ARDENT
CONSULTING ENGINEERS

ST GEORGE WEST LONDON LTD

CAMDEN GOODS YARD: PFS PARCEL – JUNIPER BUILDING REVISIONS

NOISE AND VIBRATION ADDENDUM

REPORT REF. 2105800-03D

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HEAD OFFICE: 3rd Floor, The Hallmark Building, 52-56 Leadenhall Street, London, EC3M 5JE **T** | 020 7680 4088
ESSEX: 1 - 2 Crescent Court, Billericay, Essex, CM12 9AQ **T** | 01277 657 677
KENT: Suite 10, Building 40, Churchill Business Centre, Kings Hill, Kent, ME19 4YU **T** | 01732 752 155
MIDLANDS: Office 3, The Garage Studios, 41-43 St Mary's Gate, Nottingham, NG1 1PU **T** | 0115 697 0940
SOUTH WEST: City Point, Temple Gate, Bristol, BS1 6PL **T** | 0117 456 4994
SUFFOLK: Suite 110, Suffolk Enterprise Centre, 44 Felaw Street, Ipswich, IP2 8SJ **T** | 01473 407 321

Email: enquiries@ardent-ce.co.uk

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Distribution

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1. Introduction

1.1 This Noise and Vibration Addendum (NVA) has been produced by Ardent Consulting Engineers (Ardent) on behalf of St George West London Ltd (the 'Applicant') in respect of amendments to the former Petrol Filling Station (PFS) parcel (hereafter referred to as the 'PFS parcel') which along with the Morrison Supermarket parcel (MS parcel) forms part of the Camden Goods Yard development site (hereafter referred to as the 'application site').

1.2 This Noise and Vibration Addendum (NVA) has been prepared in accordance with the National Planning Policy Framework (NPPF), the Noise Policy Statement for England (NPSE) and other relevant policy and guidance detailed in **Appendix A**.

Application Background

1.3 In June 2017 a full planning application was submitted for the redevelopment of the application site. This application was accompanied an Environmental Statement (the '2017 ES') which reported on the outcomes of an environmental impact assessment (EIA) of the proposed mixed-use development. Planning permission was granted for the mixed-use development in June 2018 under planning permission reference 2017/3847/P (the 'June 2018 Consented Scheme'). This was accompanied by a Section 106 Agreement dated 15th June 2018 (the 'S106 Agreement').

1.4 A Noise and Vibration Assessment accompanied an Environmental Statement Chapter and was prepared by Ardent in July 2017 (report reference: 160630-10) for planning application 2017/3847/P. A Noise and Vibration Assessment Addendum (report reference: 160630-15) followed in October 2017.

1.5 The proposed development was granted permission in June 2018, since which, a number of amendments have been secured, including two Section 73 (S73) applications. The first S73 application related to the Petrol Filling Station (PFS) parcel specifically (application reference: 2020/0034/P) and sought amendments which allowed the insertion of a new development phase (Phase 1a) to allow for a single storey temporary food store to be constructed enabling the development of the MS parcel to come forward sooner. This application was approved in May 2020 and is referred to as the 'May 2020 Consented Scheme'. An updated EIA was undertaken

in January 2020 and reported in an Environmental Implications Letter (the 'January 2020 EIL')

1.6 The second S73 related to amendments to the MS parcel only and did not propose any further amendments to the PFS parcel. This application was approved in December 2020 and is referred to as the 'December 2020 Consented Scheme'. An updated EIA was undertaken in July 2020 and reported in an EIL (the 'July 2020 EIL').

1.7 The 2017 EIA/ES as updated by the January and July 2020 updated EIAs/EILs is hereafter referred to as the 2017 EIA/ES (as amended).

1.8 There have also been a series of non-material amendments to the extant planning permission. The most recent amendment was granted in February 2022 (application reference: 2022/0673/P) for a non-material amendment relating to the PFS parcel to remove the re-provision of the petrol filling station from the scheme description in advance of submission of this S73 application (the 'August 2022 S73 application'). The non-material amendment did not result in a new planning consent and therefore this assessment continues to refer to the December 2020 Consented Scheme.

Scope of Report

1.9 The August 2022 S73 application is for amendments to the consented PFS parcel which comprises the removal of the petrol filling station and replacement with four Electric Vehicle (EV) charging bays; additional office floorspace; rationalisation of plant space at ground floor; and reconfiguration of plant at roof level. For the avoidance of doubt there are no changes proposed to the MS parcel as part of this application. The December 2020 Consented Scheme as amended by the August 2022 proposed amendments are referred to as the 'August 2022 amended proposed development'.

1.10 This NVA is a Technical Appendix to the August 2022 EIL and informs the reported findings . The August 2022 EIL should be read in conjunction with the 2017 EIA/ES (as amended).

1.11 Noise and vibration impacts arising from the August 2022 amended proposed development have been assessed by considering any changes against the December 2020 Consented Scheme, as reported in the July 2020 EIL.

1.12 It Is considered that the baseline considered in the 2017 ES remains valid as there have been no substantial changes in the area, other than at the application site that would materially change the baseline noise environment. Therefore, no further baseline measurements are considered necessary as part of this NVA.

1.13 Changes to local, regional and national policy and guidance have also been considered, as well as effects on the acoustic context of the August 2022 amended proposed development

1.14 The aim of this NVA is to demonstrate to London Borough of Camden (LBC) that the proposed amendments and the amended proposed development as a whole would not give rise to any new or amended significant noise and vibration effects when compared to the conclusions of the 2017 ES (as amended).

Policy Context

1.15 A number of local, regional and national policy and guidance documents have been updated or introduced since the July 2020 EIL. These are summarised in the table below. None of the documents result in a change to the approach of the relevant updated noise assessments or introduce new matters for consideration.

