PENINSULAR
ACOUSTICS

Direct D and R Limited

32/38 Waterloo Rd, Blackpool

Acoustic Assessment

PUBLIC

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Acoustic Assessment

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1. Introduction

Peninsular Acoustics has been commissioned by Direct D and R Limited (hereafter referred to as “the Client”), to undertake an acoustics assessment to support a planning application for the first and second floor of an existing office building (hereafter referred to as “the Site”), which is proposed to be converted to holiday accommodation.

An acoustic glossary is provided in Appendix A to assist the reader.

1.1. Site Description

Existing Site

The Site, situated at 32/38 Waterloo Rd, Blackpool, FY4 1AB, is positioned above current commercial units, including 'Savers' general store and 'Trinity Hospice Shop.'

The Site is bound to the north by St Bede's Avenue, with residential dwellings beyond; to the east and west by existing commercial units; and to the south by Waterloo Rd with a number of existing commercial units.

Development Proposals

Development proposals comprise the conversion of the existing office building at first and second floors into holiday accommodation capable of accommodating 8-10 persons at each floor level.

An approximate redline boundary along with the identified nearby Noise Sensitive Receptors (NSR) is presented in Figure 1-1.

Figure 1-1: Approximate Redline Boundary.

1.2. Scope of Works

The following scope of works has been undertaken:

- An unattended Environmental Sound Survey has been undertaken to determine prevailing acoustic conditions;
- Noise break-in calculations in accordance with BS EN ISO 12354-3[1] and BS 8233[2] have been undertaken to achieve internal noise levels whilst also considering whole-dwelling ventilation in accordance with AD-F[3].
- Mitigation in the form of glazing and ventilation specifications and minimum sound reduction indices for non-glazed constructions has been provided,
- An assessment of the external amenity area in line with BS 8233 guidance has been undertaken, and;
- Additionally, due to the proposed development comprising holiday accommodation, at the request of the design team on the assumption of historic planning requests by Blackpool Council (hereafter referred to as 'the Local Authority') an assessment of the sound from residents using the proposed external amenity area on the identified NSR has been undertaken.

[1] BS EN 12354-3:2000 *'Building Acoustics. Estimation of acoustic performance in buildings from the performance elements. Airborne sound insulation against outdoor sound', 2000.*
[2] BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings.'*
[3] The Building Regulations 2010 'Approved Document F'.

2. Planning Policy and Guidance

Relevant national planning policy and guidance documents comprise:

- National Planning Policy Framework (2023);
- Noise Policy Statement for England (2010);
- BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings'; and*
- WHO Guidelines for Community Noise (1999).

A summary of each of the above documents is provided in Appendix B.

2.1. Local Policy

Given no specific guidance relevant and relating to noise, the assessment has been based on the guidance of BS 8233 and the World Health Organisation (WHO) guidelines for community noise (1999).

2.2. BS8233:2014 Criteria

Whilst holiday accommodation is temporary, internal acoustic targets have been informed by residential amenity within dwellings outlined in BS 8233.

Table 2-1: Indoor ambient noise levels for dwellings.

Acitivty	Location	07.00 to 23.00	23.00 to 07.00
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 $L_{Aeq,8hour}$

2.2.1. WHO Guidelines for Community Noise Criteria

BS 8233 does not give a definitive level for internal maximum noise levels or define an appropriate number of exceedances per night. However, the WHO guidelines state *"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more that 10-15 times per night. (Vallet & Vernet),"* therefore this will be considered as additional criteria as well as the aforementioned ambient sound levels from BS 8233.

3. Sound Surveys

3.1. Methodology

An unattended Environmental Sound Survey has been undertaken between 10:30 on Thursday 4th and 10:30 Thursday 11th January 2024 to establish prevailing acoustic conditions.

Two sound level meters (SLMs) were installed at 2nd floor level protruding 1m from partially opened windows to the front and rear of Site.

The measurement positions are described as follows:

- **Continuous Measurement 1 (CM1):** Centre of south facing façade overlooking Waterloo Rd;
- **CM2:** Centre of north facing façade overlooking St Bede's Avenue.

The approximate measurement locations are shown in Figure 3-1.

Figure 3-1: Site Map: Approximate measurement locations.

3.2. Equipment

Measurements were taken using class 1 integrating/averaging SLMs housed, where appropriate, in environmental protection apparatus. The SLMs were field calibrated before and after the survey, using a Class 1 calibrator, with no significant drift in calibration noted.

The SLMs were setup to record A-weighted ambient, maximum and background sound levels at a minimum along with associated octave band spectra.

3.3. Survey Conditions and Observations

3.3.1. Meteorological Conditions

Weather conditions during installation and collection of equipment were dry with low wind speeds.

Historic weather data was monitored over the course of the survey which generally indicates suitable measurement conditions i.e. wind speeds of <5m/s and mostly dry. There were some hourly periods where wind speeds may have exceeded the recommended speed, though through analysis of the data collected it has been determined that no undue elevation occurred.

Therefore, it can be concluded that there were no adverse meteorological conditions, and all measurement data is acceptable to inform the assessment.

3.3.2. Site Observations

The dominant source of noise impacting the Site is the traffic on Waterloo Road and vehicles parking in the one-hour time-limited spaces in front of the Site. Additionally, noise from pedestrians talking or shouting while walking along the pavement was observed.

Consequently, L_{AFmax} levels at the south façade overlooking Waterloo Rd are dominated by car passes, door slams and pedestrians which are likely to influence the acoustic design.

There were no fixed mechanical services or other sources of commercial sound in the vicinity of the Site that were particularly notable in comparison to the general acoustic environment and therefore, the assessment will focus on non-distinguishable criteria outlined in BS 8233.

3.4. Results

The survey locations are considered to be façade levels, however, to inform the assessment and break-in calculations, free field sound levels are presented herein by deducting 3 dB from the measured level from the SLM.

