

Rustington Golf Centre

Planning Noise Assessment

Report 20/0273/R1



Report 20/0278/R1

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Forest Business Park
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Planning Noise Assessment

Table of Contents

1	Introduction	3
2	Site Description	3
3	Noise Survey	3
3.1	Methodology and Instrumentation	3
3.2	Results	4
4	Noise Assessment	5
4.1	Planning Guidance and Criteria	5
4.2	Internal Noise Levels	6
4.3	External Amenity Areas	8
5	Conclusions	8

Attachments

Glossary of Acoustic Terms

20/0278/SP1

Site plan illustrating noise measurement positions.

20/0278/TH01 and 20/0278/TH02

Time history graphs illustrating unattended measurement results.

20/0278/F1-1

Location of enhanced external façade elements.

20/0278/SPC1

External Façade Element Sound Reduction Performance Requirements.

Appendix A

Planning and Noise Guidance.



End of Section



Planning Noise Assessment

1 Introduction

- 1.1 It is proposed to develop a parcel of land at the existing Rustington Golf Centre to provide 167 residential units. The site borders the A259 and so road traffic noise has the potential to affect the site.
- 1.2 Cole Jarman have been appointed to undertake an environmental noise survey on site with the purpose of informing a noise assessment in order to consider the potential adverse noise impacts on the amenity of future residents.
- 1.3 This report sets out the methodology and results of this noise survey and the findings of the subsequent noise assessment.

2 Site Description

- 2.1 The site is located at Rustington Golf Centre, Golfers Lane, BN16 4NB, and sits within the parcel of land bordered by Golfers Land and the A259 to the east and south respectively. The site and its surrounds is illustrated on the attached site plan 20/0278/SP1.
- 2.2 The site shares its northern boundary with the existing Golf Centre car park and Adventure Golf offering at its northern eastern corner, which is expected to be retained. Beyond this are a series of detached residential properties located along West Drive.
- 2.3 The A259 borders the site to the south, which flows to the northwest, causing the site to 'pinch' at its western extent, where it becomes thinner than its easternmost extent. Beyond the A259 to the south are several large commercial premises, occupied by a supermarket and car dealership.
- 2.4 The area to the east of the site, beyond Golfers Lane is occupied by vacant fields.
- 2.5 Traffic around the site is focused along the A259 which is typically busy, but free flowing.
- 2.6 The site sits within the jurisdiction of Arun District Council.

3 Noise Survey

3.1 Methodology and Instrumentation

- 3.1.1 In order to establish the existing noise climate on site, an unattended noise survey was undertaken at the site between 1215 hours on Monday 8th March and 1245 hours on Tuesday 9th March 2021.
- 3.1.2 Measurements of noise levels were taken from the following positions. These have been illustrated in attached site plan 20/0278/SP1.



Planning Noise Assessment

- MP1: Free-field position, approximately 12m from the nearest edge of the A259 carriageway, roughly 1.6m above local ground level;
- MP2: Free-field position within the existing adventure golf course, approximately 30m from the residences to the north on West Drive, roughly 2m above local ground level.

3.1.3 These positions were selected to quantify the change in noise levels from traffic noise from the A259 across the site, as well as representative noise levels at the worst-affected proposed residences on the site's southern boundary.

3.1.4 Measurements of the L_{Aeq} , L_{Amax} and L_{A90} indices were recorded over consecutive 15-minute periods for the duration of the survey using the equipment listed within table T1 (see attached Glossary of Acoustic Terms for an explanation of the noise units used).

Item	Manufacturer	Type
Sound Level Analyser	Norsonic	118
Sound Level Analyser	Norsonic	140
Acoustic Calibrator (x2)	Norsonic	1251
Weatherproof windshield (x2)	Norsonic	1212

T1 Equipment used during unattended noise survey.

3.1.5 The microphones were fitted within weatherproof enclosures, and the sound level meters calibrated before and after the survey in order to confirm an acceptable level of accuracy. No significant drift was noted to have occurred.

3.1.6 In addition to the two unattended measurement positions noted above, a series of attended measurements of the Adventure Golf course's sound effects and water pumps in operation were undertaken using the equipment set out within table T1 above.

3.1.7 Measurements were undertaken at a free-field position roughly 1.2m above local ground level at the position denoted as MP3 on the attached site plan 20/0278/SP1.

3.1.8 The weather conditions during both the setup and collection of the noise monitoring equipment were clear and cool with dry roads and a slight breeze. These conditions are deemed acceptable and are not considered to have affected measurement results.

3.2 Results

3.2.1 The results of the unattended noise measurements are presented in attached time history figures 20/0278/TH01 and 20/0278/TH02.

3.2.2 The noise climate onsite was dominated by road traffic noise from the A259, with birdsong notable during periods of traffic inactivity.



Planning Noise Assessment

- 3.2.3 The resultant average day and night time period noise levels recorded at the measurement positions are presented in table T2.

Position	Daytime	Night Time	
	$L_{Aeq, 16h}$	$L_{Aeq, 8h}$	Typical L_{AFmax}
MP1: Site southern boundary	77	68	87
MP2: Adventure Golf Course	55	51	64

T2 Average weekday period noise levels.

- 3.2.4 The results of the attended measurements of noise from the Adventure Golf sound effects and water pumps captured at position MP3 are set out within table T3 below.

Noise Source	Measured Ambient Noise Level, dB $L_{Aeq1min}$ at								dB(A)
	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Adventure Golf sound effects and water pumps	62	61	56	54	56	53	43	37	59

T3 Measured Adventure Golf sound effect and water pump noise level.

4 Noise Assessment

4.1 Planning Guidance and Criteria

Planning Guidance

- 4.1.1 Guidance is available from various sources to aid our assessment and establish the criteria to which the development should strive towards. Full details of relevant national planning guidance, local planning policy and design criteria are included in Appendix A.
- 4.1.2 Based on the guidance set out within Appendix A, the following noise level criteria are sought for external noise intrusion within the proposed development:

- * Daytime internal noise levels within all habitable rooms no greater than 35dB $L_{Aeq, 16h}$;
- * Night time internal noise levels within all habitable bedrooms no greater than 30dB $L_{Aeq, 8h}$;



Planning Noise Assessment

- ✦ Night time maximum noise levels within all bedrooms no greater than 45dB L_{Amax} for typical events occurring no more than 10 times during the night.
- ✦ Aspirational daytime noise levels in private outdoor amenity areas no greater than 55dB $L_{Aeq,16h}$.