Table 3.1: Policy and Guidance Changes

Policy or Guidance	Issue / Latest Update	Changes / Implications on Proposed Development
NPPF	July 2021	No specific updates in relation to noise and vibration policy that affect the approach or outcome of assessments, but greater emphasis placed on good design.
London Plan	March 2021	Policy D13 in relation to the Agent of Change *"…The Agent of Change principle places the responsibility for mitigating impacts from existing noise and other nuisance-generating activities or uses on the proposed new noise-sensitive development…"* and

		D14 policy aims *"… to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise…"*
Camden SPD - Amenity	January 2021	Emphasis is placed on good design and managing impacts of development. Key messages in relation to noise are as follows: • *The Council will assess the impact of noise and vibration through the consideration of acoustic reports submitted by applicants.* • *Noise mitigation (where appropriate) is expected to be incorporated into developments at the design stage.* • *The Council will secure mitigation measures through planning condition or legal agreement where necessary.* • *The Council will adopt the 'agent of change' principle.*
Design Manual for Roads and Bridges (DMRB) LA111 Noise and vibration – Rev 2	May 2020	Magnitude of impact tables retained from previous version, no substantive changes that affect the approach or outcomes of the assessment of changes to road traffic noise.

2. Background Information

Historic PFS

2.1 Prior to the 2018 Consented Scheme, the former Morrisons petrol filling station consisted of eight pumps, allowing up to eight vehicles to refuel at any one time. The previous arrangement is shown in the photograph at **Figure 2.1** below.

Figure 2.1: Historic Petrol Filling Station (Source: Google Maps)

December 2020 Consented Scheme

2.2 The extant planning permission seeks to retain the petrol filling station element with eight fuel pumps and provided circa 7,000sqm of office floor space. The December 2020 Consented Scheme was to be accessed from Chalk Farm Road, with two separate ingress and egress points.

2.3 Mechanical plant was consented to be located on first and second floor level, and at roof level. Mechanical plant noise levels were to be controlled by planning condition 10 which covers all plant to be installed on the parcel.

August 2022 Amended Proposed Development

2.4 This August 2022 S73 application seeks to amend the December 2020 Consented Scheme by removing the petrol filling station element to provide four EV charging bays, additional office floorspace, rationalisation of plant space at ground floor and reconfiguration of plant at roof level.

2.5 It is not proposed to vary planning condition 10 relating to mechanical plant. Mechanical plant can be selected, located, oriented and if required attenuated to achieve the criteria set out in condition 10 of the December 2020 Consented Scheme. Condition 10 is duplicated below for ease of reference and completeness.

10 Fixed Mechanical plant noise

Prior to installation of the relevant plant/ machinery/ equipment, details shall be submitted to and approved in writing by the Council, of the external noise level emitted from that plant/ machinery/ equipment and mitigation measures as appropriate. The mitigation measures shall ensure that the external noise level emitted from plant, machinery/ equipment will be lower than the lowest existing background noise level by at least 10dBA, by 15dBA where the source is tonal, as assessed according to BS4142:2014 at the nearest and/or most affected noise sensitive premises, with all machinery operating together at maximum capacity.

Reason: To ensure that the amenity of occupiers of the development / surrounding premises is not adversely affected by noise from mechanical installations/ equipment, in accordance with Policy A4 of the Camden Local Plan 2017.

3. Noise Impact

3.1 The potential impacts of the proposed amendments to the PFS parcel have been compared against the December 2020 Consented Scheme, as reported in the July 2020 NVA.

3.2 Demolition and construction traffic and operations are expected to be similar, based on information provided by the transport consultants, to those required for the February 2022 consented scheme and would be controlled via the Construction Logistics Plan (CLP) and Construction Environment Management Plan (CEMP) produced in accordance with LBC Pro-Forma. The proposals for the MS parcel remain unchanged. Therefore, the conclusions of the 2017 ES (as amended) would remain valid. Demolition and construction traffic will not be considered further in this NVA.

3.3 Mechanical plant associated with the December 2020 consented scheme is controlled by planning condition. The August 2022 amended proposed development rationalises plant on lower floors and reconfigures and optimises roof mounted plant. The plant would be selected, located, oriented and if necessary attenuated to meet the requirements of the December 2020 consented scheme, planning condition 10. The proposals for the MS parcel remain unchanged. Therefore the conclusions of the 2017 ES (as amended) would remain valid and noise levels from mechanical plant have not been considered further in this NVA.

3.4 The convenience store and the office would be serviced via the service yard to the rear of the building on the PFS parcel. For the other uses at the PFS parcel, deliveries would be less frequent and therefore would be accommodated within the existing delivery bays on Chalk Farm Road.

3.5 Further details of the delivery and servicing arrangements would be provided within a Delivery and Servicing Management Plan (DSMP), as secured by the relevant Section 106 Agreement. This would be prepared and discharged prior to occupation. The proposals for the MS parcel remain unchanged. Therefore the conclusions of the 2017 ES (as amended) remain valid and servicing noise has not been considered further in this NVA.

3.6 It is considered that the only change that would result in impacts on the acoustic environment relate to the removal of the petrol filling station and changes in the

number of vehicle movements associated with the August 2022 amended proposed development.

3.7 As advised by the transport consultants within their Transport Statement (TS) the majority of users of the petrol filling station are non-primary, i.e., they do not make specific trips to the petrol filling station as the ultimate destination. Rather the use of the petrol filling station is incidental as a pass by or when accessing other services in the area. It is considered in the TS that this split would be 5% primary and 95% non-primary.

3.8 Acoustically this means that the removal of the petrol filling station would not necessarily result in a substantial reduction in noise levels on the surrounding roads within the study area as the majority of vehicles (95%) would still be present on the road network. The proposals for the MS parcel remain unchanged. Accordingly, adopting a conservative approach, the conclusions of the 2017 ES (as amended) remain valid

3.9 The proposed amendments include four EV charging bays. These would be rapid chargers and vehicles would be on the parcel for approximately 30 minutes to receive a full charge. It is also considered that the majority of the users of the EV charging bays would be non-primary users. For the EV charging bays non-primary users are expected to account for 80% of users; however, it is clear that there would be a substantial reduction in vehicle activity associated with the site when compared with the consented scheme.

