Norwich Western Link

Environmental Statement

Chapter 7: Noise and Vibration

Appendix 7.1: Legislation, policy and guidance

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1 Legislation

1.1 Environmental Noise Directive 2002/49/EC

1.1.1 This Directive relates to the assessment and management of environmental noise, and it is commonly referred to as the Environmental Noise Directive (END). It promotes the implementation of a three-step process:

- Undertake strategic noise mapping to determine exposure to environmental noise;
- Ensure information on environmental noise is made available to the public; and
- Establish Action Plans based on the strategic noise mapping results, to reduce environmental noise where necessary, and to preserve environmental noise quality where it is good.

1.1.2 EU Directive 2002/49/EC has been transposed into UK law as the Environmental Noise (England) Regulations 2006 (as amended).

1.2 European Commission (2014) Environmental Impact Assessment Directive (EIA), 2014/52/EU

1.2.1 This Directive published on 16 April 2014 amends Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.

1.2.2 It was considered necessary to amend the 2011 Directive to strengthen the quality of the Environmental Impact Assessment procedure, align that procedure with current best practice and other relevant legislation and policies developed by the European Union and Member States.

1.2.3 An Environmental Impact Assessment report prepared under this legislation should include, inter alia, a description of the likely significant effects of the project and the measures envisaged to avoid, reduce or, if possible, offset any identified significant adverse effects on the environment.

1.3 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

1.3.1 EU Directive 2014/52/EU has been transposed into UK law through the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

1.4 The Noise Insulation Regulations 1975 (as amended 1988) (NIR)

1.4.1 The NIR were made under powers inferred by Section 20 of Part II of the Land Compensation Act. Regulation 3 imposes a duty on authorities to undertake or make a grant in respect of the cost of undertaking noise insulation work in or to eligible buildings, subject to meeting certain criteria given in the Regulation, for new roads or carriageways.

1.4.2 Regulation 4 provides authorities with discretionary powers to undertake or make a grant in respect of the cost of undertaking noise insulation work in or to eligible buildings for an altered road. Regulation 5 provides authorities with discretionary powers to undertake or make a grant in respect of the cost of undertaking noise insulation work in or to eligible buildings during construction works for a substantial period of time, but in respect of which building no duty under Regulation 3 or power under Regulation 4 has arisen.

1.4.3 With respect to residential properties affected by noise from new or altered highways, to qualify for such an offer, four criteria must all be fulfilled at 1m in front of the most exposed door or window of an eligible room in the façade of a property:

- Level - The highest total traffic noise level expected within the first fifteen years use of the road (the 'Relevant Noise Level') must be not less than the Specified Level of 68 dB $L_{A10,18h}$. Predicted noise levels of 67.5 dB $L_{A10,18h}$ and above are rounded up to 68 dB $L_{A10,18h}$;
- Increase - The Relevant Noise Level in the design year, or within any other year between the year before the highway construction works commenced and the design year, must be at least 1 dB(A) greater than

that immediately before construction commenced (the 'Prevailing Noise Level');

- Contribution - Noise from traffic on the road for which the Regulations apply must contribute at least 1.0 dB $L_{A10,18h}$ to the Relevant Noise Level; and
- Locality - The property under consideration must be within 300m of the Scheme.

1.4.4 The Regulations apply only to qualifying eligible rooms, which include living rooms and bedrooms affected by road traffic noise.

1.4.5 The NIR requires application of the road traffic noise level calculation method detailed within the Calculation of Road Traffic Noise memorandum 1988 (CRTN).

1.5 Control of Pollution Act, 1974

1.5.1 The principal legislation covering demolition and construction noise is the Control of Pollution Act 1974, Part III. Sections 60 and 61 of the Act give the local authority special powers for controlling noise arising from construction and demolition works, regardless of whether a statutory nuisance has been caused or is likely to be caused. Works within the scope of these provisions include repair and maintenance work and road works. These powers may be exercised either before works start or after they have started.

1.5.2 Section 60 enables a local authority in whose area work is going to be carried out, or is being carried out, to serve a notice of its requirements for the control of site noise on the person who appears to the local authority to be carrying out the works. Such a notice may also be served on others appearing to the local authority to be responsible for, or to have control over, the carrying out of the works.

1.5.3 This notice can:

- Specify the plant or machinery that is or is not to be used;

- Specify the hours during which the construction work can be carried out;
- Specify the level of noise that can be emitted; and
- Provide for any changes of circumstances.