4.2 Internal Noise Levels

- 4.2.1 In order to adequately control noise ingress to habitable rooms throughout the development it will be necessary for elements of the external building fabric to achieve certain minimum levels of sound insulation performance. An octave band assessment of noise intrusion has therefore been undertaken based on the results of the noise survey.
- 4.2.2 As no plans are currently available showing proposed habitable room sizes and glazing areas, we have conducted our calculations based on assumptions as to typical room sizes for bedrooms and living rooms. The dimensions of these can be found set out in table T4 below. If the final floor and glazing areas differ drastically to these, then revisions to the calculations would be necessary.
- 4.2.3 The development layout has been assessed on the basis of *Carlton Design Partnership's* Site Layout Planning Drawing (ref: 201209/SL1).
- 4.2.4 Typical L_{Amax} levels during night time hours have been considered in order to ensure reasonable maximum internal noise levels within bedrooms.

Room	Dimension		
	Floor area (m ²)	Height (mm)	Glazing area (m ²)
Bedroom	12	2500	2.6
Living Room	16	2500	5.2

T4 Assumed typical room dimensions.

- 4.2.5 An assessment of noise from the Adventure Golf course has been conducted using measurement data captured at position MP3 as per the attached site plan 20/0278/SP1 and detailed in T3. This has not been corrected for contributions from road traffic noise in order to form a robust assessment, despite traffic noise noted to be the dominant noise source during the attended measurements.

Glazing

- 4.2.6 Double glazing of a performance beyond that of standard thermal glazing will be required to meet the internal noise criteria with windows closed across the majority of habitable rooms



Planning Noise Assessment

throughout the development. Minimum sound reduction performance requirements for glazing are presented within the attached specification 20/0278/SPC1.

- 4.2.7 Windows should not be sealed, but openable for times when purge ventilation is required (examples given in Approved Document F include purging of fumes from burnt food when cooking or removal of fumes when painting).

Background Ventilation

- 4.2.8 As is standard, it will be necessary to provide trickle ventilation in order to achieve suitable background ventilation rates with windows closed. It is necessary to consider such ventilation as part of any BS8233 assessment.

'any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment'

- 4.2.9 To provide background airflow whilst also providing a suitable level of noise mitigation, acoustically rated trickle vents will be required as is the standard approach for dwelling construction in order to provide suitable ventilation when windows are closed.
- 4.2.10 The trickle vents must meet the minimum performance standards as set out within the attached specification 20/0278/SPC1.
- 4.2.11 Noise levels have been assessed on the basis of up to one unit in bedrooms and two in living rooms.
- 4.2.12 It is expected that this ventilation provision will allow ventilation in accordance with Approved Document F 'Ventilation' of the Building Regulations. This should be confirmed by the relevant consultants.

Mitigation Locations

- 4.2.13 The location of the glazing and ventilation required across the site in order to achieve the internal noise limits as specified within section 4.1 are set out within the attached specification document 20/0278/SPC1 and table T5.



Planning Noise Assessment

Façade Type	Location	Glazing Type	Ventilator Type
A	Habitable rooms on southern facing façades within first row of houses on site boundary adjacent to the A259	G1	V1
B	Habitable rooms on northern facing façades within first row of houses and within second row of houses on site boundary adjacent to the A259	G2	V1
C	All other habitable rooms	G3	V2

T5 Location of glazing and ventilation types.

4.2.14 It is noted that non-habitable rooms (such as bathrooms) have no acoustic requirements, so no specific acoustic ventilation is necessary to such rooms.

4.2.15 With the above specified mitigation in place, noise from the road and Adventure Golf Course is mitigated to meet the internal noise limits.

4.3 External Amenity Areas

4.3.1 The daytime noise levels set used within our assessment as set out within table T2 indicate that it will be necessary to mitigate noise emissions from the nearby A259 in order to provide suitable aspirational daytime external amenity area levels in line with those set out in section 4.1.

4.3.2 We recommend that this be achieved by orientating dwellings such that their associated external amenity areas are screened by the dwellings themselves, as has been accounted for on the *Carlton Design Partnership Site Layout Planning Drawing*.

4.3.3 Through this principle, we expect in the case of the first row of dwellings to the A259 that it will be possible to provide all dwellings with an area of garden observing the aspirational 55dB $L_{Aeq,16h}$ or below through taking account of the screening loss afforded by a two-storey residential property.

5 Conclusions

5.1 It is proposed to develop a parcel of land at the existing Rustington Golf Centre to provide 167 residential units. The site borders the A259, and so road traffic noise has the potential to affect the site.



Planning Noise Assessment

- 5.2 Cole Jarman have conducted noise survey works across the site in order to establish the existing noise climate. Details of the survey and a subsequent noise intrusion assessment have been provided within this report.
- 5.3 It has been found that a suitable level of amenity can be provided within the proposed residences, with acoustically enhanced glazing and ventilation openings necessary for some dwellings. Acoustic performance requirements have been set out for the various external façade elements.

 End of Section



Planning Noise Assessment

Glossary of Acoustic Terms

L_{Aeq}

The notional steady sound level (in dB) which over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measurement over that period. Values are sometimes written using the alternative expression dB(A) L_{eq} .

L_{Amax}

The maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise when occasional loud noises occur, which may have little effect on the L_{Aeq} noise level. Unless described otherwise, L_{Amax} is measured using the “fast” sound level meter response.

L_{A10} & L_{A90}

If non-steady noise is to be described, it is necessary to know both its level and degree of fluctuation. The L_{An} indices are used for this purpose. The term refers to the A-weighted level (in dB) exceeded for n% of the time specified. L_{A10} is the level exceeded for 10% of the time and as such gives an indication of the upper limit of fluctuating noise. Similarly L_{A90} gives an indication of the lower levels of fluctuating noise. It is often used to define the background noise.

L_{A10} is commonly used to describe traffic noise. Values of dB L_{An} are sometimes written using the alternative expression dB(A) L_n .

L_{AX} , L_{AE} or SEL

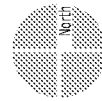
The single event noise exposure level which, when maintained for 1 second, contains the same quantity of sound energy as the actual time varying level of one noise event. L_{AX} values for contributing noise sources can be considered as individual building blocks in the construction of a calculated value of L_{Aeq} for the total noise. The L_{AX} term can sometimes be referred to as Exposure Level (L_{AE}) or Single Event Level (SEL).

