



UTTLESFORD DISTRICT COUNCIL

Noise Assessment Technical Guidance

June 2017

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Scope

This document has been prepared in relation to UDCs local plan policy on noise.

It is designed to take account of Planning Practice Guidance, British Standards, National Policy and other guidance to ensure that developments achieve the highest possible standards without compromising the health and well-being of people that live and work within Uttlesford District Council (UDC)

The technical guidance aims to provide help and advice in relation to noise in a planning context to encourage good acoustic design. Applicants, developers and acoustic consultants are advised to read and have regards to this document prior to submitting a planning application.

It should be noted that while this technical guidance endeavours to reflect current best practice, it shall be reviewed following the release of new or updated national policy, guidance, standards and evidence

1. Introduction

- 1.1 Noise can have significant detrimental effects on the environment, health and quality of life. Evidence exists that links aviation noise to impaired cognitive learning in children and long term exposure of noise to increased risks of heart disease and hypertension.
- 1.2 Noise is often an important factor in assessing the environmental acceptability of a development proposal. It is a material consideration in the planning process and it is this primary mechanism for local authorities to prevent serious conflicts between different land uses.
- 1.3 Many developments can generate significant amounts of noise or are sensitive to the impact of noise. It is the responsibility of Uttlesford District Council as Local Planning Authority to ensure that developments are appropriately designed to protect people from the harmful effects of noise.
- 1.4 Although undertaking a noise survey and assessment as part of the planning application process will incur a financial cost for a developer, the costs of remedying any noise problems post development are likely to be much higher.
- 1.5 This document provides guidance to applicants and consultants concerning the assessment and prediction of environmental noise.
- 1.6 This document provides guidance that is not exhaustive. If you have any questions or wish to discuss the requirements of a specific noise assessment please contact Environmental Health by registering your enquiry at: Environmentalhealth@uttlesford.gov.uk

2.0 Noise

- 2.1 Noise is defined as unwanted sound (whether that is music, industrial machinery or road traffic) and is an unavoidable part of everyday life. It can be a source of stress and irritation and can have a detrimental impact on people's health and wellbeing.

3.0 Noise & Planning

- 3.1 Typically any developments involving residential dwellings are the most noise-sensitive, whilst industrial developments such as general industry are one of the least noise sensitive. However, industrial and commercial uses are amongst the most likely to cause a noise impact. Thus, many developments require noise control or protection measures to mitigate against the effects of noise from outside sources, which include the effects of noise from road or rail, aircraft, industry or commercial premises.

3.2 The express inclusion of noise in the National Planning Policy Framework (NPPF) means that it is a material planning consideration for local planning decisions.

4.0 The role of Environmental Health

4.1 Environmental Health (EH) is a planning consultee. The Planning Department will consult EH on all developments that may be subject to adverse levels of noise.

4.2 EH considers a number of environmental issues including noise and vibration, before making a recommendation to the Planning Department. Typically these recommendations take the following form:

- I. Planning consent may be granted without any need for noise conditions.
- II. Planning consent may be granted subject to the inclusion of suitable noise conditions.
- III. Planning consent should be refused on noise grounds in order to avoid significant adverse effects.
- IV. Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects.

4.3 The recommendations made by EH are not binding on the Planning Authority who will consider all relevant issues concerning a planning application. In addition to making recommendations to the Planning Department, EH are also there to provide advice to applicants and their consultants prior to the submission of a planning application and/or the preparation of a noise assessment.

5.0 Planning Policy & Guidance

5.1 Practitioners will be aware that the previous policy and technical advice on planning and noise matters which was contained in PPG 24 has been withdrawn. New concepts such as Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) have been introduced to the assessment, management and control of noise via the planning system and are defined later within this document.

5.2 However, whilst new policy objectives have been introduced, supporting technical advice and guidance is largely missing. The government has advised that it does not intend to provide specific technical guidance. What is clear is that in line with the government's localism agenda, noise policy is expected to be driven by at a local level, taking into account current knowledge and existing standards.

6.0 National Planning Policy Framework

- 6.1 NPPF was published in March 2012 and sets out the government's planning policies for England and how these are expected to be applied.
- 6.2 The framework states (among other commitments) that the planning system should **contribute to and enhance** the natural and local environment by: *“preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or **noise pollution** or land instability”*.
- 6.3 The express inclusion of noise in the NPPF means that it is a material planning consideration for local planning decisions. It replaces the now withdrawn Planning Policy Guidance (PPG) Note 24.
- 6.4 Paragraph 123 of the NPPF document states that planning policies and decisions should aim to:
- A. Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
 - B. Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
 - C. Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
 - D. Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

7. Noise Policy Statement for England

- 7.1 The Noise Policy Statement for England (NPSE) launched in March 2010 states the long term vision of Government noise policy is to *“promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development”*.
- 7.2 The long-term vision is supported by the following aims; through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:
- Avoid significant adverse impacts on health and quality of life;
 - Mitigate and minimise adverse impacts on health and quality of life;

- Where possible, contribute to the improvement of health and quality of life.

7.3 The intention is that the NPSE should apply to all types of noise apart from noise in the workplace (occupational noise).

8.0 National Planning Practice Guidance

8.1 The National Planning Practice Guidance (PPG) is a web-based resource, launched by the Department for Communities and Local Government (DCLG) in March 2014 to support the NPPF and make it more accessible. It can be found at the following web address:

<http://www.planningguidance.planningportal.gov.uk>.

It advises on how planning can manage potential noise impacts in new development. The guidance is regularly reviewed and updated and noise is listed as a specific category. The guidance is for ad-hoc developments, as major infrastructure is covered by overarching National Policy Statements.

8.2 Listed below are the paragraph headings contained within the PPG and it is strongly recommended that the information presented in this document is read in conjunction with the web-based resource:

- When is noise relevant to planning?
- Can noise override other planning concerns?
- How to determine the noise impact
- Observed Effect Levels
- How to recognise when noise could be a concern
- What factors influence whether noise could be a concern
- Enforcement action against a statutory nuisance
- How can the adverse effects of noise be mitigated?
- Are there further considerations relating to mitigating the impact of noise on residential developments?
- Can Local Plans include noise standards?
- Are noise concerns relevant to neighbourhood planning?
- What factors are relevant to identifying areas of tranquillity?

