M60/M62/M66 Simister Island Interchange

TR010064

ENVIRONMENTAL STATEMENT APPENDICES

APPENDIX 11.2 NOISE AND VIBRATION ASSESSMENT GUIDANCE AND STANDARDS

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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ENVIRONMENTAL STATEMENT APPENDICES

APPENDIX 11.2 NOISE AND VIBRATION ASSESSMENT GUIDANCE AND STANDARDS

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Appendix 11.2 Noise and vibration assessment guidance and standards

1.1 Introduction

1.1.1 This appendix provides descriptions of the various assessment guidance and methodologies summarised within Chapter 11: Noise and Vibration of the Environmental Statement (TR010064/APP/6.1) and used for the noise and vibration assessment.

1.2 Legislation

Land Compensation Act 1973

1.2.1 Part I of the Land Compensation Act 1973 (LCA) provides a means by which compensation can be paid to owners of land or property due to a loss in value of these assets caused by public works, such as new or improved railways and roads. Noise and vibration are two of the factors which would be considered in any claims for compensation, but the claim should consider all changes and effects, including betterment.

1.2.2 Part II of the Act 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. This is subject to meeting certain criteria given in the Noise Insulation Regulations 1975, as amended 1988.

Control of Pollution Act 1974

1.2.3 The Control of Pollution Act 1974 (CoPA) grants powers to deal with noise nuisances and places a duty on local authorities to inspect their areas from time to time in order to detect anything which should be dealt with under the Act. It also defines and empowers local authorities to create noise abatement zones within their areas. However, these zones did not gain much popularity with local authorities and few have chosen to implement them.

1.2.4 Much of CoPA has now been replaced and extended by the Environmental Protection Act 1990. However, Sections 60 and 61, which relate to noise and vibration from construction sites, remain relevant.

1.2.5 Section 60 of CoPA allows a local authority to serve a notice of its requirements for the control of site noise to the individual or entity carrying out or controlling the works. The notice may stipulate noise limits for work, particular plant or machinery that should be avoided, hours during which construction activities may be carried out, and provide for any change in circumstances.

1.2.6 Section 61 of CoPA concerns the procedures adopted when a contractor or developer approaches the local authority prior to any construction activities taking place, with the intention of agreeing noise and vibration limits in advance of works.

1.2.7 If consent is granted under Section 61, this would be considered a valid defence by the magistrates' court if the local authority was later to reverse its position and pursue an action under Section 60, provided adherence to any conditions attached to the consent had been maintained.

1.2.8 Any application for a Section 61 agreement should contain detailed method statements for the works to be conducted, information on noise mitigation measures to be employed, details of working times and supporting calculations showing the predicted noise levels at noise-sensitive receivers around the site.

Environmental Protection Act 1990

1.2.9 Part III, Section 79, of the Environmental Protection Act 1990 (EPA) defines what activities may constitute a statutory nuisance, and what activities are specifically exempt. The EPA does not apply to road traffic noise, and does apply to construction noise. Section 79 imposes a duty on local authorities to periodically survey environmental noise levels and to investigate noise complaints.

1.2.10 The Act requires local authorities to serve notice when noise nuisance exists. Under these statutory nuisance provisions, the operators of a site or facility could be required to adopt best practicable means to abate noise nuisance at any time once operations have commenced. It is therefore essential that potential nuisance effects are properly considered, so as to ensure that the operators are seen to adopt best practice, and that any potential requirements for mitigation are considered.

The Noise Insulation Regulations 1975, as amended 1988

1.2.11 The Noise Insulation Regulations 1975 (as amended) (NIR) are intended to protect residents subject to increases in traffic noise at or above a specified level arising directly from the use of new or altered roads, by making available grants for noise insulation work to be carried out on their homes. Specific circumstances need to be present for the Regulations to apply. Where there is an 'additional carriageway' the authority has a duty to (i.e. they must) carry out insulation work or make grants. For an 'altered highway', the authority has a power to (i.e. they can) carry out insulation work or make grants.

1.2.12 To be eligible for a grant due to increased road traffic noise levels, the dwelling must be within 300m of the nearest point of the carriageway of the highway and the road traffic noise level at the dwelling after the work must be:

- Above a façade level of $L_{A10,18h}$ 68dB;
- Be at least 1dB(A) greater than the prevailing noise level immediately before the work; and
- The noise level from the highway, additional carriageway, or alteration must contribute at least 1dB(A) to the relevant noise level at the receptor.