■ End of Section



Figure 20/0278/SP1

Title:
Site plan illustrating noise measurement positions

- Key:
-  MP Unattended Measurement Position
 -  MP Attended Measurement Position
 -  Site Extent
 - 

Project:
Rustington Golf Centre

Date: March 2021 Revision: -

Scale:
Not to scale



Figure 20/0278/TH01

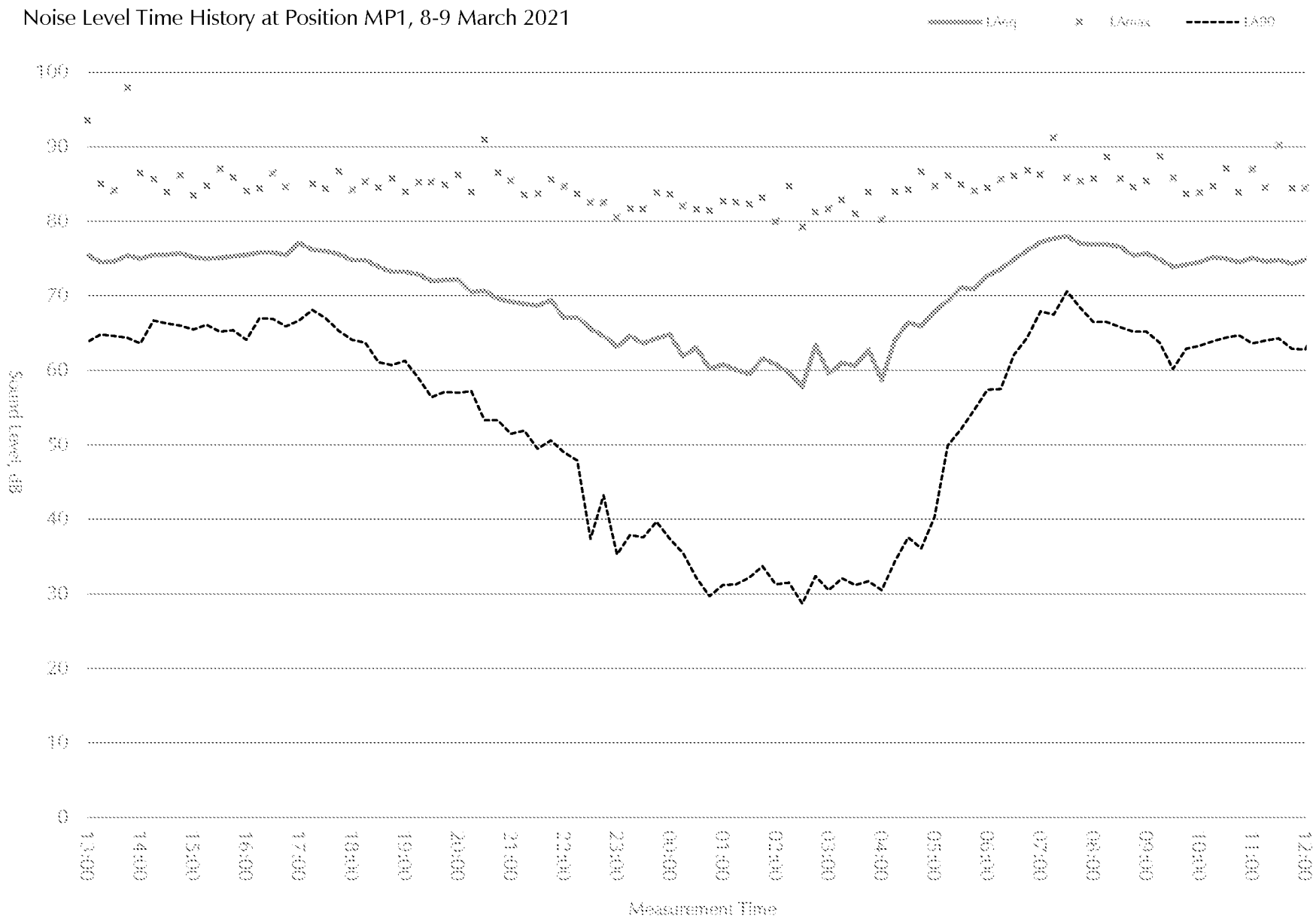




Figure 20/0278/1402

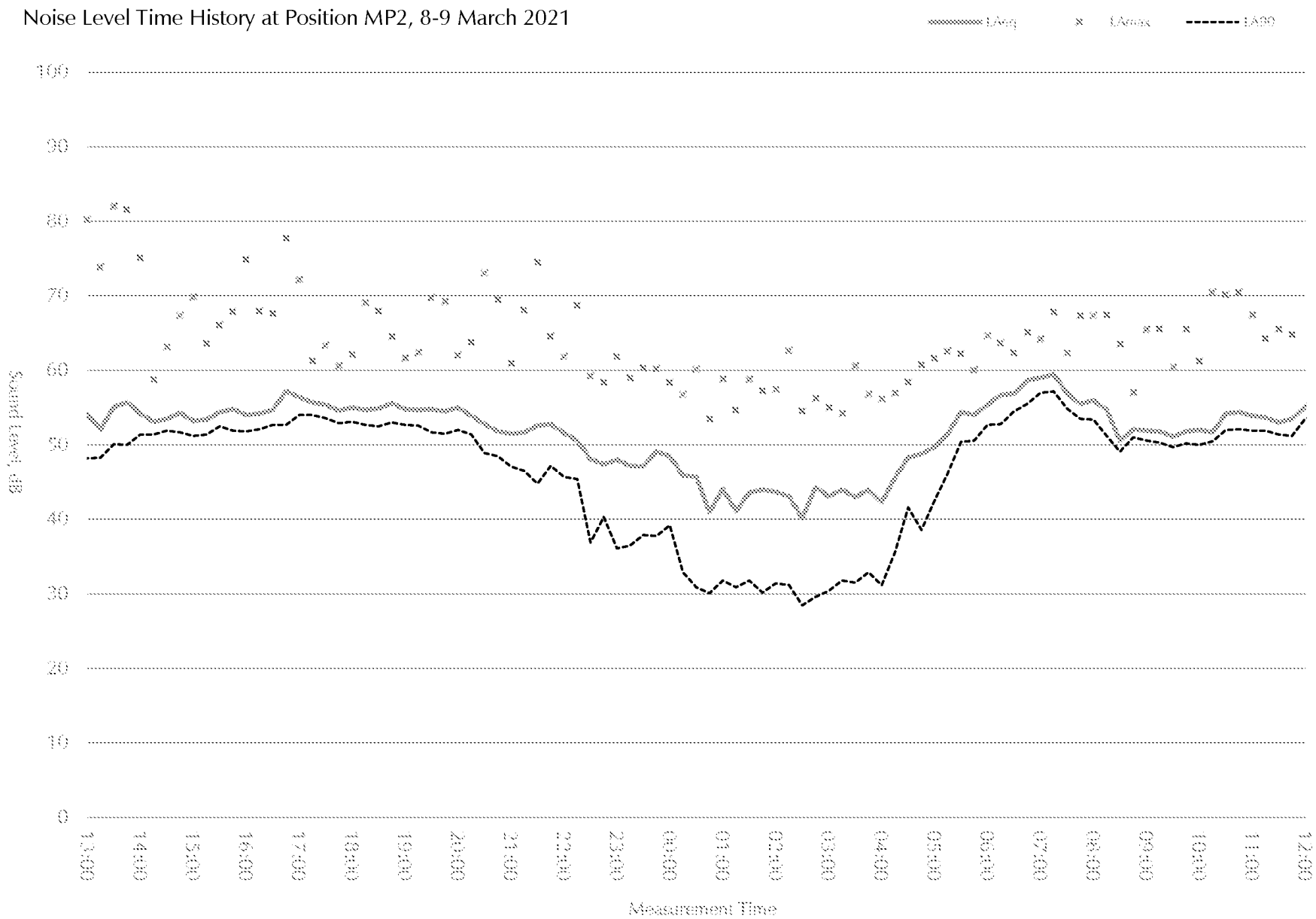


Figure 20/0278/F1

Title:

Location of external facade elements

Key:

-  Facade Type A
-  Facade Type B
- Unmarked Facade Type C

To be read in conjunction with specification
20/0278/SPC1

Project:

Rustington Golf Centre

Date:

February 2022

Revision:

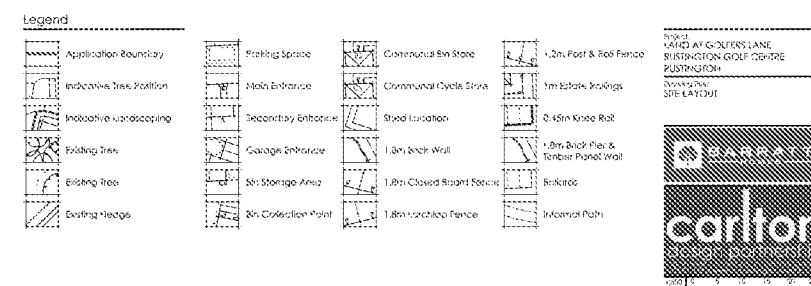
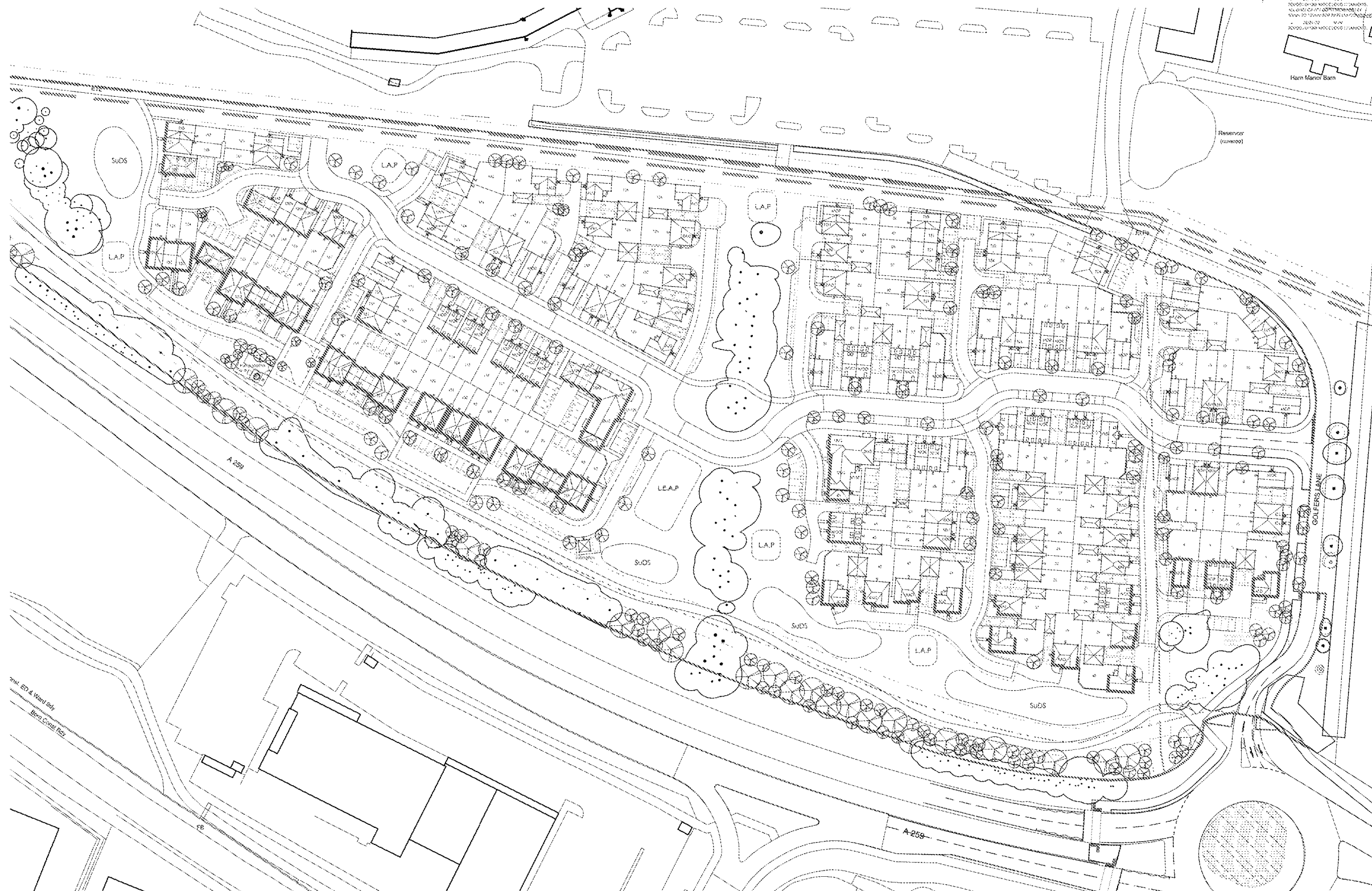
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Scale:

Not to scale

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Specification 20/0278/SPC1

Subject: External Façade Element Sound Reduction Performance Requirements
Project: Rustington Golf Centre
Date: April 2021
Revision: 0

Prepared: AS
Approved: BHo

This specification covers the acoustic performance requirements for the different elements of the external building fabric, in order to control external noise intrusion to the residential properties and meet the specific internal noise criteria. The specific elements of the external building fabric covered by this specification are as follows:

1. Glazing
2. Ventilation

The location of the various glazing and ventilation types set out within the following sections are as follows and as illustrated on figure 20/0278/F1.

Façade Type	Location	Glazing Type	Ventilator Type
A	Habitable rooms on southern facing façades within first row of houses on site boundary adjacent to the A259	G1	V1
B	Habitable rooms on northern facing façades within first row of houses and within second row of houses on site boundary adjacent to the A259	G2	V1
C	All other habitable rooms	G3	V2

T1 Location of glazing and ventilation types.

1 Glazing

The table T2 on page 2 of this specification sets out the sound reduction performance requirements for the glazed façade elements on the building.

The indicative R_w values and indicative glazing configurations quoted in the table on page 2 overleaf are for guidance only; alternatives configurations may be utilised.



External Façade Element Sound Reduction Performance Requirements

The octave band sound reduction performances quoted in the table on page 2 overleaf must be achieved by the glazing system taken as a whole in its installed condition. The specification therefore applies to the glazing, the frames and all seals on any openable parts of the systems and any required ventilation or condensation control mechanisms. This list is not exhaustive: no part of the glazing system shall cause the above figures not to be achieved.