The measured sound levels considered to be representative of conditions at the Site are presented in Table 3-1.

A full time-history of noise survey results is presented in Appendix C.

Table 3-1: Highest measured free field noise levels selected for assessment.

Date	Position	Daytime Sound Level $L_{Aeq,16hr}$ dB	Night-time Sound Level	
			Ambient $L_{Aeq,8hr}$ dB	Typical Maximum $L_{AFmax,T}$ dB
Sunday 7th January	CM1	68	59	79
Friday 5th January	CM2	50	45	62

4. Internal Noise Level Assessment

4.1. Calculation Input Parameters

Internal ambient noise levels have been calculated in accordance with BS EN ISO 12354-3 with example calculations provided in Appendix D.

Room Dimensions

Accommodation layout dimensions have been determined as per architectural drawings received from Paul Ennis; drawing refs. 443.09-001 and 443.09-002, dated November 2023.

Non-Glazed Elements

The exact specifications for the external wall and roof constructions are uncertain, therefore the sound reduction indices (R) for a brick and block cavity construction typically used in modern residential developments has been considered as a guide for the wall in conjunction with a timber roof construction as a worst-case assessment.

The non-glazed elements of the building envelope should achieve a minimum sound insulation performance of 48 dB $R_w + C_{tr}$.

Glazing Specification

Based upon architectural drawings available, the calculations have been undertaken for each habitable space using the glazing specifications outlined in Table 4-1.

Table 4-1: Glazing specifications.

Reference	Min. Performance	Typical Glass Construction
A	36 dB Rw + Ctr	10 mm panel 12mm air gap 10mm panel
B, C	29 dB Rw + Ctr	6mm panel 12mm air gap 6mm panel

Ventilation Strategy

Break-in calculations have been based upon whole-dwelling ventilation provided in accordance with AD-F for habitable rooms.

4.2. Example Calculation

An example calculation is presented below for the 1st Floor Bedroom 7, overlooking Waterloo Rd which is considered to be the most exposed area of the Site and thus all other calculations result in lower internal sound levels.

Table 4-2: Example break-in calculation input data.

Parameter	Data	Comments
Room Dimensions	3.8m x 5.2m x 2.4m W x D x H	Based upon architectural drawings
Glazing Area	2.8m^2	Based upon architectural drawings
Facade Composition	48 dB $R_w + C_{tr}$	Robust assumption for non-glazed element.
Proposed Glazing	36 $R_w + C_{tr}$	Marginally increased thickness glazing required
Proposed Ventilation	45 $D_{n,e,w} + C_{tr}$	Acoustically rated through-wall ventilator required due to high L_{AFmax} levels

Based upon the assumptions listed above and the available architectural drawings, the calculated internal sound levels, for a bedroom overlooking Waterloo Rd are:

- 27 dB $L_{Aeq,16hr}$;
- 19 dB $L_{Aeq,8hr}$; and
- 42 dB $L_{AFmax,2min.}$

The results show compliance with all relevant criteria outlined in BS 8233 and WHO Guidelines.

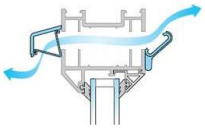
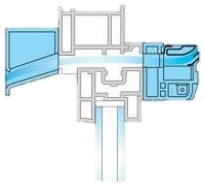
4.3. Façade Mitigation Summary

Based upon the break-in calculations undertaken, mitigation measures have been prescribed to achieve sound levels in accordance with BS 8233.

The calculations result in the need for a higher glazing and ventilation package for bedrooms compared to living rooms across the south façade overlooking Waterloo Rd.

North facing bedrooms are subject to lower noise levels therefore standard glazing and trickle ventilation units are sufficient as shown below.

Table 4-3: Mitigation Summary.

Ref.	Glazing Requirements	AD-F Ventilation Requirements
A	10mm panel 16mm air gap 10mm panel **Minimum 36 dB R_W + Ctr**	Acoustically Rated Trickle Vent Acoustically rated core-drilled background room ventilation  **Minimum $D_{n,e,w}$ + C_{tr} = 45 dB**
B	6mm panel 12mm air gap 6mm panel **Minimum 29 dB R_W + Ctr**	Standard Trickle Vent Direct airpath trickle vent located in the top of the window frame.  **Minimum $D_{n,e,w}$ + C_{tr} = 27 dB**
C		Acoustically Rated Trickle Vent Slots typically located in the window frame with more torturous path and acoustic lining.  **Minimum $D_{n,e,w}$ + C_{tr} = 37 dB**

Corresponding Locations

The above mitigation measures should be applied to all habitable rooms in the following locations:

- **Ref A:** To be applied to all Bedrooms overlooking Waterloo Rd;
- **Ref B:** To be applied to all Bedrooms overlooking St Bede's Avenue, and;
- **Ref C:** To be applied to all Living Rooms.

Figure 4-1: Recommended glazing and ventilation performance locations - 1st Floor.

