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BRIGHTWISE CONSTRUCTIONS LIMITED

NOISE IMPACT ASSESSMENT REPORT

LAND ADJ. 67 CHEETHAM HILL ROAD, MANCHESTER

Client: Brightwise Constructions Limited

Report Ref: P8470-R1-V2

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BRIGHTWISE CONSTRUCTIONS LIMITED

LAND ADJ. 67 CHEETHAM HILL ROAD, MANCHESTER

REPORT VERSION CONTROL:

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1 INTRODUCTION

1.1 Overview

1.1.1 By instruction from Brightwise Constructions Limited ('the client'), NoiseAir was commissioned to undertake a noise impact assessment (NIA) to support a planning application proposing a three-storey mixed-use development with ground floor retail and apartments on the first and second floor (planning reference 141647/FO/2024). at the Land adj. 67 Cheetham Hill Road, Manchester.

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 proposed development site is currently situated in a mixed-use area in Cheetham Hill with predominant land usage in the area comprising commercial use buildings.

1.2.2 The site is flanked Qooklas diner to the north and Proactive Personnel (a recruitment agency) to the South.

1.2.3 The site is situated on Cheetham Hill Road which constitutes the primary (road traffic) noise source in the local area.

1.2.4 **Figure 1** presents a site ariel photograph of the development site with respect to the local area and its context.



Figure 1: Site Ariel Photograph.

1.3 Development Proposals

1.3.1 At the time of writing, proposals outline the construction of a three-storey mixed-use development with ground floor retail and apartments on the first and second floor. The proposed site plan is shown below in **Figure 2**

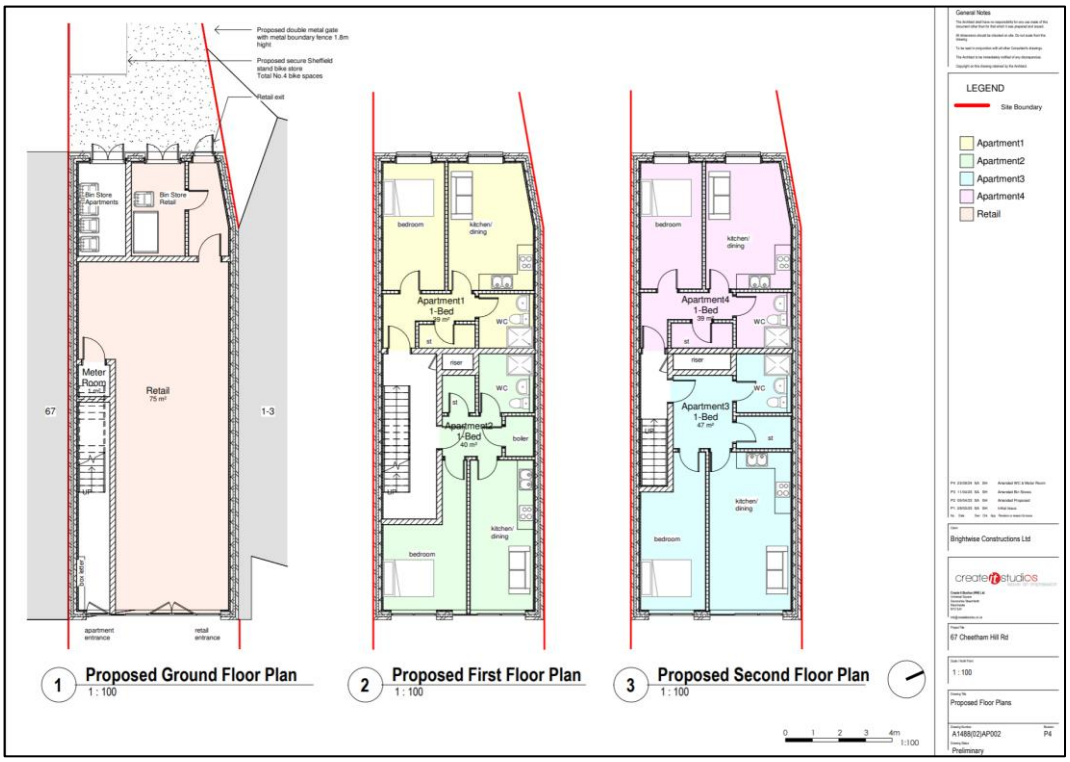


Figure 2: Floor Plans

1.3.2 We understand that the ground floor is proposed to be a small retail unit. Feedback was received form the LPA upon receipt of V1 of this report referring to potential for music/entertainment noise from the ground floor, which is not applicable to the proposals and is therefore not assessed.

