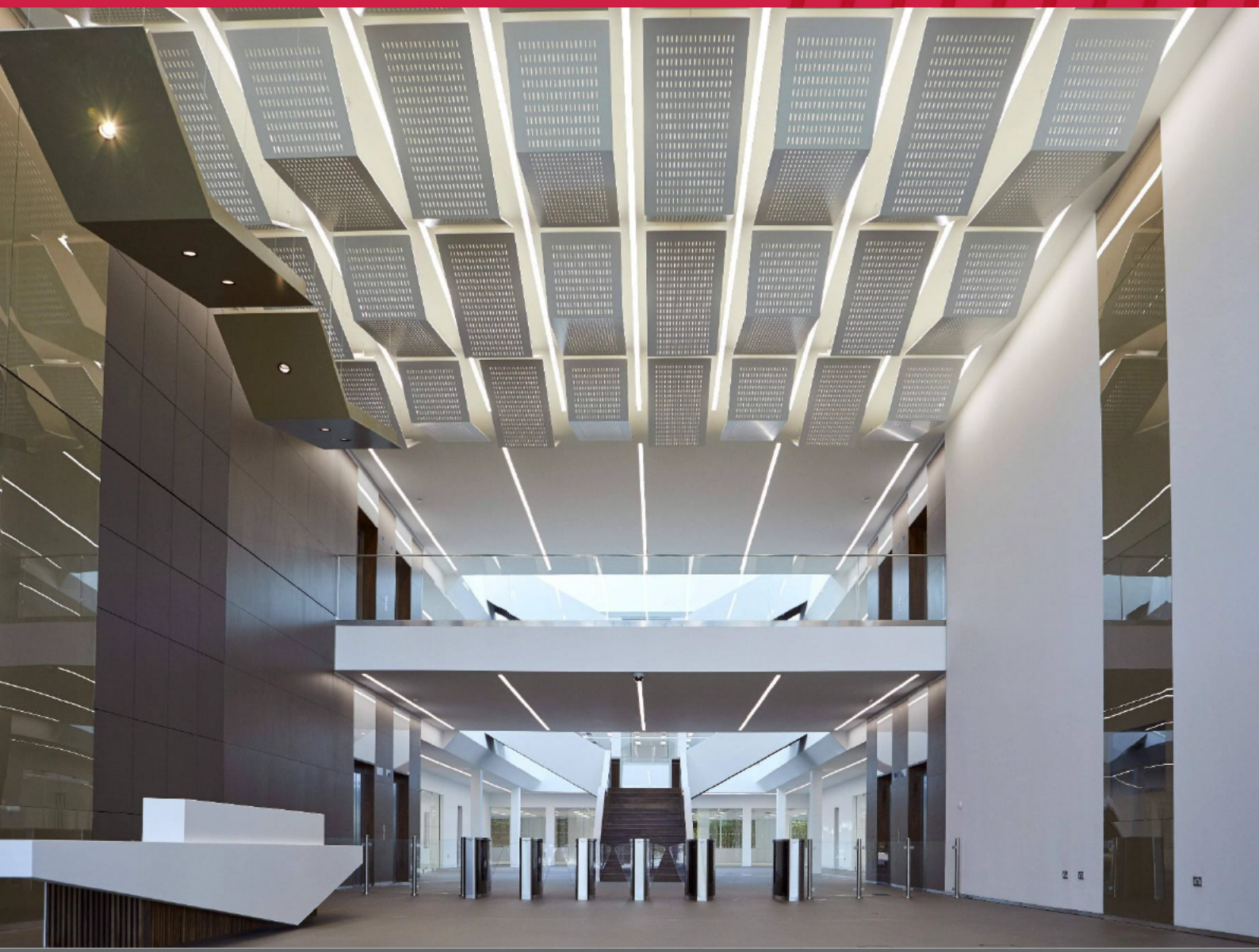
MZA ACOUSTICS

CAMPSFIELD IMMIGRATION REMOVAL CENTRE

Noise Impact Assessment
243925-15206-MZA-XXX-XX-IE-U-0000



Document History

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Rev	Date	Comment	Author	Checked
P09	25 February 2026	Update for comments	CH	KD
P08	19 February 2026	Update for typo	CH	KD
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Contents

1. INTRODUCTION

MZA Acoustics has been appointed to undertake a noise impact assessment to accompany the planning submission for the proposed expansion of the Campsfield Immigration Removal Centre (IRC) at Campsfield, Kidlington, Oxfordshire, OX5 1RE (the Site).

The results of a baseline environmental noise survey undertaken at the Site are presented and used to inform an assessment of the suitability of the site for the proposed use(s).

The survey data is also used to determine limits for noise emissions from mechanical equipment which is likely to be associated with the proposed development.

This report is necessarily technical in nature. To assist the reader, a glossary of acoustic terminology is provided in Appendix A.

2. THE SITE

2.1 Site Description

The site is located at Campsfield, Kidlington, Oxfordshire, OX5 1RE, on land under the jurisdiction of the Home Office.

2.1.1 Surrounding Area

The Site lies around 400 m to the south of Oxford Airport, and is bounded to the south and west by open fields, while to the east is an industrial/business park (recently completed).

Kidlington Town lies approximately 1.5 km to the south east of the Site, with Oxford around 9 km to the south.

The contextual site location is illustrated in **Figure 1**.

Figure 1 – Contextual site location

2.1.2 Nearest Noise-Sensitive Receptors

The nearest noise-sensitive receptors to the Site are identified as follows, and as illustrated in **Figure 2**:

- NSR 1: Houses on Evenlode Crescent, ~190 m north of the main IRC site
- NSR 2: Houses on Begbroke Crescent, ~250 m south west of the main IRC site
- NSR 3: Kidlington Ambulance Station, ~250 m north of the main IRC site

Figure 2 – Nearest noise sensitive receptors

2.2 The Proposed Development

The Proposed Development comprises the following:

- Erection of Accommodation Blocks Care and Separation Unit (CASU) Gate House Visitors' Reception Escorts' Rest Area modular buildings
- Installation of lighting columns replacement of security fencing and CCTV.
- Installation of a fence along the car park boundary. Erection of internal zonal fencing, vehicular and pedestrian gates.
- Use of existing access/egress, creation of internal roads and rearrangement of existing car parking and creation of additional parking (including EVC parking bays) for staff and visitors.
- Removal of trees and vegetation around the site. Planting of replacement trees, vegetation and biodiversity enhancements
- Provision of additional external communal space.
- Installation of solar PV panels above car parking spaces
- Groundworks.
- Creation of drainage features and installation of oil and drainage interceptors, as part of the site drainage strategy.