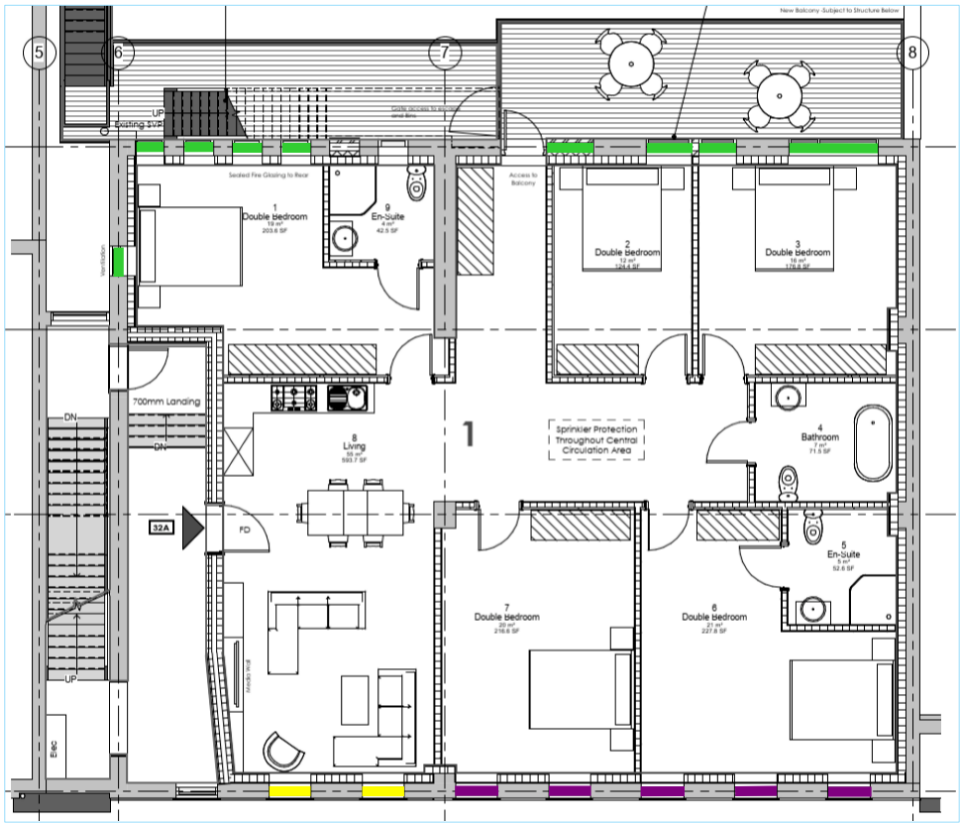
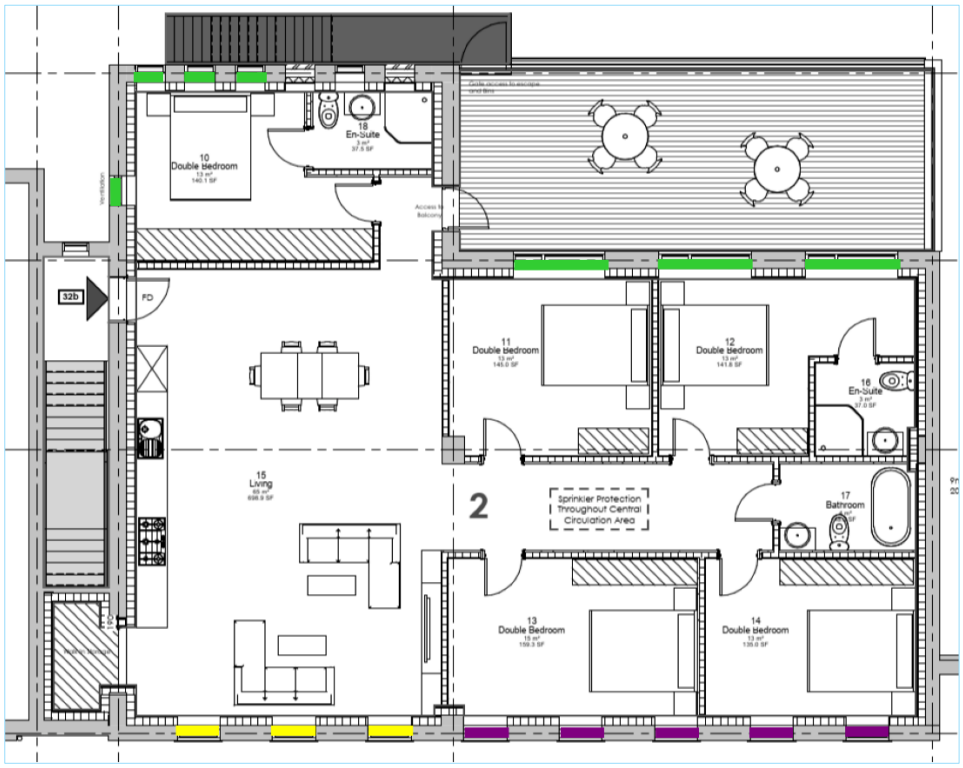


Figure 4-2: Recommended glazing and ventilation performance locations - 2nd Floor.



5. Additional Considerations

5.1. Internal Noise Transfer

Whilst the ground floor commercial premises does not have any significant noise producing elements, it is recommended that a sound insulation test during the pre-construction phase is undertaken to ensure the performance of the separating element between the ground floor and the residential units is sufficient to achieve the Building Regulation requirements and protect residential amenity.

The base construction is assumed to be concrete and therefore, there are a number of additional measures to improve the sound insulation performance. It is recommended that a design target of 53dB $D_{nT,w} + C_{tr}$ is considered as part of the detailed design process.

Design advice should be given after testing and investigations of current constructions to determine the required starting point for improvement. Potential improvements, such as a floating floor system, ceiling treatment, and external wall linings to reduce flanking transmission may be required.

5.2. Outdoor Amenity Noise

External amenity areas are proposed to the north façade of the Site overlooking St Bede's Avenue.

The highest ambient sound level measured at CM2 during the daytime was 50 dB $L_{Aeq,\ 16hr}$ which is in line with the requirements of BS 8233 and therefore, no mitigation measures for the external amenity area are required.

Amenity impact on nearby residential receptors

In addition, an indicative assessment of the use of the proposed amenity spaces has been undertaken on the nearest NSR (circa 20m away on St Bede's Avenue) to demonstrate that people potentially using the balcony area in the evening will not adversely impact existing internal residential amenity.