3.10 Heavy goods vehicles (HGVs) (in particular petrol tankers) that would have directly served the PFS parcel of the February 2022 consented scheme (primary users) would no longer be required as a result of the proposed amendments so their removal would lead to a measured reduction of these vehicles on the road network. The HGVs that would be classed as non-primary would still be present on the network, but no non-primary HGVs would access the PFS parcel.

3.11 Table 3.1 shows the breakdown in terms of Annual Average Weekday Traffic associated with the February 2022 Consented Scheme (PFS parcel only) and the proposed amendments to the PFS parcel. The proposals for the MS parcel remain unchanged. Accordingly, the conclusions of the 2017 ES (as amended) remain valid.

Table 3.1: December 2020 Consented Scheme PFS Parcel versus August 2022 Amended Proposed Development PFS Parcel Trip Generation

PFS Parcel Proposals	AAWT	HGV (%)
December 2020 Consented Scheme (petrol filling station + Offices)	1,392	74 (5%)
PFS parcel proposed amendments (EV Charging, Retail, Offices, Restaurant /Café)	370	15 (4%)
Net Change	-1,022	-59

3.12 At low-speed electric vehicles can be quieter than petrol and diesel equivalents. Whilst the surrounding area is dominated by road traffic noise it would be expected that noise in the immediate vicinity of the EV bays would be lower than if trafficked by equivalent petrol or diesel vehicles.

3.13 Furthermore, as the number of vehicles accessing the PFS parcel is reduced, the amount of manoeuvring and door slamming events would be lower when comparing the December 2020 Consented Scheme.

3.14 It is not possible to quantify the change in noise from the December 2020 Consented Scheme to the August 2022 amended proposed development. This is due to the fact that the majority of vehicle movements that would have accessed the PFS Parcel still being present on the surrounding road network, the non-primary users. However the above discussion demonstrates that vehicle movements and therefore noise associated with the PFS parcel would be expected to reduce as a result of the August 2022 amended proposals.

3.15 There will be no changes to noise emissions from the MS parcel as a result of the August 2022 amended proposals.

4. Summary and Conclusions

4.1 This NVA has been produced by Ardent on behalf of St George West London Ltd in relation to the August 2022 amended proposed development at the application site.

4.2 This NVA assess the noise and vibration impacts of the proposed amendments and of the August 2022 amended proposed development as a whole including the PFS parcel and MS parcel.

4.3 It is expected that there would be a substantial reduction in vehicle movements at the PFS parcel as a result of the removal of the petrol filling station and a slight overall reduction in vehicle movements on the surrounding road network. Therefore, noise levels associated with the August 2022 amended proposed development would be correspondingly lower. There would be no changes to the MS parcel traffic flows associated with the August 2022 amended proposed development.

4.4 The move from petrol and diesel vehicles to electric vehicles at the PFS parcel would furthermore reduce the number of impulsive noise events, associated with door slams for example, and locally reduce the level of noise from manoeuvring vehicles.

4.5 It is considered that the proposed amendments would lead to a slight reduction in noise associated with the August 2022 amended proposed development when compared to the December 2020 consented scheme. Therefore the August 2022 amended proposed development would not have a greater noise impact and as such the conclusions of the 2017 ES (as amended) remain valid.

APPENDIX A

RELEVANT POLICY & GUIDANCE

National Planning Policy Framework (NPPF) – July 2021

Under the NPPF: paragraph 185 of Section 15, with regard to environmental noise; Planning policies and decisions should aim to: -

- 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;
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

Camden Council Supplementary Planning Document – Amenity (Adopted 15 January 2021)

The Camden Council Supplementary Planning Documents (SPDs) are planning guidance documents which support the policies in the Camden Local Plan 2017. This SPD provides information on key amenity issues within the borough and includes a noise and vibration section relating to Local Plan Policy A1 – Managing the impact of development.

The SPD provides guidance in relation to noise for the following:

- Assessing the impact of noise and vibration and guidance on when an acoustic report is required for an application
- The noise and vibration thresholds against which the council considers the impact on health and wellbeing;
- Mitigation of noise impacts;
- The Agent of Change principle
- Requirements of acoustic reports regarding the information contained within reports;
- Internal noise and vibration levels in buildings;
- Assessment of plant and other noise generating equipment;
- Food drink and entertainment noise; and
- Delivery Management

The SPD provides clarification and guidance in a number of areas such as mitigation measures to control noise and vibration at proposed developments. The SPD also expands upon assessment methodologies and criteria and where deemed necessary, provides methodologies and criteria which are additional to those required by national standards and guidance.

The London Plan 2021

The latest version of the London Plan, as published in March 2021, provides an overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20–25 years. The 'Publication London Plan' brings together the geographic and locational aspects of the Mayor's other strategies, including a range of environmental issues such as climate change (adaptation and mitigation), air quality, noise and waste.