An indicative site layout plan for the development is included in **Figure 3**.

Figure 3 –Indicative site layout plan (courtesy Edgingtons Architects)

3. ASSESSMENT GUIDANCE

3.1 Introduction

The following section of the report summarises the relevant policy and guidance documents that will inform the noise assessments that follow in relation to the proposed development.

While the development will include elements of non-residential use (classrooms, healthcare), the most sensitive use is that of residential occupation. As such, with respect to the influence of the existing noise climate on the proposed development, this report focusses on the suitability for the residential use.

3.2 Local Planning Authority Criteria

The site is within the planning jurisdiction of Oxfordshire County Council, and Cherwell District Council.

Pre-application information has been received, on 5 December 2025, with some commentary on noise requirements for the application.

The Environmental Health department has provided the following comment:

"Noise

- *A noise impact assessment will be required to show that any new external plant does not adversely affect nearby residents.*
- *New plant should be designed so that the rating level is at least 5 dB(A) below the existing background level (LA90) at the nearest noise sensitive properties."*

The above will be considered in the assessment undertaken within this report.

3.3 National Planning Guidance

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

- The National Planning Policy Framework (NPPF), 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.

3.3.1 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.*

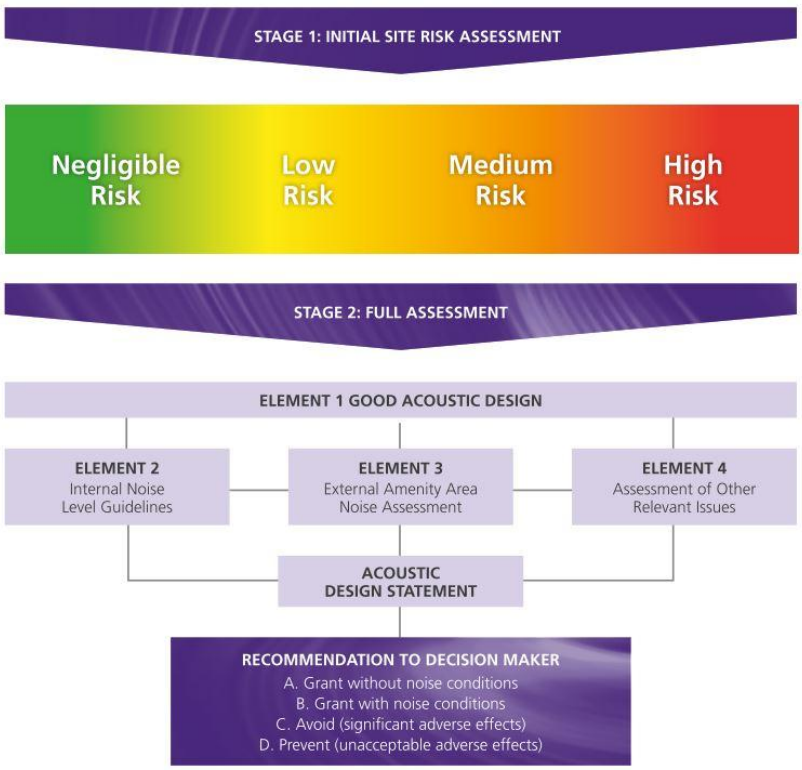


Figure 4 – Summary of the ProPG approach

3.4 **Technical Guidance**

3.4.1 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.

3.4.2 The Building Regulations 2010: Approved Document O – Overheating (2021)

MZA acoustics have confirmed with the Ministry for Housing Community and Local Government (MHCLG, formerly DLUHC) that prison accommodation would not be considered as "rooms for residential purposes" and, therefore, the requirements of Part O of the building regulations do not apply to the proposed development.

It is taken that the same would apply to the accommodation provided by the IRC and, indeed, the MoJ guidance and standards do not state a requirement to comply with Approved Document O.

3.4.3 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, these are discussed in detail in Appendix B of this report, and the relevant criteria which are adopted for this assessment summarised in Section 3.5.

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.

3.4.1 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."

A more detailed description of the assessment methodology of BS 4142 is included in Appendix B.

3.5 Adopted Assessment Criteria

As discussed above, the most sensitive elements of the proposed development will be the accommodation areas.

Criteria in these spaces for noise from anonymous sources (road, rail, aircraft, other environmental sources) have been determined, primarily from British Standard 8233 guidelines – as recommended in ProPG.

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 Internal Sound Level Criteria	
	Daytime 07:00 – 23:00 hours	Night-time 07:00 – 23:00 hours
Bedrooms	≤35 dB $L_{Aeq,16hr}$	≤30 dB $L_{Aeq,8hr}$ ≤45 dB L_{AFmax}[1]
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.

The above noise levels would not typically be applied to non-anonymous noise sources, such as noise of a commercial or industrial nature, or from noise generated by the development itself (e.g. from MUGAs or outdoor facilities associated with the IRC).

4. BASELINE NOISE SURVEY

4.1 Methodology

A survey of the baseline noise climate was undertaken between Thursday 2nd and Tuesday 7th March 2023. It is considered that the general ambient noise climate should not have significantly since this date and, therefore, the survey data is considered to be representative for use for this planning application.

It should also be noted that, while the IRC is now operational, these measurements were made prior to that and, therefore, represent a worst-case scenario (i.e in the absence of noise from the existing IRC).

A single long-term noise monitoring location was selected on site to, represent noise incident on the proposed accommodation blocks, while additional simultaneous, short-term, measurements were taken at the nearest noise sensitive receptor locations.

The locations are described as follows, and illustrated in **Figure 5**:

- LT1: Long-term measurement location on the north west corner of the existing MUGA at the site. Microphone approximately 4 m above ground level.
- ST1: Short-term measurements taken at the south of Evenlode Crescent on installation and collection of the equipment.
- ST2: Short-term measurement taken at the north west of Begbroke Crescent on installation of the equipment.
- ST3: Short-term measurement taken in Begbroke Crescent on collection of the equipment.

Figure 5 – Noise survey measurement locations

Photos of the long-term installation location are included in Appendix C.

