noise survey was undertaken by PDA Ltd. The results of the noise survey were used to inform a SoundPLAN noise model such that the noise propagation across the proposed development site can be predicted. Based on the measured and predicted façade noise levels recommendations are given for the glazing, ventilation and building façade elements that will be required to achieve the internal noise level requirements.

Our calculations suggest that the noise criteria of BS8233:2014 and WHO Guidelines can be achieved within the dwellings and therefore, in accordance with the requirements of the National Planning Policy Framework, we see no reason why the application should be refused on the grounds of noise. Further, our assessment suggests that in accordance with The Building Regulations Approved Document O, open windows are likely to be suitable as a means to mitigate against overheating in some areas however, for the majority of the development an alternative strategy will be required to mitigate overheating.

In addition, we have undertaken an assessment to determine the likely noise levels within student bedrooms associated with use of the non-residential uses on the ground floor. The gym and cinema are considered to be worst-case in terms of noise generation within the non-residential uses and our assessment suggests that the criteria of BS 8233 and the WHO guidelines can be achieved within the student bedrooms. Therefore the use of the non-residential spaces is unlikely to have an adverse impact on the occupants. Advice is given in Section 6 with regards to noise limits in the ground floor spaces and isolating gym equipment from the building structure.

APPENDIX A – DEFINITION OF ACOUSTIC TERMS

The decibel

This is the basic unit of noise, denoted dB.

A Weighting

This is a weighting process which simulates the human ear's different sensitivity at different frequencies. A weighting can be shown two typical ways, 50 dB(A) L_{eq} or 50 dB L_{Aeq}. Both mean the same thing. (See below for a definition of L_{eq}). The dB(A) level can be regarded as the overall level perceived by human beings.

L_{eq} and $L_{eq(s)}$

This is the equivalent continuous noise level which contains the same acoustic energy as the actual time-varying sound. In other words it is a kind of average noise level. It is denoted dB L_{eq} or, for A-weighted figures dB(A) L_{eq} or dB L_{Aeq}. It can also be expressed in terms of frequency analysis (see later). $L_{eq(s)}$ is the sample L_{eq} level.

L_n

This is the level exceeded for n% of the time. It is denoted dB L_n or, for A-weighted figures dB(A) L_n or dB L_{An}. It can be expressed in terms of frequency analysis (see later). L_{90} is the level exceeded for 90% of the time and is a measure of the lowest level typically reached. L_{10} is the level exceeded for 10% of the time and is the highest level typically reached. L_{50} is the level exceeded for 50% of the time and, mathematically, it is the median.

L_{max}

This is the maximum level reached during a measurement period. The "time constant", or the ability of the equipment to respond to impulses is usually expressed along with it, e.g. "Fast", "Slow", etc. It is denoted dB L_{max} or, for A-weighted figures dB(A) $L_{max,}$ dB $L_{Amax,}$ etc. It can also be expressed in terms of frequency analysis.

Frequency Analysis

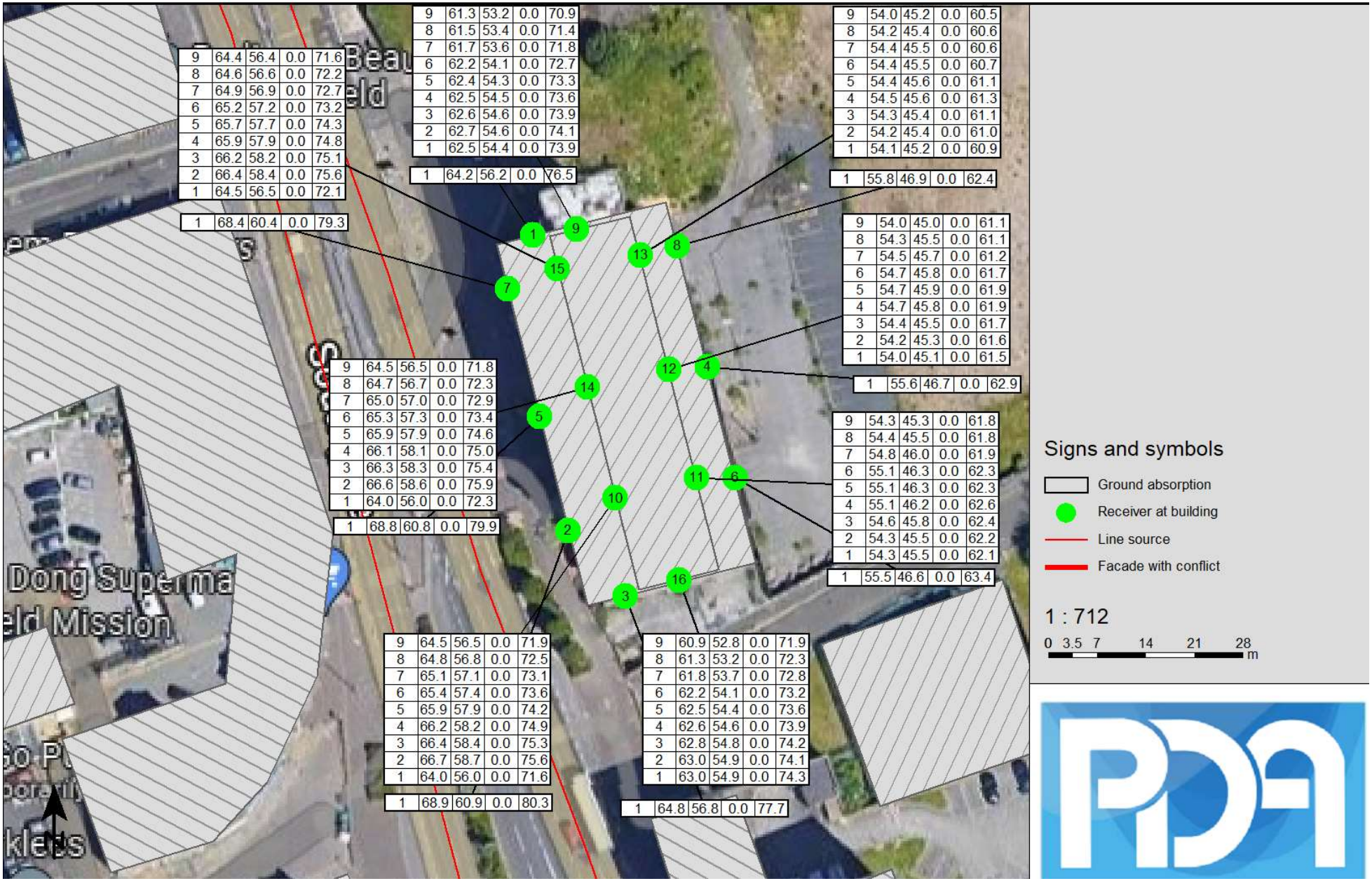
Whereas dB(A) gives a very useful overall figure, it has its limitations in that it cannot be used to model or predict the effect of noise control and mitigation as this nearly always has radically different performance at different frequencies.