The most relevant guidance in terms of the impact and assessment of noise is found within Policy D14: Noise, which states:

"…Policy D14 Noise

A *In order to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise by:*

1) *avoiding significant adverse noise impacts on health and quality of life*

2) *reflecting the Agent of Change principle as set out in Policy D13 Agent of Change*

3) *mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on existing noise-generating uses*

4) *improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity)*

5) *separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening, layout, orientation, uses and materials – in preference to sole reliance on sound insulation*

6) *where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles*

7) *promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver.*

B *Boroughs, and others with relevant responsibilities, should identify and nominate new Quiet Areas and protect existing Quiet Areas in line with the procedure in Defra's Noise Action Plan for Agglomerations…"*

Policy D14: Noise refers to Policy D13: Agent of Change, which states:

"…***Policy D13 Agent of Change***

A *The Agent of Change principle places the responsibility for mitigating impacts from existing noise and other nuisance-generating activities or uses on the proposed new noise-sensitive development. Boroughs should ensure that Development Plans and planning decisions reflect the Agent of Change principle and take account of existing noise and other nuisance generating uses in a sensitive manner when new development is proposed nearby.*

B *Developments should be designed to ensure that established noise and other nuisance-generating uses remain viable and can continue or grow without unreasonable restrictions being placed on them.*

C *New noise and other nuisance-generating development proposed close to residential and other noise-sensitive uses should put in place measures to mitigate and manage any noise impacts for neighbouring residents and businesses.*

D Development proposals should manage noise and other potential nuisances by:

1) ensuring good design mitigates and minimises existing and potential nuisances generated by existing uses and activities located in the area

2) exploring mitigation measures early in the design stage, with necessary and appropriate provisions including ongoing and future management of mitigation measures secured through planning obligations

3) separating new noise-sensitive development where possible from existing noise-generating business and uses through distance, screening, internal layout, sound-proofing, insulation and other acoustic design measures.

E Boroughs should not normally permit development proposals that have not clearly demonstrated how noise and other nuisances will be mitigated and managed…"

Design Manual for Road and Bridges, Volume 11 (LA111 – Noise and Vibration

Changes in noise level as a result of additional vehicles on the public highway can be assessed using methodologies presented in Design Manual for Road and Bridges (DMRB LA111),

This guidance document sets out the requirements for noise and vibration assessments from road projects. The construction, operation and maintenance of highway projects can lead to changes in noise and vibration levels in the surrounding environment.

The magnitude of change (in sound level) is defined in Table 3.54a of the guidance for short term and Table 3.54b for long term, as presented in Table 2:

Short term magnitude	Short term noise change (dB $L_{A10,18hr}$ or L_{night})
Major	Greater than or equal to 5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	less than 1.0

Long term magnitude	Long term noise change (dB $L_{A10,18hr}$ or L_{night})
Major	Greater than or equal to 10.0
Moderate	5.0 to 9.9
Minor	3.0 to 4.9
Negligible	less than 3.0

Table 2 (Table 3.54a and b DMRB, LA 111 - Magnitude of Change)

Noise Policy Statement for England (NPSE)

To avoid and mitigate adverse noise effects on health arising from and impacting on new development, the NPPF makes reference to NPSE. The NPSE was published in March 2010 and covers all forms of noise, other than occupational noise. For the purposes of this report, "Neighbourhood Noise" is most relevant as NPSE defined at paragraph 2.5:

"*neighbourhood noise which includes noise arising from within the community such as industrial and entertainment premises, trade and business premises, construction sites and noise in the street.* "

NPSE introduces three concepts to the assessment of noise in the UK:

- NOEL – No Observed Effect Level – This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.
- LOAEL – Lowest Observable 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.

NPSE does not numerically define levels for the NOEL, LOAEL or SOAEL rather it makes it clear that the noise level is likely to vary depending upon the noise source, the receptor and the time of day/day of the week, etc.

National Planning Practice Guidance (2014)

The purpose of the guidance is to complement the NPPF and provide advice on how to deliver its policies.

The purpose of the guidance is to complement the NPPF and provide advice on how to deliver its policies.

The guidance includes a table (as shown in Table 1) that summarises "the noise exposure hierarchy, based on the likely average response" and which offers "examples of outcomes" relevant to the NOEL, LOAEL and SOAEL effect levels described in the NPSE.

Perception	Examples of outcomes	Increasing effect level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. 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	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, eg 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, eg 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
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, eg regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, eg auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 1: Noise Exposure Hierarchy, Based on the Likely Average Response.

Calculation of Road Traffic Noise – 1988

For new developments, road traffic noise levels should be predicted in accordance with CRTN. This prediction method uses the traffic flow, vehicle speed, and percentage of heavy-duty vehicles (HDVs, over 3.5 tonnes), road gradient and other factors to calculate noise levels at receptor points.

Control of Pollution Act 1974

The local authority has powers under the Control of Pollution Act 1974 to control noise from construction sites. Section 60 of the Act allows a local authority to serve a notice of its requirements for the control of site noise. This notice may include specification of plant that is or is not to be used, hours during which the construction works can be carried out and levels of noise emission. Section 61 of the Act allows a contractor or developer to take the initiative and agree with the local authority the methods of construction, steps to minimise noise and hours of work.

The Environmental Protection Act 1990

Local authorities have a duty to deal with statutory nuisances under the Environmental Protection Act 1990. For noise to amount to a statutory nuisance, it must be "prejudicial to health or a nuisance" as outlined in Section 79 of the Act. Any proposed development should not result in a statutory nuisance being declared.

Should the Local Authority declare a development to cause a statutory nuisance, an abatement notice can be served to the developer who has up to 21 days to appeal to Magistrates' Court, as detailed in Section 80 of the Act.

The Building Regulations 2010

Building Regulations approvals are required for most new buildings and for most types of works on existing buildings. Part 10 of The Building Regulations 2010 contains provisions, including power for local authorities to test building work, take samples, and provision to ensure compliance. Part E of the Regulation 'Resistance to the passage of sound' is expanded in Approved Document E, which provides robust details to control and mitigate noise within buildings. This Document is separated over four parts which include:

- E1: Protection against sound from other parts of the building and adjoining buildings;
- E2: Protection against sound within dwelling-house etc.;
- E3: Reverberation in the common internal parts of buildings containing flats or rooms for residential purposes;
- E4: Acoustic conditions in schools.

World Health Organisation

The WHO document Guidance on Community Noise specifies additional information for noise affecting noise sensitive receptors and forms the basis of many noise limitations and design ranges for internal and external ambient noise levels. It defines noise as 'a class of sounds that are considered unwanted' (by the listener), 'that adversely affects, or may affect the physiological and psychological wellbeing of people.' Much of the research around this study is based on transportation noise.