8.3 A summary of the effects of noise exposure (in terms of health and quality of life) associated with both noise generating developments and noise sensitive developments is presented within the PPG and reproduced in Table 1.

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 (NOAEL)	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
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 (SOAEL)			
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
Noticeable and very intrusive	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

Table 1. Noise exposure hierarchy, based on the likely average response.

- 8.4 PPG on noise does not provide numerical values for the different effect levels, instead recognising that ‘the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation’.
- 8.5 It therefore remains for local authorities to consider the PPG noise exposure hierarchy and seek to align it with significance criteria, having regard to British Standards, World Health Organisation guidance and other relevant sources of evidence.

9.0 Local Policy

9.1 The Uttlesford Pre-Submission Local Plan 2017 provided the following relevant policies linked to noise:

Policy SP 12

Sustainable Development Principles

The Council will support development which ensures the prudent and sustainable management of the District's towns, villages and countryside by:-

- **employing best practice in sustainable design and construction;**
- **encouraging the redevelopment of previously-developed land which is unused or under-used for uses which are sustainable and protect the natural environment in that location;**
- **minimising the amount of unallocated greenfield land that is developed;**
- **retaining and enhancing the character, appearance and setting of those areas, settlements or buildings that are worthy of protection;**
- **reducing, to an acceptable level, any pollution that may result from development;**
- **reducing, to an acceptable level, any impacts arising from known or potential contamination both on development sites and on sites which affect development sites;**
- **locating development on land identified as being at low risk from flooding and taking into account any potential increased risk of flooding from new development;**
- **promoting development that minimises consumption of and protects natural resources including water;**
- **promoting development that makes provision for waste recycling; and**
- **promoting development which is located and designed to be energy efficient.**

Policy EN 15

Pollutants

The potential impacts of exposure to pollutants must be taken into account in locating development, during construction and in use.

Planning permission will not be granted where the development and uses would cause adverse impact to occupiers of surrounding land uses or the historic and natural environment, unless the need for development is judged to outweigh the effects caused and the development includes mitigation measures to minimise the adverse effects.

Developments sensitive to pollutants will be permitted where the occupants would not experience adverse impact, or the impact can be overcome by mitigation measures.

Policy EN 18

Noise Sensitive Development

Development will be permitted unless:

- The occupiers of surrounding land or the historic and natural environment is exposed to adverse levels of noise and/or vibration (as defined within UDCs Noise Impact Technical Guidance). Potentially noisy developments shall normally be located in areas where noise will not be of significant consideration or where its impact can be minimised by mitigation.
- The future occupants of noise sensitive development would experience adverse levels of noise and/or vibration disturbance (as defined by UDC Noise Impact Technical Guidance).

Specifically applicants, where reasonable and proportionate, according to the end-use and nature of the area and application, must demonstrate that:

- Development has regard to current UDC Noise Assessment Technical Guidance and is assessed to the satisfaction of the Local Planning Authority

Any sources of noise and vibration generated by the development are adequately mitigated to prevent loss of amenity for existing and future occupants and land uses.

9.2 Specific to noise, policy EN18 aims to make sure that wherever practicable, noise sensitive developments are separated from major sources of noise such as road, rail and air transport and certain types of industrial development. The policy links with this technical guidance which will be reviewed on an annual basis to ensure that it remains relevant and takes into account up to date standards, limits and practices.

10.0 National & International Standards

10.1 The following reference documents and guidance constitute some of the more important sources of information relating to noise and the planning process:

11.0 World Health Organisation (WHO) Guidelines for Community Noise 1999

11.1 The guidelines were prepared as a practical response to the need for action on community noise at a local level, as well as the need for improved legislation, management and guidance at the national and regional levels.

11.2 The health based guidelines serve as the basis for deriving noise standards within the framework of noise management. Key issues for noise management include models for forecasting and assessing noise.

11.3 WHO says that the health effects of noise exposure are considered to be a public health problem of growing importance, where specific effects include sleep disturbance, annoyance responses, cardiovascular/psychological effects, performance reduction effects and effects on social behaviour. The guideline values have been derived from scientific studies over many years.

11.4 Table 4.1 of the document provides guideline values for community noise in specific environments which are repeated below:

Specific environment	Critical health effect(s)	LAeq (dB)	Time base (hours)	LAmx, fast (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

11.5 Further information on the health impacts of noise and health can also be found within the WHO Night Noise Guidelines for Europe 2009.

12.0 BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

- 12.1 BS 8233:2014 provides design guidelines for appropriate internal acoustic environments within buildings according to their function. It deals with control of noise from outside the building, noise from plant and services within it, and room acoustics for non-critical situations.
- 12.2 Table 4 in section 7.7.2 of the Standard provides indoor ambient noise levels for residential dwellings which are shown below:

Activity	Location	07.00 to 23.00	23.00 to 07.00
Resting	Living room	35 dB L _{Aeq, 16hour}	-
Dining	Dining room/area	40 dB L _{Aeq, 16hour}	-
Sleeping (daytime resting)	Bedroom	35 dB L _{Aeq, 16hour}	30 dB L _{Aeq, 8hour}

- 12.3 These are the sum total of structure borne and airborne noise sources. Ground borne (Vibration) noise should be assessed separately.
- 12.4 The levels are based on WHO Guidelines and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow this typical pattern, i.e. a nightclub operating between 23.00hrs to 03.00hrs, a more focused assessment should be carried out e.g. 1 hour measurement intervals should be used.
- 12.5 Regular individual noise events (aircraft or trains) can cause sleep disturbance and therefore a guideline may be set in relation to the SEL or LA_{max,F}. Typically the Council will require LA_{max} levels should not exceed 45dB within bedroom locations at night
- 12.6 If closed windows are to be relied upon to meet the values, there needs to be an appropriate alternative means of ventilation that does not compromise the façade insulation or the resulting noise level.
- 12.7 It states that where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5dB. However, consultants should not base their assessment on the 5dB relaxation.
- 12.8 Annex G contains a calculation method for noise levels inside a room, which is expected to be used for residential uses. Consultants should refer to the Environmental Health Officer concerning choice of calculation; however, the default position of the Council would be for assessments to be carried out in accordance with the rigorous calculation method given in G2 unless good valid reasons are given otherwise.