1.2.13 The NIR additionally makes provision for the highway authority to carry out, or make grants in respect of the costs of carrying out, noise insulation work to eligible buildings were the alteration of a highway is expected to cause construction noise at a level which seriously affects for a substantial period of time the enjoyment of an eligible building.

Environmental Noise (England) Regulations 2006 implementing Environmental Noise Directive 2002/49/EC

1.2.14 The Environmental Noise Directive 2002/49/EC sets out an ongoing programme of noise mapping and noise action planning, aimed at: '*preventing and reducing environmental noise where necessary and particularly where exposure levels can induce harmful effects on human health and to preserving environmental noise quality where currently good.*' This European Directive was transposed into law by the Environmental Noise (England) Regulations 2006.

1.2.15 In addition, following a sift process of the noise mapping, Department for Environment, Food and Rural Affairs (Defra) assigned certain areas the status of an Important Area. Important Areas with respect to noise from roads or railways are where the 1% of the population that are affected by the highest noise levels from roads or major railways are located, according to the results of the strategic noise mapping.

1.3 Policy

Noise Policy Statement for England 2010

1.3.1 The Government's noise policy is set out in the Noise Policy Statement for England (NPSE). The policy came into force in March 2010. It contains the high-level vision of promoting good health and good quality of life (wellbeing) through the effective management of noise in the context of sustainable development. It is supported by three aims and together they provide the necessary clarity and direction to enable decisions to be made in any particular situation, both nationally and locally, regarding what is an acceptable noise burden to place on society. These three aims are:

- To avoid significant adverse impacts on health and quality of life
- To mitigate and minimise adverse impacts on health and quality of life
- Where possible, contribute to the improvement of health and quality of life

1.3.2 In defining these aims, the terms 'significant adverse' and 'adverse' are used for which the NPSE (para 2.20) notes that:

'*There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation (WHO). They 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*

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse level.

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

1.3.3 The three aims of the NPSE are reiterated in other relevant policy documents.

1.3.4 The NPSE goes on to state that the SOAEL is likely to be different for different noise sources, different receptors and at different times.

National Policy Statement for National Networks

1.3.5 The first of these is the National Policy Statement for National Networks (NPS NN) (Department for Transport, 2014), which advises on noise and vibration in the context of Nationally Significant Infrastructure Projects (NSIP) on the road and rail networks. It sets out the policy and reasoning by which the Secretary of State for Transport will make decisions on NSIPs. The provisions on noise and vibration are contained in paragraphs 5.186 to 5.200 of the document.

1.3.6 The Government published a draft of the NPS NN in March 2023 (Department for Transport, 2023). The consultation closed in June 2023 and the draft NPS NN has not yet been designated. However, it is potentially capable of being an important and relevant consideration in the decision-making process. The Environmental Statement continues to reference the 2014 NPS NN though, as it remains the relevant Government policy. The main aims of the draft NPS NN are not materially different to those within the 2014 NPS NN for noise and vibration.

National Planning Policy Framework

1.3.7 The National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities, 2023) came into force in March 2012 and has been revised several times, most recently in September 2023. The NPPF paragraph 174 states that the planning policies and decisions should contribute to and enhance the natural and local environment by, among other things, preventing new and existing development from being put at unacceptable risk or being affected by unacceptable levels of noise pollution. Paragraph 185 goes on to state that planning policies and decisions should:

- 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 quality of life

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

1.3.8 Paragraph 187 of the NPPF draws specific attention to the need to ensure that new development is compatible with existing businesses and community facilities and introduces an 'agent of change' principle:

'*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.*'

1.3.9 The NPPF expects local planning policies and decisions to ensure that new development is appropriate for its location and considers the effects of pollution on health, the natural environment and general amenity, including noise-sensitive development in locations that experience aircraft noise. The NPPF is quite clear that the planning system should prevent new development being built at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution.

Planning Practice Guidance

1.3.10 The NPPF was supplemented in 2014 by the on-line 'Planning Practice Guidance (PPG) – Noise' (Department for Levelling Up, Housing and Communities, 2019). This guidance was updated in July 2019. PPG-Noise advises on how planning can manage potential noise impacts of new development. It lists various acoustic and non-acoustic factors that could influence a decision on whether noise will be a concern for a project. These include the source and absolute level of noise, the time of day it occurs, and the number and frequency and pattern of noise events.

1.3.11 This document reaffirms the effect levels set out in the NPSE and also adds an additional term of Unacceptable Adverse Effect Level (UAEL) at which noise should be prevented from reaching sensitive receptors. Table 1.1 is from PPG-Noise (paragraph 005), and summarises the noise exposure hierarchy, based on the likely average response.