1.5.4 Section 61 of the Act provides a mechanism for the main contractor or developer to take the initiative and approach the local authority to ascertain its noise requirements before construction work starts. If a formal application for "prior consent" is received by the local authority it is obliged to give a decision within 28 days; failure to do so or the attachment of unnecessary or unreasonable conditions are grounds for appeal by the applicant.

1.5.5 In cases where the local authority determines that the proposals for minimising the noise of the construction activities are adequate it will issue a consent although this may be subject to conditions limiting certain aspects of the consent such as hours of use, noise levels for particular activities, etc. Provided that the applicant takes all reasonable steps to operate within the terms of the consent, even if the local authority subsequently decides to take proceedings under section 60(8), the applicant should be able to rely on the defence provided in the Act and prove that the alleged contravention amounted to the carrying out of works in accordance with a consent given under section 61.

2 Policy

2.1 National Planning Policy Framework (NPPF), 2023

2.1.1 First published in 2012 and most recently updated in December 2023, the NPPF sets out the Government's planning policies for England and how these are expected to be applied. Noise is referenced within the document as follows:

"180. Planning policies and decisions should contribute to and enhance the natural and local environment by:…[a number of points including]…

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 or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans";

and

"191. 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[69]; and

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.…"

and

"1893. 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."

2.1.2 Reference number 69 within NPPF paragraph 191(a) points to the Explanatory Note to the Noise Policy Statement for England (NPSE).

2.2 Noise Policy Statement for England (NPSE), 2010

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

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

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

2.2.4 The NPSE introduces and describes three categories, or levels, describing the presence or absence of noise effects but does not quantify those categories, stating that the corresponding objective levels are likely to be different for different noise sources, receptors and times of the day or night. These categories are:

- **NOEL** – No Observed Effect Level – This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise;
- **LOAEL** – Lowest Observed Adverse Effect Level – This is the level above which adverse effects on health and quality of life can be detected; and

- **SOAEL** – Significant Observed Adverse Effect Level – This is the level above which significant adverse effects on health and quality of life occur.

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

2.2.6 The three aims of the NPSE are:

"1 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.

2 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.

3 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."

2.3 National Policy Statement for National Networks (NPS NN), 2014

2.3.1 The Department for Transport published the NPS NN in December 2014. It provides planning guidance for promoters of nationally significant infrastructure projects on the road and rail networks.

2.3.2 Paragraph 5.189 of the NPS NN states where a development is subject to an EIA and significant noise impacts are likely to arise from the Scheme, the applicant should include a noise assessment which details the noise and vibration baseline, sensitive receptors, predictions of changes in baseline with the Scheme and mitigation measures.

2.3.3 It goes on to state in paragraph 5.193 that developments must be undertaken in accordance with the statutory requirements for noise and that due regard must be given to the relevant sections of the National Policy Statement for England, NPPF and the Government's associated planning guidance on noise.

2.3.4 The NPS NN also confirms that for most national network projects, the relevant NIR will apply.

2.4 Broadland District Council Local Plan, Development Management Development Planning Document (DPD), 2015

2.4.1 The Development Management Development Planning Document (DPD) (2015) sets out policies which should be applied within the Broadland planning authority area. Relevant to noise is Policy EN4 – Pollution which states:

"Development proposals will be expected to include an assessment of the extent of potential pollution. Where pollution may be an issue, adequate mitigation measures will be required. Development will only be permitted where there will be no significant adverse impact upon amenity, human health or the natural environment".

3 Guidance

3.1 Design Manual for Roads and Bridges (DMRB), LA 111 Noise and vibration, 2020

3.1.1 DMRB LA 111 Noise and vibration is a guidance document published by National Highways (formerly Highways England) which sets out the requirements for noise and vibration assessments from road projects, applying a proportionate and consistent approach using best practice and ensuring compliance with relevant legislation.

3.1.2 The document presents sections on defining the baseline scenario, assessment methodology for construction noise and vibration, including

construction traffic and diversion routes, and assessment methodology for operational noise.

3.1.3 For each potential impact, guidance is provided on scoping, defining a study area, defining the baseline, determination of significance and design and mitigation. Guidance is also provided on the methodologies to be applied when calculating construction noise and vibration levels and operational road traffic noise.

3.1.4 In determining significance, guidance is provided on establishing appropriate lowest observable adverse effect levels (LOAEL) and significant observable adverse effect levels (SOAEL). Further guidance is then given on determining magnitude of impact and significance of effect.

