MZA ACOUSTICS

EATON COURT, OXFORD ROAD, READING

Class AA Noise Impact Assessment

Document History

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1. INTRODUCTION

MZA Acoustics has been appointed to undertake a noise impact assessment at Eaton Court, Oxford Road, Reading RG1 7NG (the Site) to inform a planning application for partial redevelopment.

It is understood that planning permission is sought for an extension to part of the building, adding two additional floors.

This report presents the results of a baseline environmental noise survey undertaken at the Site, which has been used to inform an assessment of the suitability of the site for the proposed use.

Outline recommendations for mitigation measures that are likely to be required have been provided to demonstrate the Site is suitable for residential occupation, including recommendations for the provision of ventilation and mitigation of overheating with respect to the acoustic environment. Measures specifically for the mitigation of noise ingress from a nearby music venue and nightclub are included.

This report occasionally employs technical terminology. To assist the reader, a glossary of terms is presented in Appendix A.

1.1 Updates to this Revision

Following feedback from Reading Borough Council, the scheme has been amended to reduce the massing and provide a more visually appealing exterior.

This report has been updated to reflect the new internal layouts and construction types proposed (see Section 7).

Additional context and discussion is presented on the other commercial sources in the area (namely The Butler pub and the tyre garage located to the north of the site) (see Section 5.1).

In addition, feedback to the application for the conversion of the existing building at the site has also been considered – particularly in relation to the ventilation and overheating strategies (Section 6).

2. THE SITE

2.1 Site Description

The Site is located on Oxford Road, Reading, RG1 7NG, within Reading Borough Council.

The Site of the proposed development is a vacant office building with a two-storey west wing and a three-storey east wing. The Site also contains car parking spaces to the front and a two-storey car parking structure to the rear, which is currently closed and disused.

It is directly adjacent to Bond House, a residential building, to the west, and the Royal Meteorological Society building to the east. Mayer House, a block of residential flats, lies across the road to the east.

The Site and its immediate surroundings are labelled in Figure 1.

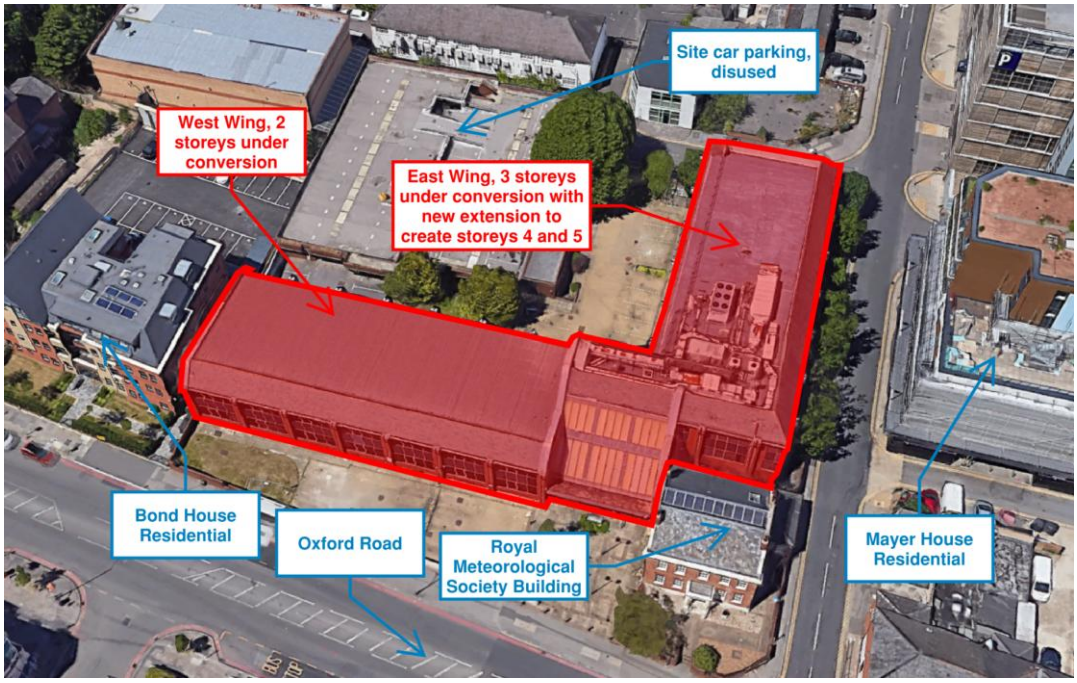


Figure 1: Eaton Court (red) and surrounding local features.

2.2 Surrounding Area

The urban area surrounding the Site is mixed use, containing commercial and residential development.

Nearby residential premises are highlighted in cyan in Figure 2. The noise impact of the extension on these premises, particularly of any associated plant, must be considered and this is discussed in Section 8 of this report.

During work by MZA to establish the noise impact from commercial noise sources on the conversion of the west wing, it was found that the most significant commercial noise source on the Site is the The Face Bar, a music venue and nightclub highlighted in blue in Figure 2. The Face Bar produces a significantly high level of bass frequency noise, often late into the night. Mitigating noise from The Face Bar is discussed in Section 7 of this report.

To the north of the site is Chatham Street and directly to the south is Oxford Road. Both roads are fairly busy and are part of multiple bus routes.

Other commercial noise sources include the Butler pub (illustrated in green); a tyre garage (yellow); a multi-storey car park (orange); and highstreet shops on Oxford road (cyan).

Figure 2: The Site's (red) proximity to: highstreet shops and takeaways (light blue), a multi-storey car park (orange), a garage (yellow), a pub (green), and a live music venue and nightclub (The Face Bar, dark blue). The area in pink is currently under redevelopment to residential flats.

2.3 The Proposed Development

It is proposed to add two additional storeys on to the east wing under Class AA of the General Permitted Development Order. This report is concerned only with the vertical extension to the west wing (addition of third and fourth floors).

3. ASSESSMENT POLICY AND GUIDANCE

3.1 Introduction

3.2 Local Policy

Reading's Local Plan 2018 references noise impact several times, although does not provide specific, quantitative guidance on the control of noise impacts either on new developments from existing sources of noise, or on existing noise-sensitive receptors from new development.

3.3 National Planning Policy Framework (NPPF), December 2024

The NPPF determines the government's planning policy for England. The document was first published in March 2012, revised in July 2018, updated in 2019, 2021, 2023 and 2024.

The current version (issued 12/12/24) of the policy document remains largely unchanged with regards to noise which is considered in Chapter 15 – 'Conserving and enhancing the natural environment', specifically in terms of pollution.

Paragraph **187** states that 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 risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans…*".

Paragraph **198** states that:

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In by doing so they should:

a) ***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.*

b) ***Identify and protect tranquil areas*** *which have remained relatively undisturbed by noise and are prized for their recreational amenity value for this reason; and*

c) ***Limit the impact*** *of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

Furthermore, Paragraph **200** continues:

Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

The guidance contained within the NPPF reference the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010).

3.4 National Planning Guidance

In preparation of this assessment, several national and local planning policies are considered, including:

- The National Planning Policy Framework (NPPF), December 2024
- The Noise Policy Statement for England (NPSE), 2010
- Planning Practice Guidance - Noise (PPG-N), 2019

The above documents guide on why the control of noise impact is important for residential development to protect the amenity of future occupants, and provide an approach to the assessment of noise impact on proposed developments. However, they are, primarily, qualitative in their guidance.

As such this report focusses on documents which provide quantitative assessment procedures. Nonetheless, a summary of the above documents is provided in Appendix B.

3.4.1 Professional Practice Guidance on Planning and Noise (ProPG, 2017)

The Professional Practice Guidance on Planning and Noise (ProPG) has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England.

The scope of the ProPG is limited to the consideration of new residential development that will be exposed predominantly to airborne noise from transport sources and is implemented in this assessment as it provides a logical approach to the assessment of noise impact on the Proposed Development.

The recommended approach to the ProPG assessment is shown in Appendix B, and is summarised as follows:

Stage 1 - An initial noise risk assessment of the proposed development site, which will inform the level of detail required in the more detailed 'Stage 2' assessment.

Stage 2 - A systematic consideration of four key assessment elements:

1. Demonstrating a "Good Acoustic Design Process"
2. Observing internal "Noise Level Guidelines"
3. Undertaking an "External Amenity Area Noise Assessment"
4. Consideration of "Other Relevant Issues"

The Stage 2 assessment also refers to quantitative guidance for the acoustic design of residential development in the following documents:

- British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings;
- The World Health Organisation Guidelines for community noise; and
- British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound.

Pertinent guidance from ProPG is summarised later in this section and further detail and context is provided in Appendix B.

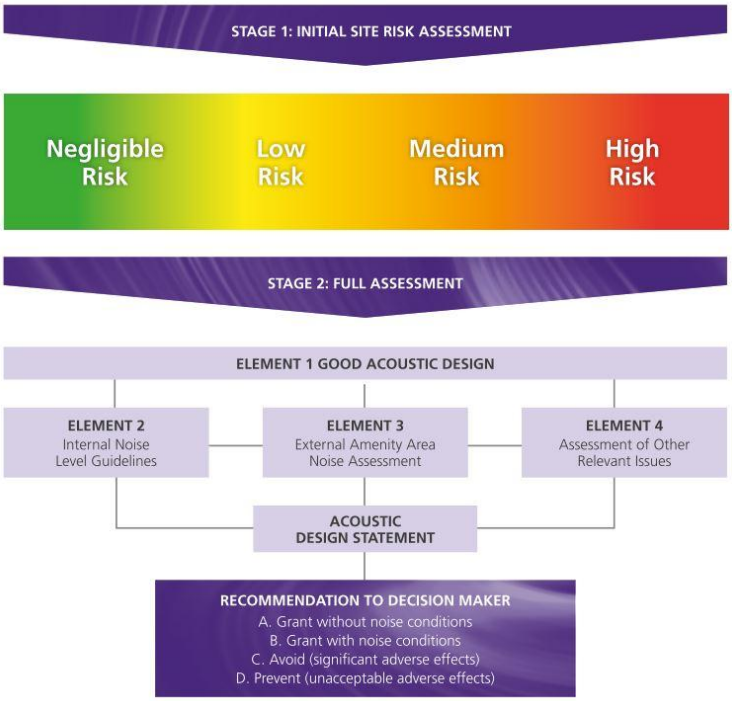


Figure 3: Summary of the ProPG approach.