Frequency analysis expresses an overall noise level at each frequency or band of frequencies in the audible range. Octave band analysis divides the audible range into 10 bands from 31.5 Hz to 16 kHz and the noise level in each band can be expressed in any form e.g. L_{eq}, L_{90}, L_{max} etc. One third octave band analysis uses 30 bands.

Narrow band analysis takes the process to resolutions of less than 1 Hz. This is useful for identifying the existence of tones (whines, hums, etc.) and in pin-pointing the sources.

APPENDIX B –NOISE MODEL RESULTS – FACADE NOISE LEVELS

Note that the first column relates to the floor level, the 2nd = Daytime Noise Level (dB L_{Aeq}), The 3rd = Night-time Noise Level (dB L_{Aeq}) and the 5th = dB L_{AFmax}



APPENDIX C – MEASURED NOISE LEVELS

Our Ref: J004090
Client: Abode Residences
Project: Crown House, Huddersfield
Results: Ambient Noise Measurements Position 1

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
24/10/2022	11:54	67	70	65	76	66	63	61	64	60	53	45
24/10/2022	11:55	69	77	62	73	67	63	64	67	63	53	45
24/10/2022	12:00	69	79	64	73	66	63	63	66	61	53	44
24/10/2022	12:05	69	81	61	72	66	65	64	66	61	53	46
24/10/2022	12:10	70	82	61	73	69	66	64	67	62	54	47
24/10/2022	12:15	69	79	61	73	65	63	63	66	62	54	44
24/10/2022	12:20	69	81	63	71	66	63	63	66	62	53	45
24/10/2022	12:25	71	89	62	73	66	63	63	68	65	58	47
24/10/2022	12:30	69	82	62	72	68	67	64	67	62	52	44
24/10/2022	12:35	69	78	62	72	65	63	64	67	62	52	43
24/10/2022	12:40	69	76	63	72	65	63	63	66	61	51	42
24/10/2022	12:45	68	78	63	72	64	62	62	66	61	51	45
24/10/2022	12:50	69	76	62	72	65	62	63	67	62	51	42
24/10/2022	12:55	69	76	62	72	66	63	63	66	62	52	44
24/10/2022	13:00	69	82	62	72	67	63	63	66	62	52	43
24/10/2022	13:05	69	84	64	72	68	65	65	66	62	53	46
24/10/2022	13:10	70	81	60	71	65	63	64	67	62	52	43
24/10/2022	13:15	69	77	63	72	65	63	63	67	61	52	44
24/10/2022	13:20	69	75	63	73	68	63	63	66	61	52	46
24/10/2022	13:25	68	76	63	74	66	62	63	66	61	52	43
24/10/2022	13:30	70	76	60	72	69	64	64	67	62	53	43
24/10/2022	13:35	68	81	59	72	65	60	62	66	61	52	43
24/10/2022	13:40	68	75	61	71	63	61	62	66	61	51	42
24/10/2022	13:45	68	74	62	70	63	61	62	66	61	51	42
24/10/2022	13:50	70	77	57	72	65	63	64	68	63	54	45
24/10/2022	13:55	69	74	61	72	67	62	63	67	62	52	43
24/10/2022	14:00	69	81	64	73	69	64	63	66	62	52	42
24/10/2022	14:05	69	75	63	72	65	62	63	66	62	52	42
24/10/2022	14:10	70	80	59	73	68	65	65	67	63	53	44
24/10/2022	14:15	70	86	61	73	68	64	64	67	63	54	46
24/10/2022	14:20	69	78	62	74	67	64	64	66	61	53	44
24/10/2022	14:25	69	82	64	74	67	64	64	66	62	54	46
24/10/2022	14:30	70	76	64	73	66	63	64	67	62	53	46
24/10/2022	14:35	70	84	64	73	67	65	65	67	62	54	49
24/10/2022	14:40	69	74	63	73	65	63	63	66	61	51	42
24/10/2022	14:45	69	74	63	73	65	62	62	67	61	51	42
24/10/2022	14:50	71	88	60	73	66	64	65	68	63	58	49
24/10/2022	14:55	70	75	62	73	66	63	64	67	62	53	46
24/10/2022	15:00	68	75	64	72	65	62	62	66	61	52	45
24/10/2022	15:05	69	77	65	73	66	63	63	66	62	53	45
24/10/2022	15:10	72	90	63	74	66	62	63	68	66	62	52
24/10/2022	15:15	74	78	67	73	64	62	64	68	69	66	60
24/10/2022	15:20	74	79	68	72	64	63	64	68	69	66	60
24/10/2022	15:25	73	83	67	73	65	62	64	67	68	64	58
24/10/2022	15:30	73	77	65	72	65	62	64	68	67	64	57
24/10/2022	15:35	73	80	62	73	67	63	65	69	68	64	57
24/10/2022	15:40	72	78	66	73	66	63	64	68	66	62	55
24/10/2022	15:45	70	76	66	74	68	62	62	66	64	60	52
24/10/2022	15:50	70	76	62	74	65	62	63	66	64	60	52
24/10/2022	15:55	71	77	62	74	65	63	64	68	65	61	52
24/10/2022	16:00	71	77	64	73	69	63	64	67	65	61	53
24/10/2022	16:05	71	79	65	71	66	62	63	67	65	60	53
24/10/2022	16:10	71	77	63	72	67	64	64	67	65	61	53
24/10/2022	16:15	72	78	64	72	65	62	64	68	66	62	54
24/10/2022	16:20	71	76	66	72	65	63	63	67	64	59	51
24/10/2022	16:25	70	75	64	71	64	62	63	67	64	58	51
24/10/2022	16:30	70	80	65	72	64	61	63	67	64	58	50
24/10/2022	16:35	73	94	64	72	65	62	63	69	69	62	53
24/10/2022	16:40	70	77	64	71	64	62	63	67	64	58	50
24/10/2022	16:45	70	79	65	74	69	63	64	67	63	57	50
24/10/2022	16:50	70	75	64	75	66	62	63	67	63	57	49
24/10/2022	16:55	70	87	65	73	66	63	65	67	63	56	48
24/10/2022	17:00	71	78	64	71	63	62	64	68	64	56	48
24/10/2022	17:05	71	87	63	72	66	63	65	68	64	56	48
24/10/2022	17:10	70	76	66	72	64	62	63	67	63	55	48
24/10/2022	17:15	71	84	61	72	70	66	64	68	64	56	48
24/10/2022	17:20	71	78	65	71	66	64	64	68	64	56	48
24/10/2022	17:25	70	77	66	70	63	62	63	68	64	55	49
24/10/2022	17:30	69	75	64	73	64	62	63	67	63	55	47
24/10/2022	17:35	69	77	63	71	64	61	62	66	62	54	46
24/10/2022	17:40	71	86	62	72	65	63	64	69	64	55	46
24/10/2022	17:45	70	77	61	70	64	62	63	67	63	55	47
24/10/2022	17:50	69	76	62	72	64	61	62	67	63	53	45