3.1.5 Relevant guidance and key passages from DMRB LA 111 have been included in the relevant sections of the **Environmental Statement: Chapter 7 Noise and Vibration** (Document Reference: 3.07.00) and have therefore not been reproduced in this Appendix.

3.2 Calculation of Road Traffic Noise (CRTN), 1988

3.2.1 The former Department of Transport/Welsh Office technical memorandum Calculation of Road Traffic Noise (CRTN) methodologies have been adopted.

3.2.2 The factors which may influence road traffic noise levels at source can be divided into two groups:

- Road related factors - gradient and surface type; and
- Traffic related factors - flow, speed and the proportion of heavy-duty vehicles.

3.2.3 The propagation of noise is also covered in CRTN and can influence the noise levels at receptor locations.

3.3 Transport Research Laboratory (TRL) Project Report PR/SE/451/02, 2002

Converting the UK traffic noise index $L_{A10,18h}$ to EU noise indices for noise mapping

3.3.1 The Calculation of Road Traffic Noise prediction method produces noise levels in terms of L_{A10}, either over a 1-hour or an 18-hour period.

3.3.2 The European-wide noise mapping exercise required by EU Directive 2002/49/EC relating to the assessment and management of environmental noise (colloquially known as the Environmental Noise Directive or END), requires outputs in terms of L_{den} and L_{night}, both of which are based on the equivalent continuous noise level L_{den}.

3.3.3 TRL published a report in 2002, which provided a 'back-end' correction for converting the UK traffic noise index $L_{A10,18h}$ to the noise indices required for EU noise mapping.

3.3.4 The TRL report presented equations for three potential methods of conversion, depending on the quantity and quality of traffic data available:

- Method 1 is the most detailed and can be used when the assessor has available hourly traffic data. Equations are provided for motorway and non-motorway roads to covert $L_{A10,1h}$ to $L_{Aeq,1h}$, with the generated $L_{Aeq,1h}$ values subsequently being used to derive values of L_{den} and L_{night} as required by the END;
- Method 2 can be used where traffic data are known or can be estimated for the relevant time periods specified in the END (i.e. 12-hour day, 4-hour evening and 8-hour night) as well as the 18-hour period, with the generated L_{day}, $L_{evening}$ and L_{night} values subsequently being used to derive values of L_{den} as required by the END; and
- Method 3 is the least detailed and can be used when only LA10,18h traffic data are available. Equations are provided for motorway and non-motorway roads to covert $L_{A10,18h}$ directly to the L_{den} and L_{night} values as required by the END.

3.3.5 For this assessment, method 3 has been adopted and as none of the roads in the Study Area (including the Scheme) are motorways, all calculations to determine the L_{night} have utilised the non-motorway correction.

3.4 BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites, Part 1 Noise

3.4.1 This Standard provides the latest recommendations for basic methods of noise control where there is a need for the protection of persons living and working in the vicinity of, and those working on, construction and open sites.

3.4.2 The Standard includes guidance on assessing the significance of noise effects. In particular, Annex E provides a discussion on the different approaches to the assessment of construction noise, in doing so giving consideration to absolute noise levels (in BS 5228-1 section E2) and to two different approaches to setting criteria based on the ambient noise level ($L_{Aeq,T}$) in the absence of construction noise (in BS 5228-1 section E3).

3.4.3 Firstly, the Standard describes the 'older and more simplistic' approach based on the advice in AL 72, noting that the original advice "*has been expanded over time to include a suite of noise levels covering the whole day/week period taking into account the varying sensitivities through these periods*".

3.4.4 Table 3.2 (Table E.2 in sub-clause E.4 of the BS 5228-1) illustrates the approach – the levels are also stated as being often used as limits above which noise insulation would be provided, subject to the temporal conditions described following the table.

Table 3.1 - Examples of time periods, averaging times and noise levels associated with the determination of eligibility for noise insulation

Time	Relevant time period	Averaging time, 'T'	Noise insulation trigger level dB $L_{Aeq,T}$ (A)
Monday to Friday	07.00 – 08.00	1 h	70
Monday to Friday	08.00 – 18.00	10 h	75
Monday to Friday	18.00 – 19.00	1 h	70
Monday to Friday	19.00 – 22.00	3 h	65
Monday to Friday	22.00 – 07.00	1 h	55
Saturday	07.00 – 08.00	1 h	70
Saturday	08.00 – 13.00	5 h	75
Saturday	13.00 – 14.00	1 h	70
Saturday	14.00 – 22.00	3 h	65
Saturday	22.00 – 07.00	1 h	55
Sunday and Public Holidays	07.00 – 21.00	1 h	65
Sunday and Public Holidays	21.00 – 07.00	1 h	55

Note: (A) All noise levels are predicted or measured at a point 1m in front of the most exposed of any windows and doors in any façade of any eligible dwelling.