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

13.1 The assessment of noise of a commercial / industrial nature is commonly based on this standard. It describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

13.2 The assessment method in BS 4142 is based on the difference between the measured 'background sound level' without the influence of any industrial noise source, and the 'rating level' of the industrial source, at the receiver location.

13.3 The background sound level ($L_{A90,T}$) is the sound level existing in the absence of the 'specific sound level' at the receiver location. The specific sound level ($L_{Aeq,Tr}$) from the industrial source can be subject to a certain weighting (penalty) where it displays an identifiable character (such as tonality, impulsivity, intermittency or otherwise distinctive features) to provide a 'rating level' ($L_{Ar,Tr}$).

13.4 The background sound level is subtracted from the rating level and the difference used to inform the assessment of the effects. BS 4142 advises: 'The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level *and* the context in which the sound occurs'.

13.5 BS 4142 advises that an initial estimate of the impact of the specific sound be conducted by subtracting the measured background sound level from the rating level and consider the following:

- Typically, the greater this difference, the greater 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.

- 13.6. The standard is not designed to assess noise which is not of an industrial nature such as noise from sports facilities or noise from bars, pubs or clubs, public address systems or construction and demolition. However, in the absence of specific assessment criteria for other noise sources, the Council will require the impact of these sources to be made using the standard.

14.0 Professional Practice Guidance on Planning & Noise - May 2017

- 14.1 The Professional Practice Guidance on Planning & Noise (ProPG) was produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system. The guidance document encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise.
- 14.2 The ProPG acknowledges and reflects on Governments overarching noise Policy Statement for England, the National Planning Policy Framework and Planning Practice Guidance, as well as other authoritative sources of guidance (e.g World Health Organisation papers, British Standards etc)
- 14.3 The guidance recognises that whilst the current government planning policy and associated guidance does not prescribe specific numerical acoustic standards, the approach provided by the ProPG will result in a more consistent approach. The approach is set out within a framework and provides opportunities to incorporate effective design interventions that will enable residential development to proceed in areas that might otherwise have been considered unsuitable.
- 14.4 The scope of the guidance is restricted to the consideration of new residential development that will be exposed predominantly to airborne noise from transport sources. It strives to;
- advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
 - encourage the process of **good acoustic design** in and around new residential developments;
 - outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
 - improve understanding of how to determine the extent of potential noise impact and effect; and

- assist the delivery of sustainable development.
- 14.5 For the purposes of the ProPG, good acoustic design can involve, for example careful site layouts, landscaping and better orientation of rooms within dwellings.
- 14.6 In providing the above, the guidance sets out a two staged approach to assist with the delivery of sustainable development.. Stage 1, relates to an initial noise assessment of the proposed development site and Stage 2 requires the systematic consideration of four key elements
- 14.7 Stage 1, being the initial risk assessment requires an assessment by a competent noise practitioner to provide an indication of the likely risk of adverse effects from where no subsequent mitigation is proposed. As a minimum, UDC will require an assessment of 24 hours for small scale development and 72hours for larger developments involving 3 or more dwellings during representative conditions. It will be necessary to present typical worse case conditions over the next 15 years on the basis of this data. For the avoidance of doubt, the assessment should take into account a typical working week during good weather conditions, not significantly influenced by wind or rain.
- 14.8 The risk assessment provides a sense of the noise challenge at a potential residential development site and should be interpreted flexibly having regard to the locality, the project and wider context. The approach underpins the preparation and delivery of an ' Acoustic Design Statement' (ADS). An outline of the initial risk assessment is provided within figure 1 below.