Our Ref: J004090
Client: Abode Residences
Project: Crown House, Huddersfield
Results: Ambient Noise Measurements Position 1

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
24/10/2022	17:55	69	77	61	71	64	61	62	66	62	53	45
24/10/2022	18:00	70	79	59	71	63	61	62	67	63	54	46
24/10/2022	18:05	69	75	59	71	65	62	63	66	62	53	44
24/10/2022	18:10	69	78	63	70	63	62	62	66	62	53	46
24/10/2022	18:15	68	75	63	72	67	62	62	66	62	53	45
24/10/2022	18:20	69	79	60	71	64	61	62	66	62	54	46
24/10/2022	18:25	69	78	60	69	62	60	62	66	62	54	46
24/10/2022	18:30	71	87	64	71	64	62	64	68	64	56	48
24/10/2022	18:35	69	79	62	70	68	63	64	66	62	55	47
24/10/2022	18:40	70	76	61	70	66	64	63	67	63	55	47
24/10/2022	18:45	69	76	59	69	63	60	62	66	62	54	45
24/10/2022	18:50	70	88	61	70	64	63	64	67	62	55	46
24/10/2022	18:55	68	74	61	72	63	61	62	66	62	53	45
24/10/2022	19:00	70	76	59	70	63	62	62	67	63	54	46
24/10/2022	19:05	70	76	57	70	64	61	63	67	63	55	47
24/10/2022	19:10	70	81	60	71	64	62	64	66	63	56	49
24/10/2022	19:15	68	75	61	69	62	62	62	66	62	53	44
24/10/2022	19:20	68	77	59	70	65	60	61	65	61	53	46
24/10/2022	19:25	68	75	55	67	61	59	62	66	62	52	43
24/10/2022	19:30	68	74	58	68	61	59	61	65	61	52	43
24/10/2022	19:35	69	76	61	70	69	63	63	66	62	54	46
24/10/2022	19:40	67	74	60	68	61	58	60	65	60	51	42
24/10/2022	19:45	68	75	55	69	61	59	60	65	61	52	43
24/10/2022	19:50	71	91	59	71	63	60	61	67	67	60	50
24/10/2022	19:55	67	79	56	66	60	58	60	64	60	51	41
24/10/2022	20:00	68	74	60	69	64	59	61	66	62	52	42
24/10/2022	20:05	68	83	55	69	61	60	62	66	62	53	44
24/10/2022	20:10	69	76	61	70	63	60	62	66	62	53	44
24/10/2022	20:15	67	74	60	67	60	59	60	65	61	51	41
24/10/2022	20:20	67	86	57	70	65	60	63	64	61	52	43
24/10/2022	20:25	66	74	54	67	62	59	59	64	60	50	40
24/10/2022	20:30	68	78	55	69	64	60	62	66	62	52	42
24/10/2022	20:35	68	78	61	68	61	59	61	65	61	52	42
24/10/2022	20:40	68	81	58	67	60	58	62	65	62	54	49
24/10/2022	20:45	73	94	53	67	67	65	73	67	63	51	40
24/10/2022	20:50	71	87	60	67	66	64	70	67	63	52	42
24/10/2022	20:55	70	86	59	68	63	60	68	66	62	51	40
24/10/2022	21:00	68	88	55	69	63	60	67	64	60	50	40
24/10/2022	21:05	68	86	53	66	63	60	66	65	61	50	40
24/10/2022	21:10	68	86	56	70	61	58	64	65	61	50	40
24/10/2022	21:15	66	74	54	67	62	58	59	64	60	50	40
24/10/2022	21:20	67	76	52	67	63	59	60	64	60	50	41
24/10/2022	21:25	67	78	52	67	63	59	61	64	60	50	40
24/10/2022	21:30	66	85	54	66	64	58	60	63	59	50	40
24/10/2022	21:35	68	85	57	68	68	62	63	65	61	52	43
24/10/2022	21:40	65	77	53	68	61	57	58	63	58	49	40
24/10/2022	21:45	66	79	54	66	61	58	59	63	59	49	40
24/10/2022	21:50	65	73	55	66	61	58	58	62	58	50	41
24/10/2022	21:55	66	73	54	67	60	57	58	63	59	48	38
24/10/2022	22:00	66	75	55	68	60	57	59	63	59	49	39
24/10/2022	22:05	67	81	54	67	69	62	62	64	60	51	44
24/10/2022	22:10	66	74	51	68	61	58	59	63	59	50	40
24/10/2022	22:15	64	73	50	66	58	55	57	61	57	48	39
24/10/2022	22:20	64	74	52	67	59	57	57	61	57	48	39
24/10/2022	22:25	65	73	51	65	59	56	58	62	58	48	39
24/10/2022	22:30	65	80	50	69	67	58	58	62	58	49	40
24/10/2022	22:35	65	75	55	66	63	57	58	62	58	48	39
24/10/2022	22:40	65	73	52	66	64	58	59	63	58	48	38
24/10/2022	22:45	63	75	49	64	57	55	57	61	57	47	38
24/10/2022	22:50	67	80	49	65	62	58	61	64	61	53	41
24/10/2022	22:55	65	83	49	62	59	57	59	62	58	49	41
24/10/2022	23:00	63	71	49	66	58	55	57	61	56	48	40
24/10/2022	23:05	64	75	50	67	59	55	57	62	57	47	37
24/10/2022	23:10	63	75	50	64	60	56	56	61	56	45	35
24/10/2022	23:15	63	72	49	64	59	55	55	60	56	45	35
24/10/2022	23:20	63	75	49	64	56	54	55	61	56	45	34
24/10/2022	23:25	62	72	49	72	64	55	55	59	55	45	36
24/10/2022	23:30	62	71	46	63	57	53	55	59	55	45	36
24/10/2022	23:35	62	82	48	64	58	55	55	60	56	46	38
24/10/2022	23:40	62	73	46	62	55	53	55	60	55	45	35
24/10/2022	23:45	64	79	46	63	57	55	58	61	57	48	38
24/10/2022	23:50	65	77	52	67	60	57	59	62	58	50	40
24/10/2022	23:55	62	74	46	61	58	56	56	59	55	46	37

Our Ref: J004090
Client: Abode Residences
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Results: Ambient Noise Measurements Position 1