3.4.5 The Standard suggests that where, in spite of the mitigation measures applied, the combined construction and baseline noise levels exceed 75 dB(A) (for a period of ten or more days of working in any fifteen consecutive days or for a total of days exceeding 40 in any six month period), a scheme for the installation of noise insulation or the reasonable costs thereof will be implemented by the developer or promoter.

3.4.6 In BS 5228-1 sub-clause E.3 an alternative approach is described using criteria based on the ambient noise level. This approach is used commonly in EIAs. Two methods are described.

3.4.7 The first is the ABC method, which is set out in Table 3.2 below (Table E.1 in BS 5228-1). Three categories, A, B and C, are described in terms of threshold values for a daytime (07:00 to 19:00 weekdays, 07:00 to 13:00 Saturday), evening and weekend, and finally a night-time period (23:00 to 07:00). If the construction site noise level exceeds the relevant threshold value this is deemed a 'significant effect'.

Table 3.2 – Example of threshold of potential significant effect at dwellings

Assessment category and threshold value period	**Threshold value, in decibels (dB $L_{Aeq,T}$) Category A (A)**	**Threshold value, in decibels (dB $L_{Aeq,T}$)Category B (B)**	**Threshold value, in decibels (dB $L_{Aeq,T}$) Category C (C)**
Night-time (23:00 − 07:00)	45	50	55
Evenings and weekends (D)	55	60	65
Daytime (07:00 − 19:00) and Saturdays (07:00 − 13:00)	65	70	75

Notes: [1] A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

[2] If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise.

[3] Applied to residential receptors only.

(A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

(B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

(C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

(D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

3.4.8 The second method states that "Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut off values of 65 dB, 55 dB and 45 dB $L_{Aeq,T}$ from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant impact."

3.4.9 These criteria may be applied not just to residential buildings, but also to hotels, hostels and buildings in religious, educational and health/community use.

3.4.10 The +5 dB criterion for a period of one month or more, might also be deemed to cause significant effects in public open space. However, the extent of the area impacted relative to the total available area also needs to be taken into account.

3.4.11 Annex F of the Standard provides guidance on estimating noise from construction sites. The estimation procedures described in this Annex take into account the more significant factors:

- The sound power outputs of processes and plant;
- The periods of operation of processes and plant;
- The distances from source to receiver;

- The presence of screening by barriers;
- The reflections of sound; and
- Attenuation from absorbent ground.

3.4.12 Four discrete prediction methods are described, two for stationary plant – the activity $L_{Aeq,T}$ method and the plant sound power method – and two for mobile plant – the method for mobile plant in a defined area and the method for haul roads.

3.5 BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites, Part 2 Vibration

3.5.1 The Standard provides the latest recommendations for basic methods of vibration control where there is a need for the protection of persons living and working in the vicinity of, and those working on, construction and open sites.

3.5.2 With respect to human exposure to building vibration, Table B1 of Annex B to BS 5228-2 provides guidance on the effects of vibration levels on human beings, and it is these (as reproduced in Table 3.3.) that the construction vibration effects have been based upon.

Table 3.3 – Guidance on effects of vibration levels

Vibration level	Effect
0.14 mms^{-1}	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mms^{-1}	Vibration might be just perceptible in residential environments.
1.0 mms^{-1}	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mms^{-1}	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

Notes: [1] The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into the recipient.

[2] A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available.

[3] Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472-1 or -2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.

3.5.3 Guide values for cosmetic damage to buildings are given in Table B.2 of the Standard, and this is reproduced below as Table 3.4, together with Figure 3.1 (below) to which it refers.