4.1.1 Meteorological Conditions

The weather throughout the survey was dry, with low wind speeds (< 5 m/s). The weather conditions are not considered to have had any significant influence on the noise survey results.

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.

4.2 **Noise Survey Results**

4.2.1 Unattended Measurements

The results of the noise survey are presented in **Table 2**. At all locations, equipment was in free-field conditions and, therefore, no corrections have been made to the data presented. Full data is presented in graphical format in Appendix D.

The following have been used to determine the presented noise levels:

- 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 measurement periods. As noise levels on Sunday (both day and night) were notably quieter than those during the rest of the week, these are excluded from the average presented.
- The maximum noise level during the night-time has been established taking the 95th percentile of the 5-minute maximum values.
- The background sound level presented is that which was considered to be "typically" occurring, by statistically analysing the measured values during the relevant assessment period.

The data measured on the morning of Tuesday 7th March has been prepended to the afternoon of Thursday 2nd March in order to assess a single, full daytime period, rather than two incomplete periods.

Table 2 – Unattended measurement (LT1) environmental noise survey results (dB, free-field)

Period	Equivalent Continuous Sound Level (dB $L_{Aeq,T}$)	Typical Maximum Noise Level (dB L_{AFmax})	Typical Background Sound Level (dB $L_{AF90,T}$)
Daytime 07:00 – 23:00	54	-	45
Night-time 07:00 – 23:00	43	59	31

4.2.2 Attended Measurements

The results of the short-term attended measurements are summarised in **Table 3**, below.

Table 3 – Attended measurement (ST1, ST2, ST3) environmental noise survey results (dB, free-field)

Date	Location / Time	Equivalent Continuous Sound Level (dB $L_{Aeq,T}$)	Maximum Noise Level (dB L_{AFmax})	Background Sound Level (dB $L_{AF90,T}$)
Thursday 2nd March 2023	ST1 11:35 – 11:45	55	69	49
	ST2 11:55-12:10	58	77	45
Tuesday 7th March 2023	ST1 13:00 – 13:10	55	71	48
	ST3 13:25 – 13:50	49	71	35

The noise climate at the short-term, attended, measurement locations was generally consistent with those at the long-term measurement location, being primarily driven by the same distant sources of noise.

The measurement at ST3 on Tuesday 7th March was significantly quieter than that measured at the other location on Begbroke Crescent during installation of the equipment and does not show good correlation with the other measurements.

The location chosen for this measurement, which was in a very enclosed area of Begbroke Crescent, is significantly more screened from the main environmental noise sources (e.g the road to the west, and Oxford airport to the north) than façades of the dwellings which would be affected by noise from the development.

Therefore, it is recommended that this measurement is excluded from further assessment with respect to establishing noise limits at Begbroke Crescent.

With the exception of ST3, the noise levels measured concurrently during the attended noise survey correlate relatively well with those measured at the long-term monitoring location (± 2 dB). As such, it is proposed to use the background sound levels measured at LT1 to represent the noise climate at each of the surrounding receptors.

4.2.3 Noise Climate

The background and ambient noise levels at the site were, generally, dominated by distant road traffic, on the A44 to the west and Langford Lane to the north.

On installation of the equipment higher levels of noise from Oxford Airport were noted than on collection. With aircraft movements over the site clearly audible, although relatively infrequent.

There are ongoing construction works on the site immediately to the east. The measurement location was distant and well screened from these, such that they were not noted to be significantly audible during the observations made during installation and collection of equipment.

5. 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 Initial Appraisal/Risk Assessment – Noise

An initial assessment of the Site is presented 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)*, and is presented in Table 4. Both the guidance in ProPG (Stage 1 Risk Assessment) and the AVO guide (Level 1 assessment) are referenced.

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 than those sources noted above, would be assessed under different criteria.

The noise levels measured at the unattended location on site (LT1) are used to inform the following assessment.

Table 4 – Initial Appraisal / Risk Assessment

Location	Period	Equivalent Continuous Sound Level (Free-field, dB $L_{Aeq,T}$)	ProPG Risk Assessment Outcome	The AVO Guide Risk Category
Proposed accommodation	Daytime (07:00 – 23:00)	54	Low	Low
	Night-time (07:00 – 23:00)	43	Low	Negligible

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 value is not exceeded at LT1.

It follows that the site is generally considered a relatively low risk in terms of the impact of the existing environmental noise sources on the proposed uses.

5.1.1 External Amenity Spaces (Terraces)

While the external amenity spaces within the IRC are not considered to have the same sensitivity as, for instance, a residential garden it is noted that the daytime noise level is generally below that of the upper threshold presented in BS 8233 for such spaces.

5.2 Ventilation and 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.

5.2.1 Background Ventilation

It is our experience from previous and current MoJ projects that ventilation is typically provided to such accommodation by mechanical means – to ensure that adequate ventilation is provided without need for occupant intervention.

However, it should be noted that the external noise levels are low enough that passive means of ventilation (including open windows) to provide background ventilation could be explored at the later design stages.

5.2.2 Overheating

As acknowledged in Section 3 of this report, the requirements of Approved Document O are not considered to apply to accommodation of this nature and, therefore, there is no statutory requirement to consider noise levels during the "overheating condition" (when increased ventilation is required to control overheating).

It is understood that the development is to be provided with mechanical cooling to control overheating as per the MEP strategy and the requirements of the MoJ.

It should however be noted that, with respect to the external noise environment, passive means of the provision of cooling (e.g opening windows) are likely to be appropriate for maintaining reasonable acoustic conditions internally.

5.2.3 Purge Ventilation

Section 4.15 of Approved Document Part F Ventilation of the Building Regulations suggests that purge ventilation is required 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." It is also "…intermittent, i.e. required only when such occasional activities occur."

The internal noise level criteria do not apply during purge ventilation, as these instances are rare and at the occupant's discretion. Purge ventilation is generally provided by openable windows.

5.3 Building Envelope Mitigation

Based on the measured noise levels, the acoustic performance requirements for the external building façade have been established.

5.3.1 External Walls

Due to the secure nature of the development, it is expected that the solid façade elements will comprise of pre-cast concrete wall panels and / or masonry outer leaf constructions.

This type of construction will provide a significantly higher sound insulation performance than any glazing or ventilator unit. Therefore, for the purposes of this assessment it will be assume that no noise is transmitted via the solid elements of the façade.

