Appendix A: Supplementary Information to the Guidelines for Noise and Vibration Assessment and Control

Requirements for Noise and Vibration Assessments

Noise and Vibration Impact Assessment (NVIA) for a project not requiring Environmental Impact Assessment (EIA)

A.1 An NVIA should normally contain some or all the following depending on the nature of the development:

- identification and classification of noise and vibration sensitive resources and receptors;
- determination of the existing/baseline noise climate at the nearest and potentially worst affected receptors, usually by measurement;
- quantification of the likely impact associated with the operation of the proposed development (in terms of the magnitude of impact, change in levels and/or exceedances above background or other reference levels);
- evaluation of noise and vibration impacts in accordance with statutory requirements, national and local policy and guidance, appropriate British and other standards and best practice;
- identification of practicable mitigation options and residual impacts; and
- documentation of the details and results of the assessment in a comprehensive technical report, comprising: front cover with name of development, identification of the applicant, report title and status; non-technical summary, if appropriate; introduction; description of development and potentially affected resources and receptors; consultation; assessment methodology and basis for this; baseline survey details and results; quantification of impacts by calculation and/or measurement; evaluation of impacts and mitigation options; identification of residual impacts; study summary and conclusions; appendices including tables, figures, calibration certificates, personal competency statements where required and all other relevant supplementary information.

NVIA for EIA Project

A.2 National requirements for EIA are set out in DCLG Planning Practice Guidance on EIA [1] and the 2017 EIA Regulations [2]. Whilst there is no statutory provision on the form that an Environmental Statement chapter on noise and vibration should take, where such a chapter is required, it should contain the information specified in Regulation 18, paragraph (3) of the Town and Country Planning (EIA) Regulations 2017, and any of the relevant information set out in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected. Any Environmental Statement submitted should accord with the advice set out in the most recently adopted Scoping Opinion (where such has been requested by the applicant).

A.3 Developments that require EIA are set out in Schedule 1 of the Town and Country Planning (EIA) Regulations 2017 and include for example: installations for the disposal of hazardous waste; installations for the disposal of more than 100 tonnes per day of non-hazardous waste by incineration or chemical treatment; extraction of more than 500 tonnes per day of petroleum or more than 500,000 cubic metres of natural gas for commercial purposes; and quarries and open-cast mines where the site surface exceeds 25 hectares. Schedule 2 developments where EIA may be required can include: mineral extraction (including exploratory and appraisal drilling for hydrocarbons); a variety of industrial activities; waste management and disposal; agricultural projects; and energy industry infrastructure. All the forms of development listed in Schedule 2 are subject to various criteria and thresholds that determine the need for screening (as listed in the second column of Schedule 2) and for EIA (as listed in paragraph 58 of the national Planning Practice Guidance on EIA).

A.4 For Schedule 2 developments, the developer may seek a Screening Opinion from the CPA prior to the submission of the planning application. Regulation 2(a) of the Town and Country Planning (EIA) Regulations 2017 identifies the information that needs to be provided for a EIA Screening Opinion request. Where EIA is required for a given development, the developer may seek the CPA's advice on the matters to be covered in the assessment by means of a

request for a Scoping Opinion, made under Regulation 15 of the Town and Country Planning (EIA) Regulations 2017. Under these Regulations, the developer is obliged to address all issues identified within the Scoping Opinion.

A.5 Where noise and/or vibration have been identified as a potentially likely significant effect of the development, and the EIA therefore requires an assessment of both, all of the information specified above (paragraph A.1) under a standard NIA should be provided, as well as the information listed below. For an NIA that forms part of an EIA, the focus moves from considering impact to determining and describing the significance of adverse and beneficial effects considering the magnitude of impact and the sensitivity of the receptors identified:

- reference to any adopted screening opinion or scoping opinion, as applicable, including an indication of how any concerns raised at the scoping stage have been addressed;
- quantification of the likely effects associated with the construction of the proposed development (in terms of the magnitude of impact, change in levels and/or exceedances above background or other reference levels, mitigation provision etc), with reference to BS 5228:2009+A1:2014 'Code of practice on noise and vibration control on construction and open sites' Part 1 Noise [3] and Part 2 Vibration [4], this is unless construction effects can be scoped out or have been scoped out at the scoping stage; the significance of the effects should be defined including their duration;
- consideration of cumulative effects with other noise generating development, as appropriate; these may need to include both inter project effects (with other projects) and intra project effects (with different elements of the same project);
- the general process should include, for each element, a description of the magnitude of impact, consideration of the sensitivity of the receptor and, combining magnitude and sensitivity, the significance of the effect;
- residual effects following the incorporation of mitigation should be identified; and

- it is often of assistance if proposed conditions are provided for the development within the assessment.

Guideline Noise and Vibration Limits

Minerals Including Oil and Gas Exploration

Site Preparation and Restoration

A.6 The Planning Practice Guidance for Minerals (PPG-M) [5] provides guideline noise limits for mineral working. This guidance allows for an increase in daytime noise limits for a temporary period of up to eight weeks, over a 12-month period, for activities associated with site preparation. Recommended noise limits for the PPG-M are provided in Table A.1 below.

Table A.1: Daytime Working Hours and Noise Limit for Temporary Minerals Operations

Hours of Work	Free field $L_{Aeq,1hr}$ dB(A)
Normal working hours (07:00 – 19:00)	70

Notes:
[1] Increased temporary daytime noise limits for periods of up to eight weeks in a year at specified noise sensitive properties should be considered to facilitate essential site preparation, restoration works and construction of baffle mounds where it is clear it will bring longer term environmental benefits.
[2] where work is likely to take longer than eight weeks, lower limits over a longer period should be considered.
[3] In some wholly exceptional cases, where there is no viable alternative, a higher limit for a very limited period may be appropriate in order to attain the environmental benefits.