3.5 Technical Guidance

3.5.1 Acoustics, Ventilation and Overheating: Residential Design Guide (The AVO Guide, 2020)

The Association of Noise Consultants' (ANC) AVO Guide collates and appraises guidance on internal target noise levels and seeks to provide a holistic approach to acoustic assessments for new residential development that takes due regard of the interdependence of provisions for acoustics, ventilation and overheating.

The document proposes a very similar two-stage approach to ProPG, with comparable threshold levels for risk grading of the site in relation to noise impact. It then continues to provide guidance on appropriate internal noise standards and schemes of mitigation that may be appropriate to meet these standards.

Application of the AVO Guide is intended to demonstrate good acoustic design as described in the ProPG. However, it is noted that both of these documents were written before the introduction of Approved Document O of the Building Regulations. ADO, discussed in more detail below, sets out statutory criteria for noise exposure in homes,

and is considered to take precedent over the guidance provided in either ProPG or the AVO Guide.

Pertinent guidance from the AVO Guide is summarised later in this Report and further detail and context is provided in Appendix B.

3.5.2 British Standard 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings

BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' provides guidance for the control of noise in and around buildings.

It gives appropriate internal target noise levels for dwellings, which are used to inform the assessment within this report.

It also outlines a method for calculating internal noise levels within buildings due to external noise incident on the façade in Annex G.2. This method is based on that given in BS EN 12354-3 'Building Acoustics - Estimation of acoustic performance of buildings from the performance elements - Part 3; Airborne sound insulation against outdoor sound'.

It is this calculation methodology that has been used to determine mitigation requirements presented in this Report.

3.5.3 BS 4142: 2014 Methods for rating and assessing industrial and commercial sound

BS 4142 provides a methodology for rating and assessing sound associated with both industrial and commercial premises. The purpose of the Standard is clearly outlined in the opening section where it states that the method is appropriate for the consideration of:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.

The Standard is based around the premise that the significance of the noise impact of an industrial/commercial facility can be derived from the numerical subtraction of the background noise level (not necessarily the lowest background level measured, but the typical background of the receptor) from the measured/calculated rating level of the specific sound under consideration.

This comparison will enable the impact of the specific sound to be concluded based upon the premise that typically "the greater this difference, the greater the magnitude of the impact". This difference is then considered as follows:

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

3.6 Adopted Assessment Criteria

3.6.1 Internal Noise Criteria – Environmental Sources

Criteria for noise from anonymous sources (road, rail, aircraft, other environmental sources) have been determined, primarily from British Standard 8233 guidelines - as recommended in ProPG and in alignment with the requirements of LBL.

The guidance is summarised in Appendix B, and the adopted assessment criteria for the assessment of existing external sound levels in relation to the residential elements of the Proposed Development are summarised in Table 1.

Table 1: Adopted assessment criteria – normal (background) conditions

Location	**Adopted Sound Level Criteria**	
	Daytime 07:00 – 23:00 hours	**Night-time 23:00 – 07:00 hours**
Bedrooms	≤35 dB $L_{Aeq,16hr}$	≤30 dB $L_{Aeq,8hr}$ ≤45 dB L_{AFmax}[1]
Living Rooms	≤35 dB $L_{Aeq,16hr}$	N/A
Dining room/areas	≤40 dB $L_{Aeq,16hr}$	N/A
External amenity areas	≤55 dB $L_{Aeq,16hr}$	N/A

[1] In line with the quoted guidance from the WHO Guidelines, it is taken that the L_{AFmax} criterion should not be compared to the highest L_{AFmax} level applicable to the assessment location(s), but rather to that more representative of the conditions typically.

BS 8233 states that a 5 dB relaxation in internal L_{Aeq} criteria would still result in 'reasonable' conditions being achieved. However, such relaxations are not generally considered appropriate to apply to the background ventilation condition (which would be continuous at all times) except in exceptional circumstances.

The above noise levels would not typically be applied to non-anonymous noise sources, such as noise of a commercial or industrial nature.

3.6.2 Internal Noise Criteria – Music Noise Sources

While there are no formal criteria for internal noise levels from music noise, it is considered that a noise level of **NR15 during the night-time** should be adequate to prevent sleep disturbance to future occupants of the Proposed Development.

4. BASELINE ENVIRONMENTAL NOISE SURVEY

4.1 Overview

Detailed noise measurements were obtained at the Site between Friday 9th and Tuesday 13th May 2025, and have been used to evaluate the ambient noise climate and noise from nearby commercial sources.

Two long term, unattended measurements were taken over a ~96-hour period outside the northeast and northwest facades of the building. Observations were made externally during the installation and collection of equipment, and during daytime and evening periods while music events were occurring at the nearby music venue.

Additionally, measurements of road traffic were taken on Friday, 13th June 2025 for the purposes of a Calculation of Road Traffic Noise (CRTN). These measurements cover the two nearest roads to the Site, Oxford Road and Eaton Place.

4.1.1 Meteorological Conditions

The weather conditions throughout the surveys were generally conducive to the measurement of environmental sound, i.e. they remained dry, with low wind speeds (< 5 m/s).

A short period of relatively heavy rain was noted on the morning of Monday 12th May, which can be seen on the graphs in Appendix D. However, this has not been considered to have a significant impact on the outcomes of the assessment and, as such the average noise levels included within this report do not exclude this period.

4.1.2 Equipment

The sound level meters were calibrated prior to commencement, and upon completion, of the survey. No significant calibration drift was observed in any of the sound level meters.

Details of the equipment used to undertake the survey are included in Appendix C.

4.1.3 Measurement Positions

The main long-term (LT) measurement position for the proposed extension is LT2, which was located out of a second-floor window in the stairwell and overlooks a number of commercial noise sources and Chatham Street, a busy main road. This position gives the main representative level of ambient noise at the Proposed Development.

LT1 was located out of a first-floor window on the north elevation and was mostly screened from traffic noise, but accurately measured noise levels from The Face Bar during music events. It is used to calculate noise levels from The Face Bar around the east elevation of the proposed extension.

The measurement positions for the two shortened CRTN measurements, CRTN 1 and CRTN 2, overlook their respective roads.

Figure 4 illustrates the long term (LT) and CRTN measurement positions.

Figure 4: Positions of measurement positions, including measurements used to inform CRTN calculations.

4.2 Long Term Survey

The results from the long-term noise survey at both positions are presented as they were measured in this section. The low frequency noise levels impacting the Site from The Face Bar are then presented separately and the method used to calculate noise levels around each elevation of the Site are discussed.

4.2.1 Long Term Noise Survey Results

The results of the unattended noise survey measurements are presented in graphical format in Appendix D. The following have been used to determine the presented noise levels in Table 2:

- The daytime and night-time periods are taken to be 07:00 to 23:00 hrs and 23:00 to 07:00 hrs, respectively.
- The daytime and night-time levels presented are the arithmetic average of the 16-hour and 8-hour $L_{Aeq,T}$ measurement periods.
- 'Typical' maximum event noise levels have been established by taking the 10th-15th highest $L_{Afmax,1min}$ value.
- The background sound level presented is that which is the lowest typically occurring, by statistically analysing the measured values during the relevant assessment period.

Table 2: Unattended noise survey results, levels rounded to integer decibel values (façade location, no correction applied).

Location	Period	Equivalent Continuous Sound Level dB $L_{Aeq,T}$	Typical Maximum Noise Level dB L_{AFmax}	Typical Background Sound Level dB $L_{AF90,T}$ [1]
LT1 – West Wing	Daytime	52	N/A	47
	Night-time	47	63	41
LT2 – East Wing	Daytime	60	N/A	53
	Night-time	54	71	42

[1] Reference period (*T*) is 1-hour for the daytime and 15-minutes for the night-time, as per BS 4142. All background levels rounded in accordance with BS 4142.

4.2.2 Observations

It was observed that, though both positions were primarily exposed to traffic noise, this level was higher at LT2 as it had a direct line-of-sight to the busy Chatham Street to the north. It was also exposed to noise from the multi-storey car park, garage, and from the nearby pub (The Butler, Chatham Street) while LT1 is mostly screened from these sources.

Analysis shows that most of the noise reaching the facades of the building is traffic noise from cars, motorcycles, and most notably busses, which stop nearby on Chatham Street and Oxford Road.

4.3 Commercial Noise

The most notable commercial noise sources affecting the site are:

- The Face Bar, to the north west;
- The Butler Pub (to the north, on the corner of Chatham Street and Eaton Place); and
- A tyre garage around 30 m north of the site on Eaton Place.

Noise from these sources is appraised below.

4.3.1 The Face Bar

Noise level data was extracted during a music event at The Face Bar. On Site observations confirmed this was a mixed rock/electronic music event, and the time period containing a single 'set' was analysed as a representative example of noise breakout.

It was found that the 63Hz octave band was considerably above the ambient noise levels measured from other sources. This level is provided in Table 3.

Table 3 also contains the level of the 63Hz octave band when distance corrected to the nearest new façade of the proposed extension.

Table 3: Noise levels from The Face Bar (levels 1 m from the building façade).

Location	Period	63 Hz Octave Band Level, dB
Measured at LT1	During event at The Face Bar	75
Corrected to East West Elevation of Extension	During event at The Face Bar	70

Due to the proximity and licensed operating hours of The Face Bar, this high level of low frequency noise can occur throughout the night, making mitigation for the proposed residences important.