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
25/10/2022	00:00	60	71	43	59	52	50	52	57	53	42	31
25/10/2022	00:05	65	84	46	63	57	60	62	62	58	51	41
25/10/2022	00:10	58	70	45	61	54	50	52	56	52	42	32
25/10/2022	00:15	62	78	45	63	58	53	54	59	55	44	33
25/10/2022	00:20	62	77	47	66	60	56	57	60	55	46	36
25/10/2022	00:25	60	74	45	61	58	53	54	58	53	43	32
25/10/2022	00:30	62	76	46	65	58	55	56	60	56	47	37
25/10/2022	00:35	64	85	47	61	58	59	63	60	56	45	34
25/10/2022	00:40	62	77	45	59	58	53	54	60	56	46	35
25/10/2022	00:45	59	72	43	59	55	53	54	56	52	42	32
25/10/2022	00:50	58	69	40	56	51	49	50	55	52	40	28
25/10/2022	00:55	57	71	40	55	49	49	50	55	50	40	30
25/10/2022	01:00	59	71	43	60	54	52	52	57	52	41	30
25/10/2022	01:05	58	73	42	60	55	51	51	56	52	41	30
25/10/2022	01:10	58	78	41	55	50	49	54	55	51	39	27
25/10/2022	01:15	58	71	41	61	52	50	51	56	52	41	30
25/10/2022	01:20	60	73	42	60	56	53	53	58	54	44	35
25/10/2022	01:25	57	69	42	60	53	51	51	54	50	40	30
25/10/2022	01:30	59	75	41	56	50	50	51	56	52	41	31
25/10/2022	01:35	52	69	38	54	48	45	45	49	45	39	29
25/10/2022	01:40	57	69	41	57	55	50	50	55	50	39	29
25/10/2022	01:45	60	71	42	65	56	54	55	57	53	44	36
25/10/2022	01:50	57	73	39	60	53	50	53	53	50	44	37
25/10/2022	01:55	58	72	41	57	50	49	52	56	51	41	30
25/10/2022	02:00	61	76	41	61	54	53	55	59	53	42	31
25/10/2022	02:05	56	70	41	61	58	52	52	53	49	41	33
25/10/2022	02:10	59	71	42	60	51	50	51	56	52	42	32
25/10/2022	02:15	56	70	39	59	49	47	48	54	49	38	30
25/10/2022	02:20	58	70	38	56	51	49	50	56	51	40	30
25/10/2022	02:25	52	66	38	50	47	45	45	50	45	35	24
25/10/2022	02:30	59	74	41	59	54	51	55	56	51	42	33
25/10/2022	02:35	58	76	39	53	49	48	50	56	51	41	32
25/10/2022	02:40	52	67	39	51	48	44	46	50	45	35	24
25/10/2022	02:45	55	68	39	54	48	46	47	52	48	37	26
25/10/2022	02:50	57	73	40	61	51	49	50	55	51	40	30
25/10/2022	02:55	55	68	37	52	46	45	48	53	48	37	26
25/10/2022	03:00	56	69	41	54	48	48	49	54	49	39	28
25/10/2022	03:05	57	70	40	58	51	49	50	55	50	40	30
25/10/2022	03:10	52	65	40	55	48	44	46	49	45	40	29
25/10/2022	03:15	56	69	38	55	48	47	49	54	49	39	29
25/10/2022	03:20	57	75	37	53	49	46	49	54	52	41	29
25/10/2022	03:25	55	70	37	52	47	46	49	53	48	37	26
25/10/2022	03:30	56	75	39	57	53	49	51	53	49	41	34
25/10/2022	03:35	52	65	40	56	49	46	46	49	46	36	27
25/10/2022	03:40	61	75	37	67	56	53	56	58	54	46	43
25/10/2022	03:45	56	68	40	62	53	54	50	53	49	39	30
25/10/2022	03:50	54	67	38	53	47	45	47	51	47	36	25
25/10/2022	03:55	59	73	39	55	49	48	51	57	53	41	28
25/10/2022	04:00	59	69	42	60	53	50	51	56	52	41	30
25/10/2022	04:05	56	68	38	61	56	53	51	52	48	42	34
25/10/2022	04:10	50	65	38	51	45	42	44	47	44	34	23
25/10/2022	04:15	60	80	39	55	50	48	52	58	52	41	29
25/10/2022	04:20	58	70	42	59	53	49	50	56	52	41	30
25/10/2022	04:25	59	72	40	55	49	49	51	56	52	41	29
25/10/2022	04:30	58	72	40	61	52	50	53	55	49	40	31
25/10/2022	04:35	57	68	41	55	50	47	49	54	50	38	26
25/10/2022	04:40	61	75	44	58	54	52	54	58	54	43	32
25/10/2022	04:45	60	73	41	57	53	54	54	58	53	43	33
25/10/2022	04:50	58	73	42	57	50	49	51	56	51	41	29
25/10/2022	04:55	57	69	42	58	57	49	51	55	50	41	32
25/10/2022	05:00	59	71	44	61	52	53	53	57	53	42	34
25/10/2022	05:05	60	75	45	64	59	53	54	57	53	48	40
25/10/2022	05:10	62	75	47	67	61	57	56	59	55	46	36
25/10/2022	05:15	63	73	50	64	56	55	56	61	57	46	36
25/10/2022	05:20	62	71	50	63	57	55	56	59	55	45	35
25/10/2022	05:25	62	76	50	63	56	53	55	60	56	46	38
25/10/2022	05:30	64	74	52	66	57	55	57	61	57	47	38
25/10/2022	05:35	63	76	50	65	58	56	57	60	56	47	36
25/10/2022	05:40	63	73	50	64	58	56	56	61	57	47	36
25/10/2022	05:45	66	76	50	67	65	60	60	63	59	50	41
25/10/2022	05:50	66	81	50	68	62	60	61	63	58	48	38
25/10/2022	05:55	66	78	49	66	59	58	59	64	59	49	38
25/10/2022	06:00	65	75	53	64	59	57	58	63	58	47	35

Our Ref: J004090
Client: Abode Residences
Project: Crown House, Huddersfield
Results: Ambient Noise Measurements Position 1