Each apartment will accommodate up to 10 individuals therefore as a worst-case assessment the Sound Power Level (SWL) generated from 10 people talking simultaneously has been calculated using a typical speech spectra resulting in a SWL of 78 dBA.

Based upon a point source propagation pattern for people speaking, the resultant sound pressure level at the façade of the nearest NSR is calculated to be 41 dB $L_{Aeq,\ T}$.

Based upon this result, the overall conclusion is that the external amenity area usage will not adversely impact existing residential conditions at St Bede's Avenue as:

- The measured sound levels at CM2 are considered to be typical of sound levels along St Bede's Avenue and therefore, sound from people on the balcony will likely be masked by road traffic noise and the wider acoustic environment; and
- During periods of lulls, if the NSR has an open window then sound levels would be circa 31 dB internally which would not result in any impact; and
- Continuous talking by 10 people is not anticipated, and generally, fewer than 10 people will be talking simultaneously. Therefore, noise generated in this space is not expected to adversely affect nearby residential receptors.

6. Conclusions

Peninsular Acoustics has been commissioned by Direct D and R Limited to undertake an acoustic assessment to measure the impact from the surrounding noise sources to the proposed holiday accommodation consisting of 2no. apartments across two upper floors.

An environmental sound survey has been undertaken which has determined prevailing acoustic conditions surrounding the Site. The is south facing overlooking Waterloo Rd is the most exposed façade to noise and measured levels at CM1 shows sound levels to be 68dB $L_{Aeq,16hr}$, 59dB $L_{Aeq,8hr}$, and 79dB 10^{th} highest $L_{AFmax,2min}$ during the night-time.

Break in calculations have been undertaken which demonstrate that with the installation of appropriate glazing and ventilation systems, internal noise level standards outlined in BS 8233 and WHO Guidelines for Community Noise will be achieved whilst giving due consideration to the ventilation requirements of AD-F.

The noise levels in amenity areas have been assessed at 50dB, aligning with the recommended lower thresholds specified in BS 8233 to ensure the proper enjoyment of these spaces.

Furthermore, the expected noise impact from the amenity areas on to nearby residential receptors has been predicted with no anticipated adverse impacts.

The results of this study have demonstrated with the inclusion of the mitigation measures outlined in this report, the Site is suitable for residential amenity.

Limitations applicable to this report are contained in Appendix E.

Appendix A

Technical Terminology

Noise	Typically defined as unwanted, unpleasant or disturbing sound
Frequency (Hz)	The number of oscillations in acoustic pressure per second. It represents the 'tone' of the sound. Often determined in octave bands
Maximum sound pressure level (L_{Fmax})	The maximum or highest sound pressure level measured with a 'fast' time weighting
Equivalent continuous sound pressure level ($L_{eq,T}$)	The average of the total sound energy over a specified time period (T). L_{eq} represents the equivalent sound level that a fluctuating source would have compared to a steady source with the same total sound energy over a specific time period. Commonly used as a descriptor of human perception of sound over time.
'A' weighting	Frequency-dependent weighting based on the response of the human auditory system which has been found to correlate well with the subjective response to sound. Denoted by the use of the letter 'A'. For example, dBA denotes an 'A' weighted sound level in decibels, or L_{Amax} denotes an 'A' weighted maximum sound pressure level.
Internal Ambient Noise Level (IANL)	The noise level within a room or enclosed space. Usually determined as an equivalent continuous sound pressure level over a specific time period ($L_{Aeq,T}$, dB)
Noise Rating (NR) curve	A single figure term used to reflect the spectral frequency content of noise. Although originally proposed to assess environmental noise, NR curves are now typically used to describe noise from mechanical ventilation systems in buildings.
$L_{night,outside}$	The incident external A-weighted long-term average sound level as defined in ISO 1996-2: 1987, determined over all the night periods of a year, in which the night is eight hours between 23:00 and 07:00.
AVO	Acoustics, Ventilation, Overheating (e.g. AVO Guide, AVO Group).
Overheating Strategy Overheating Condition	The situation where measures are in place to mitigate overheating to meet agreed compliance criteria.
Dynamic thermal modelling	A technique that can be used to simulate internal temperatures in dwellings before they are built
Ventilative cooling	Cooling by means of introducing external ambient temperature air at a high ventilation rate. Can be either passive (no fans) or mechanical (with fans).
Purge ventilation	Ventilation to aid removal of high concentrations of pollutants and water vapour released from occasional activities such as painting and decorating or accidental releases such as smoke from burnt food or spillage of water.
Mechanical cooling	Cooling by means of a refrigerant cycle. This would include 'air conditioning' systems and the use of fan coil units (FCUs).

MEV	Mechanical extract ventilation.
“Free area” as used in AD-O	Approved Document O uses the term “Minimum free area” that is required to be achieved by the Equivalent area of the window openings. AD-O provides the accepted definition of Equivalent area for the description of “free area”. The term “free area” is therefore avoided in this document to avoid further confusion.
Acoustic open area	The measurable, cross-sectional, geometric area of an opening. For a partially open window, this is considered to be the lesser of either the size of the hole in the window frame that is left by the opening light, or the combined cross-sectional area around the opening light through which air must pass to move from outside to inside. The area around a hinged opening light includes the triangular areas on the sides adjacent to the hinge, and the rectangular area on the side opposite the hinge. This should not be used for comparing the air-flow performance of elements because this will also be dependent on factors such as depth (length of air-path), surface roughness and tortuosity. Refer to reference 6 for further information.
Effective area, A_{eff}	Defined as the product of the free area and discharge coefficient, this is the preferred parameter for comparing the air-flow performance of elements. Refer to reference 6 for further information.
Equivalent area, A_{eq}	The area of a sharp-edged, circular orifice that gives the same flow rate as the actual opening at a given pressure-difference. In other words, the free-area of a notional circular hole made in an infinitely thin, infinite extent baffle that gives the same air-flow performance as the real opening. Used to describe the area of trickle vents in Approved Document F. Not to be confused with Effective area. Refer to reference 6 for further information.
Coefficient of Discharge, Cd	The ratio of the mass flow rate at the discharge end of the nozzle to that of an ideal nozzle which expands an identical working fluid from the same initial conditions to the same exit pressures.
$D_{n,e}$ / $D_{n,e,w}$	The laboratory tested sound insulation of small building elements, normalised to an equivalent absorption area of 10m2.
Façade level	The sound pressure level measured close to a building façade that includes contribution from both the incident sound and the sound reflected from the façade. Normally taken to be 3dB higher than the equivalent free-field level, when located at 1 metre from a façade.
Free-field level	A measured sound pressure level that is independent of any contributions due to reflections from nearby surfaces and is therefore representative of the direct path only.
R / R_w	The laboratory tested airborne sound insulation of a building element
Sound insulation	The capacity of a structure to prevent sound from reaching a receiving location. Sound energy is not necessarily absorbed; impedance mismatch, or reflection back toward the source, is often the principal mechanism