1.4 Planning Conditions

1.4.1 Planning permission has been granted subject to following conditions, which relates to noise:

> *"13) a) Before the occupation of the authorised apartments a scheme related to a noise survey and detailing measures to acoustic insulating the residential accommodation against noise Cheetham Hill Road, authorised Class E (a, b and c) and any other identified noise sources shall be submitted to and approved in writing by the City Council as local planning authority. The approved noise insulation scheme shall be completed before any of the apartments are occupied and maintained in situ thereafter. b) Prior to occupation of the development a verification report shall be submitted to and approved in writing*

by the City Council as local planning authority and shall demonstrated that the implemented works conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also include post completion testing to confirm Our Ref: P8470-Q1that acceptable criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.

Reason - To safeguard the amenities of the occupiers of the building and occupiers of nearby properties, pursuant to policies SP1 and DM1 of the Core Strategy for the City of Manchester, saved policy DC26 of the Unitary Development Plan and policies JP-S1 and JP-P6 of the Sustainable

Development Joint Development Plan Document - Places for Everyone.

15) Before its installation any externally mounted equipment required to facilitate the ground floor operation the authorised Class E (a), (b) and (c)) use shall be related to a scheme to be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise from any such ancillary plant, equipment and servicing, including details of acoustic attenuation. Any externally mounted equipment installed as part of the authorised development shall be installed in accordance with the specifications of the agreed and subsequently maintained in situ.

Reason - To safeguard residential amenity by minimising the impact of the development and to prevent a general increase in pre-existing background noise levels around the site, pursuant to policies SP1, H1 and DM1 of the Core Strategy for the City of Manchester and Unitary Development Plan saved policy DC26.“

2 ASSESSMENT METHODOLOGY AND SCOPE OF WORKS

2.1 National Planning Policy Framework [NPPF 2024

2.1.1 The NPPF sets out the government's planning policies for England and how they are expected to be applied. It aims to achieve sustainable development; stating that planning policies and decisions should prevent unacceptable levels of noise pollution from new and existing development while affirming that National Policy Statements form part of the national planning policy framework and should be considered in planning decisions.

2.2 Noise Policy Statement for England (NPSE)

2.2.1 The Noise Policy Statement for England (NPSE), published in March 2010, states the long-term vision of Government noise policy is to "promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development".

2.2.2 The NPSE sets out the government's overall policy on noise within the context of sustainable development. It introduces three concepts for noise management: avoid significant adverse effects; mitigate and minimise adverse effects; and where possible, contribute to improvements in health and quality of life.

2.2.3 It also establishes a hierarchy of noise management actions: avoid; reduce; remedy; mitigate; compensate.

2.2.4 The NPSE also introduces the below categories with respect to 'adverse impacts'.

'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.

SOAEL – Significant Observed Adverse Effect Level

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

2.2.5 The NPSE states that significant adverse effects on health and quality of life should be avoided. Where the impact lies somewhere between LOAEL and SOAEL, it requires that all reasonable steps are taken to mitigate and minimise the adverse effects of noise. In this regard, a certain degree of impact between LOAEL and SOAEL would be acceptable in

terms of planning policy, provided that the impact has been mitigated and minimised by design.

2.3 Planning Practice Guidance - Noise [PPG 2019]

2.3.1 PPG 2019 provides guidance on how noise should be considered in planning decisions. It was published in 2014 and updated in 2019. The document advises on how to avoid, mitigate, or minimise adverse effects of noise through good acoustic design and appropriate conditions or obligations.

2.3.2 **Table 1** summarises the noise exposure hierarchy outlined within the PPG.