A.7 Vibration is not usually an issue of any significance due to the separation distances involved but, to avoid disturbance due to occasional events, it is recommended that vibration levels do not exceed 1.0 mms^{-1} peak particle velocity (PPV) in the vertical direction when measured at the external foundations of any residential property at soil level.

Site Operations

A.8 The PPG-M guidance on noise limits for normal minerals site operations at noise sensitive properties is summarised in Table A.2. If minerals processing

or manufacturing occur within the minerals extraction site/area, then the overall levels in Table A.2 generally apply.

Table A.2: Noise Limits for Normal Minerals Operations

Hours of Work	Free field $L_{Aeq,1hr}$ dB(A)
Monday to Friday Normal Working Hours (07:00 – 19:00 hours)	representative background sound level + 10 with a maximum limit of 55
Monday to Friday Evening (19:00 – 22:00 hours)	representative background sound level + 10 with a maximum limit of 55
Saturday Mornings (07:30 – 13:00 hours)	Representative background sound level + 10 with a maximum limit of 55
Night-time (22:00 – 07:00 hours)	a maximum limit of 42
All other periods including Saturday afternoons, Sundays and Bank Holidays	Representative background sound level + 5 with a maximum limit of 50

Notes:
[1] Representative background sound levels should be determined separately for each stated period.
[2] For night-time operations (22:00 – 07:00 hours), noise limits should be set to reduce to a minimum any adverse impacts, without imposing unreasonable burdens on the mineral operator, and therefore a lower limit than that stated may be appropriate in some contexts.

Processing and Manufacture

A.9 Assessments of process and manufacture for minerals sites should use the same significance criteria as waste and other industrial sites presented in Table A.3 below. It is recommended for normal working hours (weekdays between 07:00 and 19:00 hours), that the difference between the rating level and background sound level should be no greater than +5 dB. Lower differences may be appropriate at other sensitive times of the day or if other industrial noise sources are already present in the area and affect the same NSRs.

A.10 If it is essential to operate plant at times outside of normal working hours, other specific written limits will be set by the CPA.

Waste and Other Industrial Sites

A.11 For industrial noise assessments, including waste, processing and manufacture as part of a minerals site, oil and gas production and other

industrial noise assessments, the significance of the initial evaluations that should be made are provided in Table A.3 below.

Table A.3 Initial BS 4142:2014 Assessment – Rating and Background Level Differences

Rating Level minus Background Sound Level	BS 4142:2014 Semantic Description	Significance
> 7.5 dB	A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.	significant adverse impact
0 to 7.5 dB	A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.	adverse impact
-10 to 0 dB	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.	no impact to low impact
< -10 dB	-	no impact

A.12 Note that the assignment of significance as presented in the table above is not sufficient to come to a full evaluation of the significance of an impact but should also consider the context in which a sound occurs. Further details are provided in Section 4 of the Guidelines.

National Policy, Guidance and British Standards

National Planning Policy Framework

A.13 National planning policy and its implementation are set out in the National Planning Policy Framework (NPPF) [6] which came into force in March 2012, revised in July 2018 and later updated in February 2019. The NPPF sets out the Government's planning policies for England and how these are expected

to be applied. The emphasis of the Framework is to allow development to proceed where it can be demonstrated to be sustainable. In relation to noise, Paragraph 180 of the Framework states:

> "Planning policies and decisions should 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 the development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
>
> b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and
>
> c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.'

A.14 The point 'a)' refers to 'significant adverse impacts' which relates to the 'significant observed adverse effect level' (SOAEL) in the Noise Policy Statement for England (NPSE), though the term 'effect' is used instead of the term 'impact' although these have been deemed to be interchangeable in this context. Therefore, given the comments above on the NPSE with regard to assessment methods and criteria, the current content of the NPPF does not require any change in previously adopted approaches.

Noise Policy Statement for England

A.15 The Noise Policy Statement for England (NPSE) [7] preceded the NPPF, and sets out the long term vision of Government noise policy. This vision is to 'Promote good health and a good quality of life through the effective management and control of noise within the context of Government policy on sustainable development' and is supported by three key aims:

- avoid significant adverse impacts on health and quality of life;

- mitigate and reduce to a minimum other adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.

A.16 These aims require that all reasonable steps should be taken to avoid, mitigate and minimise adverse effects of noise on health and quality of life whilst also taking into account the guiding principles of sustainable development, including social, economic, environmental and health considerations.

A.17 The NPSE applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise but does not apply to noise in the workplace (occupational noise).

A.18 Based on World Health Organisation (WHO) concepts for the definition of toxicological effects, the following thresholds are defined in the NPSE, to assist in the consideration of whether noise is likely to have 'significant adverse' or 'adverse' effects on health and quality of life:

No Observed Effect Level (NOEL)

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 noise.

Lowest Observed Adverse Effect Level (LOAEL)

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level (SOAEL)

This is the level above which significant adverse effects on health and quality of life occur.

A.19 Regarding the numerical definition of these levels, it is stated in the NPSE that:

> 'it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise

> sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.'

Planning Practice Guidance on Noise (PPG-N)

A.20 Planning Practice Guidance on Noise (PPG-N) [8] was issued in March 2014. This guidance provides advice to local planning authorities on the need to take into account the acoustic environment and to consider the following:

- 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.