The supplier should be expected to prove by means of certified test results that the above sound reduction figures can be achieved by the system being proposed. The tests shall be conducted in accordance with BS EN ISO 10140 2010 Part s 1 to 5 or BS EN ISO 140 Part 5 1998.

Glazing Sound Reduction Index (SRI) @ Octave Band Centre Frequency (Hz)							
	125	250	500	1k	2k	4k	<i>Indicative R_w</i>
Glazing Type G1							
Indicative glazing type: 10mm glass / 16-24mm airspace / 9.1mm laminated glass	29	33	44	46	49	57	45
Glazing Type G2							
Indicative glazing type: 6mm glass / 12-24mm airspace / 6mm glass	20	21	30	35	32	37	32
Glazing Type G3							
Indicative glazing type: 4mm glass / 12-24mm airspace / 4mm glass	20	18	26	33	33	30	30

T2 Glazing sound reduction performance requirements for all façades.

2 Ventilation

The table T3 on page 3 of this specification sets out the octave band and single figure sound reduction performance requirements for the passive ventilators on the building.



External Façade Element Sound Reduction Performance Requirements

Façade Groups B and C

It is anticipated systems complying with the requirements of System 1, System 3 or System 4 as defined within Building Regulations Approved Document F 2010 would be suitable.

Mechanical Ventilation Noise

Any mechanical ventilation systems should be designed to achieve noise levels inside of no more than NR25 in bedrooms and NR30 in all other habitable rooms under background ventilation mode, with a 5dB relaxation at any temporary boost increased ventilation rate under the occupier's control.

Trickle Vents

Where ventilation systems incorporate passive air intakes (trickle vents) in the façades, the vents should have an installed element-normalized level difference ($D_{n,e}$) when tested in accordance with BS EN 10140 2010 Parts 1 to 5 of not less than that indicated in the following table:

Trickle Vent Installed Element Normalized Level Difference (dB $D_{n,e}$) @ Octave Band Centre Frequency (Hz)							
	125	250	500	1k	2k	4k	Indicative $D_{n,e,w}$
Ventilator Type V1							
Indicative vent type:	48	39	44	52	66	61	49
Passivent Fresh 80dB							
Ventilator Type V2							
Indicative vent type:	35	35	34	35	34	29	35
Unattenuated trickle vent							

T3 Ventilator sound reduction performance requirements for all façades.

Typical vents which would achieve the performance requirements are also identified within table T3.

The indicative $D_{n,e,w}$ values and indicative vent types quoted above are for guidance only, alternatives may be utilised provided the **octave band** sound reduction performance quoted are achieved.



External Façade Element Sound Reduction Performance Requirements

 End of Section

Appendix A

Subject:	Planning Considerations and Guidance		
Project:	Rustington Golf Centre		
Date:	April 2021	Prepared:	AS
Revision:	0	Approved:	BHo

This document sets out the various standards and national guidance upon which the design advice has been based.

A1 National Planning Policy Framework (NPPF)

A1.1 The National Planning Policy Framework (NPPF), published in March 2012 and updated in June 2019, is currently the relevant document for defining the national policy toward noise sensitive development. It refers to the Noise Policy Statement for England (NPSE), which is discussed in the subsequent section.

A1.2 The current policy on sustainable development influences the emphasis of any noise assessment. The development of a quiet, rural site is by most measures less sustainable than the development of a site located near existing infrastructure and facilities. The rating of development sites based on prevailing noise levels should reflect this.

A1.3 Specifically, on the subject of noise, paragraph 180 of NPPF states:

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

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 and amenity value for this reason;”

A1.4 Paragraph 180 references the Noise Policy Statement for England and no other particular standards.



Planning Considerations and Guidance

- A1.5 On the general issue of amenity, paragraph 127 states that planning policies and decisions should ensure that developments:

“create places that [...] promote health and well-being, with a high standard of amenity for existing and future users...”

- A1.6 Further to this, paragraph 170 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 unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution”

- A1.7 A notable inclusion in the July 2018 edition of NPPF is the ‘agent of change’ principle in paragraph 182. In terms of noise, this principle requires that those proposing a new noise sensitive development incorporate sufficient mitigation such that the operation of existing premises in the area is not unreasonably restricted in order to control noise impact upon the new development:

“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.”

A2 Noise Policy Statement for England (NPSE)

- A2.1 This NPSE does not set quantitative guidelines for the suitability of noise sensitive development in an area depending on the prevailing levels of noise. Absent, therefore, is reference to specific noise thresholds which determine whether noise sensitive development is suitable and, if so, whether particular mitigation factors need to be considered.

- A2.2 Instead, the NPSE sets out three aims:

The first aim of the Noise Policy Statement for England

“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.”



Planning Considerations and Guidance

The second aim of the Noise Policy Statement for England

“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.”

The third aim of the Noise Policy Statement for England

“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.”

A2.3 Paragraph 2.24 states that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life. It also states that this does not mean that such adverse effects cannot occur.

A2.4 In essence, therefore, each development site must be judged on its ability to deliver on each of the stated aims. Quantifying the prevailing noise levels is therefore an essential first step in assessing a given site.

A2.5 The NPSE refers to SOAEL, the Significant Observed Adverse Effect Level. This is defined as the level above which significant adverse impacts on health and quality of life occur. Given the overall thrust of the NPSE, the SOAEL is therefore an important assessment standard although the document also comments that:

“It is not possible to have a single objective noise based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times.”

A2.6 Attention is drawn to the fact that the SOAEL is the level above which significant adverse effects can be observed. Importantly, it should be noted that the overall objective is to avoid or minimise significant adverse impacts; some degree of impact is acceptable and it is not necessary to seek to achieve no impact at all.

A3 Planning Practice Guidance (PPG)

A3.1 The Department for Communities and Local Government ‘Planning Practice Guidance’ (PPG) was published on 6 March 2014 and updated in July 2019.

A3.2 The PPG on Noise expands upon the NPPF and NPSE and sets out more detailed guidance on noise assessment. Like the NPPF and NPSE, the guidance does not include any specific noise levels but sets out further principles that should underpin an assessment.

A3.3 The PPG includes a section on noise, which states:



Planning Considerations and Guidance

"Plan-making and decision making need to take account of the acoustic environment and in doing so consider:

whether or not a significant adverse effect is occurring or likely to occur;

whether or not an adverse effect is occurring or likely to occur; and

whether or not a good standard of amenity can be achieved."

A3.4 It then refers to the NPSE and states that the aim is to identify where the overall effect of the noise exposure falls in relation to Significant Observed Adverse Effect Level ¹ (SOAEL), the Lowest Observed Adverse Effect Level ² (LOAEL) and the No Observed Effect Level ³ (NOEL).