Further guidance on the recommended levels is given in the World Health Organisation (WHO) Guidelines for Community Noise. In this document it is stated that:

"*To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55 dB* L_{Aeq} *on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB* L_{Aeq}*."*

WHO also states the following paragraph with regard to the effects of LAmax events in a night-time period:

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} *more than 10-15 times per night (Vallet & Vernet 1991)."*

WHO guidance 'Night Noise Guidelines for Europe' is concerned with the longer-term average noise levels that are covered by the EU Directive on Environmental Noise, although this does appear to suggest external maximum noise levels of around 57dBA outside bedrooms during the night to achieve internal maximum levels of 42dBA.

The World Health Organisation has recently published Environmental Noise Guidelines – for the European Region (2018) to provide recommendations for protecting human health from exposure to noise sources such as transportation (road traffic, railway and aircraft), wind turbine noise and leisure noise.

The guidance document defines the 'strength' of recommendation (for protecting against noise exposure) as either 'strong' or conditional', outlined below.

Strength of Recommendation

*"A **strong** recommendation can be adopted as policy in most situations. The guideline is based on the confidence that the desirable effects of adherence to the recommendation outweigh the undesirable consequences. The quality of evidence for a net benefit – combined with information about values, preference and resources – inform this recommendation, which should be implemented in most circumstances."*

*"A **conditional** recommendation requires a policy-making process with substantial debate and involvement of various stakeholders. There is less certainty of its efficacy owing to lower quality of evidence of a net benefit, opposing values and preferences of individuals and populations affected or the high resource implications of the recommendation, meaning there may be circumstances or settings in which it will not apply."*

External (free-field) recommendations included in the Environmental Noise Guidelines for the European Region are presented in Table 3 for specific noise sources.

Noise Source	dB L_{den}	dB L_{night}	dB $L_{Aeq,\ 24hr}$ (yearly average)	Recommendation
Road Traffic	53	45	-	Strong
Railway	54	44	-	Strong
Aircraft	45	40	-	Strong
Wind Turbine	45	-	-	Conditional
Entertainment	-	-	70	Strong/Conditional

Table 3: Extract from Environmental Noise Guidelines for the European Region

BS8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings

Formerly a Code of Practice, the 2014 revision of BS8233 is now presented and intended as a guidance document. The standard is mainly concerned with building design from an acoustic standpoint. It does however, contain information relevant to environmental noise more specifically by stating guidance for desirable internal noise levels for dwellings and other buildings.

Table 2 of BS8233:2014 provides suitable internal levels for spaces such as open-plan offices and restaurants and notes that an upper and lower noise levels should be considered, as presented in Table 4.

Objective	Typical Situation	Design range dB LAeq,T
Typical noise levels for acoustic privacy in shared spaces	Restaurant	40 - 55
	Open plan office	45 - 50
	Night club, public house	40 - 45
	Ballroom, banqueting hall	35 - 40

Table 4: Extract from Table 2 – Indoor ambient noise levels in spaces when they are unoccupied and privacy is also important

An extract of Table 4 of the document relevant for residential development is reproduced in Table 5.

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

Table 5: Extract from Table 4 – Indoor ambient noise levels in dwellings

Whilst the above criteria is for dwellings, BS8233 states that these recommendations are similar for hotel guestrooms and therefore these have been adopted as the criteria for assessment.

The guidance of BS8233:2014 with regards to external amenity spaces is as follows:

"*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*."

ProPG: Planning and Noise - May 2017

Guidance in ProPG Planning and Noise provides an approach which aims to inform developers, practitioners and local authorities on how potential residential sites should be assessed. ProPG states that the guidance can be used for other types of residential institution and therefore it is considered applicable to the site.

The guidance also builds upon government planning policy that noise should not be treated in isolation and there should be a holistic approach to good acoustic design.

ProPG sets out a 2-stage approach; the first of which is a risk assessment to identify the likelihood of significant adverse impact, then depending on the outcome of this risk assessment the extent of the acoustic design statement required. The graphic in Figure 1 is an extract from ProPG and indicates the level of risk associated with ranges of sound levels and provides some guidance on the likely extent of work associated with progressing a development exposed to these sound levels.

In relation to maximum noise levels, ProPG states that:

"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."*

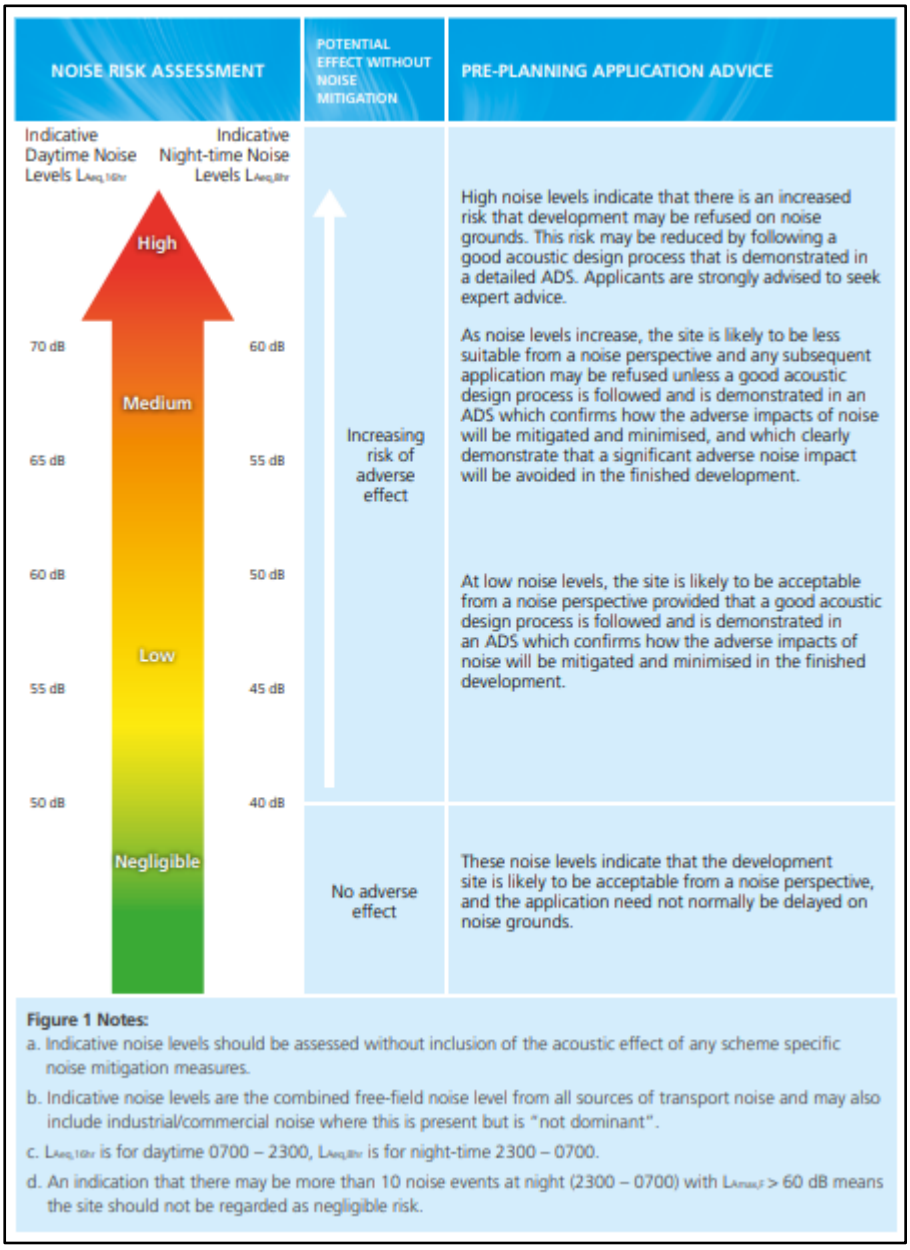

Figure 1: Extract from Figure 1 in ProPG – Initial Site Noise Risk Assessment

The second stage involves four key elements where discussion is expanded on:

- Element 1 – Good Acoustic Design Process
- Element 2 – Internal Noise Level Guidance

- Element 3 – External Amenity Area Noise Assessment
- Element 4 – Assessment of Other Relevant Issues

Having worked through the approach practitioners can present a recommendation to the decision maker.

Acoustics Ventilation and Overheating - Residential Design Guide, January 2020

Acoustics Ventilation and Overheating (AVO) recommends an approach to acoustic assessments for new residential development taking consideration for acoustics, ventilation, and overheating. AVO states that the guidance can be used for other types of residential institution and therefore it is considered applicable to the site.

Section 3 involves a two-level risk assessment approach to estimate the potential impact on occupants in the case of overheating.

The Level 1 site risk assessment is based on external free-field noise levels and the assumed scenario where a partially open window is used to mitigate overheating (Table 3-2 of the guidance).

The sound level reduction from outside to inside for a partially open window is 13dB in this instance. A Level 1 site risk assessment is considered adequate if the site falls within the 'Negligible risk' category. A Level 2 assessment can optionally be undertaken to give more confidence in the case of Low or Medium risk sites, where appropriate. The Level 2 assessment is strongly recommended for 'High' risk sites.

The Level 2 assessment suggests that assessment of the adverse effect from noise exposure should include an estimate of how frequently and for what duration the overheating condition occurs (Table 3-3 of the guidance)

Figure 2 explains the two-level noise assessment procedure for overheating conditions.