A.21 PPG-N includes examples of how to recognise when noise could be a concern and provides example outcomes to which the Observed Effect Levels can be applied. A noise exposure hierarchy, which is based on likely average response, and example outcomes are presented and this hierarchy is re-presented in Table A.4 below.

Table A.4: Planning practice guidance Noise Exposure Hierarchy

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, 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 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, 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
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, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

A.22 Noise that is not noticeable is considered to fall into the category of No Observed Effect. Noise that is noticeable but not intrusive with no perceived change in the quality of life is considered to fall into the category of No Observed Adverse Effect, with no specific measures required. On this basis, the audibility of noise from a development is not, in itself, a criterion to judge noise effects that is commensurate with national planning policy.

A.23 Noise above the LOAEL causes small changes in behaviour. Examples of noise exposures above this threshold level include: having to turn up the volume on the television; needing to speak more loudly to be heard; where there is no alternative ventilation, closing windows for some of the time because of the noise; and, potential for some reported sleep disturbance. PPG-N guidance is generally consistent with the NPPF and NPSE on the need to mitigate and minimise effects above LOAEL, whilst taking into account the economic and social benefits derived from the activity causing the noise.

A.24 Noise exposures above the SOAEL cause material changes in behaviour and/or attitude. Examples of noise exposures above this threshold include: the avoidance of certain activities during periods of intrusion; keeping windows closed for most of the time because of the noise, where there is no alternative ventilation; potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. The PPG-N reinforces advice provided in the NPPF and NPSE, namely that effects above SOAEL should be avoided and that whilst the economic and social benefits derived from the activity causing the noise must be taken into account, such exposures are undesirable. Unacceptable Adverse Effects (UAE) should be prevented.

A.25 Various factors that influence concerns about noise are identified in PPG-N, although numerical noise limits are not presented. Factors include: source and absolute level of noise plus time of occurrence. For non-steady noise, the number of noise events, frequency and pattern of occurrence are cited. Spectral content and other acoustic characteristics including tonality, duration and cumulative impacts where there is more than one source are also raised as factors of concern. Where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect even where little or no change in behaviour is likely to occur.

Planning Practice Guidance on Minerals (PPG-M)

A.26 The NPPF issued in March 2012 and amended in July 2018, superseded a number of Planning Policy Statements, Planning Policy Guidance and other national guideline documents.

A.27 Principal issues regarding the control and mitigation of noise emissions are set out in PPG-M [9] paragraph 019, namely:

> - ‘consider the main characteristics of the production process and its environs, including the location of noise sensitive properties and sensitive environmental sites;
> - assess the existing acoustic environment around the site of the proposed operations, including background noise levels at nearby noise-sensitive properties;
> - estimate the likely future noise from the development and its impact on the neighbourhood of the proposed operations;
> - identify proposals to minimise, mitigate or remove noise emissions at source; and
> - monitor the resulting noise to check compliance with any proposed or imposed conditions.’

A.28 PPG-M paragraph 020 states:

> ‘Mineral planning authorities should take account of the prevailing acoustic environment and in doing so consider whether or not noise from the proposed operations would:

- give rise to a significant adverse effect;
- give rise to an adverse effect; and
- enable a good standard of amenity to be achieved.

> In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure would be above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy.'

A.29 PPG-M paragraph 021 states:

> 'Mineral planning authorities should aim to establish a noise limit, through a planning condition, at the noise-sensitive property that does not exceed the background noise level ($L_{A90,1h}$) by more than 10dB(A) during normal working hours (0700-1900). Where it will be difficult not to exceed the background level by more than 10dB(A) without imposing unreasonable burdens on the mineral operator, the limit set should be as near that level as practicable. In any event, the total noise from the operations should not exceed 55dB(A) LAeq, 1h (free field). For operations during the evening (1900-2200) the noise limits should not exceed the background noise level ($L_{A90,1h}$) by more than 10dB(A) and should not exceed 55dB(A) LAeq, 1h (free field). For any operations during the period 22.00 – 07.00 noise limits should be set to reduce to a minimum any adverse impacts, without imposing unreasonable burdens on the mineral operator. In any event the noise limit should not exceed 42dB(A) LAeq,1h (free field) at a noise sensitive property. Where the site noise has a significant tonal element, it may be appropriate to set specific limits to control this aspect. Peak or impulsive noise, which may include some reversing bleepers, may also require separate limits that are independent of background noise (e.g. Lmax in specific octave or third-octave frequency bands – and that should not be allowed to occur regularly at night.) Care should be taken, however, to avoid any of these suggested values being implemented as fixed thresholds as specific circumstances may justify some small variation being allowed.'

A.30 Paragraph 022 states:

> 'Activities such as soil-stripping, the construction and removal of baffle mounds, soil storage mounds and spoil heaps, construction of new permanent landforms and aspects of site road construction and maintenance. Increased temporary daytime noise limits of up to 70dB(A) LAeq 1h (free field) for periods of up to eight weeks in a year at specified noise-sensitive properties should be considered to facilitate essential site preparation and restoration work and construction of baffle mounds where it is clear that this will bring longer-term environmental benefits to the site or its environs. Where work is likely to take longer than eight weeks, a lower limit over a longer period should be considered. In some wholly exceptional cases, where there is no viable alternative, a higher limit for a very limited period may be appropriate in order to attain the environmental benefits. Within this framework, the 70 dB(A) LAeq 1h (free field) limit referred to above should be regarded as the normal maximum.'