The octave band level in Table 3 was used, alongside the other measured octave band levels, for break-in calculations for the proposed residences. These inform suggestions for the façade and roof buildups and glazing that will be necessary to prevent this level of low frequency noise breaking into habitable rooms with direct exposure to The Face Bar. This is discussed further in Section 7.

4.3.2 The Butler Pub

Noise from Butler on Friday night considered as slightly elevates 125 and 250Hz bands, but is not significant relative to Face Bar

LT2 captured a small amount of noise from the nearby pub (The Butler, Chatham Street), which is licensed as a small music venue. The 125 Hz and 250 Hz octave bands were noted to be increased over the general ambient noise level during the time that noise from the Butler Pub was observed to be operating (the evening of Friday 10th May), however it was also noted that music noise from The Face Bar was also audible at the building at this time and it was difficult to determine the exact source of the noise.

It is understood that live music at The Butler does not continue into the night, finishing at 23:00.

4.3.3 Tyre Garage

No obvious noise from the operation of the tyre garage was observed during attendance on site, and there is also no clear evidence of this on the long-term data measured at the site.

The noise from the operation of the tyre garage is generally considered to be indiscernible from the general ambient noise levels from environmental sources (primarily road traffic), and considerably less pervasive than sound from the other commercial noise sources affecting the site (e.g The Face Bar).

4.4 Traffic Noise: Oxford Road and Eaton Place

Surveys to use as part of a Calculation of Road Traffic Noise (CRTN) were undertaken for Oxford Road and Eaton Place. Representative measurements of the two roads' traffic were taken and are presented in Table 4.

Measurements were made in free-field conditions.

Table 4: Measured results from the concurrent CRTN surveys, free field levels rounded to integer decibel values.

Location	**Period**	**Equivalent Continuous Sound Level dB $L_{A10,1hr}$[1]**	**Typical Maximum Noise Level dB L_{AFmax}[2]**
CRTN 1 – Oxford Road	13/06/25 10:46 – 13:46	66	77
CRTN 2 – Eaton Place		63	75

[1]Average of three consecutive 1-hour L_{A10} measurements
[2]90th percentile 1minute L_{AFmax}

5. INITIAL SITE SUITABILITY ASSESSMENT

This section presents an initial appraisal of the Site for the proposed use with respect to the noise climate as measured.

5.1 Commercial Noise Sources

Typically, acoustic criteria (as assessed in accordance with ProPG, the AVO Guide and BS 8233) are applied to "anonymous" or transport sources (i.e. road, rail, aircraft) and do not apply to noise from industrial or commercial sources which, being considered more annoying, would be assessed under different criteria.

Environmental noise levels are typical of an urban across most of the development. However, the west façade is affected by noise from the Face Bar, with the north of the development, to a lesser extent, also affected by noise from the Butler Pub, which will drive the mitigation requirements in these areas.

Noise from the tyre shop to the north of the site is considered to be relatively insignificant in the context of the wider ambient noise climate, and mitigation measures which control noise from the other commercial noise sources affecting the site will be appropriate to control noise from this source.

The mitigation requirements for the control of commercial noise sources are discussed in further detail in Sections 6 and 7.

5.2 Establishing Noise Levels from CRTN

In accordance with the CRTN Shortened Method, a representative equivalent noise level was calculated based on measured samples of road traffic on Oxford Road and Eaton Place.

Three consecutive hour-long measurements were used to calculate an $L_{10,18hour}$, in accordance with the methodology of CRTN. The $L_{10,18hour}$ was then used to calculate L_{eq} levels for predicted daytime and nighttime traffic flow on the two roads, using a method developed by TRL Ltd.

The resulting daytime and nighttime equivalent continuous sound level values are presented in Table 5.

Table 5: Equivalent continuous sound level values of Oxford Road and Eaton Place as calculated via CRTN (free-field noise levels).

Location	Period	Equivalent Continuous Sound Level dB $L_{Aeq,T}$
CRTN 1 – Oxford Road	Daytime, 07:00 – 23:00	63
	Nighttime, 23:00 – 07:00	55
CRTN 2 – Eaton Place	Daytime, 07:00 – 23:00	60
	Nighttime, 23:00 – 07:00	54

5.3 Initial Appraisal/Risk Assessment

An initial assessment of the Site is presented in Table 6 to provide "*an indication of the likely risk of adverse effects from noise, were no subsequent mitigation to be included as part of the development proposal*" (from ProPG).

Both the guidance in ProPG (Stage 1 Risk Assessment) and the AVO guide (Level 1 assessment) are referenced.

Table 6: Initial Appraisal / Risk Assessment (façade levels)

Location	Period	Equivalent Continuous Sound Level dB $L_{Aeq,T}$	ProPG Risk Assessment Outcome	The AVO Guide Risk Category
North, East, and South elevations	Daytime (07:00 – 23:00)	60 - 63	Low	Medium
	Night-time (07:00 – 23:00)	54 - 55	Low	Medium
West elevation	Daytime (07:00 – 23:00)	52[1]	N/A	N/A
	Night-time (07:00 – 23:00)	47[1]	N/A	N/A

[1]Though the west elevation is screened from most environmental noise, it is highly exposed to noise from The Face Bar. Noise breakout from The Face Bar therefore drives the mitigation requirements for this façade.

ProPG also states that sites which experience regular maximum noise levels of greater than 60 dB L_{AFmax} should also not be considered as negligible risk. This site experiences regular maximum noise levels of around 77 dB L_{AFmax} due to bus traffic.

On this basis, and considering the influence of the abovementioned commercial noise sources on the site, it is recommended that further mitigation is explored.

6. VENTILATION AND OVERHEATING

This section discusses the acoustic environment in relation to provision of ventilation and mitigation of overheating.

There are three conditions in which ventilation is required:

- Continuous background ventilation - to provide appropriate air changes to reduce damp etc.;
- Ventilation required for thermal comfort (to prevent overheating); and
- Purge ventilation - required on an ad-hoc basis, for example, to remove smells etc.

The overheating and acoustics assessment considers guidance from the AVO Guide and the Building Regulations Approved Document O (ADO) – although it should be noted that the requirements of ADO do not strictly apply to extension projects

Both documents consider the overall average (L_{Aeq}) noise levels, with the AVO Guide considering the 16-hour daytime and both documents the 8-hour night-time as well as the typically occurring L_{AFmax} noise levels at the assessment locations.

6.1 Continuous Background Ventilation

It is understood that mechanical ventilation is proposed to provide continuous background ventilation to habitable rooms in accordance with Approved Document F. As such, other passive means of providing background ventilation (e.g open windows or trickle ventilators), which typically reduce the overall sound insulation performance of the building envelope, are not required.

Appropriate attenuation may be required to MVHR units to prevent external noise break-in via ductwork and to control noise levels from the mechanical system itself. This should be developed at the detailed design stages.

6.2 Ventilation for Thermal Comfort

The provisions of Approved Document O (relating to overheating) do not apply to extension projects and, therefore, there is no statutory requirement to achieve certain internal noise levels when windows are opened for the control of overheating.

However, it is acknowledged that, during warmer months, when windows are open for additional ventilation (e.g to mitigate overheating), internal noise levels from external noise sources would inevitably increase.

Given the extant nature of the noise from The Face Bar, and considering concerns from Reading Borough Council in relation to noise exposure to future occupants, comfort cooling is to be installed to dwellings which have a direct line of sight to the venue (west facing elevations).

This will allow occupants the flexibility to control both their internal acoustic and thermal environments as they prefer.

6.3 Purge Ventilation

Approved Document F Volume 1 (dwellings) of the Building Regulations states that purge ventilation is required to remove high concentrations of pollutants and water vapour. It

is used intermittently and required only for pollutants produced by occasional activities (e.g. fumes from painting).

The document suggests that account should be taken of external noise when considering openable windows for purge ventilation.

However, considering the short periods and infrequent nature that the higher ventilation rate would be required, it is usually considered acceptable for windows to be opened. There is a general precedent that external sound levels should not determine the acceptability of opening windows to provide intermittent, occasional and ad-hoc, ventilation in cases such as those described above.

7. MITIGATION – BUILDING ENVELOPE

This section provides outline advice on the mitigation requirements of the building envelope to control noise when windows are closed to achieve the adopted assessment criteria outlined in Section 3.6.

Detailed calculations have been undertaken based on the proposed room dimensions and façade areas to provide an acoustic specification for the facade elements. Given the relatively high levels of low frequency noise experienced from The Face Bar, both the glazing and façade must be specified to provide good sound insulation performance at low frequencies in order to achieve the internal noise level target of NR15.

The noise from the Butler Pub has also been considered, though it was found that the low frequency (63 Hz) performance requirement for noise from The Face Bar drives the performance requirement of the façade for the north and west elevations.

This section provides a recommended acoustic performance of each section of the building envelope and guidance on how this might be achieved within the current design. These recommendations should be reviewed at the detailed design stages.

It should be noted that the performance requirements for the glazing and façade elements rely on noise break-in through other means (e.g. via ventilation openings/MVHR ductwork on the façade) to be appropriately controlled.

7.1 Non-Glazed Elements of the Building Envelope

This section discusses the performance requirements for the non-glazed elements of the building envelope (walls, roof).

The current external façade construction is for a lightweight cladding, which offers relatively little low frequency sound insulation, and therefore recommendations for the internal elements of this build-up to achieve appropriate levels of attenuation are provided.

It should be noted that the recommendations provided below are indicative only and should be developed at the design stages with reference to the acoustic performance specifications. It will be important to include both appropriate mass (from internal linings) and cavity depths to achieve the higher levels of low frequency performance required on elevations which have line of sight to The Face Bar.

7.1.1 Elevations with Line of Sight to The Face Bar (West, North)

Habitable rooms with direct line of sight to The Face Bar require a higher specification building envelope to prevent low frequency noise ingress.