A3.5 The guidance then presents a table, which is reproduced as table 0 overleaf. The implication of the final line of the table is that only the 'noticeable and very disruptive' outcomes are unacceptable and should be prevented. All other outcomes (i.e. all other lines in the table) can be acceptable, depending upon the specific circumstances and factors such as the practicalities of mitigation.

¹ The level of noise exposure above which significant adverse effects on health and quality of life occur.

² The level of noise exposure above which adverse effects on health and quality of life can be detected.

³ The level of noise exposure below which no effect at all on health or quality of life can be detected.



Planning Considerations and Guidance

Response	Examples of Outcomes	Increasing effect level	Action
NOEL (No Observed Effect Level)			
Not present	No Effect	No Observed Effect	No specific measures required
NOAEL (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 change in the quality of life.	No Observed Adverse Effect	No specific measures required
LOAEL (Lowest Observable 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 or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
SOAEL (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

AT1 Summary of Noise Exposure Hierarchy (from PPC)

A3.6 Under the topic of further considerations relating to mitigating the impact of noise on residential developments, the PPC states:



Planning Considerations and Guidance

"Noise impacts may be partially offset if residents have access to one or more of:

a relatively quiet facade (containing windows to habitable rooms) as part of their dwelling;

a relatively quiet external amenity space for their sole use, (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced if this area is exposed to noise levels that result in significant adverse effects;

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, external publically accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minute walking distance)."

A4 Internal and External Noise Design Criteria

A4.1 The World Health Organisation (WHO) Guidelines 1999

A4.1.1 The Guidelines for Community Noise (World Health Organisation, 1999) included values for community noise in specific environments.

A4.1.2 It is important to note that the WHO Guidelines are aspirational, as illustrated by the National Noise Incidence Study (NNIS, 2000), which indicates that 55% of the population of England and Wales are exposed to external noise levels above 55 dB $L_{Aeq, day}$. A National Physical Laboratory (NPL) report (with reference CMAM 16, dated September 1998) reviewing the original 1980 WHO Guidelines and the 1995 draft version of the current Guidelines stated:

"Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached."

"As such, it would be unwise to use the WHO guidelines as targets for any form of strategic assessment, since, given the prevalence of existing noise exposure at higher noise levels, there might be little opportunity for and little real need for any across the board major improvements. On the other hand, the most constructive use for the WHO guidelines will be to set thresholds above which greater attention should be paid to the various possibilities for noise control action when planning new developments. It is important to make clear at this point that exceedances do not necessarily imply an over-riding need for noise control, merely that the relative advantages and disadvantages of noise control action should be weighed in the balance."

A4.1.3 To prevent moderate annoyance in outdoor living areas, such as gardens and balconies of dwellings, the WHO guideline value is 50 dB $L_{Aeq, 16h}$. This can be described as an upper limit for the average noise level across the daytime and evening period (07:00h to 23:00h). The corresponding guideline value to prevent serious annoyance is stated as 55 dB $L_{Aeq, 16h}$.



Planning Considerations and Guidance

However, it is again noted that these levels are aspirational in nature, as described in A4.1.2 above.

A4.1.4 In terms of the internal noise environment, in order to achieve maximum speech intelligibility and to avoid moderate annoyance, the guideline value for noise levels within dwellings is stated as 35 dB $L_{Aeq, 16h}$ (covering the day and evening 07:00h to 23:00h). The corresponding value for the night period (23:00h to 07:00h) to avoid sleep disturbance is 30 dB $L_{Aeq, 8h}$.

A4.1.5 Additionally in terms of sleep disturbance, a guideline value of 45 dB L_{Amax} is given. In relation to this value, the Guidelines state:

“When the background noise is low, noise exceeding 45 dB L_{Amax} should be limited, if possible...”

“For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10–15 times per night...”

A4.2 WHO Environmental Noise Guidelines 2018

A4.2.1 An updated version of the Guidelines was published in October 2018. It constitutes a significant revision of the 1999 Guidelines, rather than comprising minor amendments. In relation to road traffic and railway noise, the guidance states the following:

Road Traffic Noise

For average noise exposure, the GDG strongly recommends reducing noise levels produced by road traffic below **53 decibels (dB) L_{day}** as road traffic noise above this level is associated with adverse health effects.

For night noise exposure, the GDG strongly recommends reducing noise levels produced by road traffic during night time below **45 dB L_{night}** as night-time road traffic noise above this level is associated with adverse effects on sleep.

To reduce health effects, the GDG strongly recommends that policy-makers implement suitable measures to reduce noise exposure from road traffic in the population exposed to levels above the guideline values for average and night noise exposure. For specific interventions, the GDG recommends reducing noise both at the source and on the route between the source and the affected population by changes in infrastructure.



Planning Considerations and Guidance

Railway Noise

For average noise exposure, the GDG strongly recommends reducing noise levels produced by railway traffic below **54 dB L_{den}** , as railway noise above this level is associated with adverse health effects.

For night noise exposure, the GDG strongly recommends reducing noise levels produced by railway traffic during night time below **44 dB L_{night}** , as night-time railway noise above this level is associated with adverse effects on sleep.

To reduce health effects, the GDG strongly recommends that policy-makers implement suitable measures to reduce noise exposure from railways in the population exposed to levels above the guideline values for average and night noise exposure. There is, however, insufficient evidence to recommend one type of intervention over another.

A4.2.2 The L_{den} is an equivalent sound level that represents the situation over the full 24 hour day, taking account of the L_{day} (0700-1900h), with a penalty of 5dB(A) for evening noise $L_{evening}$ (1900-2300h) and a penalty of 10dB(A) for night time noise L_{night} (2300-0700). The L_{night} index is equivalent to the $L_{Aeq, 8h}$ index as used in other standards such as BS 8233 (but not necessarily with the same numerical guidelines).

A4.2.3 The guidance no longer specifies L_{Amax} criteria but states in section 2.2.2:

"In many situations, average noise levels like the L_{den} or L_{night} indicators may not be the best to explain a particular noise effect. Single-event noise indicators – such as the maximum sound pressure level (L_{Amax}) and its frequency distribution – are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by L_{Amax} . Nevertheless, the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The guidelines therefore make no recommendations for single-event noise indicators."

A4.2.4 As with the 1999 WHO document, the guideline values in the 2018 document represent aspirational targets to be achieved in the long term, rather than values that should immediately be adopted into relevant policy.

A4.2.5 This is reflected in the following excerpt from the government's Aviation 2050 consultation document (which relates to aircraft noise but the principle of the statement is relevant to other noise sources):

"The government is considering the recent new environmental noise guidelines for the European region published by the World Health Organisation (WHO). It agrees with the ambition to reduce noise and to minimise adverse health effects, but it wants policy to be underpinned by the most robust evidence on these effects, including the total cost of action and recent UK specific evidence which the WHO report did not assess."