Horizontal Guidance Note IPCC H3, Horizontal Guidance for Noise

A.31 Horizontal Guidance Note IPCC (Integrated Pollution Prevention and Control) H3 [10] has been produced by the Environment Agency (EA) for England and Wales in collaboration with the Scottish Environment Protection Agency (SEPA) and the Northern Ireland Environment and Heritage Service (EHS). The stated aim of the guidance is:

> 'The purpose of this IPPC Horizontal Guidance Note for Noise Assessment and Control is to provide supplementary information, relevant to all sectors, to assist Applications in preventing and minimising emissions of noise and vibration as described in the IPPC Sector Guidance Notes (or the General Sector Guidance Note).'

A.32 IPPC is a regulatory system that adopts a cohesive approach to control the environmental impacts of certain industrial activities and involves defining controls for industry to protect the environment via a permitting process.

A.33 To obtain a permit, operators must demonstrate the application of Best Available Techniques (BATs) together with the attainment of other certain criteria which include consideration of relevant local factors.

A.34 Part 1 of the Horizontal Guidance has now been withdrawn, although Part 2 on noise assessment and control remains current at the time of the preparation of these guidelines. This Part 2 document is aimed at both Regulators and Operators and provides the principles of noise measurement and prediction, the control of noise by design, by operation and management techniques and abatements

A.35 The regulation of noise under IPPC brings together several legislative regimes with differing scopes but similar purpose and in some instances with require co-ordination between the Regulator, Planners and Environmental Health/Protection Teams. Within the early stages, lead Planners and Environmental Health/Protection offices should be consulted to ensure effective liaison and consultation with relevant parties.

BS 4142: 2014 'Methods for rating and assessing industrial and commercial sound'

A.36 Procedures are set out in BS 4142:2014 [11] for the determination of: rating levels for sources of sound of an industrial and/or commercial nature; and, ambient, background and residual sound levels at outdoor locations. These procedures support: the investigation of complaints; the assessment of sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and, the assessment of sound at proposed new dwellings or premises used for residential purposes.

A.37 The foreword to BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' provides the following introduction for the assessment of human response to sound:

> 'Response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact, for example, can depend on such factors as the margin by which a sound exceeds the background sound level, its absolute level, time of day and change in the

> acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood.'

A.38 The note to paragraph 8.5 of BS 4142:2014 is relevant to the assessment of the proposed development, and states:

> 'Where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation.'

A.39 BS 4142:2014 primarily provides a numerical method by which to determine the significance of sound of an industrial nature (i.e. the 'specific sound' from the proposed development) at residential noise sensitive receptors (NSRs). The specific sound level may then be corrected for the character of the sound (e.g. perceptibility of tones and/or impulses), if appropriate, and it is then termed the 'rating level', whether or not a rating penalty is applied. The 'residual sound' is defined as the ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.

A.40 The specific sound levels should be determined separately in terms of the $L_{Aeq,T}$ index over a period of T = 1-hour during the daytime and T = 15-minutes during the night-time. For the purposes of the Standard, daytime is typically between 07:00 and 23:00 hours and night-time is typically between 23:00 and 07:00 hours.

A.41 Certain acoustic features can increase the significance of the impact over that expected from a basic comparison between specific sound level and the background sound level. These features include tonality and impulsivity, as well as intermittency. Where appropriate, a rating penalty for sound based on a subjective assessment of its characteristics should be established as set out in Table A.5 below. In other circumstances an objective appraisal of tonal and/or impulsive characteristics may be appropriate.

Table A.5 Subjective Corrections for Acoustic Characteristics

Acoustic Feature	Correction, dB to Specific Noise Level		
	Just Perceptible	Clearly Perceptible	Highly Perceptible
Tonality	2	4	6
Impulsivity	3	6	9
Other Characteristics	3		
Intermittency	3		

A.42 Consideration and documentation of the uncertainty in assessment outcome and the determination of representative background noise levels from contiguous or disaggregated measurement intervals of normally not less than 15 minutes are specified in this standard. One example of the statistical analysis of background noise levels based on modal value is presented in the standard, although this should not automatically be assumed to be the representative value. Lower quartile values have previously been used on developments in SCC and elsewhere to determine representative levels with good effect.

A.43 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level of the specific sound. In the context of the Standard, adverse impacts include, but are not limited to, annoyance and sleep disturbance. Typically, the greater this difference, the greater is the magnitude of the impact:

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

A.44 Whilst there is a relationship between the significance of impacts determined by the method contained within BS 4142:2014 and the significance of effects described in the PPG-N, there is not a direct link. It is not appropriate to ascribe numerical rating / background level differences to LOAEL and SOAEL because this fails to consider the context of the sound, which is a key requirement of the Standard.

A.45 The significance of the effect of the noise in question (i.e. whether above or below SOAEL and LOAEL) should be determined on the basis of the initial estimate of impact significance from the BS 4142:2014 assessment with reference to the examples of outcomes described within the PPG-N and after having considered the context of the sound. It is necessary to consider all pertinent factors, including:

- the absolute level of the sound;
- the character and level of the residual sound compared to the character and level of the specific sound; and
- the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
  - facade insulation treatment;
  - ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
  - acoustic screening.

BS 5228 ‘Code of Practice for Noise and Vibration Control on Construction and Open Sites’

BS 5228-1:2009+A1:2014 ‘Code of Practice For Noise and Vibration Control on Construction and Open Sites - Part 1: Noise’

A.46 Guidance on basic methods of noise control relating to construction and open sites is presented in Part 1 of BS 5228-1:2009+A1:2014. Methods for predicting and measuring noise, assessing impact and mitigation options including: engineering measures, restricted hours of working and setting of boundary or community noise limits are also presented.