Appendix B

Relevant National Policy and Guidance

National Planning Policy Framework

The 'National Planning Policy Framework' (NPPF) was published by central government in 2012 and replaces previous Planning Policy Guidance Notes. It does not replace the Noise Policy Statement (England) 2010 to which it refers. The Planning Practice Guidance (PPG) online resource for the NPPF was launched in March 2014 to assist practitioners with the content of the NPPF.

The NPPF includes a *"presumption in favour of sustainable development that is the basis for every plan, and every decision*". This is a very clear direction which may conflict with the application of existing local policies in development control decisions and will influence the eventual replacement of those policies.

To clarify this point, the PPG says "Where the development plan is absent, silent or the relevant policies are out of date [the NPPF] requires the application to be determined in accordance with the presumption in favour of sustainable development unless otherwise specified".

Also, "The NPPF represents up-to-date Government policy and must be taken into account where it is relevant to a planning application or appeal. If decision takers choose not to follow the NPPF, clear and convincing reasons for doing so are needed".

LPAs are therefore obliged to follow the NPPF unless they have up-to-date local policies that would justify a departure and, even then, the NPPF has 'material consideration' status. Where local policies conflict with one another, considerations shall be *'guided by the NPPF'*. Where local noise policies are dated, absent or in conflict it appears that national noise policy must take precedence.

The NPPF contains four aims as follows:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life as a result of new development, including through the use of conditions
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established
- Identify and protect areas of tranquillity

The reference numbers 27 and 28 point respectively to the Explanatory Note to the Noise Policy Statement for England (NPSE) (see below) and the provisions of the Environmental Protection Act 1990 and other relevant law.

Noise Policy Statement for England

The 'Noise Policy Statement for England' (NPSE) was published in March 2010. The NPSE is the overarching statement of noise policy for England and applies to all forms of noise other than occupational noise, setting out the long-term vision of Government noise policy which 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."

That vision is supported by the following aims which are reflected in three of the four aims for planning policies and decisions in paragraph 123 of the NPPF:

"THROUGH THE EFFECTIVE MANAGEMENT AND CONTROL OF ENVIRONMENTAL, NEIGHBOUR AND NEIGHBOURHOOD NOISE WITHIN THE CONTEXT OF GOVERNMENT POLICY ON SUSTAINABLE DEVELOPMENT:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life."

The NPSE introduces the concepts of NOAEL, LOAEL and SOAEL in relation to the potential health implications of a noise/vibration effect, defined as follows:

- "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."

It is acknowledged, however, that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise, in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that "*further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise."*

BS8233:2014 / WHO Guidelines for COMMUNITY NOISE

Table 2-1 in Section 3 presents recommended internal noise levels for residential dwellings, as given in BS 8233:2014.

It is recommended that in order to provide a comfortable environment within habitable rooms, specifically bedrooms, the external building fabric be generally designed to achieve the internal night-time noise level of 30 dB(A) and daytime level of 35 dB(A).

The figures given above would be considered the LOAEL, and levels below the figures above would be considered the NOEL. Levels significantly greater than the figures given above would be considered the SOAEL and should be avoided.

BS 8233:2014 also recommends that individual noise events at night can be disturbing to sleep patterns, and that a guideline level should be set in terms of SEL or $L_{AF,max}$.

BS 8233 does not give a definitive level for internal maximum noise levels, or define an appropriate number of exceedances per night. However, the World Health Organisation's 'Guidelines for Community Noise' (1999) references a study by Vallet & Vernet, 1991, which concluded that "For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB $L_{AF,max}$ more that 10-15 times per night."

For the purposes of assessment, less than 10 exceedances per night would be considered the NOEL, with 15 exceedances considered the LOAEL. Numbers significantly in excess of this would be considered the SOAEL.

BS 8233 also states that it is desirable that the steady noise level in external amenity areas (such as gardens or outdoor living areas) does not exceed 50 dB $L_{Aeq,T}$, with 55 dB $L_{Aeq,T}$ being acceptable in noisier environments. This is in line with recommendations given in the WHO Guidelines for Community Noise.

However, in the period since the original issue of the WHO guidelines, the Government has set all English Local Planning Authorities specific five-year housing supply targets. This has placed greater emphasis on making efficient use of land resource earmarked for residential development. BS 8233:2014 recognises this, and states that it should be accepted that these values are not achievable in all circumstances where development would be otherwise desirable. The document goes on to suggest that in areas such as city centres, or urban areas adjoining the transport network, a compromise (between elevated external noise levels and ensuring development needs) is warranted.

On this basis, levels lower than 50 dB(A) will be considered the NOEL, levels above 50 dB(A) considered to be the LOAEL and levels above 55 dB(A) would be considered to be the SOAEL, but would be addressed on a case-by-case basis, and would not necessarily be considered a barrier to development.