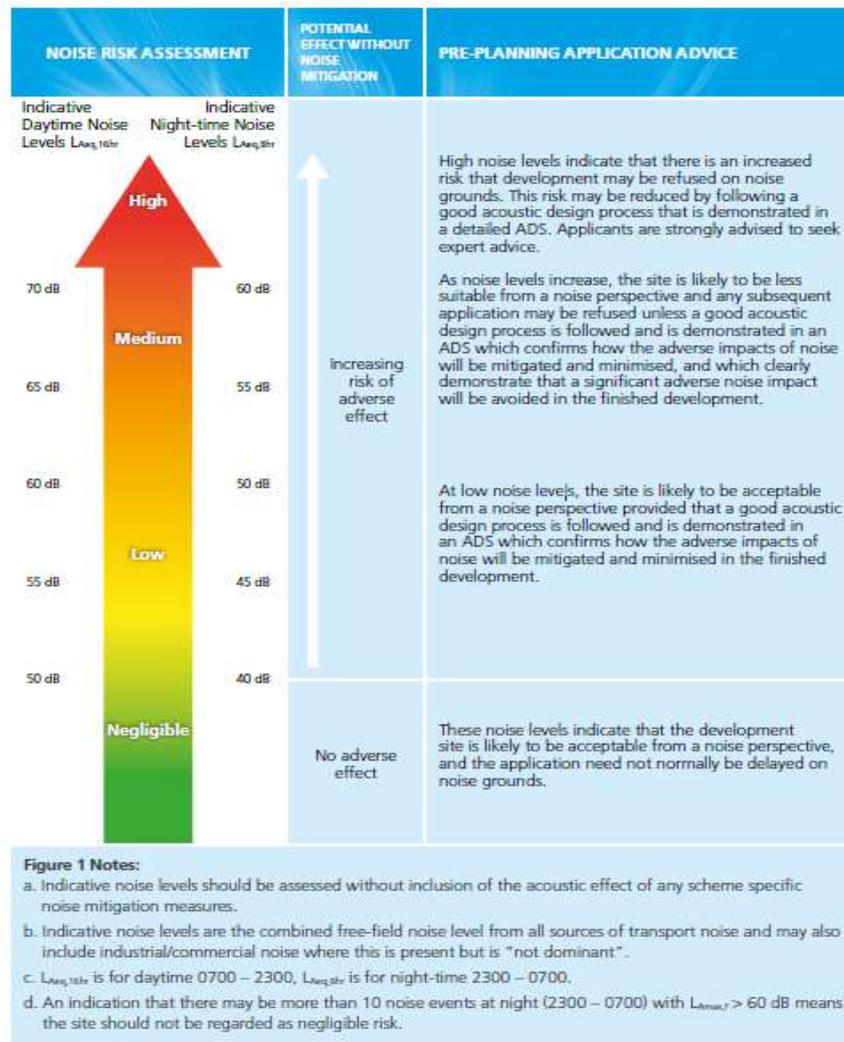


Figure 1. Stage 1– Initial Site Noise Risk Assessment

14.9 The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:

- Element 1 – demonstrating a “Good Acoustic Design Process”;
- Element 2 – observing internal “Noise Level Guidelines”;
- Element 3 – undertaking an “External Amenity Area Noise Assessment”;
- Element 4 – consideration of “Other Relevant Issues”.

14.10 The guidance suggests that the approach is underpinned by the preparation and delivery of an Acoustic Design Statement. A summary of the ProPG approach is given below.

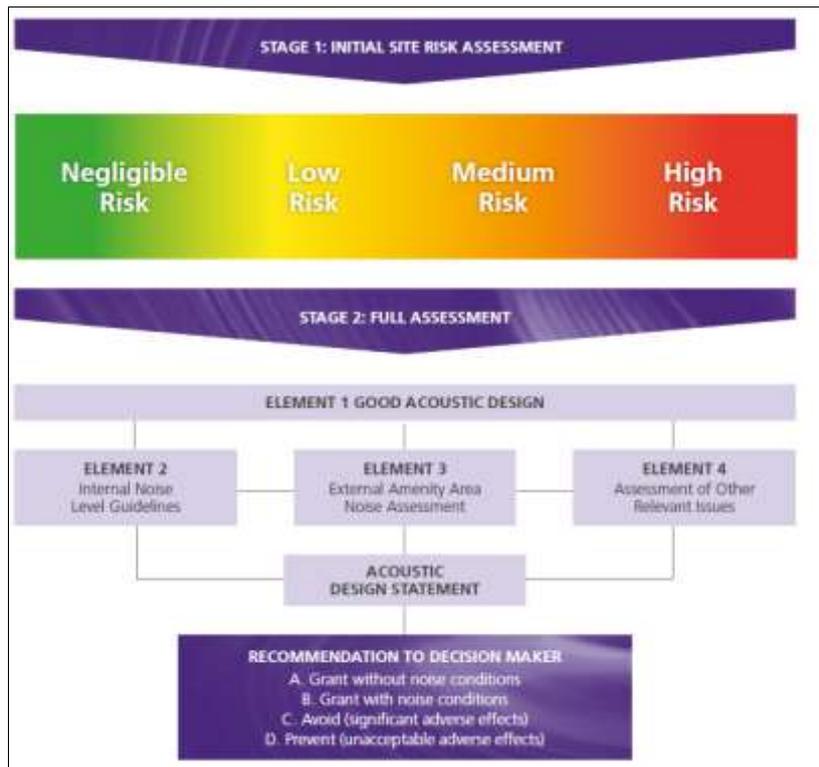


Figure2. Summary of ProPG approach

- 14.11 UDC Environmental Health Officer will scrutinise noise impact assessments to ensure that they are in line with the ProPG and will expect developers and practitioners to adopt the principles of good acoustic design. For this reason early dialogue with the Council’s Environmental Health Service is advised. Evidence will need to be provided at the planning application stages that good acoustic design principles have been properly considered before it can be considered for approval.
- 14.12 It should be noted, that the ProPG considers that suitable guidance on internal noise levels can be found in BS8233:2014. The ProPG adds weight to this guidance providing further points on clarity on how the standard should be interpreted, including night time internal L_{Amax} criteria.
- 14.13 In keeping with the guidance, Uttlesford District Council will request designers to achieve the internal guidelines set out within the ProPG and BS8233:2014 with windows open. Where this is not possible, full justification will be given in keeping with the principles of good acoustic design.
- 14.14 Where it is necessary for windows to be closed in order to meet internal noise criteria, internal noise levels will need to be assessed with any façade openings (such as trickle ventilators) in the open position.

- 14.15 Where a development scheme is reliant on open windows to mitigate against overheating, consideration will need to be given to a ventilation strategy as a further detailed assessment of impact will be necessary. Under these circumstances Uttlesford District Council will expect alternative mechanical or passive ventilation schemes to be proposed. Where mechanical schemes are proposed, the noise impact of these systems must also be assessed. Under these circumstances Uttlesford District Council will expect full justification of the ventilation approach to be provided within the ADS.
- 14.16 In accordance with BS:8233 2014, the design of the development should ensure that external amenity areas should not be above 50–55dB LAeq 16hr. Where external amenity spaces are likely to be above 55dB LAeq, developers are encouraged to engage with the Council at an early stage so that decisions can be made on the acceptable design and noise level. The development must be designed to achieve the lowest practicable noise levels in external amenity spaces. Where significant adverse impacts remain, despite the adoption of good acoustic design measures, UDC may accept proposals to off-set higher external noise levels as outlined within para 3(V) of the guidance document.
- 14.17 Information on the acceptability of residential development in these situations will be made on a case by case basis, having regard to Elements 1 & 4 of ProPG, supporting new guidance, national policy and evidence, in keeping with the principles of sustainable development to protect people from harmful effects of noise.