BS 5228-2:2009+A1:2014 'Code of Practice For Noise and Vibration Control on Construction and Open Sites - Part 2: Vibration'

A.47 Criteria for the control of building damage and subjective effects of vibration are presented in BS 5228-2:2009+A1:2014. Guideline PPV values for the assessment of vibration on humans are re-presented in Table A.6 below.

Table A.6 BS 5228-2 PPV Guideline Values for Vibration Inside Buildings

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.

NB: values apply at locations which are representative of the point of entry into the recipient; transfer functions will be required where only external magnitudes are available; values provide an initial indication of potential effects, assessments in accordance with the principles of BS 6472 may be appropriate where the tabulated values are routinely measured or expected

BS 6472-1:2008 'Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting'

A.48 Perceptible vibration inside buildings can give rise to discomfort, disturbance and/or activity interference, as well as giving rise to concerns about building damage. The degree of annoyance experienced from the vibration can depend on a number of factors such as: the characteristics of vibration i.e. frequency (typically between 0.5 Hz and 80 Hz), duration, magnitude, continuous/transient/intermittent; time of day; audible noise that may accompany the vibration; and the activity someone may be undertaking or engaged in.

A.49 Guidance on the prediction of human response to vibration in buildings is presented in BS 6472-1:2008 [12] using vibration dose value (VDV) criteria to establish the probability of adverse comment which might be expected from building occupants based on criteria re-presented in Table A.7 below.

Consideration is given to the time of day and use made of the occupied space in buildings, whether residential, office or workshop.

Table A.7 Vibration Dose Values (m/s$^{1.75}$) above which various degrees of adverse comment may be expected in residential buildings

Place and time	Low probability of adverse comment[1]	Adverse comment possible	Adverse comment probable[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

[1] Below these ranges, adverse comment is not expected.
[2] Above these ranges adverse comment is very likely.

BS 7385: Part 2: 1993 'Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration'

A.50 PPV guideline values for the onset of various stages of damage are presented in Part 2 of this standard BS 7385: Part 2: 1993 [13] and the major difference between the sensitivity of people in feeling vibration and the onset of levels of vibration which damage the structure is identified. The following definitions of extent of damage are provided:

- *Cosmetic*: The formation of hairline cracks on drywall surfaces or the growth of existing cracks in plaster or drywall surfaces: in addition, the formation of hairline cracks in mortar joints of brick/concrete block construction.
- *Minor*: The formation of large cracks or loosening and falling of plaster or drywall surfaces or cracks through bricks/concrete blocks.
- *Major*: Damage to structural elements of the building, cracks in support columns, loosening of joint, splaying of masonry cracks, etc.

A.51 Criteria for minor and major structural damage to buildings are based on magnitudes of vibration which are greater than twice and four times those required to cause cosmetic damage, respectively.

A.52 According to BS 7385: Part 2: 1993, the threshold for the onset of potential cosmetic damage (i.e. formation of hairline cracks on drywall surfaces or the growth of existing cracks in plaster or drywall surfaces) to residential or light

commercial buildings varies with frequency. This ranges from a component PPV of 15 mms-1 at 4 Hz, rising to 20 mms-1 at 15 Hz, and to 50 mms-1 at and above 40 Hz.

A.53 BS 7385: Part 2 vibration guide values (maximum of three orthogonal components of velocity measured at the base of the affected building) are re-presented in Table A.8 below.

Table A.8 BS 7385-2 Transient Vibration Guide Values for Cosmetic Damage

Type of Building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings.	50 mms^{-1} at 4 Hz and above	
Unreinforced or light framed structures. Residential or light commercial type	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

A.54 The vibration magnitudes presented in the above Table are suggested limits for a minimal probability of vibration-induced cosmetic damage. Information is also provided in BS 7385: Part 2 which indicates that the risk of damage tends to zero below 12.5 mms-1 peak component particle velocity.

A.55 Below a frequency of 4 Hz, where high displacement is associated with a relatively low peak component particle velocity value, A maximum displacement of 0.6 mm (zero to peak) is also recommended in BS 7385: Part 2, in addition to the above PPV thresholds but only for unreinforced, light framed structures, residential or light commercial type buildings.

British Standard 8233:2014 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’

A.56 BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' [14] provides guidance on the control of noise for new and refurbished buildings. The standard covers planning and design; control of noise from external sources; information on factors affecting sound insulation; and noise from building services. Design considerations and noise criteria for specific types of buildings are included in the standard, covering indoor

ambient noise levels, noise ratings, internal sound insulation, reverberation time, privacy requirements, and noise emissions where applicable.

A.57 Clause 7.7.4 and Table 6 of BS 8233:2014 suggest ambient noise levels within non-domestic buildings that should not normally be exceeded. The design ranges provided in Table 6 are reproduced in Table A.9 below.

Table A.9: BS 8233:2014 Typical Noise Levels in Non-Domestic Buildings

Activity	Location	Design Range $L_{Aeq,T}$ (dB)
Speech or telephone communications	Department store, cafeteria, canteen, kitchen	50 - 55
	Concourse, corridor, circulation	45 - 55
Study and work requiring concentration	Library, gallery, museum	40 - 50
	Staff/meeting room, training room	35 - 45
	Executive office	35 - 40
Listening	Place of worship, counselling, meditation, relaxation	30 - 35

Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7, Traffic Noise and Vibration (DMRB)

A.58 A methodology for the assessment of noise from road traffic to establish the magnitude and significance of any change due to a highway scheme is set out in DMRB[15]. The evaluation of road traffic noise impacts due to new or altered highways is based on the calculated changes in $L_{A10,18hr}$ noise levels outside residential dwellings. The methodology is often used for the assessment of changes in road traffic noise levels on local roads as a result of major developments.