Table 1: National Planning Practice Guidance noise exposure hierarchy

Perception	Increasing Effect Level	Action
Not noticeable	No Observed Effect	No specific measures required
Noticeable and not intrusive	No Observed Adverse Effect	No specific measures required
Lowest Observed Effect Level		
Noticeable and intrusive	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Effect Level		
Noticeable and disruptive	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Unacceptable Adverse Effect	Prevent

2.4 Scope of Works

2.4.1 The location of the development site is a mixed-use area with road traffic noise due to Cheetham Hill Road being the predominant source of noise in the area. Therefore, it is reasoned that the NIA should consider noise from road traffic primarily.

2.4.1 Should mechanical plant be installed at the site, this poses a risk of adverse impacts to future residents at the site. This report, therefore, sets out plant noise limits to mitigate against potential adverse impacts from mechanical plant noise.

2.4.2 The scope of this assessment includes consideration of noise at each facade of the proposed residential dwellings where noise sensitive areas might be located in terms of the potential impact of local noise sources.

2.5 Assessment Criteria

2.5.1 In order to achieve noise levels which are considered to be in alignment with the planning approaches and policies discussed in Section 2.1, it is considered that all efforts are made to

ensure that future occupants are unlikely to be exposed to noise levels which might breach the LOEL criteria.

2.5.2 It should be noted however that planning guidance does not preclude development where the LOEL is likely to be breached in certain circumstances as long as reasonable efforts are made to mitigate and reduce such an effect.

2.5.3 There is potential for road noise from Cheetham Hill Road to impact future residents at the proposed dwellings. It is therefore considered that the noise assessment should be undertaken in accordance with BS 8233:2014, a summary of which is provided below.

2.5.4 Reference has also been made to BS 4142:2014+A1:2019 given the potential of adverse noise impact upon residents at the proposed dwellings due to any future mechanical plant to be installed. The BS 4142:2014 document and its assessment criteria are set out below.

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

2.6.1 British Standard 8233:2014 – *Guidance on sound insulation and noise reduction for buildings* (BS 8233) 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.

2.6.2 Guidelines for buildings in terms of internal noise level are reported in **Table 2**.

Table 2: 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 $L_{Aeq,8hour}$

2.6.3 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.

2.6.4 Furthermore, BS 8233:2014 provides guidance on desirable noise levels in areas that are intended to be used for external amenity space, such as gardens, balconies and roof gardens which are intended to be used for relaxation. For these spaces it is desirable that the external noise level does not exceed 50 dB LAeq,T up to a level of 55 dB LAeq,T for noisier environments.

2.7 British Standard 4142:2014 (BS 4142:2014+A1:2019)

2.7.1 British Standard 4142:2014 - Methods for rating and assessing industrial and commercial sound, sets the methodology for rating and assessing sound of an industrial and commercial nature, which includes sound from fixed installations such as mechanical and electrical plant and equipment.

2.7.2 In BS 4142:2014, a noise rating is determined and compared with the existing local background sound level based on several more cumulative acoustic feature corrections to apply where appropriate. For example, if the noise includes a distinguishable tone, impulse, intermittency or other readily distinguishable sound characteristic, then additional cumulative penalties individually ranging from 0 to 9 dB may be applied depending on the type of noise.

2.7.3 BS 4142:2014 seeks to determine a “representative” background sound level, stating that “…the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods”.

2.7.4 The assessment of the impact depends upon the margin by which the rating level of the specific sound source exceeds the background sound level but also promotes a consideration of the context in which the sound occurs when making an assessment. BS 4142:2014 states that an initial estimate of the impact of the specific sound is made by subtracting the measured background sound level from the rating level, while considering the following points:

- Typically, the greater this difference, the greater the magnitude of the impact;
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and,
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

2.7.5 Therefore, a BS 4142:2014 assessment may deduce a low impact where the specific sound level is below the background sound level.

3 ACOUSTIC SURVEY

3.1 Noise Monitoring

3.1.1 NoiseAir conducted unattended noise monitoring between 10th April 2025 and 11th April 2025 at the development site. Unattended noise monitoring was undertaken at the monitoring location ML1 as presented in **Figure 3**.



Figure 3: Approximate noise monitoring location

3.1.2 The noise measurements were made using a Class 1, integrating sound level meter (SLM).

3.1.3 The acoustic equipment was calibrated to comply with Section 4.2 of BS 7445-1:2003[1], before and after the noise monitoring periods. The results are summarised in **Table 3**.