15.0 BS 5228: 2009 Code of practice for noise and vibration control on construction and open sites

- 15.1 This Standard is divided into two parts.
- *Part 1* provides basic information on the prediction and measurement of noise from construction sites and operations. Methods of assessment are included as well as review of relevant legislation. A database of noise levels for a wide range of equipment is also provided.
 - *Part 2* deals with vibration from construction and open sites. The legislative background is provided, together with information on vibration control. A review of relevant vibration criteria is provided together with guidance on measuring vibration.
- 15.2 BS 5228-2 indicates that construction activities (particularly piling) generally only generate vibration impacts when they are located less than 20 metres

from sensitive locations. The effect depends on the type of piling, ground conditions and receptor distance.

- 15.3 'Best Practicable Means' (as per the Control of Pollution Act 1974) should be adopted as a minimum in order to mitigate against construction phase noise effects.

16.0 *BS 6472: 2008 Guide to the evaluation of human exposure to vibration in buildings*

- 16.1 Provides guidance on the likely human response to differing levels of vibration. This standard should be used to assess the likely adverse impact of developments which are likely to cause significant levels of vibration. Where there is a concern that vibration caused by a development may damage or otherwise effect the structure of another building *BS 7385: 1990 Evaluation and measurement of vibration in buildings* can be used to determine the likelihood of this occurring.

17. Entertainment Venues

- 17.1 Noise from entertainment venues e.g. noise from recorded music, live bands, or karaoke, can be particularly annoying for local residents and businesses if it is not adequately contained within the venue.
- 17.2 When considering the potential impact of a proposal for an entertainment venue consultants should consider the overall noise level (L_{Aeq}) and the 63 Hz and 125 Hz octave band noise levels (L_{eq}).
- 17.3 Music noise in the 63 Hz and 125 Hz octave bands, which is often described as bass noise, is particularly difficult to contain and the impulsive and non-steady character of low frequency music noise is particularly disturbing for local residents exposed to it.
- 17.4 Applicants and consultants should note that although a particular business model may require a 'chilled out' or 'acoustic' venue, planning approval for an entertainment venue will remain in place as long as the development exists. Subsequent owners or tenants may wish to provide much louder entertainment in the future.
- 17.5 For this reason applicants and consultants should predict the noise impact of a proposed entertainment venue using noise levels that are representative of those found in 'typical' venues of the kind being applied for. Consultants should provide their rationale for using particular noise levels and reference the source of noise levels used for their predictions.
- 17.6 A lively bar can operate around 95dB L_{Aeq} and nightclubs can be even higher at 105dB L_{Aeq} . The range of levels at 63Hz and 125Hz octave bands is wider

than the A weighted levels and can be up to 115dB Leq and 110dB Leq respectively

- 17.7 There is a lack of consensus on an assessment method for noise levels within habitable rooms with regard to entertainment noise. The design aim however, should be for the design to be 'inaudible*'. The building structure is therefore key, and will usually involve a high performing solution in loud music venues.
- 17.8 Existing noise standards/criteria are not appropriate for evaluating low frequency noise; in almost all other situations the established noise descriptors are based on the A-weighted sound level (dBA) which effectively filters out low frequency sounds.
- 17.9 When dealing with noise control, especially at the lower frequencies it is usual to look at the octave band data as a Z-weighting (linear) and not the A-weighting, due in main to the amount you have to 'take off', resulting in meaningless data (-26.2dB at 63Hz) and also with respect to the sound insulation performance of various constructions materials.
- 17.10 Rather than just A-weighted levels being assessed e.g. internal noise levels as per BS 8233: 2014; a low frequency band analysis should also be carried out.

**Noise is considered to be inaudible when it is at a sufficiently low level such that it is not recognisable as emanating from the source in question and it does not alter the perception of the ambient noise environment that would prevail in the absence of the source in question.*

- 17.11 A planning application for a new entertainment venue that is structurally detached from other building uses should demonstrate that music noise from the proposal will not be 'audible' in nearby residential properties, assuming that the residential properties in question have their windows open. The criterion here is:

'Entertainment noise (L_{Aeq}) should be controlled to 10dB below the background noise level (L_{A90}) without the entertainment noise present, in each octave band at the nearest noise sensitive location'.

- 17.12 In order to control music noise levels so as not to exceed any agreed maximum permissible operating levels, a suitable noise limiting device is likely to be needed, in addition to structural acoustic treatments such as uprated lobby systems and size, location and fixing of loudspeakers.

18.0 Mixed Use Developments

- 18.1 Where a planning application includes a proposal to contain a potentially noisy development within the same building as a noise sensitive use or vice versa the noise survey should consider the transfer of noise between the noisy and noise sensitive uses.

18.2 An example of where this should be considered would be a proposal for a bar or club within the same building as residential properties. Consultants should demonstrate that the structure of the development will be sufficient to adequately contain the noise generated within the development. In doing so consultants should consider:

- flanking noise;
- structure borne noise;
- the overall level of noise (L_{Aeq}) generated by the use in question and any tonal or impulsive characteristics that the noise may contain; and
- the acoustic properties of the development (including the construction of party floors and/or walls, windows and doors, ventilation systems, and structural columns.)

19.0 Construction / demolition work

19.1 Noise from construction or demolition works as part of a development can be intrusive or disruptive to local businesses and/or noise sensitive land uses. For this reason construction or demolition activities should be restricted to daytime periods and have finite start and finish times.

19.2 All noisy works (i.e. those that are audible beyond the site boundary) should be restricted to the following hours to minimise disruption:

- **Monday - Friday: 7.30am - 6pm**
- **Saturday: 8.30am - 1pm**
- **Sunday / Bank holidays: No work generating observed noise impact**

These restrictions apply to deliveries/collections to the site.

19.3 By utilising set working hours for activities on site as well as deliveries to the site, respite is provided for local residents and businesses near to the development. Noise and disruption to local residents will occur during development works, so it is important to remember that local residents may not necessarily be in favour of the development or all aspects of it. By keeping an open dialogue and attempting to placate any complaints or grievances, the development is likely to progress more efficiently.