A.59 It is stated in paragraph 3.5 of DMRB HD 213/11 that:

> 'The threshold criteria used for traffic noise assessment during the day is a permanent change in magnitude of 1 dB $L_{A10,18h}$ in the short term (i.e. on opening) or a 3 dB $L_{A10,18h}$ change in the long term (typically 15 years after project opening). For night time noise impacts, the threshold criterion of a 3 dB $L_{night,outside}$ noise change in the long term should also apply but only where the $L_{night,outside}$ is predicted to be greater than 55 dB for any scenario.'

A.60 It is further stated in paragraph 3.37 of DMRB HD 213/11 that:

> 'A change in road traffic noise of 1 dB $L_{A10,18h}$ in the short term (e.g. when a project is opened) is the smallest that is considered perceptible. In the long term (typically 15 years after project opening), a 3 dB $L_{A10,18h}$ change is considered perceptible.'

A.61 DMRB guidance indicates that a 25% increase in traffic flows will result in a 1 dB(A) increase in road traffic noise levels. Conversely, a 20% reduction in traffic flows will result in a decrease of 1 dB(A) in road traffic noise levels. The guidance also provides a semantic scale for the classification of long term magnitude of impact and this is re-presented in Table A.10 below.

Table A.10 DMRB Classification of Magnitudes of Noise Impacts in the Long Term

Change in Noise Level dB(A)	Magnitude of Noise Impact
0.0	No Change
0.1 – 2.9	Negligible
3.0 – 4.9	Minor
5.0 – 9.9	Moderate
> 9.9	Major

The Calculation of Road Traffic Noise (CRTN)

A.62 CRTN [16] provides procedures for measuring and calculating road traffic noise levels for new and altered highways.

A.63 Traffic and the level of noise it generates fluctuate in intensity hourly, daily and seasonally and so the impact of traffic noise is assessed in terms of a time-averaged indicator. Traffic noise levels are predicted using the $L_{A10,18h}$ index in dB. This is the noise level exceeded for 10% of the time for each hour of the 18-hour period from 06:00 to 24:00 hours on an average weekday. The main determinant in calculating road traffic noise is the annual average weekday traffic (AAWT) for the 18-hour period from 06:00 to 24:00 hours. In addition to the traffic flow, the calculation of road traffic noise levels take into account the following factors:

- traffic composition expressed as the percentage of heavy vehicles;
- mean traffic speed (km/hr);
- road gradient (percentage);
- type of road surface and texture (texture depth in mm);

- distance of the reception point from the road;
- nature of the ground cover between the road and the building (i.e. acoustically hard or absorbent ground);
- the shielding effect of intervening obstructions such as buildings and topographical features;
- the shielding effects of any purpose-built noise barriers or cuttings forming part of the Scheme design;
- reflections from barriers, walls or buildings on the opposite side of the road;
- reflections from the façade of the building at the reception point; and
- the additive effects of noise from more than one road or section of road.

Building Bulletin 93 – Acoustic Design of Schools

A.64 In February 2015 the Department of Education and the Education Funding Agency published the updated Building Bulletin 93 (BB 93 2015) [17]. This document supersedes BB 93 published in 2003 (BB 93 2003) [18] and sets out minimum performance standards for the acoustics of school buildings and the document is meant to be read in conjunction with 'Acoustics of Schools; a design guide' [19] published by the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA).

A.65 The performance standards described in BB 93 2015 provide performance targets for compliance with the Requirement from Part E of the Building Regulations 2010 (as amended):

> 'Each room or other space in a school building shall have the acoustic conditions and the insulation against disturbance by noise appropriate to its intended use.'

A.66 Acoustic performance standards are set out in Section 1 of BB 93 2015. Meeting these standards is the normal way of satisfying Requirement E4 of Building Regulations 2010, the School Premises Regulations 2012 and the Independent School standards.

A.67 According to the BB 93 2015 document the objective is to provide suitable indoor ambient noise levels (IANL) for:

- clear communication of speech between teacher and student;

- clear communication between students; and
- learning and study activities.

A.68 The IANL includes contributions from external sources outside the school premises (including, but not limited to, noise from road, rail and air traffic, industrial and commercial premises), and building services sources (e.g. ventilation systems, plant, drainage, etc).

A.69 The IANL excludes noise associated with teaching activities, equipment used in the teaching space, and rain noise on lightweight roofs and roof glazing.

A.70 The performance standards are presented in terms of the 'upper limits for indoor ambient noise levels in terms of $L_{Aeq,30mins}$ during normal teaching hours'. Values are provided for both new buildings and for conversions and refurbishments of existing buildings.

A.71 It is stated in BB 93 2015: 'That in order to protect students from regular discrete noise events, eg, aircraft or trains, indoor ambient noise levels should not exceed 60 dB $L_{A1,30mins}$. This is achieved by default for spaces with IANLs up to 40 dB $L_{Aeq30min}$ but requires assessment in spaces with higher IANL limits e.g., 45 and 50 dB.'

A.72 A set of tabulated objective indoor ambient noise levels for different room spaces within schools is provided in BB 93 document.

A.73 Because of BB 93 2015's explicit link to the Building Regulations it does not provide direct guidance on external noise other than in the determination of the IANLs within classrooms. This is a material change to the previous version of BB93 2003.