Table 1.1 Noise exposure hierarchy and effect levels

Response	Examples of Outcomes	Increasing effect level	Action
Not present	No effect	No Observed Effect	No specific measures required
No Observed Effect Level (NOEL)			
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

Response	Examples of Outcomes	Increasing effect level	Action
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour. attitude or other physiological response, e.g. turning up the television volume; 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
Significant Observed Adverse Effect Level (SOAEL)			
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

1.3.12 None of the policy documents assign numeric values to the effect levels. This is because the effect level should reflect the nature of the noise source and the sensitivity of the receptor considering also local context. The document states that:

'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.*

In line with the Explanatory Note of the NPSE, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the Significant Observed Adverse Effect Level and the Lowest Observed Adverse Effect Level for the given situation.'

A Green Future: Our 25 year Plan to Improve the Environment, 2021

1.3.13 The 25 Year Environment Plan sets out a comprehensive and long-term approach to protecting and enhancing natural habitats and landscapes in England for the next generation. This includes reducing pollution, including noise pollution.

1.4 Guidance and standards

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

1.4.1 The Design Manual for Roads and Bridges (DMRB) LA 111 Noise and Vibration, Revision 2 (DMRB LA 111) (Highways England, 2020) sets out the requirements for assessing noise and vibration from a road project, applying a proportionate and consistent approach using best practice and ensuring complaince with relevant legislation.

1.4.2 The document sets out how to define the study areas for the various assessments (i.e. construction, operation) and then lists the process to follow to determine whether effects are significant, as discussed within Chapter 11: Noise and Vibration of the Environmental Statement (TR010064/APP/6.1).

World Health Organisation

Guidelines for Community Noise 1999

1.4.3 The World Health Organisation (WHO) Guidelines for Community Noise (GCN) (1999) provides a range of noise guideline values for noise in specific environments.

1.4.4 WHO guidance states that the critical effects of noise in a dwelling are on sleep, annoyance and speech interference. To avoid sleep disturbance, indoor guideline values for bedrooms are 30dB $L_{Aeq,8hr}$ for continuous noise and 45dB L_{Amax} for a single sound event.

1.4.5 At night, sound pressure levels at the outside façades of the living space should not exceed 45dB $L_{Aeq,8hr}$ and 60dB L_{Amax} so that people may sleep with bedroom windows open. These values have been obtained by assuming that the noise reduction from outside to inside with the window partly open is 15dB(A).

1.4.6 To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55dB $L_{Aeq,16hr}$ for a steady, continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50dB $L_{Aeq,16hr}$.

Night Noise Guidelines for Europe 2009

1.4.7 The WHO Night Noise Guidelines for Europe (NNG) (2009) sets out the night noise guideline of 40dB $L_{Anight,outside}$ with an interim target limit of 55dB $L_{Anight,outside}$. It also states that when the average night noise level over a year exceeds the 55dB target limit *'The situation is considered increasingly dangerous for public health. Adverse health effects occur frequently, a sizeable proportion of the population is highly annoyed and sleep-disturbed. There is evidence that the risk of cardiovascular disease increases'*.

Environmental Noise Guidelines for the European Region 2018

1.4.8 The WHO Environmental Noise Guidelines for the European Region (ENG) (2018) report provide recommendations for protecting human health from exposure to environmental noise originating from various sources. The sources considered are road traffic noise, railway noise, aircraft noise, wind turbine noise and leisure noise.

1.4.9 The guidelines are intended to be suitable for policy making and guiding principles were developed within the document to provide generic advice and support for the incorporation of recommendations into a policy framework. The guideline exposure levels presented are not meant to identify effect thresholds.

1.4.10 The guidelines relevant to the scheme are those relating to road traffic noise, reproduced below. The guideline noise levels are provided for exposure at the most exposed façade, outdoors.

- For average noise exposure, the Guideline Development Group (GDG) strongly recommends reducing noise levels produced by road traffic below 53dB Lden, 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 45dB Lnight, 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 guidance 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 change in infrastructure.

1.4.11 Although the ENG (WHO, 2018) supersede the WHO guidelines for community noise and WHO night noise guidelines for Europe, the GDG recommends that all guidelines not covered by the ENG (WHO, 2018) should remain valid.

1.4.12 The guideline levels presented above have been reviewed in the development of the scheme-specific noise criteria for significance of effect. The levels themselves have not been adopted as threshold values, as there are UK Policy-based threshold noise levels that are considered to be more appropriate and established.