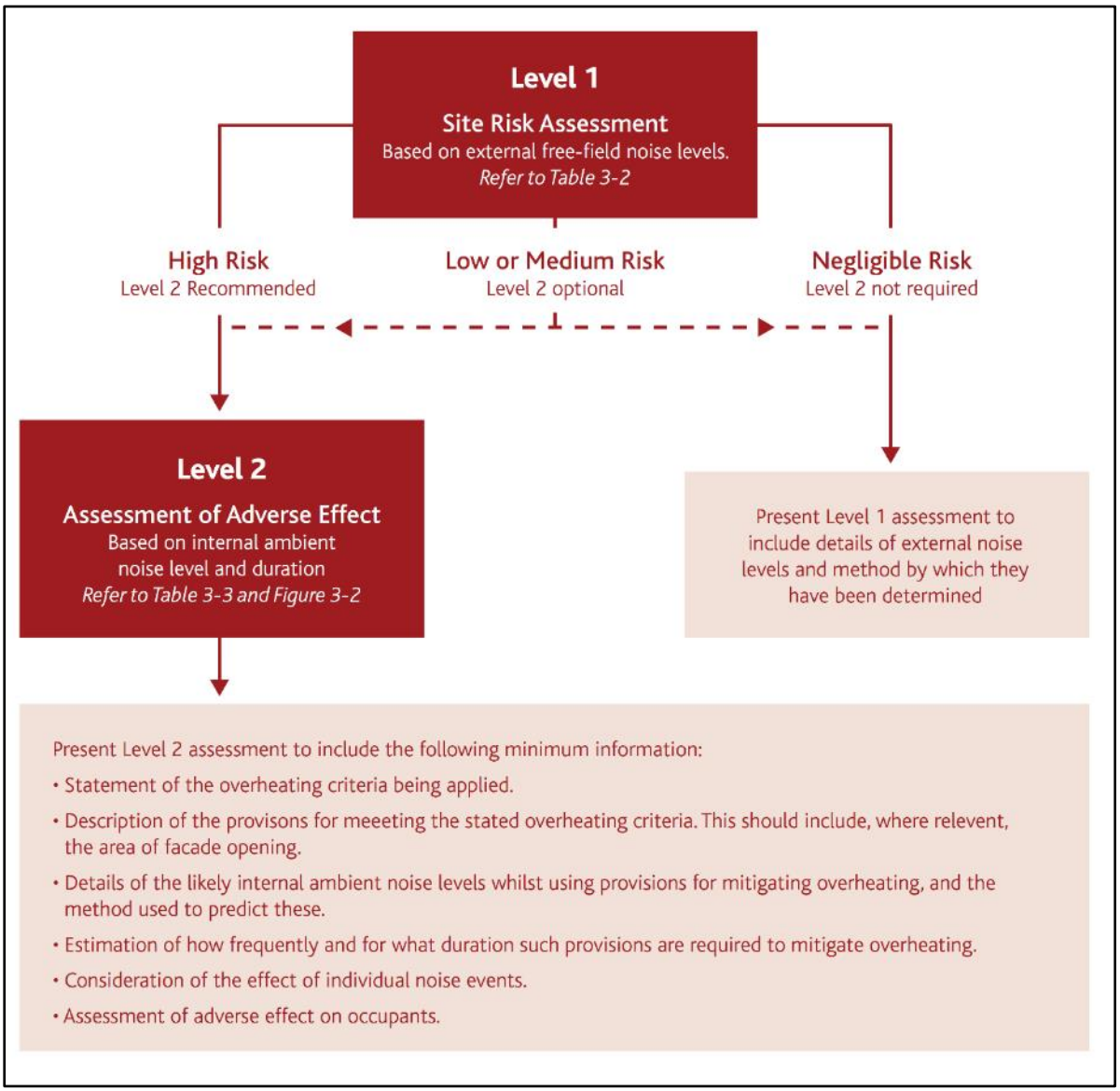

Figure 2: Two-level Assessment Procedure (Figure 3.1 of AVO Guidance)

Figure 3 shows the Level 1 site risk assessment of noise, relating to overheating conditions.

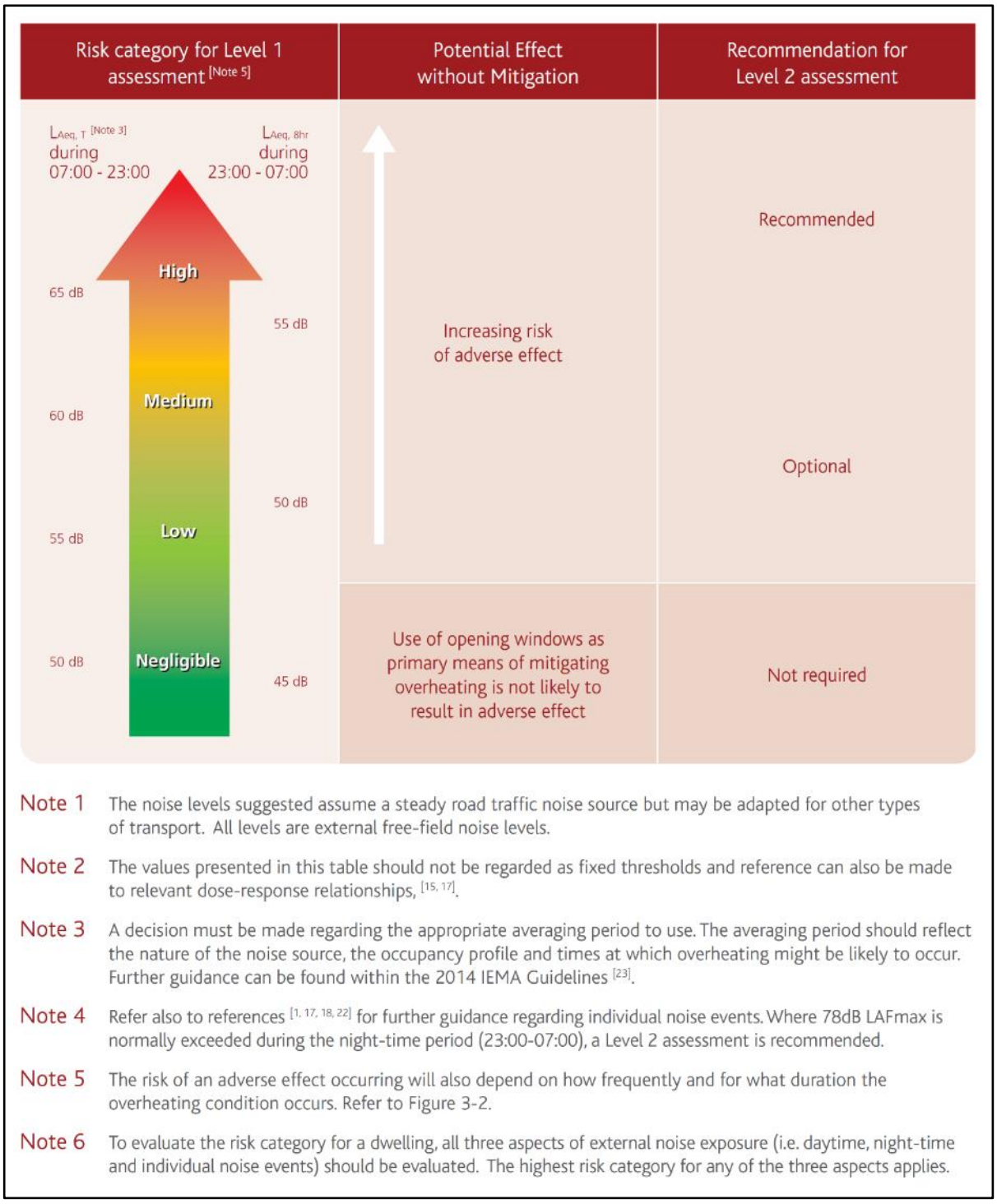

Figure 3: Level 1 Risk Assessment (Figure 3.2 of AVO guidance)

Figure 4 shows the Level 2 site risk assessment of noise, relating to overheating conditions.