ANC / IOA – The Acoustics of Schools, A Design Guide

A.74 The Acoustics of Schools design guide was published in November 2015 and, on the subject of external areas, recommends that:

> For new schools, 60 dB $L_{Aeq,30min}$ should be regarded as an upper limit for external noise at the boundary of external areas used for formal and informal outdoor teaching, and recreation.

It may be possible to meet the specified indoor ambient noise levels on sites where external noise levels are as high as 70 dB $L_{Aeq,30min}$ but this will require considerable building envelope sound insulation, or screening.

Noise levels in unoccupied playgrounds, playing fields and other outdoor areas should not exceed 55 dB $L_{Aeq,30min}$ and there should be at least one area suitable for outdoor teaching activities where noise levels are below 50 dB $L_{Aeq,30min}$. If this is not possible due to a lack of suitably quiet sites, acoustic screening should be used to reduce noise levels in these areas as much as practicable, and an assessment of noise levels and of options for reducing these should be carried out.'

Artificial Grass Pitch (AGP) Acoustics - Planning Implications

A.75 'AGP Acoustics – Planning Implications' (PDF) [20], published by Sport England, provides details of the acoustics implications associated with AGPs and proposes noise criteria, assessment methods and practical measures to reduce noise from AGPs. The guidance follows on from an acoustics research programme involving detailed analysis of relevant noise guidance documents and site testing in a range of locations.

A.76 AGP Acoustics considers the World Health Organisation (WHO) 'Guidelines for Community Noise' [21] published in 1999, which provides guidance for noise levels in outdoor living areas. It states that, to avoid 'moderate annoyance' during the daytime and evening, the noise levels should not exceed 50 dB $L_{Aeq,T}$, for a 16 hour daytime period from 07:00 to 23:00 hrs. AGP Acoustics states that a 16 hour assessment period may not truly reflect the noise impact as it takes into account times of use and non-use and suggests an appropriate assessment time period of one hour, $L_{Aeq,1hour}$ as this is typically the time period for a community sports session on an AGP.

A.77 AGP Acoustics also draws upon other guidance from the National Physical Laboratory and states: '*it is not necessarily the case that where these levels are exceeded, the noise will adversely affect nearby residential properties'*. The document goes on to state that the IOA/IEMA guidance on the significance of a noise change is also helpful in the assessment of noise impacts.

A.78 The research in AGP Acoustics found that the most significant noise levels were generally derived from the voices of players (with the exception of some cases where impact noises of balls hitting perimeter strike boards and goal back boards were more noticeable). The document provides predictions of typical noise levels from AGPs at 10 m from the sideline halfway marking. However, it states that it is not possible to accurately determine the noise propagation of an AGP on a ‘one case fits all’ basis as reflections from buildings can increase the noise levels. It also states that, as noise levels vary with height, the height of dwellings needs to be specifically considered (i.e. sensitive rooms within flats may be more exposed to noise).

A.79 AGP Acoustics also provides practical advice regarding mitigation for impact noises and the use of acoustic barriers and bunds.

Glossary

Technical Terms

A-weighting/A-weighted

Weighting of the audible frequencies designed to reflect the response of the human ear to sound. The ear is more sensitive to sound at frequencies in the middle of the audible range than it is to either very high or very low frequencies. Sound measurements are often A-weighted (using a dedicated filter) to compensate for the sensitivity of the ear.

Ambient sound level / Ambient noise level

BS 4142:2014 defines the ambient sound level as the: 'totally encompassing sound in a given situation at a given time, usually from many sources near and far.' It is sometimes used to represent an environmental sound level defined specifically in terms of the L_{Aeq} index.

In the majority of other standards and guidance, the ambient sound level is referred to as the ambient noise level.

Background sound level / Background noise level

PPG-M refers to the background noise level as the: 'A-weighted sound pressure level of the residual noise at the assessment with no operation occurring at the proposed site, defined in terms of the $L_{A90,T}$.'

BS 4142:2014 defines the background sound level $LA_{90,T}$ as the: 'A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels' (i.e. a sound level defined specifically in terms of the LA90 index). The ambient sound level is a measure of the residual sound and the specific sound when present.

The terms 'ambient' and 'background' may be colloquially synonymous when describing environmental noise levels but this is not correct in formal terminology for acoustics terms.

Baseline sound or noise levels / Baseline sound or noise environment

The existing sound or noise levels before construction or operation of a development commences.

Decibel (dB)

Units of sound measurement and noise exposure measurement.

Equivalent continuous sound pressure level ($L_{Aeq,T}$)

Defined in BS 7445-2:1991 as the 'value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time' i.e. it is a measure of the noise dose or exposure over a period. It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise including noise mapping. It is also the unit that best reflects community response.

Façade/Free-field

This applies to the positions for either measurement or prediction. A façade position is one that effectively represents sound levels at a building but is conventionally taken at a position 1 m from the building; this includes reflections from the building. A free-field position is one that is at least 3.5 m from a building where reflection effects are not significant. The difference between a sound level measured at a façade position and a free-field position, assuming that there is a specific sound source that causes reflections, is that levels are around 3 dB higher at the façade, due to the reflection effects.

Frequency

The pitch of the sound, measured in Hz. The tonal quality of a sound is described and measured in terms of the frequency content and is commonly expressed as octave or third octave bands; the latter being the division of the octave bands into three for finer analysis, across the frequency spectrum. The smaller the octave band or third octave band centre frequency number defined in terms of Hz, the lower the sound. For example, 63 Hz is lower than 500 Hz and is perceived as a deeper sound. The attenuation due to air absorption and natural barriers increases with

frequency, i.e. low frequencies are always the most difficult to control/mitigate. Frequency ranges for commonly occurring sounds include:

- the low notes on a bass guitar are typically around 40 to 50 Hz;
- the lowest string on a guitar is typically about 80 Hz;
- middle C is about 250 Hz;
- the C above middle C is about 500 Hz;
- sound from cars in a residential area is generally around 250 and 500 Hz;
- Greenwich Mean-time signal (pips) is around 1 kHz;
- bird calls are generally around 2 to 5 kHz; and
- a ‘Shhh’ sound made by the mouth is mostly around 4 kHz and above.