Table 3: 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 (1402868)	NOR1209 (12694)	NOR1225 (72914)	NOR1251 (30940)	-25.2	-26.2	0.1

3.1.4 Weather conditions throughout the survey and were considered to be favourable throughout the entire duration of the measurements.

3.2 Measured Sound Levels

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

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

3.2.2 These levels represent the measured 'façade levels'. All further calculations from Section 3.3 onwards and assessments for the front façade (ML1) incorporate a -3 dB façade correction to convert the values presented to equivalent free field levels.

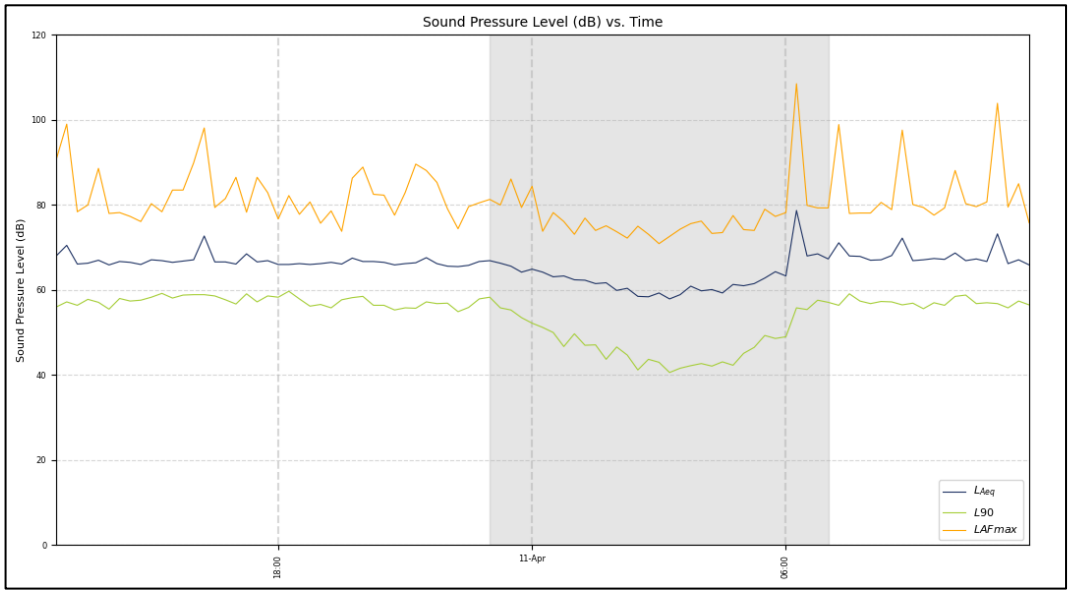


Figure 4: Level vs. time graph showing L_{Amax}, L_{Aeq} and L_{A90} sound levels – ML1

3.2.3 The results for each of 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_{AFmax}
ML1	07:00-23:00	67.0 – 68.5
	23:00-07:00	66.4
	23:00-07:00*	78.2*
*11th highest L_{max} event		

3.3 Background Sound Levels

3.3.1 A histogram showing the $L_{AF90,15min}$ sound levels for the daytime and night-time is presented in **Figure 5** and **Figure 6**.

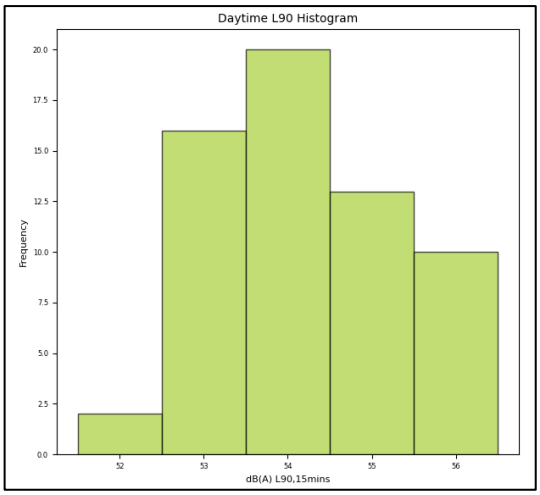


Figure 5: $L_{A90,15mins}$ noise readings at ML1 – Daytime.