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
25/10/2022	06:05	65	74	51	67	59	57	58	62	58	47	37
25/10/2022	06:10	66	73	51	67	61	59	60	64	59	50	40
25/10/2022	06:15	65	74	51	66	60	58	58	63	58	48	39
25/10/2022	06:20	66	76	55	68	65	60	61	63	58	49	41
25/10/2022	06:25	66	76	54	67	62	61	61	63	58	49	40
25/10/2022	06:30	66	79	49	68	60	61	59	63	58	49	39
25/10/2022	06:35	66	80	52	67	60	58	60	64	59	49	39
25/10/2022	06:40	66	72	57	70	64	61	60	63	59	50	41
25/10/2022	06:45	68	76	58	68	62	60	61	66	61	51	41
25/10/2022	06:50	68	75	54	70	63	61	62	66	61	52	42
25/10/2022	06:55	68	78	56	69	62	60	61	65	61	50	41
25/10/2022	07:00	68	76	57	70	62	59	61	66	61	50	40
25/10/2022	07:05	68	74	56	69	63	61	62	65	61	52	42
25/10/2022	07:10	69	77	53	70	65	61	62	66	62	53	44
25/10/2022	07:15	68	73	59	70	63	61	62	65	61	51	42
25/10/2022	07:20	69	78	58	70	64	62	63	66	61	52	44
25/10/2022	07:25	69	76	57	71	64	62	63	67	62	53	43
25/10/2022	07:30	70	80	58	72	67	64	65	67	62	55	46
25/10/2022	07:35	69	85	62	73	68	64	64	66	62	55	47
25/10/2022	07:40	69	75	58	71	65	62	63	66	61	52	44
25/10/2022	07:45	69	79	56	71	65	63	63	66	62	52	43
25/10/2022	07:50	69	75	60	70	64	61	62	67	62	52	43
25/10/2022	07:55	69	77	63	73	68	64	63	67	62	53	44
25/10/2022	08:00	69	79	57	70	67	64	63	67	62	53	44
25/10/2022	08:05	70	84	57	72	67	62	64	68	63	53	45
25/10/2022	08:10	71	90	60	71	65	62	64	68	66	60	49
25/10/2022	08:15	69	86	61	72	65	62	62	66	62	56	54
25/10/2022	08:20	69	77	59	71	65	62	63	67	62	53	44
25/10/2022	08:25	69	77	56	71	66	63	64	67	62	53	44
25/10/2022	08:30	71	90	60	71	67	62	63	68	66	60	51
25/10/2022	08:35	69	80	64	74	68	63	64	67	62	54	46
25/10/2022	08:40	69	77	61	71	66	62	63	67	62	53	43
25/10/2022	08:45	70	83	60	74	66	63	64	67	63	54	45
25/10/2022	08:50	70	78	61	70	65	62	64	67	63	54	44
25/10/2022	08:55	70	78	66	72	69	70	65	67	63	54	45
25/10/2022	09:00	70	81	64	73	67	68	64	67	63	55	46
25/10/2022	09:05	70	80	64	71	65	70	64	67	63	55	44
25/10/2022	09:10	71	79	67	73	66	72	65	68	63	54	46
25/10/2022	09:15	70	74	66	72	66	71	64	66	61	53	44
25/10/2022	09:20	69	75	66	71	65	70	63	66	61	53	43
25/10/2022	09:25	70	78	65	71	64	69	64	67	63	55	46
25/10/2022	09:30	70	76	64	70	65	68	64	67	63	54	45
25/10/2022	09:35	70	79	66	72	67	69	64	67	62	53	44
25/10/2022	09:40	69	81	63	71	64	67	62	65	61	55	43
25/10/2022	09:45	69	79	57	71	64	63	64	66	61	53	44
25/10/2022	09:50	70	76	59	71	64	63	64	67	62	53	43
25/10/2022	09:55	68	80	59	70	64	62	63	66	61	52	43
25/10/2022	10:00	67	73	61	71	63	60	60	64	59	50	41
25/10/2022	10:05	69	78	61	73	67	63	63	66	62	53	44
25/10/2022	10:10	69	79	60	71	64	62	64	67	62	53	44
25/10/2022	10:15	68	80	59	69	63	61	62	66	61	50	40
25/10/2022	10:20	69	75	62	70	64	62	63	67	62	52	42
25/10/2022	10:25	69	76	59	69	62	60	62	66	61	51	41
25/10/2022	10:30	69	79	59	70	64	61	63	67	62	52	42
25/10/2022	10:35	69	81	63	73	65	62	62	67	62	52	45
25/10/2022	10:40	69	76	63	69	68	65	64	66	61	52	44
25/10/2022	10:45	71	79	66	73	69	69	67	68	63	57	49

Our Ref: J004090
Client: Abode Residences
Project: Crown House, Huddersfield
Results: Ambient Noise Measurements Position 2