Hertz (Hz)

The unit of frequency in cycles per second.

$L_{Aeq,T}$

See ‘Equivalent continuous sound pressure level’.

$L_{Amax,F}$

Maximum value of the A-weighted sound pressure level, measured using the fast (F) time weighting (in dBA).

L_{A90}

See ‘Background sound level’.

Loudness/Loud

The measure of the subjective impression of the magnitude or strength of a sound as perceived by the human ear.

Noise and Sound

Response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact, for example, can depend on such factors as the margin by which a sound exceeds the background sound level, its absolute level, time of day and change in the acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood. Sound

can be measured by a sound level meter or other measuring system. Noise is related to a human response and is routinely described as unwanted sound, or sound that is considered undesirable or disruptive.

Octave

The range between two frequencies whose ratio is 2:1.

Octave bands

Groups of frequencies defined by standards where the upper frequency of each band is equal to twice the lower frequency of the next higher band. Octave bands are usually named by their geometric centre frequency. For example, the octave band extending between 44.7 Hz and 89.1 Hz is called the 63 Hz octave band. The octave band extending between 89.1 Hz and 178 Hz is called the 125 Hz octave band. The full complement of octave bands in the audible frequency range is as follows: 31.5, 63, 125, 250, 500, 1,000, 2,000, 4,000, 8,000 and 16,000 Hz.

Rating level, $L_{Ar,Tr}$

BS 4142:2014 (Ref 15-11) defines the rating level as 'The specific noise level plus any adjustment for the characteristic features of the noise.'

Reflection

Sound can be reflected by hard surfaces including water which is acoustically hard and reflection effects can affect sound levels.

Slow/Fast Time Weighting

The response speed of the detector in a sound level meter. Slow response time is 1 second; fast response time is 1/8 second (0.125 seconds) and will detect changes in sound levels more rapidly than measurements made with Slow time-weighting.

Sound

See 'Noise and Sound'.

Sound Power Level (SWL, L_w)

A sound power level is a measure of the total power radiated as sound by a source in all directions. It is a property of the source and is essentially independent of the measuring environment. The sound power level of a source is expressed in decibels

(dB) and is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to a reference sound power. The reference sound power in air is normally taken to be 10^{-12} watt.

Sound Pressure Level (SPL)

Sound pressure is the dynamic variation of the static pressure of air and is measured in force per unit area. Sound pressure is normally represented on a logarithmic amplitude scale, which gives a better relationship to the human perception of hearing. The sound pressure level is expressed in decibels (dB) and is equal to 20 times the logarithm to the base 10 of the ratio of the sound pressure at the measurement location to a reference sound pressure. The reference sound pressure in air is normally taken to be 20 µPa, which roughly corresponds to the threshold of human hearing.

Sound spectrum

A sound represented by its frequency components.

Source term

The acoustic properties of a source defined as a sound power level or as a sound pressure level under specific measurement conditions. Source terms are sometimes provided as a spectrum.

Specific sound level, $L_{Aeq,Tr}$

BS 4142:2014 defines the specific sound level as the ‘equivalent continuous A-weighted sound pressure level produced by the specific sound source over a given reference time interval’.

Third-octave bands / 1/3rd octave band

Frequency ranges where each octave is divided into one-third octaves.

Tonal

Sound sources sometimes contain audible or measurable components that can be identified as hums, whistles etc. The presence of these tonal components is sometimes considered to add an extra, annoying quality to the sound.

Abbreviations

AGP Artificial Grass Pitch

ANC Association of Noise Consultants

AWP All Weather Pitch

BAT Best Available Techniques

BB 93 Building Bulletin 93

BS British Standard

CNVMP Construction Noise and Vibration Management Plan

CPA County Planning Authority

CRTN Calculation of Road Traffic Noise

dBA Decibels A-weighted

DCLG Department for Communities and Local Government

DfE Department for Education

DMRB Design Manual for Roads and Bridges

EA Environment Agency

EIA Environmental Impact Assessment

EfW Energy from Waste

EHS Environment and Heritage Service

Hz Hertz

IANL Indoor Ambient Noise Level

IOA Institute of Acoustics

IPPC Integrated Pollution Prevention Control

ISO International Organisation for Standardisation

ISS Independent School Standards

LOAEL Lowest Observed Adverse Effect Level

NOEL No Observed Effect Level

NPPF National Planning Policy Framework

NSR Noise Sensitive Receptor

NPSE Noise Policy Statement for England

MPA Minerals Planning Authority

MRF Material Recovery Facility

MUGA Multi-use Games Area

NIA Noise Impact Assessment

ONVMP Operational Noise and Vibration Management Plan

PPG 24 Planning Policy Guidance 24: Planning and Noise

PPG-M Planning Practice Guidance for Minerals

PPG-N Planning Practice Guidance – Noise

PPV Peak Particle Velocity

SEPA Scottish Environment Protection Agency

SOAEL Significant Observed Adverse Effect Level

SPR School Premises Regulations

UAE Unacceptable Adverse Effect

VDV Vibration Dose Value

WHO World Health Organization

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