5.3.2 Windows

5.3.2.1 Accommodation

Considering the relatively low external noise levels, standard thermal double-glazing units (e.g 4mm glass / 12mm air / 4mm glass) which typically achieve a minimum sound reduction index of ≥ 29 dB $R_w + C_{tr}$ would be sufficient in all locations to mitigate external noise break-in.

In our experience, bespoke window units are likely to be provided to prison accommodation which incorporate an adjustable ventilator, although this is not required for provision of background ventilation (which is typically provided mechanically).

Should any passive solutions (e.g trickle ventilators) be used for provision of background ventilation to the accommodation, then the performance of these should be specified accordingly. In any case, given the relatively low external noise levels, standard trickle ventilator units are likely to be appropriate.

5.3.2.2 Ancillary Uses

It should be noted that noise levels incident on the façades of the ancillary blocks (non-residential) are also low enough that standard double-glazed units (which would not necessarily need to be bespoke security units) should be appropriate to achieve internal noise targets for any use (e.g. classrooms, etc.).

6. CAR PARK NOISE EMISSIONS ASSESSMENT

This section assesses the likelihood of any impact on the existing noise-sensitive receptors in proximity of the site due to the Proposed Development due to noise from the proposed car park.

Generally, the proposed development is suitably distant from the nearest noise-sensitive receptors such that typical day-to-day site activity would not impact on the existing noise sensitive receptors.

The Proposed Development also increases the parking provision on the site, to extend to the northern boundary with Kidlington Ambulance Station and adjacent to the dwellings on Evenlode Crescent.

An assessment of the noise from the car park operations is presented in **Table 5**. This has been made on the following basis:

- MZA Acoustics has library data for the movement of cars within car parks, taken at a 10 m distance.
- The assessment is made to the receptors on Evenlode Crescent, which is ~75 m from the centre of the nearest row of parking spaces.
- It is assumed that, at a shift change, up to 50% of the staff car park capacity would change within a 1-hour period (a total of 70 movements has been used in the following assessment).
- A nominal 5 dB of screening has been allowed for from the earth bund which separates the parking from the dwellings on Evenlode Crescent. In reality, this is likely to be greater.

Table 5 - Car park movements assessment

Calculation Step	
Arriving vehicle	
Car pass-by at 10 m (duration 2s)	68 dB $L_{Aeq,T}$
Car manoeuvring at 10 m (duration 10s)	61 dB $L_{Aeq,T}$
Car door slam at 10 m (duration 1s)	63 dB $L_{Aeq,T}$
Total car movement (duration 13s)	*63 dB $L_{Aeq,13s}$*
SEL of car movement (duration 1s)	74 dBA
Conversion SEL single vehicle to 1 hour L_{Aeq} (-10log(3600))	39 dBA
Number of movements in 1 hour (70) (+10log(72))	57 dB $L_{Aeq,1hr}$
Level corrected for distance from 10 m to 75 m (-20log(75/10))	40 dB $L_{Aeq,1hr}$

Calculation Step	
Screening from earth bund located between car park and Evenlode Crescent	-5 dB
Predicted noise level at receptors on Evenlode Crescent	**35 dB $L_{Aeq,1hr}$**
Departing vehicle	
Car door slam at 10 m (duration 1s)	63 dB $L_{Aeq,T}$
Starting engine at 10 m (duration 2s)	59 dB $L_{Aeq,T}$
Car manoeuvring at 10 m (duration 10s)	61 dB $L_{Aeq,T}$
Car pass-by at 10 m (duration 2s)	68 dB $L_{Aeq,T}$
Total car movement (duration 15s)	*63 dB $L_{Aeq,15s}$*
SEL of car movement (duration 1s)	75 dBA
Conversion SEL single vehicle to 1 hour L_{Aeq} (-10log(3600))	39 dBA
Number of movements in 1 hour (70) (+10log(72))	58 dB $L_{Aeq,1hr}$
Level corrected for distance from 10 m to 75 m (-20log(75/10))	40 dB $L_{Aeq,1hr}$
Screening from earth bund located between car park and Evenlode Crescent	-5 dB
Predicted noise level at receptors on Evenlode Crescent	**35 dB $L_{Aeq,1hr}$**
Totals	
50% changeover (arrival and departure) average noise level	**38 dB $L_{Aeq,1hr}$**
Prevailing ambient noise level (day / night)	54 dB $L_{Aeq,16h}$ / 43 dB $L_{Aeq,8h}$
Prevailing background sound level (typical, day/night)	45 dB $L_{AF90,1hr}$ / 31 dB $L_{AF90,15m}$

It is shown that with 50% of the main car park spaces being utilised during a shift change, this would result in average noise levels which are significantly below both the daytime and night-time ambient noise levels (which are also dominated by road traffic noise – likely masking the influence of noise from the car park).

The noise level is around 7 dB higher than the prevailing background noise level during the night-time. However, considering the relatively low absolute noise levels from

vehicle movements, these are considered highly unlikely to disturb the residences on Evenlode Crescent.

Furthermore, it is noted that the main road into the car park is situated on the more distant side of the car park from the receptors on Evenlode Crescent and, therefore, it is considered likely that the noise from vehicle movements would generally be lower than those predicted above.

7. PLANT NOISE EMISSIONS

With respect to the control of noise which falls under the remit of BS 4142 (primarily mechanical services noise from fixed plant and equipment), at this stage the details of all plant and equipment are not known.

It is understood that there will be mechanical ventilation and cooling to elements of the scheme and, therefore, noise will need to be controlled to meet appropriate levels.

Based on the outcomes of the environmental noise survey, and the requirements of the Local Planning Authority (detailed in Section 3.2), the noise limits for plant noise have been established as presented in **Table 6**.

The noise limits are presented as free-field limits. If the assessment is undertaken to a façade location, then appropriate corrections should be made.

Table 6 – BS 4142 noise emissions limits (free-field)

Location	Period	Equivalent Continuous Sound Level (Free-field, dB $L_{Aeq,T}$)	Rating Noise Level Limit (dB $L_{Ar,Tr}$)
All noise sensitive receptors	Daytime (07:00 – 23:00)	45	40
	Night-time (07:00 – 23:00)	31	26

7.1 Standby Generator

It is understood that a standby generator, which would be used in the event of power loss to the development only, is proposed with a sound pressure level of ~65 dB(A) at 1 m.