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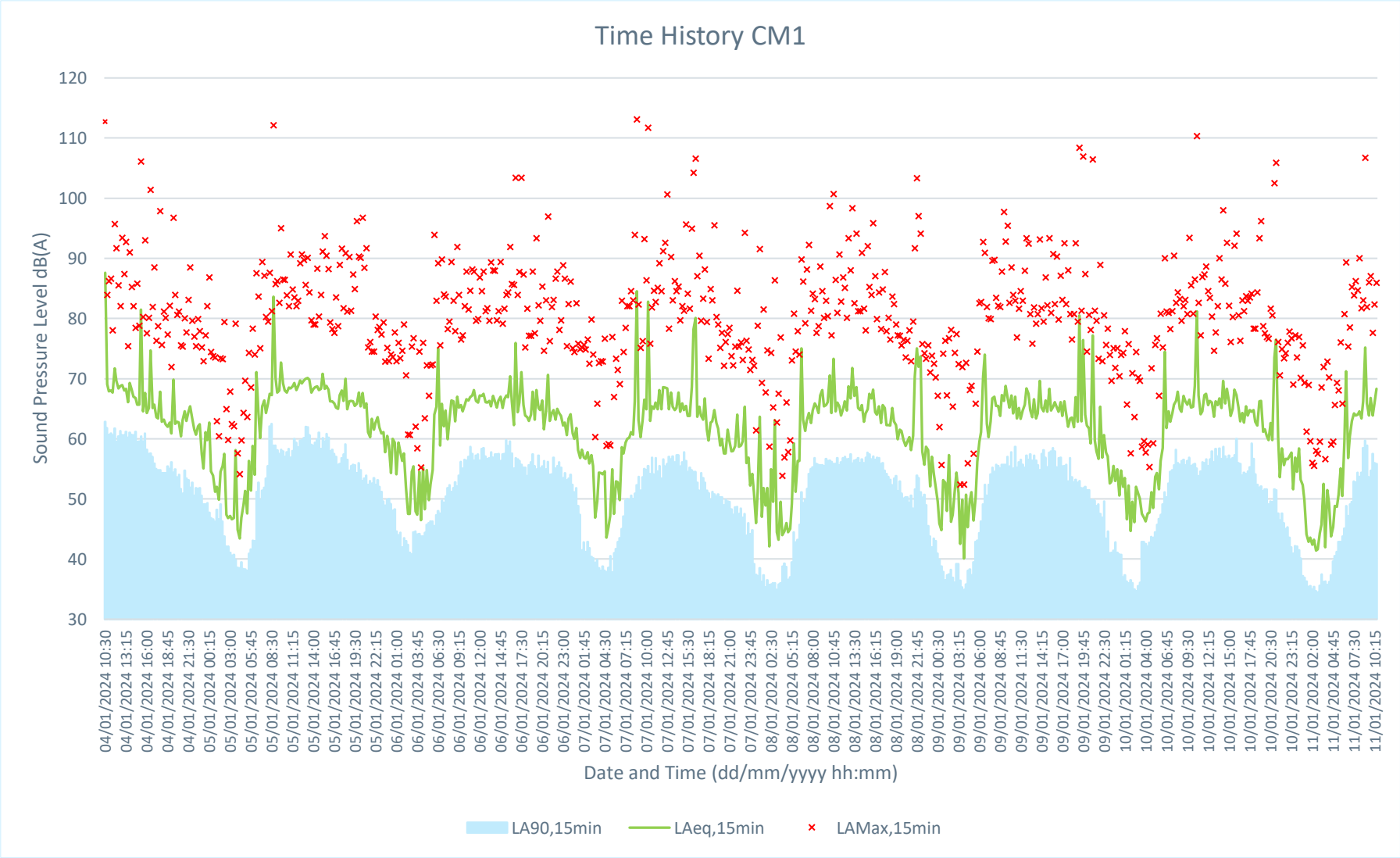
Appendix C