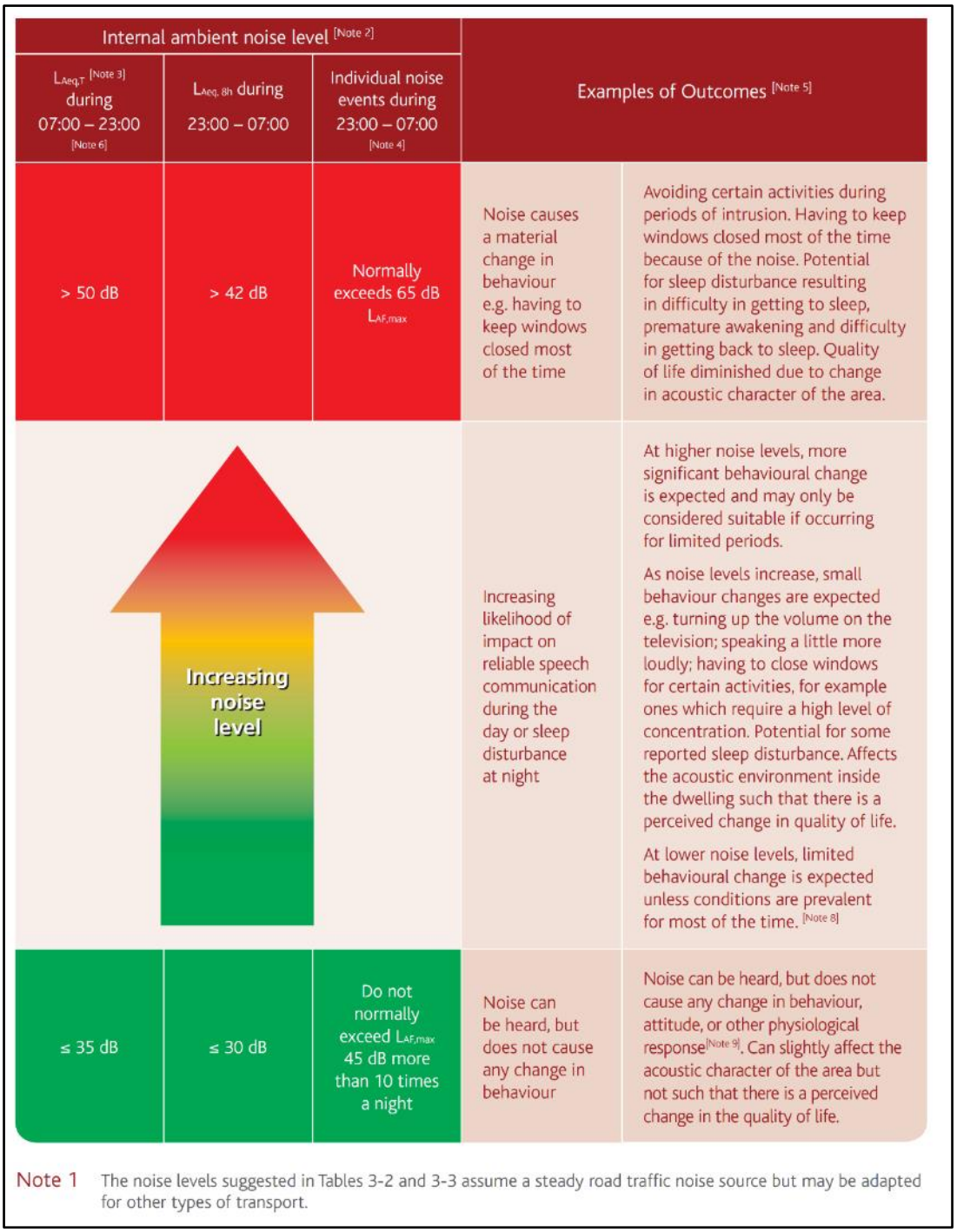

Figure 4: Level 2 Risk Assessment (Figure 3.3 of AVO guidance)

The noise levels suggested in Figure 3 and Figure 4 assume a steady road traffic noise source but may be adapted for other types of transport by taking account of the differing responses to different transport sources.

BS6472-1:2008 – Guide to Evaluation of Human Exposure to Vibration in Buildings - Part 1: Vibration sources other than blasting

This document offers guidance on how people inside buildings respond to vibration: the judgement criteria are more stringent at higher frequencies than in the superseded standard due to changes in the vertical frequency weighting.

Assessment of building vibration with respect to human response: When the appropriately-weighted vibration measurements or predictions have been used to derive the VDV (Vibration Dose Value) for either 16hr (daytime) or 8h (night-time) at the relevant places of interest, their significance in terms of human response can be derived from Table 6, shown below:

Vibration dose value ranges which might result in various probabilities of adverse comment within residential buildings

Place and time	Low probability of adverse comment $m \cdot s^{-1.75}$ 1)	Adverse comment possible $m \cdot s^{-1.75}$	Adverse comment probable $m \cdot s^{-1.75}$ 2)
Residential buildings 16 h day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8 h night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

NOTE For offices and workshops, multiplying factors of 2 and 4 respectively should be applied to the above vibration dose value ranges for a 16 h day.

Table 6: Vibration Dose Values from BS6472-1:2008

BS4142:2014 Methods for rating industrial and commercial sound

BS4142:2014 uses a comparison between the rating and background sound levels to establish an initial estimate of the likely significance of impact. The standard notes:

a) *Typically, the greater this difference, the greater the magnitude of the impact.*

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

c) *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*

d) *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.*

The context of the assessment must then be considered, which can significantly alter the outcome of the assessment. Factors that might alter the outcome of the assessment include the absolute level of sound compared to the residual sound level, the character of the sound compared to the residual, the sensitivity of the receptor etc.