The proposed generator lies approximately 140 m from the nearest noise-sensitive receptors, on Evenlode Crescent.

A high-level assessment, based on point source noise propagation, suggests that the generator would be around 22 dB(A) at the nearest noise-sensitive receptor – which is below the typical background noise level established above.

Therefore, the impact of the standby generator is considered likely to be negligible – especially when considering its infrequent operation.

7.2 Indicative Air Source Heat Pump Assessment

7.2.1 Receptor Locations

Assessments are undertaken for both the residential receptors on Evenlode Crescent and Begbroke Crescent, with their relative assessment parameters from the proposed equipment summarised in the following tables.

At this stage, detailed screening calculations (or 3D modelling) have not been used and, therefore, cautious amounts of screening have been allowed for – whereby -5 dB is applied for plant which may have partial line of sight to a receptor, and -10 dB where

plant is fully screened (e.g by intervening buildings). In practice, it is considered likely that actual screening and losses experienced would be greater than these.

Table 7 – Assessment parameters for Evenlode Crescent

Building	NO units	Distance (m)	Screening (dB)
Escorts Rest	1	62	-5
Visitors Reception	1	125	-5
Gate House	9	173	-10
Two buildings to east of site (name not known)	2	189	-10
East block	2	231	-10
Main block	24	166	-10[1]
North Block	4	155	-5

[1] Equipment located on roof in imperforate plant enclosure

Table 8 – Assessment parameters for Begbroke Crescent

Building	NO units	Distance (m)	Screening (dB)
Escorts Rest	1	527	-10
Visitors Reception	1	403	-10
Gate House	9	392	-10
Two buildings to east of site (name not known)	2	375	-10
East block	2	345	-10
Main block	24	260	-10[1]
North Block	4	275	-10

[1] Equipment located on roof in imperforate plant enclosure

7.2.2 Assessment

Initial selections and locations for the primary noise generating plant (external air source heat pumps) which provide heating and hot water to the buildings have been provided by the project mechanical engineers.

The selected units are the Mitsubishi CAHV-R450YA model, and noise data for the units has been provided by the manufacturer as follows:

- COP Priority mode (most efficient operation): 64 dB(A) SPL at 1 m
- Capacity Priority mode (maximum duty): 72 dB(A) SPL at 1 m

Furthermore, it has been discussed with the mechanical engineers that, where required, mitigation in the form of acoustic packs may be installed to units. The pack in question is quoted to reduce noise levels by up to 7 dB(A) and is shown below.

Figure 6 – Noise survey measurement locations

Assessments to the two identified receptors are presented in **Table 9**. It should be noted that calculations have been undertaken using spectral (octave band) data so may not correlate exactly with calculations undertaken using overall A-weighted levels.

Predicted levels are colour coded with respect to compliance with the limits, where green are compliant, amber are marginal exceedance (within 3 dB), and red are more significant exceedances.

Table 9 – Indicative plant noise assessment to Evenlode Crescent

Receptor	Operating Mode	Daytime		Night-Time	
		Limit	Predicted	Limit	Predicted
No Mitigation					
Evenlode Crescent	COP Priority	40	27	26	27
	Capacity Priority		34		34
Begbroke Crescent	COP Priority		20		20
	Capacity Priority		28		26

Receptor	Operating Mode	Daytime		Night-Time	
		Limit	Predicted	Limit	Predicted
Acoustic Packs to All Units					
Evenlode Crescent	COP Priority	40	20	26	20
	Capacity Priority		26		26
Begbroke Crescent	COP Priority		12		12
	Capacity Priority		18		18

It can be seen that the cumulative noise levels from the mechanical equipment, when all running concurrently, is significantly below the background noise level during the daytime at both receptors at all duties – with no further mitigation required.

During the night-time, the noise limits are exceeded at Evenlode Crescent, although only marginally when operating under Capacity Priority mode, and more significantly when operating at full duty (Capacity Priority mode).

When mitigation is applied to all units, the noise level limits are met at all receptors.

It should be noted that the above assessment considers all plant to be running continuously and concurrently. It is very likely that during the night-time, when heating and hot water demand is likely to be lower, not all units would be operational, or many would run at reduced duty and, therefore, the noise levels would be lower.

Furthermore, more detailed calculations of screening etc. are likely to result in lower noise levels at the receptors.

As such, this may mean that mitigation would not be required to all units.

The final strategy should be co-ordinated during the detailed design stages in conjunction with the MEP engineer's operational requirements to finalise which units require acoustic mitigation.

7.2.3 Rating Corrections

No rating corrections have been applied in the above calculation.

It is considered that, given the number of plant items, any intermittency from equipment turning on/off would generally be well masked by other operation plant, as well as by the general environmental noise experienced at the receptors.

It is also noted that the existing noise climate, which consists of distant road traffic and noise from the airport and nearby industrial estate(s), is of a similar character (broadband) to that emitted from the equipment (which has no inherent tonal features) and, therefore, it is very likely that the sound is likely to be indistinguishable from the general ambient noise climate at the nearest noise sensitive receptors.

8. CONCLUSION

MZA Acoustics has been appointed to undertake a noise impact assessment to accompany the planning submission for the proposed expansion of the Campsfield Immigration Removal Centre at Campsfield, Kidlington, Oxfordshire, OX5 1RE (the Site).

The results of a baseline environmental noise survey undertaken at the Site have been used to inform an assessment of the suitability of the site for the proposed use(s).

Noise levels at the proposed development site are relatively low, such that there are no onerous requirements on the ventilation or mitigation strategy with respect to controlling noise to the accommodation or ancillary elements of the development.

An assessment of noise from the car park has been undertaken and it is shown that the predicted noise from the parking is below the existing ambient noise levels at the nearest noise-sensitive receptors during both the daytime and night-time. The predicted noise levels from the car park exceed the background noise levels during the night-time, however the absolute sound levels are suitably low such that is considered unlikely that noise from the use of the car park would cause disturbance to the nearest residences on Evenlode Crescent.

Limits for noise emissions from mechanical plant and equipment (and other operations under the scope of BS 4142) have been established based on the baseline noise survey measurements.