Planning Considerations and Guidance

A4.2.6 Therefore, other current standards and guidance, such as BS 8233, still represent the most relevant and appropriate basis for assessment.

A4.3 **British Standard BS 8233:2014**

A4.3.1 Guideline values for dwellings with respect to internal and external noise levels are included in BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (BSi).

A4.3.2 The standard states 50 dB $L_{Aeq,T}$ as being desirable as a steady state noise level not to be exceeded in gardens. It also states 55 dB $L_{Aeq,T}$ as an upper guideline value. The time period T is usually taken to be the 16 hour day (07:00h to 23:00h).

A4.3.3 Paragraph 7.7.3.2 of the standard goes on to say the following:

“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 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.

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.”

A4.3.4 It can be seen that external noise levels, especially on small balconies to apartment blocks, are not proposed to be a controlling index by which suitability of a residential site is defined.

A4.3.5 Therefore, when designing noise sensitive developments that incorporate gardens or other external amenity areas, the intent shall be to provide an area for each property in which the noise levels are consistent with these standards. Where these standards cannot be achieved, then reasonable measures shall be employed to provide screening or other forms of mitigation so as to minimise the noise levels in the external amenity areas.

A4.3.6 An important principle here is that sustainable development sites will often be exposed to relatively high levels of environmental noise, and while means are available to insulate internal



Planning Considerations and Guidance

spaces, they are not always available to protect external spaces. Strict adherence to the enforcement of such external noise criteria would preclude development in the majority of areas considered for development in semi-urban or urban environments or in areas in the vicinity of transportation noise sources. This is why the external standards shall be viewed as targets or triggers of mitigation measures rather than thresholds not to be exceeded in all circumstances.

A4.3.7 Buildings can be designed to achieve specific levels of insulation against external noise. It is reasonable, therefore, to set specific internal noise standards as the test of whether a development satisfies the requirements of the NPPF and the aims of the NPSE. In essence, these require a high quality design that achieves a good standard of amenity.

A4.3.8 Guidance in respect of indoor ambient noise levels is contained in Table 4 of BS 8233:2014 and tabulated below.

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

Note 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

AT2 Table 4 of BS 8233:2014

A4.3.9 The previous edition of BS 8233 included quantitative guidance with respect to night-time L_{Amax} noise levels in bedrooms. BS 8233:2014 does not provide such guidance, however in paragraph 7.7.5.1.1 it is noted that the recommendations for ambient noise in hotel bedrooms are similar to those for living accommodation and Table H.3 in Annex H.3 gives example night-time L_{Amax} limits in hotel bedrooms of 45-55 dB.

A4.3.10 The WHO study informing the 1999 Guidelines derived the L_{Amax} night time noise standard on the basis of 10 to 15 occurrences per night.

A4.4 ProPG: Planning and Noise (2017)

A4.4.1 ProPG is a guidance document prepared by a working group consisting of representatives of the Association of Noise Consultant (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH). It provides professional practice guidance on Planning and Noise with regard to new residential development that will be exposed to airborne noise from transport sources. It is also noted that good professional guidance should have regard to any



Planning Considerations and Guidance

reasonably foreseeable changes to existing, and/or new sources, as well as sources currently effecting the site.

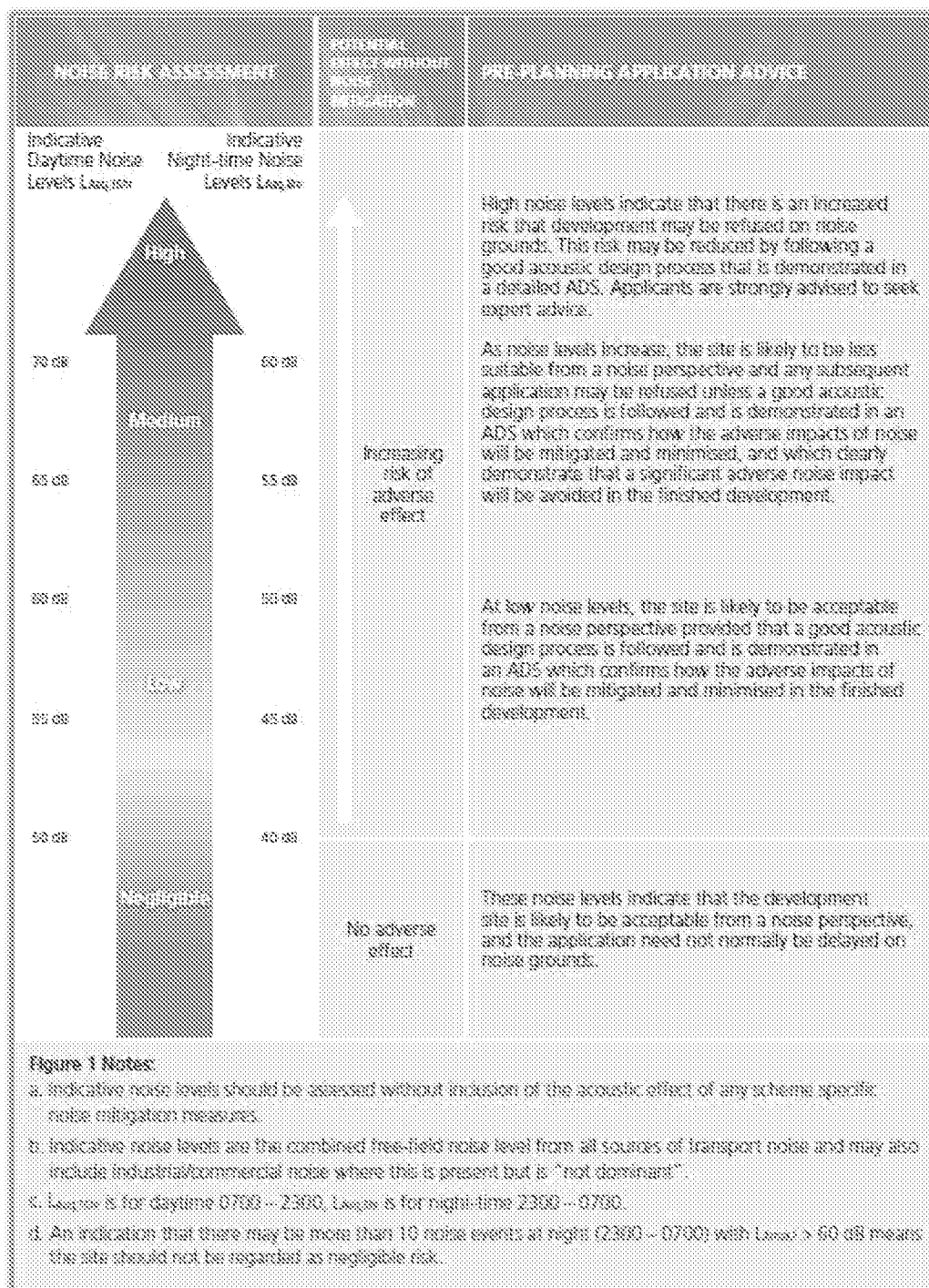
- A4.4.2 ProPG provides two stages of assessment, the first being an initial site risk assessment and the second being a full assessment. The second is only necessary when the initial risk assessment and circumstances dictate.