British Standard 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites'

Part 1 – Noise

1.4.13 British Standard 5228:2009+A1:2014 Part 1 – Noise (British Standards Institution, 2014a) provides suitable methods for the calculation of noise from construction activities, including basic information regarding noise levels from a range of construction equipment. For the calculation of construction noise at the receptor locations the selected A-weighted sound power levels of the plant and equipment are corrected to consider the 'percentage on-time' (portion of time in which the equipment is operating at its maximum power); 'duration of activity' (amount of time in relation to the 'shift duration' in which the equipment is expected to operate); distance between sound sources and receptors; percentage of soft ground; and any screening corrections from obstacles between the source and receptor.

1.4.14 Annex E of BS 5228-1:2009+A1:2014 (British Standards Institution, 2014a) provides criteria for the assessment of the potential significance of effects from construction noise based on different approaches. This assessment references the Method 1 ABC method.

1.4.15 Method 1 is in reference to Table 1.2, which shows an example of the threshold of significant effect at dwellings. This is based on measurements of ambient noise, which are rounded to the nearest 5dB for the time periods given.

Table 1.2 Example threshold of potential significant effect at dwellings (BS 5228-1:2009+A1:2014, Table E1)

Assessment category and threshold value period	Threshold value, in decibels (dB) $L_{Aeq,T}$		
	Category A (A)	**Category B** (B)	**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

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

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

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

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

1.4.16 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.

1.4.17 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 3dB due to site noise.

Part 2 – Vibration

1.4.18 British Standard 5228:2009+A1:2014 Part 2 – Vibration (British Standards Institution, 2014b) provides recommendations for basic methods of vibration control relating to construction and open sites where work activities and operations generate significant vibration levels. The method of measurement for characterising building vibration is also discussed.

1.4.19 Annexes C and D of BS 5228-2:2009+A1:2014 (British Standards Institution, 2014b) contain measured vibration levels for different forms of piling and ancillary operations which can be used for the estimation of vibration levels at a construction site. Annex E of the standard provides derived empirical formulae to predict the resultant Peak Particle Velocity (PPV) from a construction vibration activity. The formulae include a number of parameters specific for calculating vibratory compaction; percussive and vibratory piling; dynamic compaction; and the vibration of stone columns and tunnel boring operations. For some processes, an indicator of the probability of these figures being exceeded is included as one of the variables in the formulae.

1.4.20 BS 5228-2:2009+A1:2014 (British Standards Institution, 2014b) sets out a scale of significance of vibration effects, which is defined separately for human response and buildings response, referring to and reproducing the data from BS 6472-1:2008 (British Standards Institution, 2008) and BS 7385-2:1993 (British Standards Institution, 1993).

1.4.21 Table 1.3 presents guideline levels of vibration and the associated human response effect.

Table 1.3 Guidance on effect of vibration levels on human receptors from BS 5228-2:2009+A1:2014

Vibration Level	Effect
0.14mm/s	Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3mm/s	Vibration might just be perceptible in residential environments.
1mm/s	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.
10mm/s	Vibration is likely to be intolerable for any more than very brief exposure to this level in most building environments.
NOTES: The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into the recipient.	

Vibration Level	Effect
A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available. 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.	

1.4.22 For building structure response BS 5228-2:2009+A1:2014 (British Standards Institution, 2014b) reproduces the advice provided in BS 7385-2:1993 'Evaluation and measurement for vibration in buildings: Guide to damage levels from groundborne vibration' (British Standards Institution, 1993). The response of a building to groundborne vibration is affected by the type of foundation, underlying ground conditions, the building construction and the state of repair of the building. Table 1.4 reproduces the guidance for transient vibration (values should be halved for continuous vibration) detailed on building classification and guide values for cosmetic building damage.

Table 1.4 Transient Vibration Guide Values for cosmetic damage from BS 5228-2: 2009+A1:2014

Type of building	PPV in frequency range of predominant pulse	
	4Hz to 15Hz	15Hz and above
Reinforced or framed structures	50mm/s	50mm/s
Industrial and heavy commercial buildings		
Unreinforced or light framed structures (1)	15mm/s at 4Hz increasing to 20mm/s at 15Hz	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above
Residential or light commercial buildings (2)		
(1) Values referred to are at the base of the building. (2) At frequencies below 4Hz, a maximum displacement of 0.6mm (zero to peak) is not to be exceeded.		