Initial selections for the standby generators and proposed air source heat pumps have been reviewed. The assessment demonstrates that the noise limits stipulated by the Local Planning Authority can be met when all units are running concurrently and at maximum duty by implementing acoustic mitigation to units. In practice, it is considered likely that units would not operate in this manner, and that detailed calculation (e.g by 3D noise model) would predict lower noise levels – leading to less mitigation being required.

The limitations to this report are included in Appendix E.

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 and 2023.

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 **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).

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, 2017)

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.

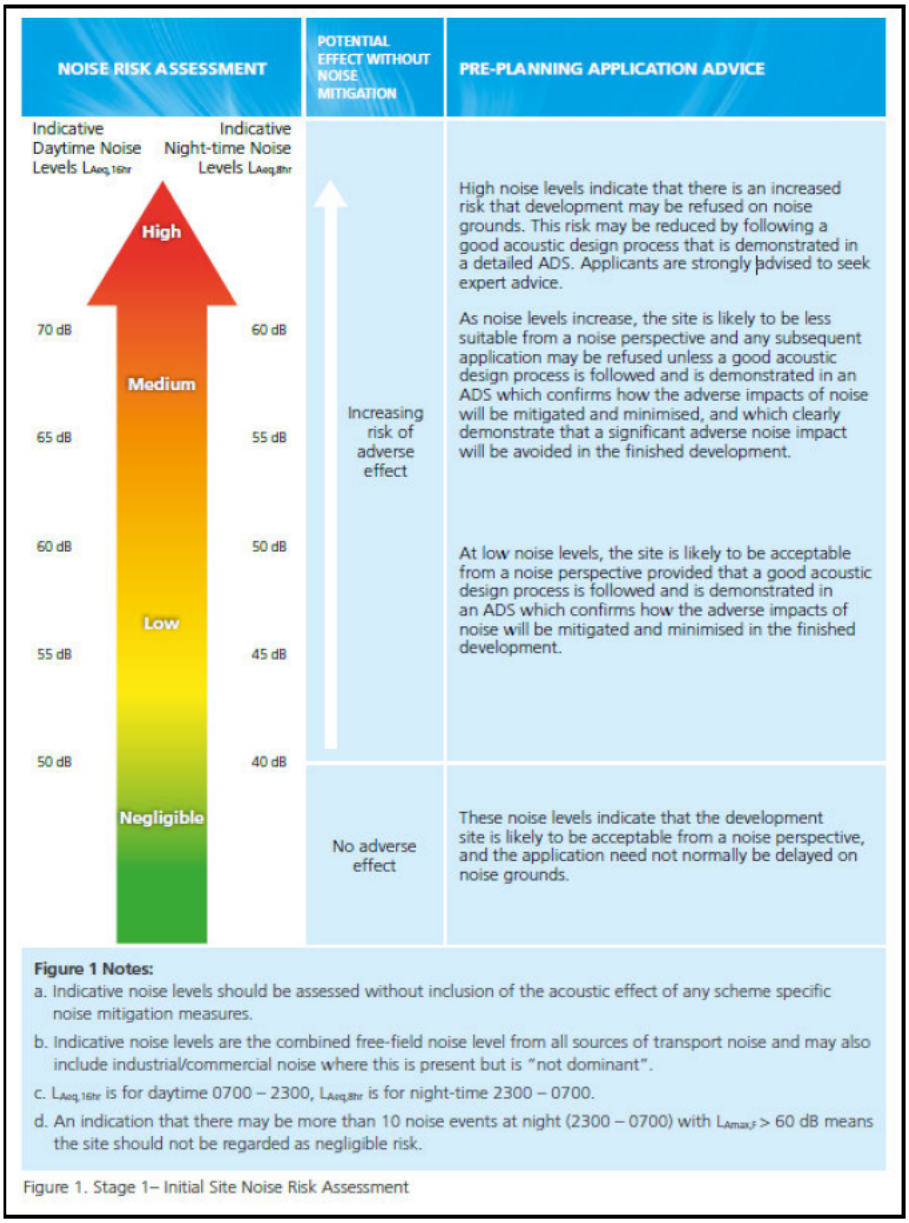


Figure 7 – ProPG Stage 1 Risk Assessment

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 LAeq 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 LAeq target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal LAeq levels start to exceed the internal LAeq 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 LAeq 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.

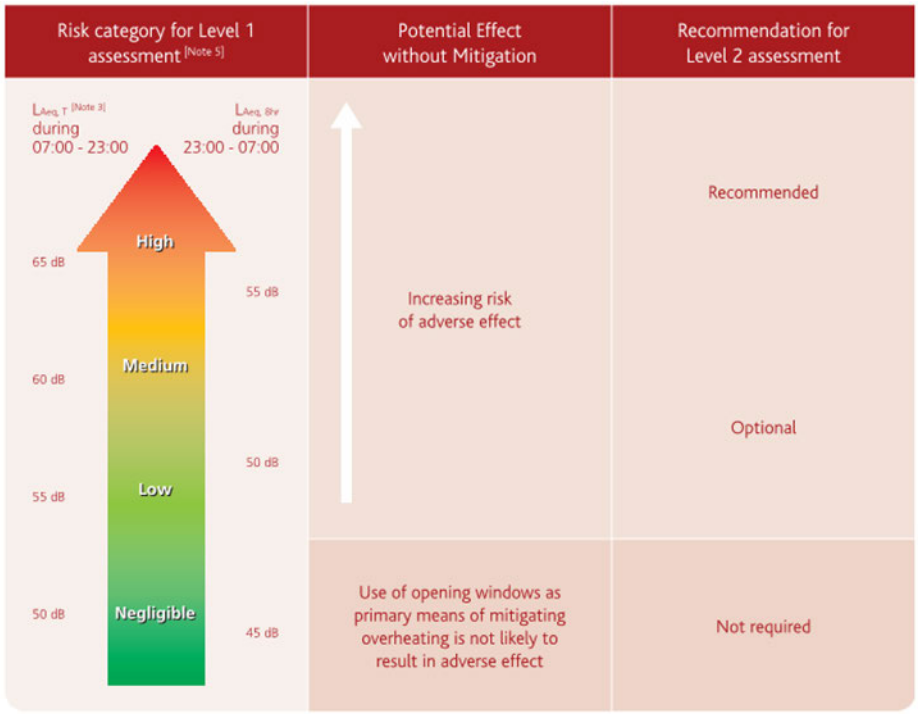


Figure 8 – AVO Guide – Level 1 risk assessment

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 9 – 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 10** and **Figure 11** present examples of such a scale.