A sound insulation performance of ~50 dB $R_w + C_{tr}$ is required for this façade, with a minimum performance of ~31 dB in the 63Hz octave band.

Based on the current external façade proposals, for a Euroclad Vieo standing seam façade system, the following upgrades are likely to be required – although it should be noted that there may be other methods to achieve the above performance requirements:

- Internal room lining of 3 layers of 15 mm SoundBloc (or similar dense plasterboard)
- 200mm steel stud mounted on a resilient bar; 150mm mineral wool in the cavity, with a density of at least 40kgm^{-3}

- 2 x 18 mm cement particle board to slab edge

7.1.2 Other Elevations (East, South)

Habitable rooms on the elevations with no line of sight to the The Face Bar require a wall build-up capable of preventing a relatively normal amount of noise ingress from traffic.

A sound insulation performance of 45 dB $R_w + C_{tr}$ is required for these façades, with no particularly onerous low frequency noise control requirement.

Based on the current external façade proposal, a more regular internal lining of 2 x 12.5 mm SoundBloc (or similar dense plasterboard) is likely to be appropriate.

7.1.3 Roof

The roof construction is similarly important for the prevention of low frequency noise ingress and is required to achieve appropriate levels across the whole development.

The roof will require a sound insulation performance of 50 dB $R_w + C_{tr}$ with a minimum performance of 31 dB in the 63Hz octave band).

Indicatively, this could be achieved with a build-up consisting of (outside to inside):

- 210mm insulating panel (to achieve thermal requirements)
- 18 mm plywood deck
- 248mm solid joist with rubber isolation clip
- 2 layers of 100mm mineral wool in the cavity, with a density of at least 40kgm^{-3}
- 1 layers of 12.5mm SoundBloc
- Total depth: 548mm.

7.2 **Glazing**

7.2.1 West Elevation (Line of Sight to The Face Bar)

In order to achieve the internal noise level target of NR 15, habitable rooms with direct line of sight to The Face Bar will require a relatively high performing window system to prevent low frequency noise ingress.

Windows are likely to be an acoustic laminate system and should achieve a minimum acoustic performance of 31 dB $R_w + C_{tr}$ with a sound reduction index of at least 25 dB in the 63Hz octave band.

7.2.2 Other Elevations

Habitable rooms on the elevations with no line of sight to The Face Bar require glazing capable of preventing a normal amount of noise ingress from traffic.

Windows incorporating relatively standard thermal double glazing achieving a minimum acoustic performance of 29 dB $R_w + C_{tr}$ would be appropriate.

An indicative build-up for this would be 6 mm glass / 12 mm air / 4 mm glass.

8. PLANT NOISE EMISSIONS

8.1 Introduction

Noise emissions limits for building services that serve the development are set to protect the amenity of existing, nearby noise-sensitive receptors (generally considered to be residential properties).

At this early stage, plant selections and layouts are unknown.

Residential mechanical ventilation systems do not typically generate high levels of noise and are relatively easily attenuated using in-line attenuators/silencers.

ASHPs require good air flow to operate correctly. As such, they can be difficult to acoustically attenuate, as this normally requires an acoustic enclosure or barrier. If not correctly designed, this could restrict air flow and reduce efficiency.

8.2 Nearest Noise-Sensitive Receptors

The nearest noise-sensitive receptors (NSRs) to the Site's associated plant are considered to be the residences in Mayer House, to the east of the Site. The closest façade of Mayer House to the proposed extension also overlooks Chatham Street to the north, and therefore experiences a similar background noise level to that measured at LT2 in the baseline noise survey (Section 4).

Mayer House's closest façade is approximately 16m away from the rooftop of the proposed extension.

8.3 Background Levels and Plant Noise Emission Limits

As discussed in Section 3, Reading Borough's Local Plan makes no specific requirements for noise emissions. It is therefore considered appropriate to use those established in BS 4142:2014.

BS 4142:2014 suggests that *"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."*

As such, it is recommended that mechanical noise does not exceed the measured background sound levels, as set out in Table 7.

Table 7: Proposed plant noise emission limits at nearest noise-sensitive receptors (level 1 m from the building façade)

Receptor Location	Period	Typical Lowest Background Noise Level [1] dB $L_{A90,T}$	Rating Level Limit dB $L_{Ar,Tr}$
Receptors screened from major roads (e.g rear elevation of Bond House)[2]	Daytime (07:00 – 23:00)	47	47
	Night-time (23:00 – 07:00)	41	41
Receptors with line of sight to major roads[3]	Daytime (07:00 – 23:00)	53	53
	Night-time (23:00 – 07:00)	42	42

[1] Derived using 1-hour periods during the daytime and 15-minute periods during the night-time, as per guidance in BS 4142:2014.
[2] Measured background noise levels at LT1
[3] Measured background noise levels at LT2

The proposed criteria and limits would require agreement with the Local Planning Authority and any subsequent planning conditions reviewed to confirm alignment.

9. CONCLUSION

MZA Acoustics has been appointed to undertake a noise impact assessment at Eaton Court, Oxford Road, Reading RG1 7NG (the Site) to inform a planning application for partial redevelopment, proposing an extension of 2 floors to the east of the building.

A baseline noise survey has been undertaken at the site, which has been used to predict the potential noise impact for future occupiers of the Proposed Development.

Acoustic performance specifications for the façade, roof and windows have been recommended to provide suitable sound insulation to the rooms that are likely to be affected by noise breakout from loud music events at the nearby music venue and nightclub, The Face Bar, and other commercial sources (albeit to a lesser extent).

This report also contains a recommended specification for proposed facades without direct line-of-sight to The Face Bar, to ensure suitable sound installation from nearby noise sources including busy roads.

It should be noted that the acoustic performance specifications provided have been developed holistically – i.e allowing for a contribution of sound from each building element. If the acoustic performance of one element changes, then others may be relaxed, or may need to be improved.

Ultimately, the intent of the acoustic performance specifications provided is to achieve appropriate internal noise level targets and it is recommended that this should form the basis of any condition imposed (rather than, necessarily, compliance with the acoustic specifications provided herein).

Guidance has been provided on appropriate build-ups for each element. It is likely that these will be developed during the detailed design stages of the project, during which it should be confirmed that the internal noise level targets will be met.

The risk of high noise levels during overheating is discussed. The requirements of Approved Document O do not apply to this project, however given the risk of noise disturbance from The Face Bar, and the concerns raised by Reading Borough Council in relation to noise impact from the venue, it is proposed that the rooms which are effected by noise from The Face Bar would have comfort cooling provided to allow them to control their exposure to this noise.

Plant noise emissions limits have been established based on the measured background sound levels at the site.

The limitations to this report are included in Appendix F.

Appendices

Appendix A – Glossary of Acoustic Terminology

Airborne Sound	Sound that reaches the point of interest by propagation through air.
Ambient Sound:	Sound from all sources at any given time, form both near and far. Usually measured in terms of L_{Aeq}.
A-Weighting	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Background Sound Level	The A-weighted sound pressure level that can be considered the baseline in the absence of any noise from a specific source of sound under assessment. Measured in terms of $L_{A90,\,T}$.
Calibration	The measurement system/ chain should be periodically calibrated, within a laboratory, against traceable calibration instrumentation, to either National Standards or as UKAS-Accredited, as required. The calibration of the system should also be checked in the field using a portable calibrator before and after each short term measurements, and periodically for longer term monitoring.
Class 1	The Class of a sound level meter describes its accuracy as defined by the relevant international standards – Class 1 is more accurate than Class 2. The older standard IEC 60651 referred to the grade as "Type", whereas the new standard IEC 61672 refers to it as the "Class". The most accurate meters used in the field (as opposed to a laboratory) are Class 1. Class 2 meters can be used in some instances; however MZA Acoustics use Class 1 (or Type 1) meters by default, as required by BS 4142:2014, for example.
Decibel	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds (s1 and s2) is given by 20 log10 (s_1/s_2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20 Pa.
Fast time Weighting (F)	Averaging time used in sound level meters. Defined in BS EN 61672-2:2013 Electroacoustics. Sound level meters. Pattern evaluation tests.
Free-field / Façade	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5 m away.
$L_{AF90,\,T}$	The 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 fast time-weighting (F). Generally used to describe the 'background' sound conditions.
L_{AFmax}	The maximum A-weighted sound pressure level during a given time period. Lmax is sometimes used for the assessment of occasional loud sounds, which may have little effect on the overall L_{eq} noise level, but could still affect the sound environment. Unless described otherwise, it is measured using the fast time-weighting (F).
$L_{eq,\,T}$	A sound level index called the equivalent continuous sound level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded. Where the value is A-weighted, is will be presented '$L_{Aeq,T}$' or 'dBA $L_{eq,T}$', otherwise is should be an un-weighted (or linear) value.

L_p	See Sound Pressure Level.
Noise	Related to human response to sound. Unwanted sound, or sound that is considered undesirable or disruptive.
Octave Band	Frequency ranges in which the upper limit of each band is twice the lower limit. Octave bands are identified by their geometric mean frequency, or centre frequency.
Sound Absorption Coefficient	A measure of how effective a material is at absorbing sound incident to its surface. The index range is between 0 and 1, where 1 indicates a perfectly absorbent material and 0 indicates a perfectly reflective one.
Sound Power	In a specified frequency band, the rate at which acoustic energy is radiated from a source. In general, the rate of flow of sound energy, whether from a source, through an area, or into an absorber.
Sound Power Level	Of airborne sound, ten times the common logarithm of the ratio of the sound power under consideration of the standard reference power of 1 pW. Expressed in decibels.
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level	The sound level is the sound pressure relative to a standard reference pressure of 20 Pa ($20x10^{-6}$ Pascals) on a decibel scale.
Weighted Sound Reduction Index (R_w)	A single-figure quantity which characterises the airborne sound insulating properties of a material or element over a range of frequencies.