Stage 1: Initial Site Noise Risk Assessment

- A4.4.3 ProPG suggests that a Stage 1 initial site risk assessment should be undertaken on all sites at the earliest possible opportunity in order to gauge the potential effect of noise on future residential premises, without the benefit of any noise mitigation measures.
- A4.4.4 It is important to note that the initial 'Stage 1' assessment at a proposed residential development is not the basis for the eventual recommendation to the decision maker. It is intended to highlight the importance of good acoustic design within a scheme. For example, a site with a high risk of adverse effect without noise mitigation may not necessarily be unsuitable for development; however, the importance of good acoustic design provided by experts would be critical at such a site, with a detailed acoustic design statement provided.
- A4.4.5 ProPG states that a site which displays a low risk of adverse effect without noise mitigation is more likely to be acceptable from a noise perspective, provided that a good acoustic design process is followed, and sites with no risk of adverse effect need not normally be delayed on noise grounds.
- A4.4.6 The criteria provided for Stage 1 assessment of the L_{Aeq} noise levels for day and night within the initial site risk assessment are provided below:



Planning Considerations and Guidance



A4.4.7 The initial noise risk assessment also considers the effect of L_{Amax} maximum noise levels at night (2300-0700h), where the guidance states:

"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 a negligible risk."



Planning Considerations and Guidance

Stage 2: Overview

- A4.4.8 Stage 2 of the ProPG guidance provides a systematic consideration of key elements of acoustic design. The guidance advocates a proportional, risk based approach to the Stage 2 assessment. The Stage 1 risk assessment should inform whether careful consideration is required, with the detailed input of specialist acoustic consultants essential at higher risk sites, or straightforward accelerated decision making potentially possible in relation to lower risk sites.

Stage 2: Element 1 – Good Acoustic Design Process

- A4.4.9 ProPG states that a good acoustic design process is an implicit part of achieving the requirements of government noise policy, as set out in the NPSE and NPPF, and outlined in Supplementary Document 1 of the ProPG.
- A4.4.10 However, it is also stated that good acoustic design does not simply constitute compliance with recommended internal and external criteria, if the solution adversely affects living conditions within the spaces, and hence the quality of life of the inhabitants. The following example is provided:

“Using fixed unopenable glazing for sound insulation purposes is generally unsatisfactory and should be avoided; occupants generally prefer the ability to have control over the internal environment using openable windows, even if the acoustic conditions would be considered unsatisfactory when open. Solely relying on sound insulation of the building envelope to achieve acceptable acoustic conditions in new residential development, when other methods could reduce the need for the approach, is not regarded as good acoustic design.”

- A4.4.11 Applicants must therefore consider all possibilities for mitigation including but not limited to:
- ✧ Checking the feasibility of relocating, or reducing noise levels from relevant sources;
 - ✧ Considering options for planning the site or building layout;
 - ✧ Considering the orientation of proposed building(s);
 - ✧ Selecting construction types and methods for meeting building performance requirements;
 - ✧ Assessing the viability of alternative solutions;
 - ✧ Assessing external amenity area noise;
 - ✧ Examining the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc.

Stage 2: Element 2 – Internal Noise Level Guidelines

- A4.4.12 ProPG considers the guidance provided within BS 8233:2014 to be suitable for the assessment of internal noise levels. However, the ProPG provides additional commentary. The following table reproduces the internal ambient criteria provided within Figure 2 of ProPG. The guidance from BS 8233:2014 is displayed in black, with additional comments and criteria from ProPG in blue:



Planning Considerations and Guidance

Activity	Location	0700h to 2300h	2300h to 0700h
Resting	Living room	35 dB $L_{Aeq, 16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq, 16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16h}$	30 dB $L_{Aeq, 8h}$ 45 dB $L_{Amax, F}$ ^{(1) (see A)}

NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax, F}$ depending on the character and number of events per night. Sporadic noise events could require separate values. 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 45dB $L_{Amax, F}$ 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 (see Appendix A [which advocates reference to available dose-response relationships appropriate for the types of noise source being considered]).

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 (see Section 3.D [which states that if certain criteria are fulfilled the noise practitioner should recommend refusal on noise grounds alone, regardless of any case for the development]).

AT3 Table 4 of BS 8233:2014 with ProPG annotations in blue

- A4.4.13 It should be noted that the guidance above includes criteria for L_{Amax} noise levels, along with further guidance relating to the assessment of maximum levels in Note 4.

Stage 2: Element 3 – External Amenity Area Noise Assessment

- A4.4.14 With regard to external amenity spaces, ProPG references the guidance provided within BS 8322:3014, section 6. ProPG presents a statement summarising BS 8233:2014 section 6 which states:

“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 $L_{Aeq, 16h}$ ”



Planning Considerations and Guidance

A4.4.15 The standard continues:

“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 but should not be prohibited.”

A4.4.16 ProPG also references guidance within the PPG on noise, which states:

“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”

A4.4.17 It is highlighted within ProPG that both BS 8233:2014 and the PPG on noise require a decision to be made as to whether or not external amenity areas are intrinsically important to the required design. However, it is noted that the PPG also states that noise impacts may be partially offset if the residents of affected dwellings are provided, through the design of the development or the planning process, with access to alternative spaces as set out in paragraph A3.6 of this appendix.

A4.4.18 ProPG section 2.51 states that Local Planning Authorities (LPAs) will be best placed to provide guidance in relation to what is ‘relatively quiet’, as the concept will inherently vary between scenarios.

A4.4.19 The advice in section 2.52 of ProPG highlights the increased importance of LPAs protecting publically accessible external amenity spaces in areas that typically exhibit heightened existing noise climates, such as cities, where development is necessary but private external amenity areas below 55 dB $L_{Aeq,16h}$ are not practicable. Publically accessible spaces such as parks and squares in these areas may be providing respite for nearby residents and, therefore, should be protected.

Stage 2: Element 4 – Assessment of Other Relevant Issues

A4.4.20 This section of the guidance relates to all other relevant issues and seeks to build upon relevant national and local planning and noise policies. Examples are provided including, but not limited to, the following:

- ✦ Compliance with relevant national and local policy
- ✦ Magnitude and extent of compliance with ProPG
- ✦ Likely occupants of the development
- ✦ Acoustic design v unintended adverse consequences
- ✦ Acoustic design v wider planning objectives

A4.4.21 Other issues specific to the site may be added by the LPA, where relevant.

 End of Section

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