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'.

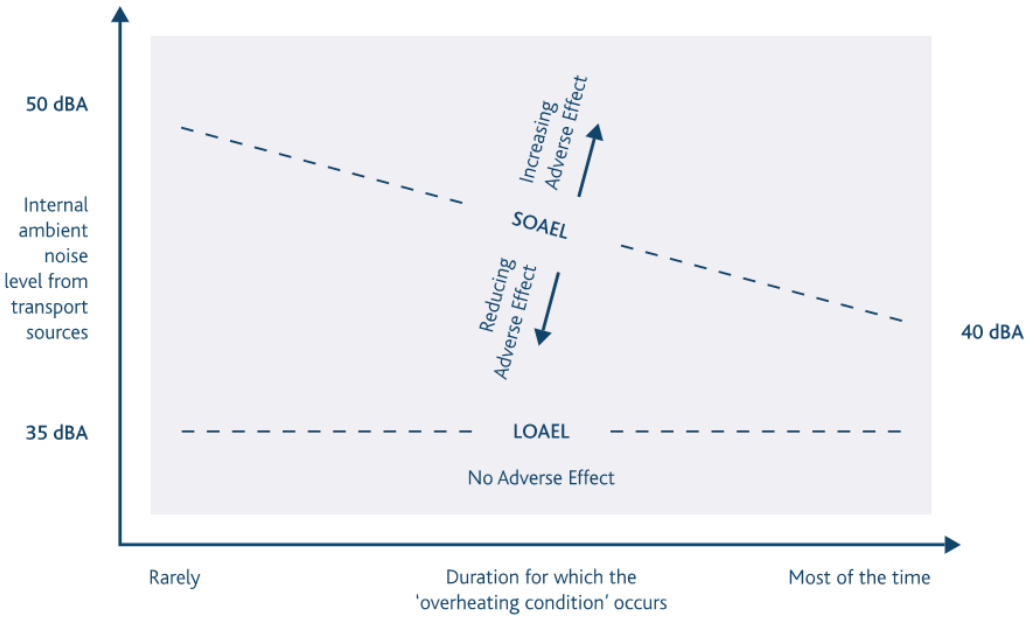


Figure 10 – Figure B-2 of the AVO Guide - the 'AVO Diagram' for daytime noise exposure

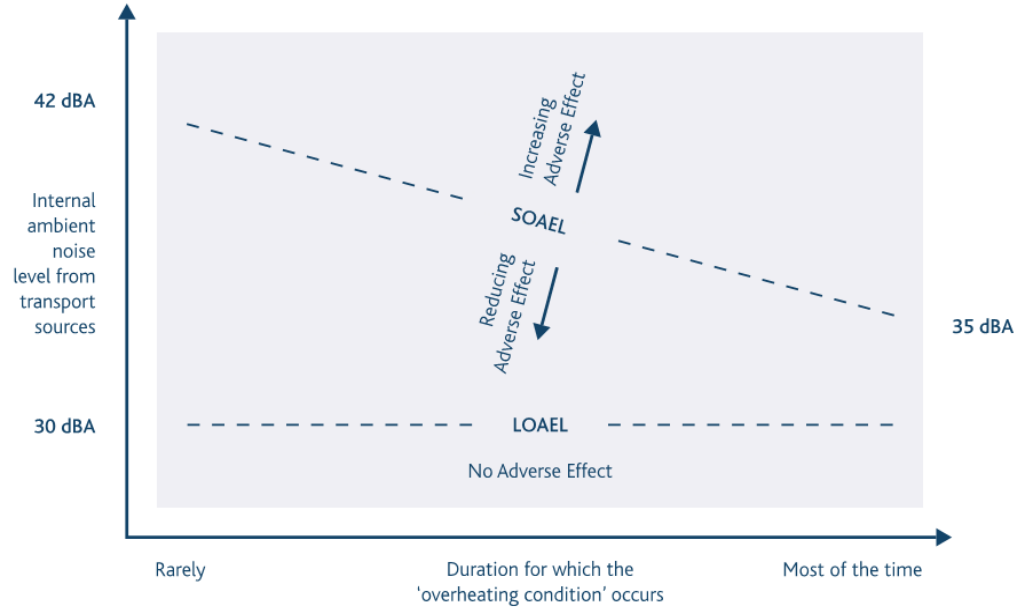


Figure 11 – Figure B-3 of the AVO Guide - the 'AVO Diagram' for night-time noise exposure

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 10 – 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 $L_{Aeq,8hour}$

In terms of design criteria for "...traditional external areas that are used for amenity space, such as gardens and patios..." BS 8233:2014 states that:

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

In relation to other external amenity areas it states:

> *"Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."*

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 11 – 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:

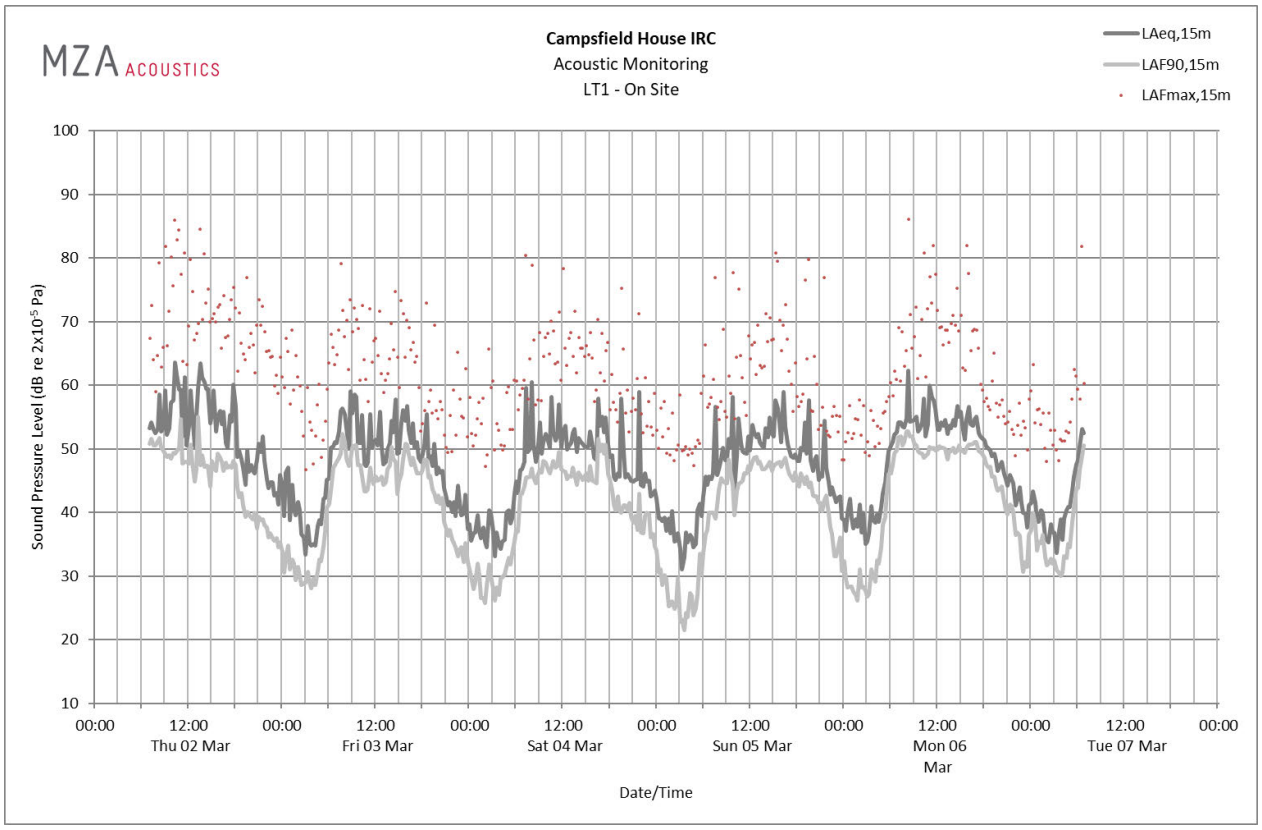
- the absolute level of the sound;
- the character and level of the residual sound compared to the character and level of the specific sound; and
- the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure 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.

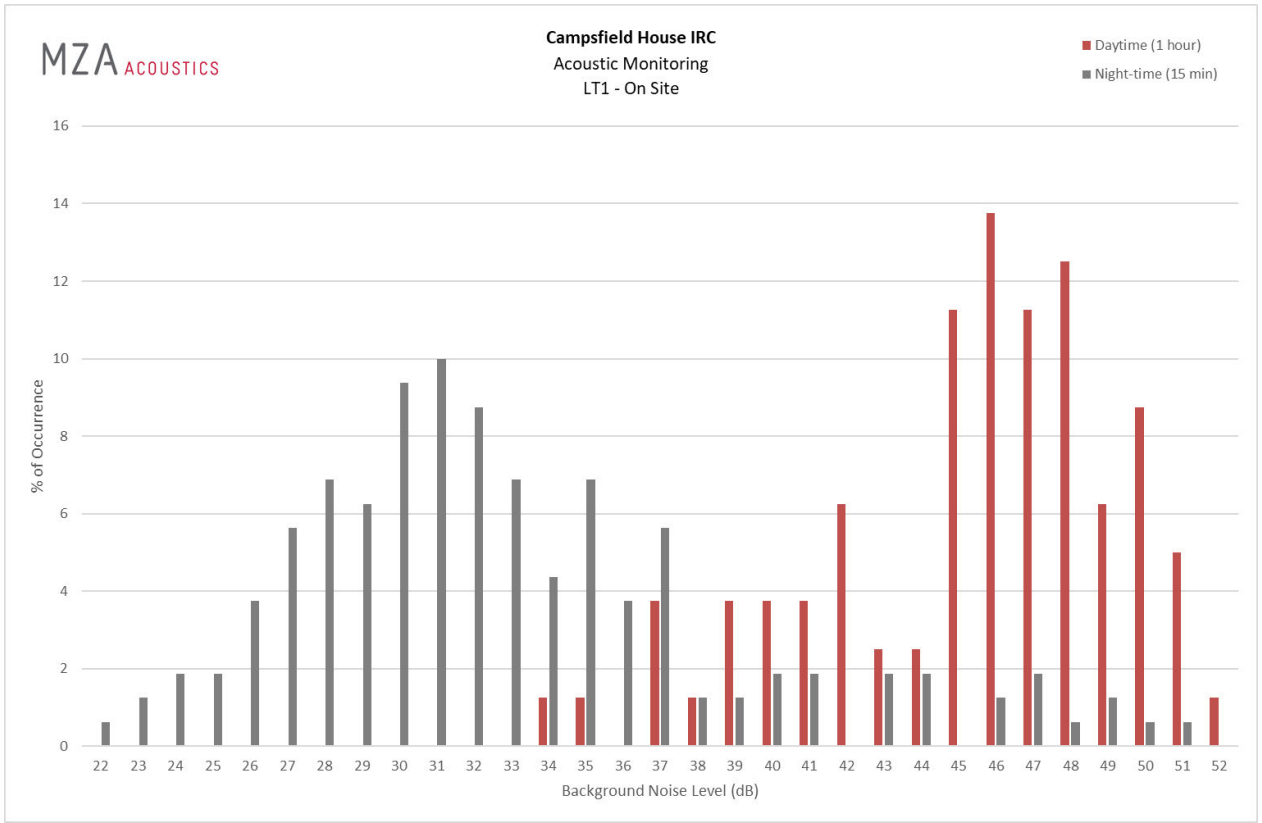
Appendix C – Environmental Noise Survey Equipment

Figure 12 – Long-term monitoring location photograph

Equipment	Type	Serial Number	Calibration Due Date
LT1, ST1 (collection), ST3 (collection)			
Sound Level Meter	01dB Metravib FUSION	11704	17/05/2024
Pre-amplifier	01dB Metravib PRE22	1707136	
Microphone	GRAS 40CD 1/2" Pre-polarised free-field	331728	
Calibrator	01dB Metravib CAL31	83395	17/05/2023
ST1 (installation) & ST2 (installation)			
Sound Level Meter	01dB Metravib FUSION	14465	19/04/2024
Pre-amplifier	Integrated with meter	N/A	
Microphone	GRAS 40CD 1/2" Pre-polarised free-field	470849	
Calibrator	Cirrus CR:515	98855	05/05/2023

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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