Appendix B – Summary of Guidance Documents and Standards

NATIONAL PLANNING POLICY AND GUIDANCE

NATIONAL PLANNING POLICY FRAMEWORK (NPPF), December 2024

The NPPF determines the government's planning policy for England. The document was first published in March 2012, revised in July 2018, updated in 2019, 2021, 2023 and 2024.

The current version (issued 12/12/24) of the policy document remains largely unchanged with regards to noise which is considered in Chapter 15 – 'Conserving and enhancing the natural environment', specifically in terms of pollution.

Paragraph 187 states that 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 risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans…".

Paragraph 198 states that:

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In by doing so they should:

- ***d) 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.*
- ***e) Identify and protect tranquil areas*** *which have remained relatively undisturbed by noise and are prized for their recreational amenity value for this reason; and*
- ***f) Limit the impact*** *of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

Furthermore, Paragraph **200** continues:

Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

The guidance contained within the NPPF reference the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010).

NOISE POLICY STATEMENT FOR ENGLAND (NPSE), 2010

The NPSE provides more detail than the NPPF setting out the long-term vision of the Government noise policy and applying to all forms of noise excluding occupational noise. The NPSE repeatedly refers to the management and control of noise within the context of Government Policy on sustainable development.

The NPSE also stresses that noise impact should not be treated in isolation from other related factors. At paragraph 2.7 for example it states:

> *'…the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications.'*

The NPSE introduces and describes three categories, or levels, describing the presence or absence of noise effects but does not quantify those categories, stating that the corresponding objective levels are likely to be different for different noise sources, receptors and times of the day or night. These categories 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
- **SOAEL** – Significant Observed Adverse Effect Level – This is the level above which significant adverse effects on health and quality of life occur.

The NPSE recognised that, at the time of publication, further research was needed into how these categories might be quantified for different scenarios. There is still no robust, universally accepted method of deriving suitable values and a variety of approaches are adopted in different circumstances. The subjective guidance provided in the Planning Practice Guidance (PPG) for noise can be of assistance in deriving suitable values.

The three aims of the NPSE are:

- Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

PLANNING PRACTICE GUIDANCE – NOISE (PPG-N), 2019

The Government launched the Planning Practice Guidance (PPG) web-based resource in March 2014 and refreshed it in July 2019. The section on noise provides tabulated descriptions of example outcomes of the categories introduced in the NPSE based on the likely average response. It also adds a fourth category termed Unacceptable Adverse Effect (UAE).

The PPG-N describes sound that is not noticeable to be at levels below the NOEL. It describes exposures that are noticeable but not to the extent there is a perceived change in quality of life as below the LOAEL and need no mitigation. With reference to the definition of noise in the NPSE, such emissions are 'sound; and not 'noise'. On this basis, the audibility of sound from a development is not, in itself, a criterion to judge noise effects that is commensurate with national planning policy.

The PPG-N suggests that noise exposures above the LOAEL cause small changes in behaviour. Examples of noise exposures above the LOAEL provided in the PPG-N is having to turn up the volume on the television; needing to speak more loudly to be heard; where there is no alternative ventilation, closing windows for some time because of the noise; or, a potential for some reported sleep disturbance. In line with the NPPF and NPSE, the PPG-N states that consideration needs to be given to mitigating and minimising effects above the LOAEL but taking account of the economic and social benefits being derived from the activity causing the noise.

The PPG-N suggests that noise exposures above the SOAEL cause material changes in behaviour. Examples of noise exposures above the SOAEL cause material changes in behaviour. Examples of noise exposures above the SOAEL provided in the PPG-N are, where there is no alternative ventilation, keeping windows closed for most of the time or avoiding certain activities during periods when the noise present; and/or there is a potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. In line with the NPPF and NPSE, the PPG-N state that effects above the SOAEL should be avoided and that whilst the economic and social benefits being derived from the activity causing the noise must be taken into account, such exposures are undesirable.

The guidance in the PPG-N, which is based on that provided in the NPSE, is summarised in the following table.

The PPG-N states that there are many factors which should be considered when determining if noise is of concern; one factor is the number of noise events, the frequency and pattern of occurrence of the noise.

The PPG-N provides further information on the adverse effects of noise and how it can be mitigated. For noise sensitive development, mitigation measures can include: avoiding noisy locations; designing the development to reduce the impact of noise from the local environment, including noise barriers; and optimising the sound insulation provided by the building envelope including through noise insulation.

Perception	Examples of Outcomes	Increasing Effect Levels	Action
No Observed Effect Level			
Not present	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. 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, attitude or other physiological response, 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 small actual 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, attitude or other physiological response, 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, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

PROFESSIONAL PRACTICE GUIDANCE ON PLANNING AND NOISE (PROPG)

As discussed in Section 2 of this report, the ProPG is designed to provide practitioners with guidance on a recommended assessment approach to the management of noise within the planning system in England for new residential development.

The guidance is non-statutory and is primarily aimed at the assessment of proposed residential development 'exposed predominantly to noise from existing transport sources'. Despite being non-statutory, it is expected to be widely adopted by planning authorities as best practice when considering noise affecting new residential development.

The ProPG aims to complement Government planning and noise policy and guidance, and in particular it strives to:

- "advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- encourage the process of good acoustic design in and around new residential developments;
- outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- improve understanding of how to determine the extent of potential noise impact and effect; and
- assist the delivery of sustainable development."

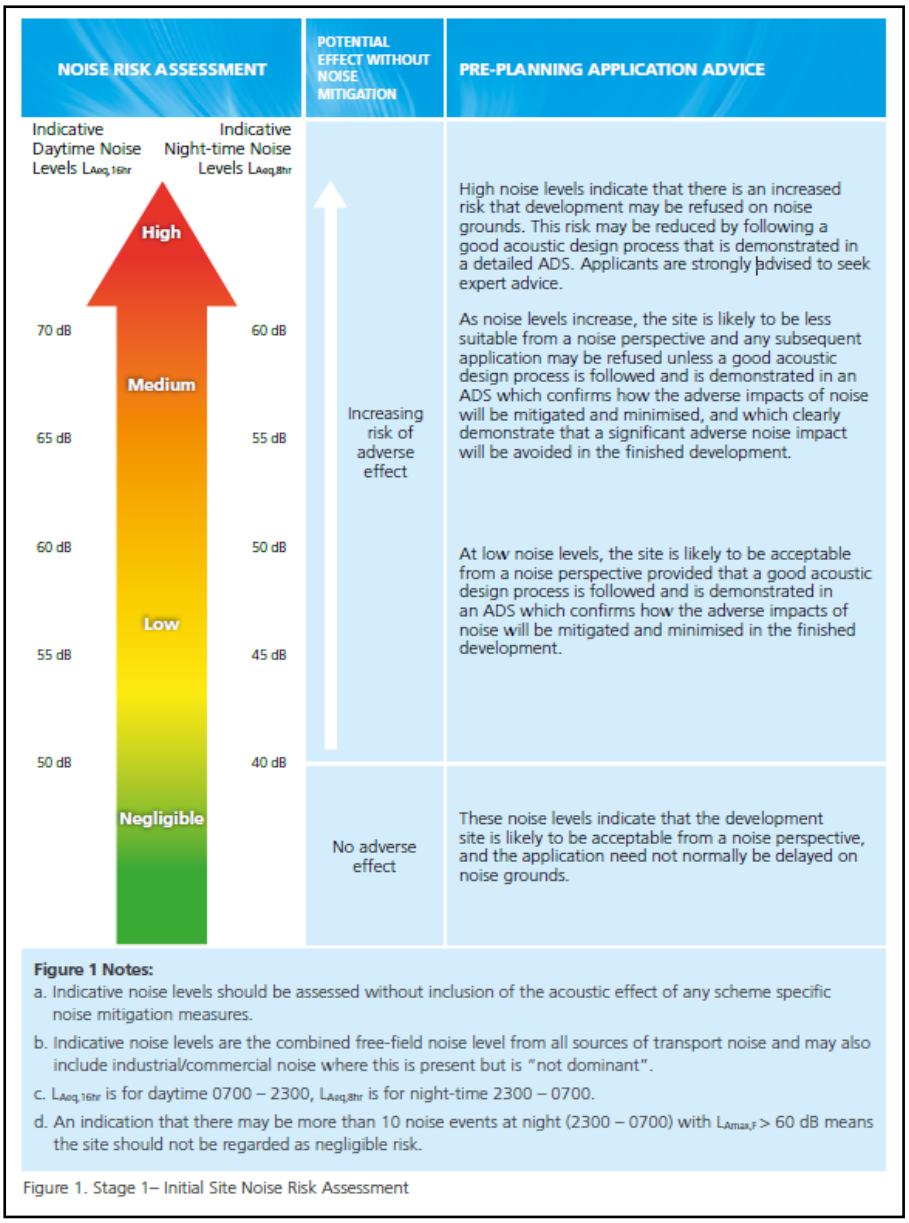
The assessment approach, as summarised and implemented in the body of this report, is described as follows.

Stage 1 Risk Assessment

The Stage 1 initial noise risk assessment is based on placing the site within ranges of external noise levels, which correspond to varying degrees of risk. The external noise levels refer to the combined free-field noise level from all relevant sources of transport noise that affect the site. The external noise levels may also include industrial/commercial noise where it is present, but where it is "not dominant".

The indicative noise levels are intended to provide a sense of the noise challenge at a potential residential development site and should be interpreted flexibly having regard to the locality, the project and the wider context.

The initial noise risk assessment approach is presented in Figure 1 in the ProPG, which is reproduced in the following figure.