Time History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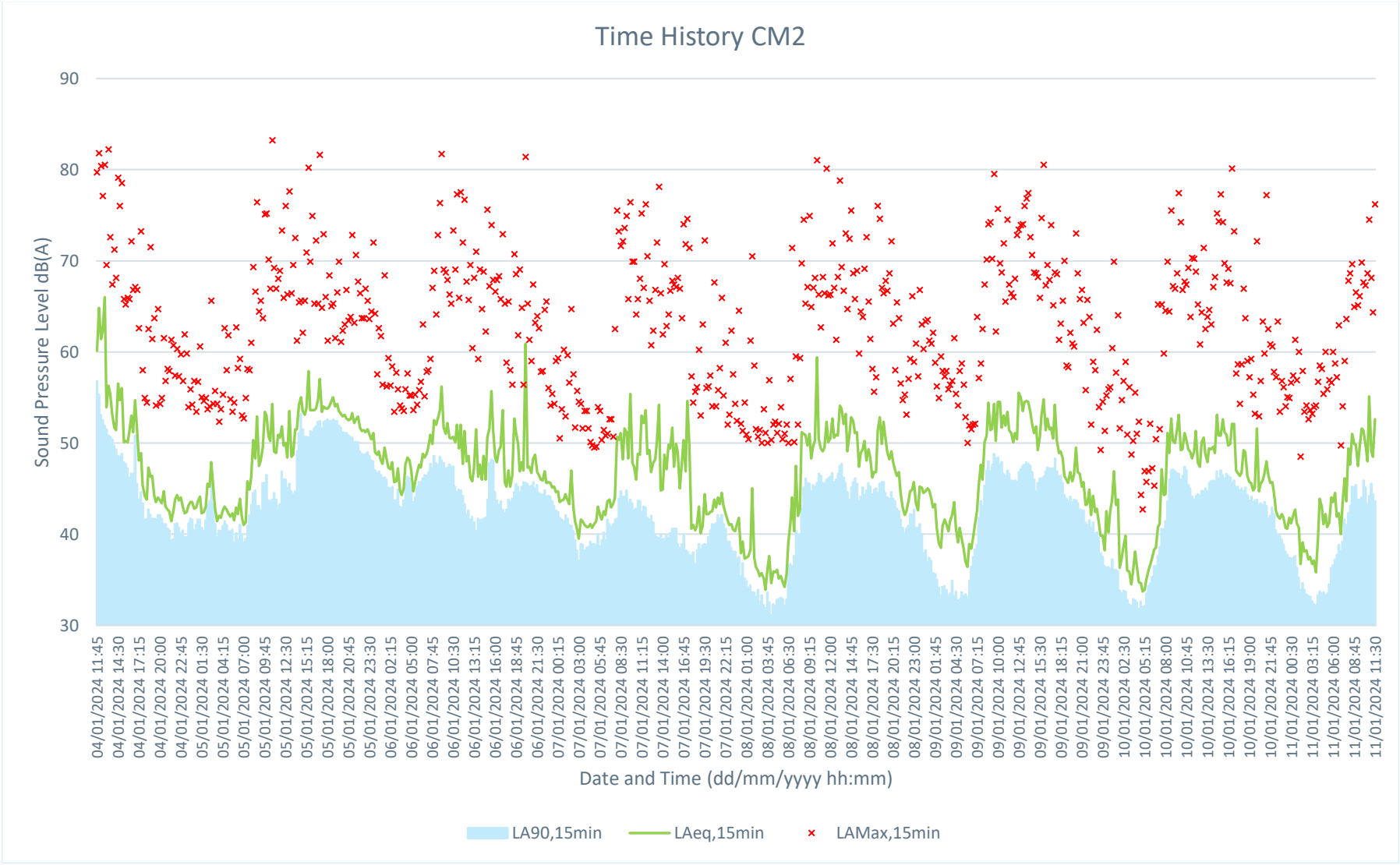
10/01/2024 17:45
10/01/2024 20:30
10/01/2024 23:15
11/01/2024 02:00
11/01/2024 04:45
11/01/2024 07:30
11/01/2024 10:15
Date and Time (dd/mm/yyyy hh:mm)
LA90,15min
LAeq,15min
LAMax,15min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Sound Pressure Level dB(A)
90
80
70
60
50
40
30
04/01/2024 11:45
04/01/2024 14:30
04/01/2024 17:15
04/01/2024 20:00
04/01/2024 22:45
05/01/2024 01:30
05/01/2024 04:15
05/01/2024 07:00
05/01/2024 09:45
05/01/2024 12:30
05/01/2024 15:15
05/01/2024 18:00
05/01/2024 20:45
05/01/2024 23:30
06/01/2024 02:15
06/01/2024 05:00
06/01/2024 07:45
06/01/2024 10:30
06/01/2024 13:15
06/01/2024 16:00
06/01/2024 18:45
06/01/2024 21:30
07/01/2024 00:15
07/01/2024 03:00
07/01/2024 05:45
07/01/2024 08:30
07/01/2024 11:15
07/01/2024 14:00
07/01/2024 16:45
07/01/2024 19:30
07/01/2024 22:15
08/01/2024 01:00
08/01/2024 03:45
08/01/2024 06:30
08/01/2024 09:15
08/01/2024 12:00
08/01/2024 14:45
08/01/2024 17:30
08/01/2024 20:15
08/01/2024 23:00
09/01/2024 01:45
09/01/2024 04:30
09/01/2024 07:15
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10/01/2024 08:00
10/01/2024 10:45
10/01/2024 13:30
10/01/2024 16:15
10/01/2024 19:00
10/01/2024 21:45
11/01/2024 00:30
11/01/2024 03:15
11/01/2024 06:00
11/01/2024 08:45
11/01/2024 11:30
Date and Time (dd/mm/yyyy hh:mm)
LA90,15min
LAeq,15min
LAMax,15min