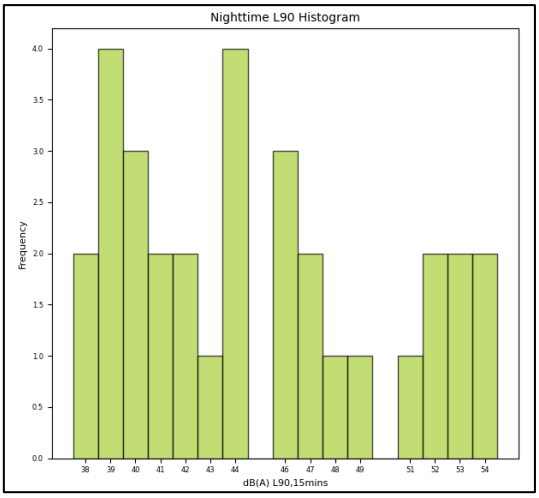


Figure 6: $L_{A90,15mins}$ noise readings at ML1 – Night-time.

3.3.2 For ML1, L_{A90} background sound levels of 53 dB(A) and 39 dB(A) have been adopted for the daytime period.

4 NOISE IMPACT ASSESSMENT

4.1 BS 8233:2014 Assessment of Daytime and Night-time Noise Levels in Living Rooms and Bedrooms

4.1.1 The worst-case noise levels 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.

Facade	Daytime ($L_{Aeq,16hours}$) / Night-Time ($L_{Aeq,8hours}$ / L_{Amax})	Worst Case Noise Level at the Façade of the Property (dB(A))	BS 8233:2014 Target Internal Level (dB(A))	Worst Case Level of Attenuation Required (dB(A))
East	Daytime $L_{Aeq,16hours}$	66	35	31
	Night-Time $L_{Aeq,8hours}$	63	30	33
	Night-Time L_{Amax}	75	45	30

4.2 Building Envelope Performance – Windows Open

4.2.1 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 6.

4.2.2 However, with windows open, the attenuation provided by the façade will be approximately 10 -15 dB(A). This would potentially allow the recommended internal noise limit to be exceeded in most rooms at the development during certain parts of a typical day / night.

4.2.3 **Table 6** shows the level of exceedance for partially open windows at receiver façades.

Table 6: Summary of Internal Noise Levels with Windows Partially Open (based on a Partially Open Window Providing up to 15 dB(A) Attenuation).

Façade	Room Type	Day / Night	Excess (dB)	Required Internal Levels Achieved (Yes / No)
East	Living/Dining/Kitchen Room	Day	+16	No
	Bedroom	Night	+18	

4.2.4 It is considered that in many circumstances, such as urban/ sub-urban developments, an exceedance of up to 5 dB(A) in accordance with BS 8233:2014 is likely to be acceptable to future residents and therefore is unlikely to breach the LOEL criteria discussed in Section 2 of this report.

4.2.5 Where exceedances are likely to be greater than +5 dB, on occasions, this may be acceptable to a resident, but when quiet conditions are required, the resident should be able to close the windows whilst maintaining adequate ventilation.

4.2.6 Given the above, results demonstrate that internal noise criteria will generally be exceeded across the outward facing façades of the development during daytime and night-time periods when relying on a partially open window. Alternative ventilation will therefore be required. After initial feedback from the local authority subsequent to the submission of V1 of this report, the applicant has reviewed the ventilation strategy and proposed to utilise System 4 MVHR as a background ventilation strategy.

4.2.7 Façades to the rear of the development are likely to experience much lower noise levels due to the natural screening provided by the surrounding buildings, however, there is no sufficient data to support this assumption. It is, therefore, recommended that all façades adhere to the mitigation measures outlined below.

4.3 Plant Noise Limits

4.3.1 It is recommended that the rating level (measured / calculated in accordance with BS 4142:2014+A1:2019) from any mechanical plant to be installed at the development site should not exceed 5 dB below the measured background sound level at the nearest NSR. This acoustic survey has measured conservative background sound levels of 53 dB and 39 dB $L_{A90,1hour}$ / $L_{A90,15mins}$ for daytime and night-time periods respectively.