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
24/10/2022	12:02	52	57	50	62	53	51	48	49	44	33	21
24/10/2022	12:05	52	61	50	62	54	51	48	49	43	33	21
24/10/2022	12:10	53	64	50	62	55	53	50	50	43	33	22
24/10/2022	12:15	53	59	51	61	55	52	50	49	44	34	22
24/10/2022	12:20	52	60	50	61	53	51	48	49	44	34	22
24/10/2022	12:25	54	70	50	62	55	52	50	50	46	36	23
24/10/2022	12:30	53	60	50	61	54	52	49	49	44	34	23
24/10/2022	12:35	54	65	51	62	57	52	51	50	46	36	24
24/10/2022	12:40	53	67	50	62	57	54	49	49	44	35	22
24/10/2022	12:45	52	71	50	61	53	51	48	49	44	35	23
24/10/2022	12:50	52	56	50	61	53	51	48	49	44	33	22
24/10/2022	12:55	52	63	50	63	55	53	48	48	43	34	23
24/10/2022	13:00	53	62	50	63	56	55	49	49	43	33	21
24/10/2022	13:05	52	59	50	62	54	51	49	48	43	32	21
24/10/2022	13:10	52	65	50	61	53	51	49	49	44	33	23
24/10/2022	13:15	53	63	50	61	54	52	50	50	45	35	23
24/10/2022	13:20	52	57	50	61	55	51	48	49	44	33	21
24/10/2022	13:25	52	57	50	62	54	51	49	48	43	32	21
24/10/2022	13:30	52	59	50	61	54	51	49	49	44	34	23
24/10/2022	13:35	51	64	49	60	55	51	48	48	43	32	22
24/10/2022	13:40	52	58	50	61	53	51	48	48	43	33	22
24/10/2022	13:45	53	68	50	60	53	51	50	50	46	37	26
24/10/2022	13:50	53	65	50	61	54	51	49	49	44	35	26
24/10/2022	13:55	52	60	50	61	53	51	49	49	44	34	23
24/10/2022	14:00	53	63	51	64	56	53	51	49	45	36	25
24/10/2022	14:05	53	61	51	64	55	52	49	49	44	35	23
24/10/2022	14:10	54	63	51	64	55	52	51	50	46	37	26
24/10/2022	14:15	53	65	50	64	54	51	50	49	45	35	24
24/10/2022	14:20	52	63	50	64	56	51	49	49	44	34	23
24/10/2022	14:25	53	62	51	65	56	53	49	49	44	34	23
24/10/2022	14:30	53	60	50	63	54	51	49	50	45	36	26
24/10/2022	14:35	53	63	51	63	54	52	50	49	45	35	24
24/10/2022	14:40	53	63	51	62	54	52	49	50	45	35	24
24/10/2022	14:45	55	66	52	63	56	54	51	51	46	39	27
24/10/2022	14:50	54	67	51	63	54	53	51	51	45	36	22
24/10/2022	14:55	54	66	51	62	54	52	50	51	47	37	25
24/10/2022	15:00	54	64	51	63	55	53	49	50	46	36	25
24/10/2022	15:05	54	63	52	65	56	52	50	51	47	37	25
24/10/2022	15:10	55	62	52	64	55	53	51	51	48	41	32
24/10/2022	15:15	57	66	55	63	54	53	51	53	51	46	41
24/10/2022	15:20	57	68	55	64	55	52	51	53	52	47	42
24/10/2022	15:25	55	71	53	63	54	52	50	51	49	45	42
24/10/2022	15:30	55	70	53	64	55	53	51	51	49	44	36
24/10/2022	15:35	56	65	53	64	55	53	51	52	49	42	32
24/10/2022	15:40	56	70	54	64	56	53	52	52	49	43	34
24/10/2022	15:45	55	61	54	64	55	54	51	51	48	41	32
24/10/2022	15:50	56	65	53	64	56	54	52	51	48	42	29
24/10/2022	15:55	56	64	54	64	57	54	53	52	49	42	33
24/10/2022	16:00	55	60	53	62	55	52	51	51	48	42	32
24/10/2022	16:05	56	64	53	63	57	53	51	52	50	43	35
24/10/2022	16:10	55	66	54	62	54	54	52	51	48	42	33
24/10/2022	16:15	55	63	53	61	54	55	52	51	48	41	32
24/10/2022	16:20	56	64	53	61	55	55	53	51	48	40	32
24/10/2022	16:25	54	58	52	60	53	51	49	50	47	40	30
24/10/2022	16:30	53	58	51	61	53	51	49	50	46	39	29
24/10/2022	16:35	54	68	51	61	53	50	48	51	47	39	29
24/10/2022	16:40	54	67	52	62	54	51	49	50	47	40	31
24/10/2022	16:45	52	59	50	61	55	51	47	49	45	37	27
24/10/2022	16:50	53	59	51	60	54	51	49	49	45	37	26
24/10/2022	16:55	53	65	50	60	53	50	48	49	45	36	25
24/10/2022	17:00	54	64	51	61	54	51	49	51	46	38	28
24/10/2022	17:05	54	63	51	60	54	51	49	51	46	37	28
24/10/2022	17:10	52	58	51	60	53	50	48	49	44	36	25
24/10/2022	17:15	53	59	50	60	54	52	48	49	45	35	23
24/10/2022	17:20	53	60	51	60	55	53	49	50	45	35	29
24/10/2022	17:25	54	58	50	60	53	51	48	51	46	37	27
24/10/2022	17:30	52	61	50	60	52	50	47	49	44	35	24
24/10/2022	17:35	52	59	49	59	52	50	47	49	44	35	24
24/10/2022	17:40	53	61	51	60	53	51	48	51	45	35	26
24/10/2022	17:45	52	56	49	59	52	50	47	49	44	35	26
24/10/2022	17:50	52	57	50	61	53	50	48	50	45	35	26
24/10/2022	17:55	52	58	49	59	52	50	47	49	44	34	24
24/10/2022	18:00	53	60	50	61	55	51	48	49	45	36	29

Our Ref: J004090
Client: Abode Residences
Project: Crown House, Huddersfield
Results: Ambient Noise Measurements Position 2

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
24/10/2022	18:05	53	61	51	62	54	51	48	50	45	36	27
24/10/2022	18:10	52	61	50	60	53	51	48	49	44	35	28
24/10/2022	18:15	52	66	50	60	54	51	48	49	44	36	28
24/10/2022	18:20	52	56	50	60	53	51	47	49	44	36	26
24/10/2022	18:25	54	69	50	61	54	52	50	50	46	42	30
24/10/2022	18:30	56	69	49	60	53	51	53	53	47	38	27
24/10/2022	18:35	53	61	50	60	53	51	48	49	45	38	27
24/10/2022	18:40	53	60	50	60	54	52	48	49	45	36	25
24/10/2022	18:45	52	58	50	60	52	50	47	50	45	36	25
24/10/2022	18:50	57	69	50	61	54	52	55	53	48	39	27
24/10/2022	18:55	54	73	51	61	53	52	49	51	47	36	25
24/10/2022	19:00	53	61	51	60	54	51	48	50	45	36	24
24/10/2022	19:05	63	75	52	63	59	58	65	56	51	45	33
24/10/2022	19:10	66	78	51	63	59	58	69	58	52	46	34
24/10/2022	19:15	53	61	50	62	56	52	50	50	45	36	22
24/10/2022	19:20	54	62	50	62	55	51	50	50	46	39	27
24/10/2022	19:25	61	74	51	62	58	54	63	54	49	43	31
24/10/2022	19:30	61	74	50	60	56	53	63	52	48	41	28
24/10/2022	19:35	52	61	49	60	55	52	48	49	43	33	21
24/10/2022	19:40	52	58	49	58	52	51	47	49	44	34	23
24/10/2022	19:45	53	63	49	59	52	50	48	49	45	37	26
24/10/2022	19:50	53	65	48	60	55	51	47	50	46	35	21
24/10/2022	19:55	52	68	48	58	55	56	48	48	43	32	21
24/10/2022	20:00	57	75	50	58	53	55	57	52	48	35	23
24/10/2022	20:05	59	85	50	58	56	61	58	54	49	38	22
24/10/2022	20:10	58	81	49	60	58	59	57	53	48	36	21
24/10/2022	20:15	58	87	49	59	61	62	56	52	47	37	21
24/10/2022	20:20	52	70	48	58	52	49	48	49	44	30	18
24/10/2022	20:25	52	65	47	58	53	50	49	48	43	33	23
24/10/2022	20:30	51	59	48	58	51	49	47	48	43	31	19
24/10/2022	20:35	52	60	49	58	51	49	47	49	44	33	23
24/10/2022	20:40	51	67	48	58	51	49	47	48	43	34	23
24/10/2022	20:45	54	67	49	58	53	53	54	50	44	32	20
24/10/2022	20:50	56	69	51	59	54	54	57	51	45	34	22
24/10/2022	20:55	55	67	49	58	52	52	55	50	44	33	22
24/10/2022	21:00	54	69	48	58	52	52	55	49	43	31	21
24/10/2022	21:05	52	62	47	57	52	51	51	48	42	30	19
24/10/2022	21:10	52	72	47	59	50	50	49	48	44	34	24
24/10/2022	21:15	50	65	47	59	52	50	46	47	42	31	19
24/10/2022	21:20	51	70	48	58	53	52	47	48	43	33	23
24/10/2022	21:25	54	75	47	57	52	51	52	50	44	32	20
24/10/2022	21:30	49	64	47	57	50	49	45	46	41	28	18
24/10/2022	21:35	53	64	47	61	56	54	51	49	42	29	18
24/10/2022	21:40	50	75	46	57	51	49	48	47	41	30	19
24/10/2022	21:45	49	59	46	57	50	49	45	46	41	28	17
24/10/2022	21:50	49	64	47	58	51	49	45	46	41	30	18
24/10/2022	21:55	49	56	47	58	51	49	44	46	41	31	19
24/10/2022	22:00	49	62	46	57	50	49	45	46	41	30	20
24/10/2022	22:05	50	60	46	57	53	50	47	47	41	32	22
24/10/2022	22:10	50	62	46	58	51	51	46	47	42	31	20
24/10/2022	22:15	49	64	45	56	50	48	44	46	42	31	20
24/10/2022	22:20	48	59	46	57	50	48	43	45	40	30	19
24/10/2022	22:25	49	59	45	57	50	48	45	45	41	30	20
24/10/2022	22:30	50	60	46	58	53	49	46	46	42	33	21
24/10/2022	22:35	48	56	45	58	53	49	44	45	40	29	20
24/10/2022	22:40	52	69	46	58	52	50	50	48	43	33	19
24/10/2022	22:45	48	55	45	57	50	48	43	44	39	29	19
24/10/2022	22:50	49	60	45	57	50	49	45	46	41	31	19
24/10/2022	22:55	48	60	44	56	49	48	43	45	40	28	18
24/10/2022	23:00	47	54	45	57	49	48	43	44	39	29	20
24/10/2022	23:05	48	72	45	57	50	48	44	45	40	29	23
24/10/2022	23:10	48	63	44	57	50	48	43	45	40	29	20
24/10/2022	23:15	47	53	43	57	49	47	42	44	38	26	18
24/10/2022	23:20	46	54	44	57	49	47	42	43	37	25	18
24/10/2022	23:25	47	53	44	58	50	48	42	43	38	27	18
24/10/2022	23:30	46	53	44	57	49	47	41	42	37	26	17
24/10/2022	23:35	46	55	43	57	49	47	41	42	37	24	17
24/10/2022	23:40	46	53	43	57	48	47	41	43	38	26	18
24/10/2022	23:45	47	53	43	57	49	47	42	43	38	27	17
24/10/2022	23:50	47	57	44	57	49	48	43	44	38	27	18
24/10/2022	23:55	48	65	43	58	51	49	44	44	41	35	28
25/10/2022	00:00	45	50	42	56	48	47	40	40	35	25	18
25/10/2022	00:05	50	72	42	57	49	49	50	46	39	27	18