19.4 A Construction Management Plan (CMP) shall be submitted to and approved by the Council for large schemes. This would contain a Noise & Vibration section based on BS 5228 with reference to other relevant standards. It should also contain a community consultation strategy which includes how and when local businesses and residents will be consulted on matters such as out of hours works. Any proposal for out of hours works shall be submitted to and approved by Environmental Health section, the details of which should be submitted at least 28 days in advance of such works commencing.

20.0 Industrial / commercial developments

- 20.1 BS 4142 should be used to assess the likely impact of noise from industrial and commercial sources at noise sensitive premises (section 3.5). One of the indications of the impact of a BS 4142 assessment is 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*.
- 20.2 The Council consider that new developments should contribute and enhance the area in which they are located and where possible, contribute to the improvement of people's health and quality of life as per the NPSE. With this in mind, the design objective should be:
- 'The development should be designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location'**.
- 20.3 Where this criterion cannot be achieved, the various noise control measures considered as part of the assessment should be fully explained (i.e. relocation of noise sources, use of quieter equipment, enclosures, screening, and restriction of the hours of operation) and the achievable noise level should be identified. This information will allow us to make a judgement concerning the application and its likely impact on the surrounding area.
- 20.4 In addition to the above, maximum noise levels should also be adequately controlled. Where uses generate high noise levels of a short duration (e.g. loud bangs) on a regular basis, these should aim to be controlled so as not to exceed 55 dB (L_{Amax}) at the façade of noise sensitive premises nearby in accordance with the recommendations of the World Health Organisation.
- 20.5 Deliveries and collections are usually controlled by restricting operational hours but depending on the extent of these activities, a Noise Management Plan (NMP) may be requested, which would include an assessment of noise. This would usually involve assessing the noise upon arrival, loading/unloading period and then departure.
- 20.6 The NMP may also need to include controls such as acoustically sealed delivery bays, and restrictions on vehicle mounted refrigeration units and audible alarm systems. Where applicable, the noise assessment will take account of multiple noise sources operating simultaneously and state the cumulative level of these.

21.0 Noise and Vibration from Fixed Plant / Equipment

- 21.1 Noise from fixed plant, equipment or machinery can be very annoying and disruptive to people living nearby particularly where that item involved emits a noise with impulsive or tonal characteristics.
- 21.2 Many of the noise complaints Environmental Health receive about noise from plant, equipment and machinery specifically concern the character of the noise emitted.
- 21.3 Any noise assessment needs to consider not only the overall level of noise emitted but also its particular characteristics. The noise assessment should be based on BS 4142: 2014 and any application for fixed plant, equipment or machinery must demonstrate that:
- ‘Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location’.**
- 21.4 By designing the sound pressure level of any plant items to generate a noise impact of at least 5dB below the existing background level, any plant noise impact should be of a negligible level which should not give rise to complaints from users or occupiers of existing noise-sensitive usages.
- 21.5 Past experience has shown that this criterion can be readily achieved. Where available, product specification data for new items should be submitted with the acoustic report.
- 21.6 Consultants should be using these to compare with data from the noise survey, and propose mitigation where the levels are above those specified in the criterion. Where this information is not available, a consultant may choose to measure the noise levels generated by the equipment in question where the equipment has already been installed elsewhere (and in accordance with the guidance in BS 4142).
- 21.7 Where fixed plant, equipment or machinery is attached to a building the vibration caused by it can pass through the building structure and cause structure borne noise elsewhere in the building. Where it is to be installed in or on a building containing a noise sensitive use, structure borne noise should be considered in the noise assessment and adequate control measures should be proposed. An example of where this would be required is where there is a proposal to install fixed plant or equipment on the roof of a residential apartment block.

22.0 Other Potentially Noisy Activities

- 22.1 The following types of development proposals or applications may have additional specific guidance published to review noise impacts or may otherwise be a potential source of noise.
- 22.2 It is recommended that pre-application discussions are held with Environmental Health if any of the following application types are to be submitted:
- Motor car/bike tracks/speedways
 - BMX, skateboard, scooter, mountain bike tracks
 - MUGAs
 - Sport stadia
 - B2 Use Class developments
 - Wind Turbines
 - Gymnasia
- 22.3 The above list is far from exhaustive; however it highlights some of the applications that have been considered with particular attention to noise in the past.
- 22.4 If there is any doubt over whether noise issues may need to be addressed prior to submitting a planning application, please contact the Environmental Health Service.

23.0 Determining planning applications

- 23.1 Consideration of noise will depend upon the development proposal. If a particular development is for a noise-sensitive end use then consideration of the locality of the proposal is an important aspect of any application.
- 23.2 The review will also consider the operational times of local businesses as well as any noise that they may emit. Transport noise sources may also affect recommendations made, especially if the development proposal is near to a busy road or railway line.
- 23.3 Noise conditions may include recommendations for upgraded sound insulation, which can be a vital means of protecting future occupants from transport noise or industrial /commercial noise sources. However, upgraded glazing, for example may only protect or mitigate against noise if windows are kept shut. As such, some developments may also need to provide acoustic trickle vents and/or acoustically-treated forced ventilation, to help reduce the need to open windows in the first place.
- 23.4 Consideration for new businesses will typically involve a review of the noise likely to be emitted from the business. This can include plant or equipment associated with that business and its operation, but may also consider

transport noise from deliveries or dispatched merchandise as well as possible increased traffic flows from visitors or staff arriving or leaving the site.

- 23.5 Certain types of business may also be expected to have similar patterns of operation; for example, bars and hot food takeaways tend to concentrate on afternoon and evening trade, whereas storage and distribution centres are likely to include overnight operations.
- 23.6 All development proposals should consider the ambient noise levels already present in a given area. For developments that are likely to have an impact as referenced in section 3.6, consideration of appropriate acoustic mitigation measures will be necessary to reduce the impact from the development site to an acceptable level.