NOISE RISK ASSESSMENT	POTENTIAL EFFECT WITHOUT NOISE MITIGATION	PRE-PLANNING APPLICATION ADVICE
Indicative Daytime Noise Levels $L_{Aeq,16hr}$ / Indicative Night-time Noise Levels $L_{Aeq,8hr}$		
High: 70 dB / 60 dB	Increasing risk of adverse effect	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.
Medium: 65 dB / 55 dB		As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.
Low: 60 dB / 50 dB; 55 dB / 45 dB		At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
Negligible: 50 dB / 40 dB	No adverse effect	These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.

Figure 1 Notes:

a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.

b. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".

c. $L_{Aeq,16hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.

d. An indication that there may be more than 10 noise events at night (2300 – 0700) with $L_{Amax,F}$ > 60 dB means the site should not be regarded as negligible risk.

Figure 1. Stage 1– Initial Site Noise Risk Assessment

Figure 5: ProPG Stage 1 Risk Assessment

Stage 2 Element 1 – Good Acoustic Design Process

ProPG states that planning applications for new residential development should include evidence that the following have been properly considered:

- Check the feasibility of relocating, or reducing noise levels from relevant sources.
- Consider options for planning the site or building layout.
- Consider the orientation of proposed building(s).
- Select construction types and methods for meeting building performance requirements.
- Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost CDM (construction design and management) etc.
- Assess the viability of alternative solutions.
- Assess external amenity area noise.

Stage 2 Element 2 – Internal Noise Level Guidelines

The internal noise level guidelines provided under Element 2 within Figure 2 of the ProPG are based upon the guidance in BS 8233:2014. Accompanying notes 4 – 7 from Figure 2 of the ProPG state the following:

> **"Note 4** – Regular individual noise events (for example, schedules aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LAmax,F depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45 dB LAmax,F more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number distribution, predictability and regularity of noise events.
>
> **Note 5** – Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7.
>
> **Note 6** – Attention is drawn to the requirements of the Building Regulations.
>
> **Note 7** – Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant

rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form."

Stage 2 Element 3 – External Amenity Area Noise Assessment

ProPG refers to the design ranges in BS 8233:2014 with respect to the assessment of external amenity, as well as guidance in the PPG-N. Based on these two documents the following guidance is provided with respect to the assessment of noise in external amenity areas:

3(i) "If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended"

3(ii) "The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB LAeq,16hr."

3(iii) 'These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces."

3(iv) "Whether or not external amenity spaces are an intrinsic part of the overall design, consideration of the need to provide access to a quiet or relatively quiet external amenity space forms part of a good acoustic design process."

3(v) "Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:

- a relatively quiet façade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or
- a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different protected location); and/or
- a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or
- a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance)."

Stage 2 Element 4 – Other Relevant Issues

ProPG states that the following other relevant issues, should be considered, where appropriate:

- 4(i) compliance with relevant national and local policy
- 4(ii) magnitude and extent of compliance with ProPG
- 4(iii) likely occupants of the development
- 4(iv) acoustic design verses unintended adverse consequences
- 4(v) acoustic design verses wider planning

Planning Recommendations

Following the ProPG assessment approach, will lead the noise practitioner to choose between four possible recommendations to the decision maker. These are as follows:

- planning consent may be granted without any need for noise conditions.
- planning consent may be granted subject to the inclusion of suitable noise conditions.
- planning consent should be refused on noise grounds in order to avoid significant adverse effects ("avoid"); or
- planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects ("prevent").

Full details of where and when the above recommendations apply are provided in Section 3 of ProPG.

TECHNICAL GUIDANCE

ACOUSTICS VENTILATION AND OVERHEATING RESIDENTIAL DESIGN GUIDE – JANUARY 2020

The Acoustics, Ventilation and Overheating (AVO) Guide recommends an approach to acoustic assessments for new residential development that takes due regard of the interdependence of provisions for acoustics, ventilation and overheating.

The AVO Guide is intended for the consideration of new residential development that will be exposed predominantly to airborne sound from transport sources, and to sound from mechanical services that are serving the dwelling in question.

The AVO Guide provides guidance on all stages of the assessment and design of dwellings. However, of particular use at planning stage, is its guidance on the initial site appraisal – which aligns broadly with that of ProPG. The level 1 site risk assessment from the AVO guide is presented in the following figure.

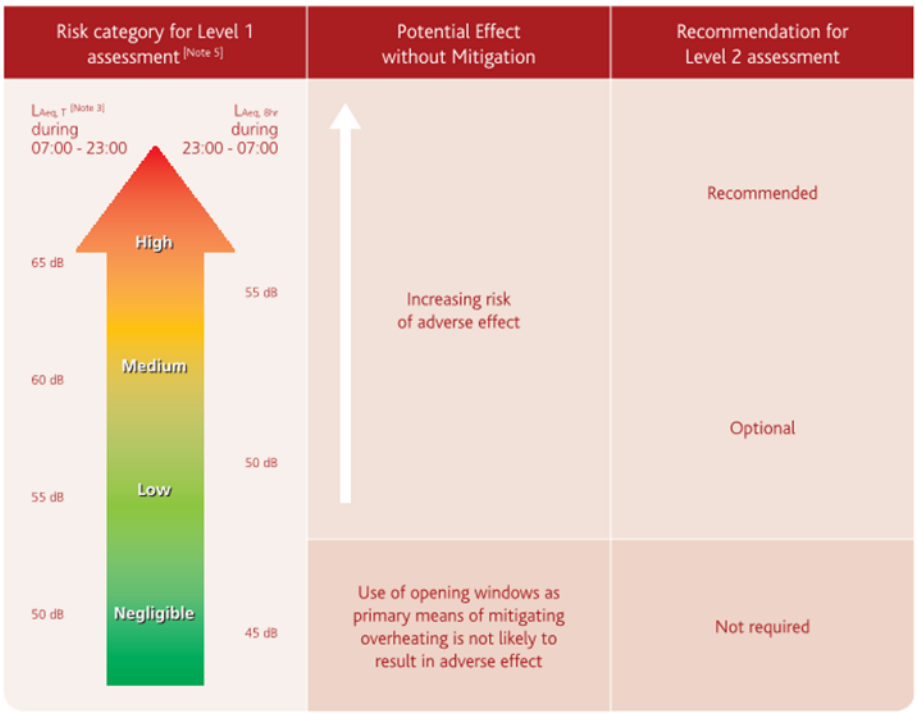


Figure 6: AVO Guide - Level 1 risk assessment

Also of use at the early stages of the design is the AVO Guide's high level recommendations on appropriate glazing and ventilation strategies for schemes depending on their external noise levels.

The following figure presents Table B-2 of The AVO Guide, which provides an initial assessment of appropriate mitigation requirements for dwellings that fall within varying external noise level brackets.

Ventilation System from ADF	Cont. equiv. (L_{Aeq}) or events (L_{AFmax})	Level Difference, external free field level – internal reverberant level, dB	
		Typical windows and vent	Higher acoustic performance windows and vent
1, 2	L_{Aeq}	21	31
	L_{AFmax}	22	35
3 (with trickle vent)	L_{Aeq}	23	33
	L_{AFmax}	24	38
4 (no trickle vent)	L_{Aeq}	27	38
	L_{AFmax}	31	45

Figure 7: The AVO Guide Table B-2: Potential level differences associated with different ventilation systems from ADF

It follows that, depending on their risk categories, developments (or areas of developments) would be subject to more detailed assessments on the risk of occupants being exposed to high levels of noise within dwellings, dependant on the method of controlling overheating and the frequency with which the overheating condition would occur – as informed by the mechanical engineer and, likely, an overheating assessment.

The AVO Guide provides a recognition that the absolute levels within standard documents may be exceeded under overheating conditions and provides a sliding scale on which to assess the impact of an experienced noise level dependant on the frequency with which it is experienced. Figure 8 and Figure 9 presents an example of such a scale during the daytime.

The AVO Guide does not, however, provide a quantitative indication of the duration under which a noise condition may be experienced while still being 'acceptable'.

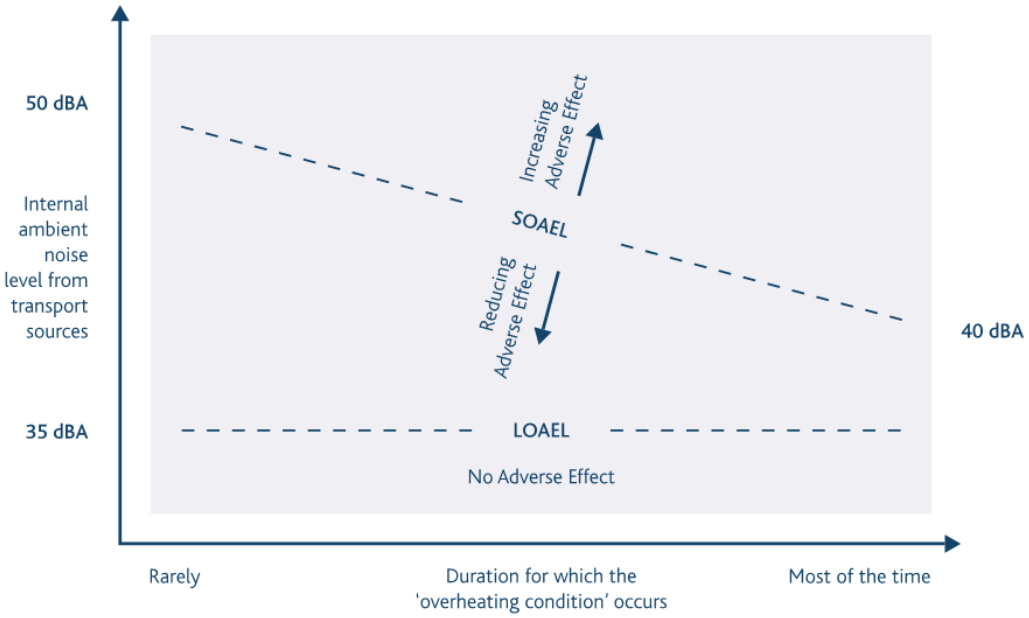


Figure 8: Figure B-2 of the AVO Guide - the 'AVO Diagram' for daytime noise exposure