Our Ref: J004090
Client: Abode Residences
Project: Crown House, Huddersfield
Results: Ambient Noise Measurements Position 2

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
25/10/2022	00:10	46	61	43	56	50	48	44	41	35	25	17
25/10/2022	00:15	46	52	43	56	49	48	42	42	36	25	17
25/10/2022	00:20	47	58	44	57	49	48	44	44	38	26	19
25/10/2022	00:25	48	56	44	57	49	48	45	44	39	31	19
25/10/2022	00:30	46	56	43	57	54	48	43	42	37	26	17
25/10/2022	00:35	48	63	43	56	49	49	48	43	37	24	17
25/10/2022	00:40	48	68	43	55	48	49	47	43	37	26	19
25/10/2022	00:45	47	55	43	56	50	48	44	43	37	26	17
25/10/2022	00:50	44	51	42	56	48	47	40	39	34	23	17
25/10/2022	00:55	44	49	42	56	47	47	40	39	34	23	17
25/10/2022	01:00	48	57	44	58	50	48	44	44	41	33	24
25/10/2022	01:05	46	53	42	57	49	48	41	41	37	29	20
25/10/2022	01:10	44	56	42	56	48	47	40	39	34	23	18
25/10/2022	01:15	44	60	42	56	48	48	40	40	35	24	17
25/10/2022	01:20	44	51	42	56	48	48	40	40	35	24	17
25/10/2022	01:25	44	51	42	57	48	48	40	38	34	24	17
25/10/2022	01:30	44	50	41	56	48	47	39	39	34	23	17
25/10/2022	01:35	43	50	41	56	48	47	39	38	33	23	18
25/10/2022	01:40	43	50	41	57	48	47	39	37	32	22	17
25/10/2022	01:45	44	50	42	56	48	47	40	40	34	23	17
25/10/2022	01:50	44	51	41	57	49	47	40	38	33	24	17
25/10/2022	01:55	44	49	42	56	49	48	41	39	34	23	17
25/10/2022	02:00	50	62	45	61	55	50	47	45	40	32	19
25/10/2022	02:05	49	59	45	59	54	49	46	44	41	36	20
25/10/2022	02:10	45	50	43	56	48	47	41	40	35	24	17
25/10/2022	02:15	47	56	42	62	50	48	44	42	38	34	24
25/10/2022	02:20	44	50	42	57	48	47	40	39	34	24	17
25/10/2022	02:25	44	58	42	56	49	48	40	39	34	24	20
25/10/2022	02:30	45	52	42	57	49	48	41	40	35	28	19
25/10/2022	02:35	44	63	41	56	48	47	40	39	35	28	18
25/10/2022	02:40	42	58	41	56	48	47	39	36	32	27	19
25/10/2022	02:45	44	53	41	56	48	46	41	40	35	27	18
25/10/2022	02:50	46	61	41	59	48	46	42	42	38	32	23
25/10/2022	02:55	42	48	40	56	47	46	38	38	32	23	17
25/10/2022	03:00	43	48	40	56	47	46	38	38	33	23	17
25/10/2022	03:05	44	52	41	56	47	46	39	40	35	27	19
25/10/2022	03:10	42	46	41	56	47	47	38	37	31	23	17
25/10/2022	03:15	44	53	42	56	47	47	39	40	34	24	17
25/10/2022	03:20	43	53	41	56	48	47	39	39	33	23	18
25/10/2022	03:25	44	49	42	57	49	48	39	38	33	24	17
25/10/2022	03:30	45	50	42	56	49	48	41	40	35	25	17
25/10/2022	03:35	43	50	42	57	48	47	39	38	33	27	18
25/10/2022	03:40	45	51	42	57	48	48	40	40	35	30	20
25/10/2022	03:45	45	50	42	57	49	48	40	40	34	29	20
25/10/2022	03:50	46	53	43	57	49	48	42	42	36	31	20
25/10/2022	03:55	48	52	45	56	49	49	43	45	36	32	19
25/10/2022	04:00	49	59	44	58	50	49	45	45	40	34	25
25/10/2022	04:05	49	58	45	57	50	49	46	44	41	33	23
25/10/2022	04:10	49	55	46	56	48	50	47	44	39	29	18
25/10/2022	04:15	50	59	46	57	49	50	48	47	41	30	19
25/10/2022	04:20	46	51	42	56	48	48	43	41	36	30	20
25/10/2022	04:25	44	50	42	56	48	48	40	39	34	29	18
25/10/2022	04:30	45	54	43	56	49	48	41	41	33	26	17
25/10/2022	04:35	45	51	42	56	49	48	40	41	34	28	18
25/10/2022	04:40	46	55	42	56	49	48	42	42	37	28	18
25/10/2022	04:45	47	59	42	56	49	49	44	43	37	28	18
25/10/2022	04:50	44	52	42	57	49	48	40	40	34	25	17
25/10/2022	04:55	47	57	44	57	49	49	43	43	37	31	25
25/10/2022	05:00	48	60	43	57	49	48	44	44	41	36	26
25/10/2022	05:05	46	57	43	58	50	48	42	42	37	29	21
25/10/2022	05:10	48	56	44	60	51	49	44	44	40	31	22
25/10/2022	05:15	48	58	44	58	49	48	44	45	40	31	21
25/10/2022	05:20	47	55	44	57	49	48	42	43	38	30	19
25/10/2022	05:25	46	54	43	57	49	47	42	43	37	26	18
25/10/2022	05:30	47	55	44	57	49	48	43	44	38	29	21
25/10/2022	05:35	48	60	45	58	50	49	44	44	39	33	25
25/10/2022	05:40	48	54	45	57	49	49	44	44	38	29	22
25/10/2022	05:45	49	56	45	57	52	50	45	45	40	28	21
25/10/2022	05:50	51	62	46	59	52	51	48	47	41	31	24
25/10/2022	05:55	48	55	45	57	50	48	44	45	39	28	20
25/10/2022	06:00	49	53	46	58	51	49	44	46	40	30	23
25/10/2022	06:05	49	65	45	59	51	49	46	46	41	33	23
25/10/2022	06:10	50	54	47	59	52	50	46	46	41	32	26