4.3.2 Good acoustic design is therefore recommended to ensure that mechanical plant which may form part of the proposals is located away from nearby local residents and away from noise sensitive areas of the proposed development such as bedroom windows. This is typically achieved by installing mechanical plant within appropriately designed plant rooms or at façades which face away from noise sensitive receptors.

4.3.3 General recommendations for mechanical plant often require the use of appropriate anti-vibration mounts to ensure that vibration transfer into the building through structure borne vibration is minimised. Other typical solutions to minimise noise breakout typically include acoustic screens, acoustic enclosures, attenuators and acoustic louvres, however, the requirement of such measures should be determined at the detailed design stage.

4.3.4 At present, no plant proposals are available for assessment. If a future retail tenant proposes plant, this will need to be assessed at a later date.

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 to all floors. Noise sensitive rooms are 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, 30 dB L_{Aeq} during the night-time in bedrooms and not typically exceed 45 dB L_{Amax} during the night-time hours in bedrooms.

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.

5.1.3 Based on the design details forwarded, worst case façade attenuation calculations have been undertaken in accordance with BS EN ISO 12354-3:2017.

5.1.4 **Table 7** present a summary of the different elements for living rooms and bedrooms with System 4 MVHR as a background ventilation strategy.

5.1.5 We recommend that any mechanical ventilation system to be installed at the site must achieve an operational noise level of NR20 in habitable rooms.

Table 7: Summary of Potential Building Envelope Performance Requirements - Active Ventilation

Façade Zone	Room Type	Wall R_w+C_{tr} (dB)	Glazing R_w+C_{tr} (dB)
All	Living Room	47	27
	Bedrooms		

5.1.6 It should be noted that the acoustic performance values stated are for guidance and based on information provided at the time of writing. A thorough and detailed acoustic design statement should be carried out when the relevant information is available.

5.1.7 **Table 8** below provides a typical example summary for each element type outlined in **Table 7**. It should be noted that the examples provided in **Table 8** are for guidance only. However, any adopted solution must achieve the acoustic performance values presented in **Table 7**.

Table 8: Summary of Building Element Type Typical Examples		
Element Type	**Acoustic Performance**	**Typical Example**
Wall	47 dB R_w+C_{tr}	BS8233 Example - Brick and block external wall
Window	Up to 27 dB R_w+C_{tr}	6 mm pane, 12 mm air filled cavity, 6 mm pane

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

5.1.9 It should be 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.

5.1.10 Full calculations showing frequency data used are shown in **Appendix B**.

5.2 Separating Floor Requirements Between the Ground and First Floors

5.2.1 It is understood that the retail unit to the ground floor is to be use as a small retail unit.

5.2.2 Proposals for the site indicate that the first-floor residential dwellings are to be located directly above the retail area on the ground floor.

5.2.3 A typical internal reverberant noise level within a small retail unit of this kind would be up to approximately 60 dB (most likely below this level).

5.2.4 We recommend that a target noise level within the proposed apartments at first floor level should not exceed 20 dB(A). Assuming an internal reverberant level of 60 dB within the shop area, the divisional ceiling should be designed to achieve a minimum sound reduction index of not less than 40 dB Rw + Ctr.

5.2.5 In practice, the building regulations, which are a mandatory requirement for the development, would require the separating floor to achieve an in-situ performance of at least 43 dB $D_{nT,w}+C_{tr}$.

5.2.6 Detailed construction design works have not been undertaken at present and therefore no separating floor details are available to review at present. In any case, a minimum performance of 43 dB $D_{nT,w}+C_{tr}$ is guaranteed through building control.

6 CONCLUSIONS

6.1 Overview

6.1.1 By instruction from Brightwise Constructions Limited, NoiseAir was commissioned to undertake a noise impact assessment in order support a planning application proposing a three-storey mixed-use development with ground floor retail and apartments on the first and second floor at the development site.

6.2 Conclusions

6.2.1 Calculations show that to achieve a reasonable internal acoustic environment in habitable rooms as specified within BS 8233:2014, the building envelope constructions should be selected to meet the sound reduction index (SRI) values presented in **Table 7**, which would require acoustic grade trickle ventilators meeting the performance specified.

6.2.2 Any mechanical plant to be installed at the development site should not exceed 5 dB below the measured background sound levels of 53 dB and 39 dB $L_{A90,1hour}$ / $L_{A90,15mins}$ for daytime and night-time periods respectively. At this stage no proposals for plant are available to assess.