Table 3.4 – Transient vibration guide for cosmetic damage

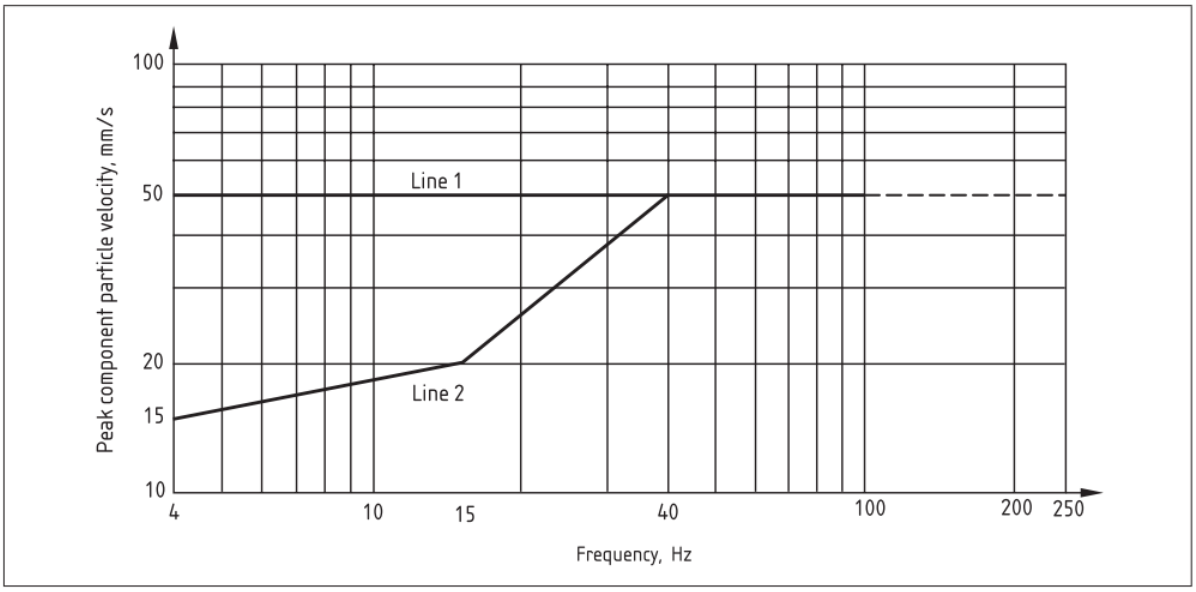
Line (see Figure 3-1 below)	**Type of building**	**Peak component particle velocity in frequency range of predominant pulse 4 Hz to 15 Hz**	**Peak component particle velocity in frequency range of predominant pulse 15 Hz and above**
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mms^{-1} at 4 Hz and above	50 mms^{-1} at 4 Hz and above
2	Unreinforced or light framed structures Residential or light commercial buildings	15 mms^{-1} at 4 Hz increasing to 20 mms^{-1} at 15 Hz	20 mms^{-1} at 15 Hz increasing to 50 mms^{-1} at 40 Hz and above

Notes: [1] Values referred to are at the base of the building.

[2] For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

3.5.4 It should be noted that the above guidance is for transient vibration. For continuous vibration, such as may occur during the use of vibratory equipment, the guidance in the Standard is that the levels in the Table above and Figure below be reduced by 50%.

Figure 3.1 – Transient vibration guide values for cosmetic damage



3.6 Planning Practice Guidance – Noise (PPG-N), 2019

3.6.1 This web-based resource was issued for use by the Department for Communities and Local Government (DCLG). The purpose of the guidance is to complement the NPPF and provide advice on how to deliver its policies.

3.6.2 The section on noise was published in 2014 and last updated in July 2019. It includes a table that summarises "*the noise exposure hierarchy based on the likely average response of those affected*" and offers "*examples of outcomes*" relevant to the NOEL, LOAEL and SOAEL effect levels described in the NPSE. The term Unacceptable Adverse Effect (UAE) level is introduced which

equates to noise perceived as "*present and very disruptive*". It is stated that UAEs should be prevented.

3.6.3 These outcomes are in descriptive form and there is no numerical definition of the NOEL, LOAEL and SOAEL (or UAE), or detailed advice regarding methodologies for their determination. There is also no reference to the further research that is identified as necessary in the NPSE. The noise exposure hierarchy table is duplicated in Tables 3.5 to 3.8 below.

Table 3.5 – Noise exposure hierarchy based on the likely average response – no observed effect level

Perception	Examples of outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No specific measures required

Table 3.6 – Noise exposure hierarchy based on the likely average response – no observed adverse effect level

Perception	Examples of outcomes	Increasing Effect Level	Action
Present and not intrusive	Noise can be heard but does not cause any change in behaviour or 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

Table 3.7 – Noise exposure hierarchy based on the likely average response – lowest observed adverse effect level

Perception	Examples of outcomes	Increasing Effect Level	Action
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

Table 3.8 – Noise exposure hierarchy based on the likely average response – significant observed adverse effect level

Perception	Examples of outcomes	Increasing Effect Level	Action
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

Perception	Examples of outcomes	Increasing Effect Level	Action
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