Our Ref: J004090
Client: Abode Residences
Project: Crown House, Huddersfield
Results: Ambient Noise Measurements Position 2

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
25/10/2022	06:15	50	57	46	58	51	50	46	47	41	34	24
25/10/2022	06:20	50	58	47	58	51	50	47	47	41	31	24
25/10/2022	06:25	51	66	48	59	52	51	49	48	42	33	29
25/10/2022	06:30	49	55	45	57	50	49	44	46	40	31	22
25/10/2022	06:35	51	57	48	59	53	51	47	48	43	33	22
25/10/2022	06:40	51	57	49	61	55	51	47	48	43	34	23
25/10/2022	06:45	53	63	49	64	58	51	49	50	44	35	22
25/10/2022	06:50	53	60	50	61	54	51	49	49	44	35	25
25/10/2022	06:55	53	66	50	60	54	51	50	50	45	39	32
25/10/2022	07:00	54	60	50	60	53	51	50	50	46	42	33
25/10/2022	07:05	53	65	50	61	54	51	50	50	45	37	29
25/10/2022	07:10	53	65	50	62	58	54	50	49	45	35	27
25/10/2022	07:15	54	67	51	60	54	51	50	50	46	40	46
25/10/2022	07:20	53	65	51	59	54	52	49	50	45	38	33
25/10/2022	07:25	53	59	50	61	54	51	50	50	45	38	31
25/10/2022	07:30	54	60	51	62	55	53	50	50	46	37	30
25/10/2022	07:35	53	65	50	61	56	54	50	50	44	35	30
25/10/2022	07:40	53	61	50	61	54	51	50	49	45	36	28
25/10/2022	07:45	54	59	51	62	54	51	50	50	45	38	31
25/10/2022	07:50	54	64	52	62	54	52	50	51	45	38	31
25/10/2022	07:55	53	59	50	62	54	51	49	49	44	33	22
25/10/2022	08:00	54	59	52	63	56	53	50	51	46	38	27
25/10/2022	08:05	54	60	52	62	55	53	50	50	46	37	25
25/10/2022	08:10	55	68	52	62	55	53	51	52	49	38	28
25/10/2022	08:15	53	61	51	62	55	53	50	50	45	36	25
25/10/2022	08:20	54	67	51	62	54	52	50	51	45	34	24
25/10/2022	08:25	54	60	52	64	55	52	51	51	45	39	34
25/10/2022	08:30	54	65	51	62	55	52	49	51	46	38	28
25/10/2022	08:35	53	59	51	64	55	52	49	50	45	36	24
25/10/2022	08:40	53	58	51	63	54	52	49	50	46	36	24
25/10/2022	08:45	54	61	52	63	55	52	50	51	46	37	25
25/10/2022	08:50	53	62	51	61	53	51	49	50	45	36	25
25/10/2022	08:55	53	63	51	60	54	53	50	50	45	35	24
25/10/2022	09:00	54	64	51	63	56	56	51	50	46	36	24
25/10/2022	09:05	53	61	51	62	53	55	49	50	45	35	24
25/10/2022	09:10	54	62	51	61	53	55	50	50	44	34	27
25/10/2022	09:15	53	58	52	62	54	55	49	49	44	36	30
25/10/2022	09:20	52	56	51	61	53	54	48	49	43	33	21
25/10/2022	09:25	54	70	52	62	53	54	49	50	45	39	32
25/10/2022	09:30	55	67	52	62	55	54	50	51	47	39	33
25/10/2022	09:35	55	71	52	62	54	54	50	51	48	43	36
25/10/2022	09:40	53	60	51	61	54	53	49	49	45	36	24
25/10/2022	09:45	52	57	51	60	54	52	49	49	44	35	23
25/10/2022	09:50	53	61	51	61	54	52	49	49	44	36	26
25/10/2022	09:55	53	63	51	60	54	52	49	49	47	35	26
25/10/2022	10:00	51	58	49	60	52	50	47	48	43	33	28
25/10/2022	10:05	52	63	50	63	56	52	49	49	44	35	24
25/10/2022	10:10	52	59	50	60	53	51	48	49	43	33	22
25/10/2022	10:15	53	66	51	60	54	51	49	50	46	37	25
25/10/2022	10:20	53	62	50	63	54	52	49	50	45	36	24
25/10/2022	10:25	52	63	49	59	53	51	48	48	44	36	24
25/10/2022	10:30	52	63	49	60	53	51	48	48	44	34	29
25/10/2022	10:35	54	72	50	60	53	51	48	49	48	43	38
25/10/2022	10:40	53	68	51	62	54	52	49	49	46	42	33
25/10/2022	10:45	58	74	51	62	55	55	52	55	49	38	27