APPENDIX A - REPORT LIMITATIONS

This Report is presented to Brightwise Constructions 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 Brightwise Constructions 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 – NOISE INGRESS CALCULATIONS

BS 8233:2014 - Noise Ingress Calculation

Term	Description	Value
S_f	Total facade area (m^2)	8.40
S_{wi}	Window area (m^2)	1.20
S_{ew}	External wall area (Sf - Swi) (m^2)	7.20
S_{rr}	Area of the ceiling (m^2)	12.00
S	Total area exposed to noise ingress (Sf + Srr)	20.40
x	Room length (x)	4.00
y	Room width (y)	3.00
z	Room height (z)	2.80
V	Room Volume (m^3)	33.60
K	Facade Measuremet Correction	0.00
A0	Ref. qbs area (m2)	10.00
k	k=3 in BS 8233:2014 + Tollerance	3.00
	Number of vents	2.00
r	Distance to window / vent (m)	0.00
d	Angle of incidence (deg)	180.00

Project: Cheetham Hill Road, Manchester
Description: Daytime Noise Ingress
by: MG

Results: 34 dB L_{Aeq} NR 29

Term	Description	Description of noise level	Octave Band Centre Frequency (Hz)								Broadband	
			63	125	250	500	1000	2000	4000	8000	dB(A) 63-8k	dB(A) 125-2k
$L_{eq,ff}$	Free-field L_{eq} outside room		71	68	64	58	53	48	45	43	61	60

Term	Description	Specification										Dn,e,w	Rw	C	Ctr	Rw + Ctr	Comments
												$D_{n,e,w}$	R_w	C	C_{tr}		Comments
R_{wi}	SRI of glazing/window:	27 dB Rw+Ctr 6:12:6 mm	14	20	19	29	38	36	45	45	-	-	-	32	-2	-5	27	Acoustics Bulletin Sept/Oct 1994
	SRI of external wall:	47 dB Rw+Ctr BS8233 Example - Brick and block external wall	34	40	44	45	51	56	56	56	-	-	-	51	-1	-4		0.0

BS 8233:2014 - Noise Ingress Calculation

Term	Description	Value
S_f	Total facade area (m^2)	8.40
S_{wi}	Window area (m^2)	1.20
S_{ew}	External wall area (Sf - Swi) (m^2)	7.20
S_{rr}	Area of the ceiling (m^2)	12.00
S	Total area exposed to noise ingress (Sf + Srr)	20.40
x	Room dimension x	4.00
y	Room dimension y	3.00
z	Room dimension z	2.80
V	Volume of receiving room (m^3)	33.60
K	Facade Measuremet Correction	0.00
A0	Ref. qbs area (m2)	10.00
k	k=3 in BS 8233:2014 + Tollerance	3.00
	No. of vents in external wall	2.00
r	Distance to window / vent (m)	0.00
d	Angle of incidence (deg)	0.00

Project: Cheetham Hill Road, Manchester
Description: Night-time Noise Ingress
by: MG

Results: 16 dB L_{Aeq} NR 11
43 dB LA_{max}

Term	Description	Description of noise level	Octave Band Centre Frequency (Hz)								Broadband	
			63	125	250	500	1000	2000	4000	8000	dB(A) 63-8k	dB(A) 125-2k
$L_{eq,ff}$	Free-field L_{eq} outside room		39	46	47	48	47	43	37	32	54	51
L_{max}	Free-field L_{max} outside room		79	76	74	71	68	63	58	53	73	73

Term	Description	Specification										Dn,e,w	Rw	C	Ctr	Rw + Ctr	Comments
												$D_{n,e,w}$	R_w	C	C_{tr}		Comments
R_{wi}	SRI of glazing/window:	27 dB Rw+Ctr 6:12:6 mm	14	20	19	29	38	36	45	45	-	-	-	32	-2	-5	27	Acoustics Bulletin Sept/Oct 1994
	SRI of external wall:	47 dB Rw+Ctr BS8233 Example - Brick and block external wall	34	40	44	45	51	56	56	56	-	-	-	51	-1	-4		0.0

APPENDIX C – 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, which 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.
Ground borne 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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