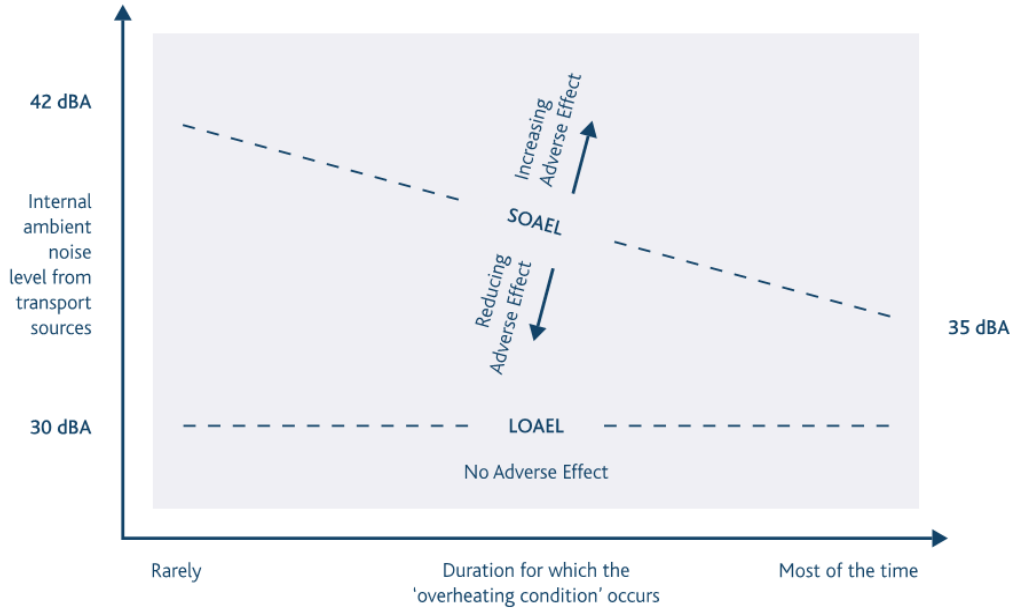


Figure 9: Figure B-3 of the AVO Guide - the 'AVO Diagram' for night-time noise exposure

BS 8233:2014 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

BS 8233:2014 Guidance on sound insulation and noise reduction for buildings provides guidance for the control of noise in and around buildings. Through providing appropriate criteria and limits for internal and external noise levels it can be used to guide the design of new buildings (or refurbished buildings undergoing a change of use).

Guidance pertaining to indoor noise levels for residential spaces is summarised in the table below. These levels refer to the overall internal noise resulting from steady external environmental noise, such as road traffic, and are not applicable for sources of noise with specific character.

Table 8: BS 8233 – Indoor ambient noise levels in spaces when unoccupied

Activity	Location	Daytime 07:00 – 23:00	Night-time 23:00 – 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 $L_{Aeq,8hour}$

Shorter duration and intermittent noise events can be responsible for sleep disturbance. While BS 8233 does not recommend specific maximum noise limits for controlling these events, Note 4 from Figure 2 of the ProPG states that good acoustic design can be used so that individual noise events do not normally exceed 45 dB L_{AFmax} more than 10 times a night.

BS 8233:2014 states that, *"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."* However, the document does not recommend any specific criterion.

The noise level criteria specified in BS 8233:2014 are broadly in line with those specified by the World Health Organization (WHO) in its Guidelines for Community Noise (1999), as described below.

WHO GUIDELINES FOR COMMUNITY NOISE

The WHO Guidelines consolidate scientific knowledge on the health effects of community noise and provide guidance to environmental health authorities and professionals trying to protect people from the harmful effects of noise in non-industrial environments. The main sources of community noise are identified as road, rail and air traffic; industries; construction and public work; and neighbours.

The effects of noise in dwellings are, typically, sleep disturbance, speech interference and annoyance. Suggested guideline limitations, and the time periods to which they relate, are presented in the following table.

Table 9 – WHO guideline values for community noise in specific environments

Specific environment	Critical health effect(s)	$L_{Aeq,T}$	Time base, T (hours)[1]	L_{AFmax}
Outdoor living areas	Serious annoyance, daytime and evening	55 dB	16	-
	Moderate annoyance, daytime and evening	50 dB	16	-
Dwellings indoors	Speech intelligibility and moderate annoyance, daytime and evening	35 dB	16	-
Inside bedrooms	Sleep disturbance, night-time	30 dB	8	45 dB[2]
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45 dB	8	60 dB

[1] These periods are usually taken to be 07:00 – 23:00 (16 hour day) and 23:00 – 07:00 (8 hour night)
[2] The document states that, *"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LAFmax more than 10-15 times per night…"*

In line with the quoted guidance from the WHO Guidelines, it is taken that the L_{AFmax} criterion should not be compared to the highest L_{AFmax} level applicable to the assessment location(s), but rather to that more representative of conditions typically.

It is noted that the WHO guidance relating to night-time maximum noise levels is based on a study of sleep disturbance due to aircraft movements, which are not a prominent feature here. However, in the absence of similar guidance relevant to rail or road traffic, together with aircraft noise typically being considered more annoying than the other two modes of transport, it is considered appropriate to apply the guidance for the purposes of the assessment.

BS 4142:2014+A1:2019 METHODS OF RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

BS 4142:2014+A1:2019 primarily provides a numerical method by which to determine the significance of sound of an industrial nature (i.e. the 'specific sound' from the proposed development and/or existing source) at residential NSRs. The specific sound level may then be corrected for the character of the sound, if appropriate, and this is then termed the 'rating level' (denoted as $L_{Ar,Tr}$), whether or not a rating penalty is applied.

With regard to the rating correction, paragraph 9.2 of BS 4142:2014+A1:2019 suggests the following subjective methods for the determination of the rating penalty for tonal, impulsive and/or intermittent specific sounds:

Tonality

- For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

Impulsivity

- A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.

Intermittency

- When the specific sound has identifiable on/off conditions, the specific sound level should be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Other sound characteristics

- Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

BS 4142:2014+A1:2019 requires that the background sound levels adopted for the assessment be representative for the period being assessed. The Standard recommends that the background sound level should be derived from continuous measurements of normally not less than 15-minute intervals, which can be contiguous or disaggregated. However, the Standard states that there is no 'single' background sound level that can be derived from such measurements. The accompany not to paragraph 8.1.4 states that:

"A representative level should account for the range of background sound levels and should not automatically be assumed to be either the minimum or modal value."

Estimating Impact

An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level of the specific sound. In the context of the Standard, adverse impacts include, but are not limited to, annoyance and sleep disturbance.

Typically, the greater this difference, the greater the magnitude of the impact, while 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.

BS 4142:2014 recommends the following scale to estimate the impact:

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on context.
- 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.

Whilst there is a relationship between the significance of impacts determined by the method contained within BS 4142:2014+A1:2019 and the significance of effects described in the PPG-N, there is not a direct link. It is not appropriate to ascribe numerical rating / background level differences to LOAEL and SOAEL because this fails to consider the context of the sound which is a key requirement of the Standard.

The significance of the effect of the noise in question (i.e. whether above or below SOAEL and LOAEL) should be determined on the basis of the initial estimate of impact significance from the

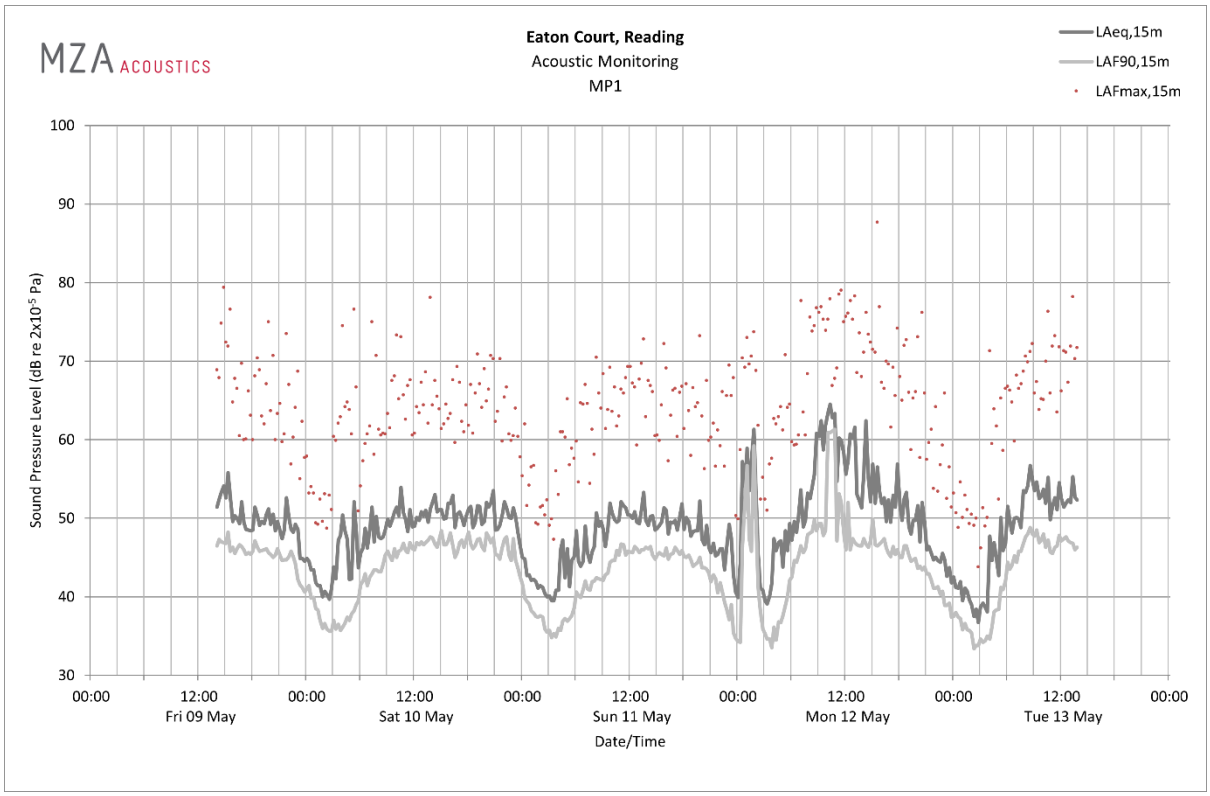
BS 4142:2014 assessment with reference to the examples of outcome described within the PPG-N and after having considered the context of the sound. It is necessary to consider all pertinent factors, including:

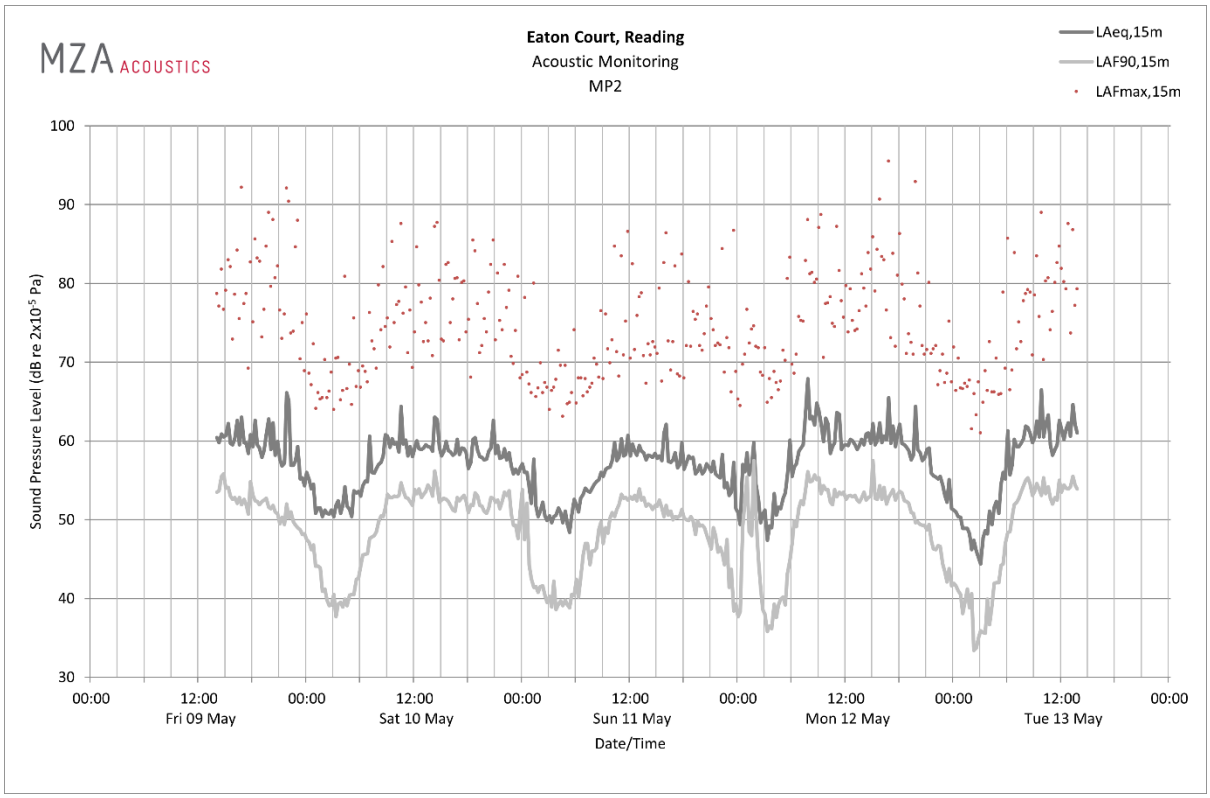
- the absolute level of the sound;
- the character and level of the residual sound compared to the character and level of the specific sound; and
- the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions such as:
    - façade insulation treatment;
    - ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
    - acoustic screening.

Appendix C – Environmental Noise Survey Equipment

Equipment	Type	Serial Number	Calibration Due Date
Attended Monitoring Location (ST1)			
Sound Level Meter	Nti Audio XL2-TA	A2A-14034-E0	31/10/2026
Pre-amplifier	Nti Audio MA220	9379	
Microphone	NTI Audio MC230A	A19094	
Calibrator	Cirrus CR:515	93522	30/10/2025
Unattended Monitoring Location (LT1)			
Sound Level Meter	01dB Metravib FUSION	14465	02/06/2026
Pre-amplifier	01dB Metravib PRE22	2135015	
Microphone	GRAS 40CD 1/2" Pre-polarised free-field	470849	
Calibrator	01dB Metravib CAL31	98855	03/04/2026
Unattended Montitoring Location (LT2)			
Sound Level Meter	01dB Metravib FUSION	14087	19/10/2025
Pre-amplifier	01dB Metravib PRE22	2113049	
Microphone	GRAS 40CD 1/2" Pre-polarised free-field	446548	
Calibrator	01dB Metravib CAL31	87801	29/04/2026

Appendix D – Noise Survey Results





Appendix E – Limitations to this Report

This report has been prepared for the titled project or named part thereof and should not be used in whole or part and relied upon for any other project without the written authorisation of MZA Acoustics Limited. MZA Acoustics Limited accepts no responsibility or liability for the consequences of this document if it is used for a purpose other than that for which it was commissioned. Persons wishing to use or rely upon this report for other purposes must seek written authority to do so from the owner of this report and/ or MZA Acoustics Limited and agree to indemnify MZA Acoustics Limited for any and all loss or damage resulting therefrom. MZA Acoustics Limited accepts no responsibility or liability for this document to any other party other than the person by whom it was commissioned.

The findings and opinions expressed are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations MZA Acoustics Limited reserve the right to review the information, reassess any new potential concerns and modify our opinions accordingly.

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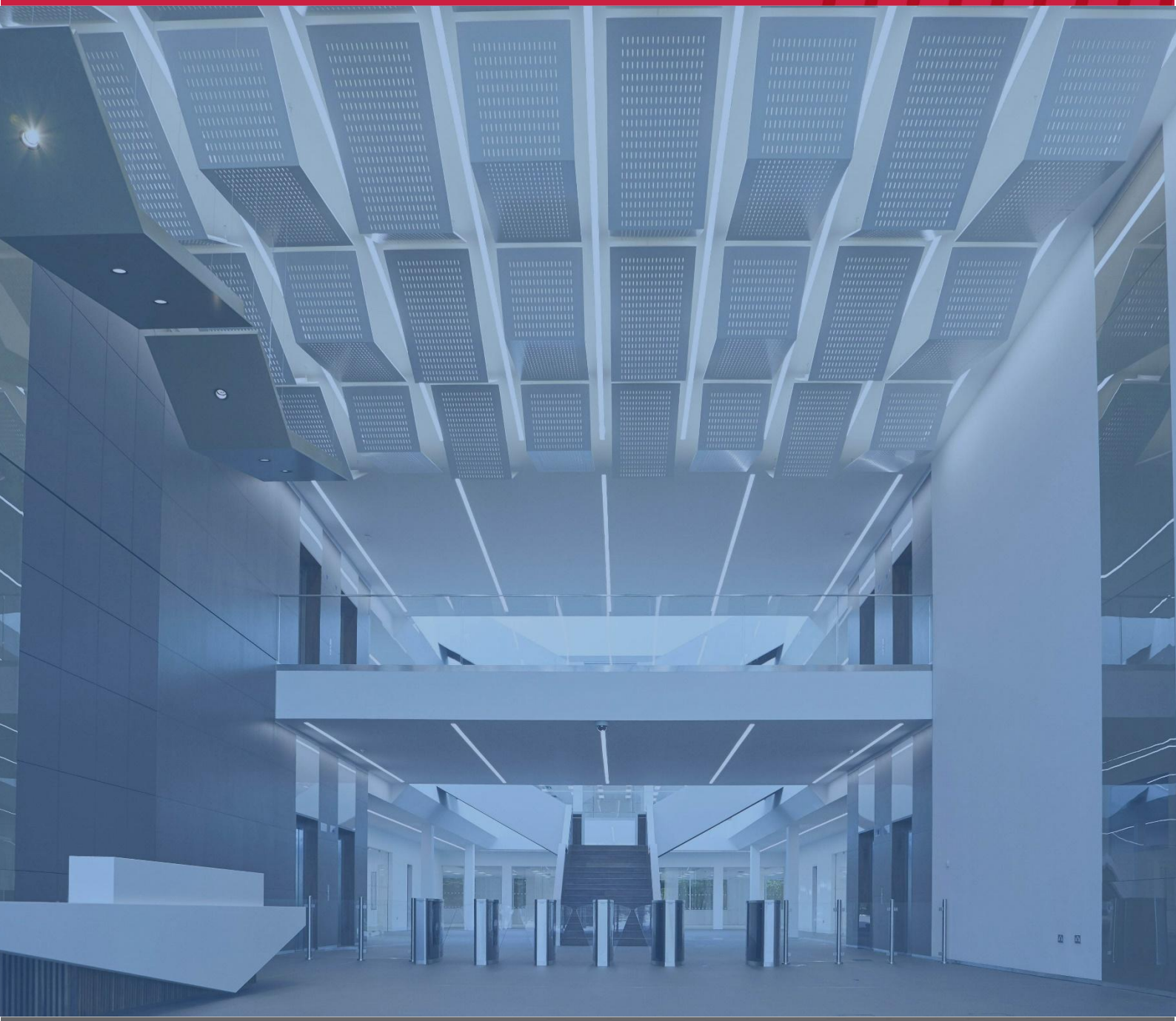

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