24.0 Acoustic Reporting Requirements

24.1 The following information **MUST** be included in all acoustic reports:

- Stage 1 initial assessment to include
 1. A statement of the reason for and scope of the report.
 2. Details of the proposed development to which the report relates.
 3. A location and development plan.
 4. A description of the area and environment surrounding the development site
 5. The methodology used to carry out the noise survey including the location of any noise monitoring locations, the equipment used and details of its last accredited calibration, and the weather conditions at the time the survey was carried out
 6. Full table of results.
 7. Assessment of the results in accordance to the relevant standards and policies.
- Full stage 2 assessment to include;
 1. Assessment of elements 1-4 in accordance with the ProPG
 2. An Acoustic Design Statement to include information on the above and recommendations for noise control measures if needed.
 3. Full calculations of the noise reductions expected to support any suggested noise control measures.

24.2 Acoustic reports should be submitted as part of the planning application. The information is often essential to allow Planning and Environmental Health to assess the impact of the proposed development and make recommendations.

- 24.3 Failure to submit an acoustic report with a planning application may therefore delay the application process and is likely to result in the Environmental Health Service recommending that the application be refused.
- 24.4 A suitably qualified and experienced acoustic consultant should carry out the noise survey and complete an acoustic report.
- 24.5 The Council is unable to recommend a consultant.

Supplementary information - Acoustic design guidance

Building orientation

A building should be orientated in such a way as to minimise noise exposure. For example, buildings can be arranged so that they form a natural acoustic barrier against noise sources. This is particularly effective where one side of the development has a dominant noise source, such as a busy road/factory.

The facade facing a noise source should be constructed with suitable acoustic mitigation measures built in. Acoustically-treated forced ventilation may also be necessary to minimise the need to open windows.

These techniques can be used to great advantage, particularly if designed in conjunction with the layout of the rooms, allowing bedrooms or living rooms to face away from a noise source (see section 5.3.1.3).

Screening

Complete enclosure of the noise source or receiver is the most effective form of barrier (providing it is impervious and sufficiently heavy). The walls and roof of a building usually perform this function for a noise sensitive development whereas acoustically enclosing plant or equipment may be applicable for noise making developments.

Barriers or acoustic screens that are not complete enclosures (e.g. screens/fences) are normally most effective when tall, long, sound-absorbent and close to either the noise source or receiver.

Whether they are an existing feature, such as a railway cutting or embankment; a purpose designed acoustic barrier, such as a solid boundary fence or earth mound; a purpose designed feature of the building, such as a courtyard; or the building itself, which attempts to arrange sensitive internal spaces away from any noise source, barriers can prove extremely effective in mitigating or attenuating noise.

They protect low-rise buildings better than high rise buildings. Generally the taller the barrier the better, but there are physical limits above which the barrier will not realistically offer any additional protection. They should usually extend well beyond the site boundary to ensure adequate protection is offered.

Acoustic barriers are usually constructed from timber, although any solid material with a sizeable mass per unit area will provide acoustic shielding. Barriers can even be made from transparent/opaque materials such as plastic, for areas where visual amenity may be of importance.

It is vital that an acoustic barrier does not have any gaps within it, as even a small gap or hole in the barrier at ground level is sufficient to render it ineffective. If a barrier or enclosure is proposed or required as part of a development, full calculations will be necessary in addition to any related product specification data.

Building layout / design

When considering the layout of a proposed building, it may be better to locate non

habitable rooms, such as kitchens, bathrooms and stairwells on the noisier aspects of the building. This allows these non-sensitive rooms to act as an acoustic barrier to the more sensitive, habitable rooms, which are located at the quieter side of the building.

For semi-detached/terraced houses and flats/apartments, the positioning of rooms relative to those in the adjacent residences is important to ensure that noisier areas such as kitchens, living rooms and bathrooms do not share party walls, ceilings or floors with bedrooms residing in separate occupancy.

Such incompatible adjacent room types are highly likely to give rise to noise complaints in the future. If the layout of a building is such that these incompatible room types are adjacent to each other, either vertically or horizontally, then it is likely that uprated acoustic measures will be required in the walls and/or floors to mitigate against noise transfer.

Building Regulations Approved Document E considers impact noise through floors and provides appropriate mitigation measures to counter the effects of footfalls, but it does not consider impact noise through walls that would be commonplace in kitchen areas through the closing/slamming of kitchen doors and drawers. This can be a significant source of noise if a kitchen in one property is adjacent to a bedroom in an adjoining property.

Sound insulation schemes

The required sound insulation should be determined on the basis of the assessment of:

- 1) the level and characteristics of the noise outside the building
- 2) the design criteria noise levels in the rooms and other spaces of the building.

A suitable sound insulation scheme should be suggested which meets the required Council internal noise criteria. In its simplest terms, when the attenuation factor for the building element is subtracted from the measured noise level, the resulting figure should be at or less than the appropriate noise criterion target level.

Windows and doors

The windows and external doors of a building should be to a specification that ensures they provide sufficient insulation against external noise.

To achieve a good standard of insulation external doors should be close-sealed with no gaps in or around them, and have sufficient mass to resist external noise.

Where necessary, higher standards may be achieved by providing entrance porches with double doors. Providing they are properly fitted, standard thermal double glazed window units will generally reduce external noise levels by approximately 30dB.

The amount of noise that is reduced by a feature such as a window is known as the Sound Reduction Index (Rw).

Sound reduction indices – Rw, Rtra, Ctr

Where no particular environmental noise predominates, then consulting a manufacturer's table of sound reduction figures for typical glazing specifications, you can determine the glazing panel which will achieve the level of sound insulation needed. This is expressed as the R_m or R_w . R_m is the 'mean reduction index', and R_w the 'weighted reduction' and incorporates a correction for the ear's response, and is often the index quoted.

If the main element of noise is likely to be traffic noise, then another corrective factor needs to be considered, and that is some 'weighting' of the sound reduction levels which accommodates typical traffic frequencies more closely. This is specified as the R_{tra} , Traffic Noise Reduction Index.

Example:

A development close to a very busy main road is proposed and the noise survey carried out. The night time external noise measurement is 57dB LAeq and therefore a reduction of at least 27dB is needed to meet bedroom criteria. Looking at a manufacturer's glazing specification, a glazing panel of 4:12:4 will achieve a suitable reduction if in a general noise environment of mixed noise sources.