1.4.23 Minor damage is possible at vibration magnitudes which are greater than twice those given in Table 1.4, with major damage at values greater than four times the values in the table. BS 7385-2:1993 (British Standards Institution, 1993) also notes that the probability of cosmetic damage tends towards zero at 12.5mm/s peak component particle velocity.

1.5 Calculation methodologies

Introduction

1.5.1 This section describes the calculation methodologies that have been followed during the noise and vibration assessment of both construction and operational noise.

1.5.2 In Section 1.4 of this appendix the guidance within both parts of BS 5228-1:2009+A1:2014 (British Standards Institution, 2014a) has been described. These British Standards also provide calculation methodologies. These calculation methodologies are not repeated in this section of the appendix.

Calculation of Road Traffic Noise 1988

1.5.3 The calculation method for predicting road traffic noise in the UK is defined within the 'Calculation of Road Traffic Noise' (CRTN), a technical memorandum document produced by the Department of Transport in 1988. The prediction method takes into account factors such as the traffic flow, composition, vehicles' speed, the alignment and distance of the road, the road surface type, the nature of the intervening ground cover between the road and reflections from building façades, in order to calculate the noise level from the road at a particular receiving property or receptor. The method considers the road traffic noise as a line source taken to be at 3.5m distance from the nearside carriageway edge and 0.5m above the ground as the effective source position.

1.5.4 Traffic and the level of noise it generates fluctuates hourly, daily and seasonally and so the impact of traffic noise is assessed in terms of a time-averaged indicator and using annualised data. In the UK, traffic noise is normally assessed using $L_{A10,18h}$ index, defined as the arithmetic mean of the dB(A) noise levels exceeded for 10% of the time in each of the 18, one-hour periods between 06:00-24:00 on a typical weekday. This takes account of the diurnal variation in traffic noise. Annual Average Weekday Traffic (AAWT) flows, speeds and percentage of heavy vehicles are normally used to allow for seasonal variations.

1.5.5 The calculation method consists of an initial Basic Noise Level calculation at a reference distance of 10m which depends on the flow, traffic composition and speed of a road segment. Subsequently the method calculates all the corrections related with noise propagation to a receptor location where this includes distance, ground absorption, barrier screening, reflections, angle of view and façade correction.

Acronyms and initialisms

Acronym or initialism	Term
AAWT	Annual Average Weekday Traffic
CRTN	Calculation of Road Traffic Noise
CoPA	Control of Pollution Act
dB	Decibel
Defra	Department for Environment, Food and Rural Affairs
EIA	Environmental Impact Assessment
ENG	Environmental Noise Guidelines for the European Region
EPA	Environmental Protection Act 1990
GCN	Guidelines for Community Noise
GDG	Guideline Development Group
IEMA	Institute of Environmental Management and Assessment
LCA	Land Compensation Act 1973
LOAEL	Lowest Observed Adverse Effect Level
NNG	Night Noise Guidelines for Europe
NPPF	National Planning Policy Framework
NPS NN	National Policy Statement for National Networks
NSIP	Nationally Significant Infrastructure Projects
NIR	Noise Insulation Regulations
NPSE	Noise Policy Statement for England
PPG	Planning Practice Guidance
PPV	Peak Particle Velocity
SOAEL	Significant Observed Adverse Effect Level
UAEL	Unacceptable Adverse Effect Level
VDV	Vibration Dose Value
WHO	World Health Organisation

References

British Standards Institution (1993). BS 7385-2:1993, Evaluation and measurement for vibration in buildings -Guide to damage levels from ground borne vibration.

British Standards Institution (2008). BS 6472-1:2008, Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting.

British Standards Institution (2014a). BS 5228-1:2009+A1:2014: Code of practice for noise and vibration control on construction and open sites. Noise.

British Standards Institution (2014b). BS 5228-2:2009+A1:2014: Code of practice for noise and vibration control on construction and open sites. Vibration.

Department for Environment, Food and Rural Affairs (2010). Noise Policy Statement for England.

Department for Levelling Up, Housing and Communities (2019). Planning Practice Guidance: Noise.

Department for Levelling Up, Housing and Communities (2023). National Planning Policy Framework.

Department of Transport and Welsh Office (1998). Calculation Road Traffic Noise

Institute of Environmental Management and Assessment (2014). Guidelines for Environmental Noise Impact Assessment.

World Health Organisation (1999). Guidelines for Community Noise.

World Health Organisation (2009). Night Noise Guidelines for Europe.

World Health Organisation (2018). Environmental Noise Guidelines for the European Region.