Appendix D

Example Noise Break in Calculation

		Internal Noise Break-in				**Calculation to BS12354-3:2000**						
	Project Name		Blackpool			**Consultant**	Joel Phillips					
	Project No.		PA0166			**Checker**	Adam Walker					
	Room Name		1st Floor Bedroom 7			**Date**	18/01/2024					
Room Details												
Width			3.8	m	Height		2.4	m				
Depth			5.2	m	Volume		47.424	m^3				
Façade Area			9.1	m^2	Surface Area		82.72	m^3				
Additional Façade Area				m^2	Total Façade Area		9.1	m^2				
		63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**R_w / D_{new}**	**C_{tr}**	
Area of glass / SRI	2.8	24	30	32	38	36	40	49	43	39	-3	SG 10mm/12mm/10mm
Area of façade / SRI	6.3	34	41	43	48	50	55	55	55	51	-3	2x103mm brick (75mm gap + plast)
Vent No. off / D_{ne}	1	27	43	37	38	46	57	66	57	45	-3	AAC125HP (8500mm^2 EA) Through Wall
Composite Façade Sound Reduction												
Composite SRI		28	34	36	42	41	45	52	48	43	-3	
Measured Incident Sound Level (Free field)		**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB(A)**		**Notes**
$L_{Aeq\ Daytime}$		61.9	54.8	52.5	51.1	62.1	65.3	49.5	35.0	68		
$L_{Aeq\ Night\ Time}$		55.2	48.2	48.3	55.6	48.3	55.3	45.7	38.4	59		
$L_{AFmax\ Night\ Time}$		69.6	75.9	79.9	75.8	71.7	74.5	57.3	38.4	79		
Reverberation Time												
Receive Room Low Frequency Correction	No											
Receive Room Reverberation Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			
Total Absorption A (m^2)		15.18	15.18	15.18	15.18	15.18	15.18	15.18	15.18			
10log(S/A)		-2.21	-2.21	-2.21	-2.21	-2.21	-2.21	-2.21	-2.21			
Daytime L_{aeq} Typical	**0700-2300**											
Lp Via Vent		36.1	13.0	16.8	14.3	17.3	9.5	-15.3	-20.7	20		
Lp via Façade (BS8233:2014)		34.4	21.2	16.9	9.6	22.1	21.3	-1.9	-11.7	26		
L_{Aeq} Total		**38.4**	**21.8**	**19.8**	**15.6**	**23.3**	**21.5**	**-1.7**	**-11.2**	27		
Noise Limit Type	dB(A)											
Target Noise Limit	35	52	42	35	29	26	25	25	27	35		
Night Time L_{aeq} Typical	**2300-0700**											
Lp Via Vent		29.4	6.5	12.5	18.8	3.6	-0.5	-19.1	-17.4	16		
Lp via Façade (BS8233:2014)		27.8	14.6	12.6	14.1	8.4	11.3	-5.7	-8.4	16		
L_{Aeq} Total		**31.7**	**15.2**	**15.6**	**20.1**	**9.6**	**11.5**	**-5.5**	**-7.9**	19		
Noise Limit Type	dB(A)											
Target Noise Limit	30	47	37	30	24	21	20	20	22	30		
Night Time Maximum Typical	**2300-0700**											
Lp Via Vent		43.8	34.1	44.1	39.0	26.9	18.7	-7.5	-17.4	39		
Lp via Façade (BS8233:2014)		42.1	42.3	44.3	34.3	31.7	30.5	5.9	-8.4	39		
L_{AFmax} Total		**46.1**	**42.9**	**47.2**	**40.3**	**33.0**	**30.7**	**6.1**	**-7.8**	42		
Noise Limit Type	dB(A)											
Target Noise Limit	45	62	52	45	39	36	35	35	37	45		

			Internal Noise Break-in				Calculation to BS12354-3:2000						
	Project Name		Blackpool			Consultant	Joel Phillips						
	Project No.		PA0166			Checker	Adam Walker						
	Room Name		1st Floor Bedroom 3			Date	18/01/2024						
Room Details													
Width			3.8	m	Height		2.4	m					
Depth			4.2	m	Volume		38.304	m^3					
Façade Area			9.1	m^2	Surface Area		70.32	m^3					
Additional Façade Area				m^2	Total Façade Area		9.1	m^2					
		63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**R_w / D_{new}**	**C_{tr}**		
Area of glass / SRI	3.25	18	24	22	29	39	33	38	32	32	-3	SG 6mm/12mm/6mm	
Area of façade / SRI	5.9	34	41	43	48	50	55	55	55	51	-3	2x103mm brick (75mm gap + plast)	
Vent No. off / D_{ne}	1	32	32	32	31	33	31	31	31	32	0	Trickle vent with direct air path	
Composite Façade Sound Reduction													
Composite SRI		22	28	26	33	43	37	42	36	36	-2		
Measured Incident Sound Level (Free field)		**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB(A)**		**Notes**	
$L_{Aeq\ Daytime}$		43.9	36.8	34.5	33.1	44.1	47.3	31.5	17.0	50			
$L_{Aeq\ Night\ Time}$		41.2	34.2	34.3	41.6	34.3	41.3	31.7	24.4	45			
$L_{AFmax\ Night\ Time}$		52.6	58.9	62.9	58.8	54.7	57.5	40.3	21.4	62			
Reverberation Time													
Receive Room Low Frequency Correction	No												
Receive Room Reverberation Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				
Total Absorption A (m^2)		12.26	12.26	12.26	12.26	12.26	12.26	12.26	12.26				
10log(S/A)		-1.28	-1.28	-1.28	-1.28	-1.28	-1.28	-1.28	-1.28				
Daytime L_{Aeq} Typical	**0700-2300**												
Lp Via Vent		14.0	6.9	4.7	4.2	13.2	18.5	2.7	-11.8	21			
Lp via Façade (BS8233:2014)		23.3	10.2	9.8	1.4	2.9	11.6	-9.1	-17.7	14			
L_{Aeq} Total		**23.8**	**11.9**	**11.0**	**6.0**	**13.6**	**19.3**	**2.9**	**-10.8**	22			
Noise Limit Type	dB(A)												
Target Noise Limit	35	52	42	35	29	26	25	25	27	35			
Excess													
Night Time L_{Aeq} Typical	**2300-0700**												
Lp Via Vent		11.4	4.4	4.4	12.7	3.5	12.5	2.8	-4.5	16			
Lp via Façade (BS8233:2014)		20.6	7.6	9.6	9.9	-6.8	5.6	-9.0	-10.3	11			
L_{Aeq} Total		**21.1**	**9.3**	**10.7**	**14.6**	**3.9**	**13.3**	**3.1**	**-3.5**	17			
Noise Limit Type	dB(A)												
Target Noise Limit	30	47	37	30	24	21	20	20	22	30			
Excess													
Night Time Maximum Typical	**2300-0700**												
Lp Via Vent		22.8	29.1	33.1	30.0	23.9	28.7	11.5	-7.4	33			
Lp via Façade (BS8233:2014)		32.0	32.3	38.2	27.1	13.5	21.8	-0.3	-13.3	32			
L_{AFmax} Total		**32.5**	**34.0**	**39.4**	**31.8**	**24.2**	**29.5**	**11.7**	**-6.4**	35			
Noise Limit Type	dB(A)												
Target Noise Limit	45	62	52	45	39	36	35	35	37	45			
Excess													

Appendix E

Report Limitations

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