BUT because the significant noise source here is traffic, this glazing specification fails to achieve a suitable reduction because the ' R_{tra} is 25dBA, (57-25=32dBA). A more suitable glazing panel would have a specification of 10:12:4 achieving an R_{tra} of 29dBA (57-29=28dBA).

In this case, if the R_{tra} figure was not quoted, the report would not be satisfactory.

Building Regulations and BS EN ISO 717-1 (standard for acoustic testing) introduce a 'correction factor' for low frequency noise, the C_{tr} .

Glazing (and other structural building components) specifications may now quote sound insulation data in terms of R_w with a C_{tr} correction. For example, a manufacturer's 6/16/6.8 glazing unit has an R_w of 38dB and C_{tr} of -6dB.

In a general noisy environment it will be acceptable to quote the R_w rating alone, but when considering specifications in environments where low frequency noise is the principal area of concern, which can include traffic and noise from clubs etc., then the C_{tr} correction should be applied.

Traffic noise can often result in reverberant noise being passed through glass into a building. This is usually due to the glazing panels being constructed of the same thickness of glass meaning that when the outer pane vibrates, it causes the inner pane to vibrate as well.

Acoustic glazing often has different thicknesses of glass incorporated into the glazing unit, meaning each pane has a different reverberant frequency and therefore noise is not transmitted through it as easily.

Increasing the thickness of the panes of glass (for example from 4mm to 6mm) provides an improvement in noise attenuation, as does increasing the air gap between the panes. For example panes of 10mm and 6mm with a 12mm gap between them will reduce noise levels by about 34dB.

Where external noise levels are very high, standard thermal double-glazing may fail to provide sufficient acoustic attenuation. If this is the case, then higher performance acoustic glazing, which utilises secondary glazing can be considered. This is usually characterised by an air gap between the panes of at least 100mm and can be constructed with secondary sashes.

Again, it is advisable for the two panes to be of different thickness and performance can be further improved if the sides of the air space between the panes are lined with sound absorbent material. Under some circumstances, triple glazing may be sought as a means of noise attenuation, but these measures are only usually required in proximity to sites exhibiting a significant noise impact.

Note: If the rigorous calculation is used as per BS 8233: 2014, and included in the report (for each room type, façade and/or floor level, L_{Aeq} , L_{Amax} , day and night time) then the R_{tra} and C_{tr} correction would not need to be quoted.

Acoustic glazing is only of benefit when the windows are kept closed; this is obviously not always practical. Partially opening the window will typically reduce the acoustic performance to 10-15dB.

This is of great concern where the uprated acoustic performance is to protect occupiers of a bedroom, where opening the window to increase ventilation and comfort will instead introduce unacceptable levels of noise which may make sleep difficult.

Windows may also be fitted with acoustic trickle vents, but these are primarily for background ventilation as opposed to rapid ventilation or summer cooling. It may therefore be necessary to introduce alternative acoustically-treated mechanical ventilation to bedrooms and some lounge areas, the aim being to increase ventilation rates in a room without physically having to open the window.

Ventilation

The Building Regulations (outside the scope of this guidance) recommend that habitable rooms in dwellings have background ventilation. Along with the specification of glazing for the development a scheme of how such ventilation is to be provided should also be included.

Occupants should be provided with a supply of fresh air in habitable rooms without having to open the windows (whilst also having the option to do this for purge ventilation, or at the occupant's discretion).

If partially open windows were relied upon for background ventilation, the insulation would be reduced to 10-15dB. The indoor noise level criteria for bedrooms and living rooms do not need to be achieved when windows are opened to achieve Part F purge ventilation requirements*.

Where ambient noise levels are high, a scheme of ventilation will need to be provided that does not compromise the acoustic attenuation afforded by the glazing. This may come in the form of individual window trickle vents or acoustic trickle vents.

Whilst these types of vents do not usually replace opening windows, they aim to minimise the need to open windows, providing a more comfortable internal noise level. The use of acoustic trickle vents can be used to permit adequate background ventilation as required by the Building Regulations Part F. Although it is worth noting that ventilation requirements can vary from dwelling to dwelling.

****Note: Purge ventilation is the manual control of ventilation in rooms or spaces at a relatively high rate to rapidly dilute pollutants and/or water vapour. It may be provided by natural means (e.g. an openable window) or by mechanical means (e.g. a fan). It is an intermittent need i.e. painting & decorating, smoke from burnt food BUT is also used to improve thermal comfort.***

These vent types usually have an acoustic performance in excess of that of uprated glazing, whilst still allowing background ventilation to occur.

Where ambient noise levels are more extreme and the opening of windows is likely to be required to increase ventilation rates, then it may be necessary to consider forced acoustically-treated mechanical ventilation.

This method utilises acoustically-treated fans (quiet running) that are capable of providing normal and summertime flow rates so occupants do not need to open windows during hot summer days.

If combined with a boost facility, then this may reduce the need to open windows for summer cooling or rapid ventilation purposes. Mechanical systems may include fans within individual rooms or may be incorporated as part of a larger scheme, which provides 'whole house' ventilation. This may operate in conjunction with kitchen and bathroom extraction systems to provide both input and output air to the building, sometimes with heat recovery to pre-heat the incoming air during colder periods.

These systems usually filter and acoustically shield the incoming air to prevent external noise entering a building. Sometimes 'make up' air is brought in from the quieter side of the building to utilise the natural acoustic shielding that the building itself provides. Ducted systems with intakes on the quiet side of the building might be required in very noisy situations, or where appearance rules out through-the-wall fans.

Mechanical ventilation is often utilised in Air Quality Management Areas where there is the need to shield both transportation noise and polluted air from the occupiers of the buildings. Proofing against noise will usually satisfy many air quality issues; reconfiguration of the system to provide make up air from the furthest point away from a transport source or emission will typically satisfy many air quality issues.

When undertaking residential environmental noise assessments noise break-in calculations (as per BS 8233: 2014) must be made to determine what ventilation strategy is required to achieve the internal noise level criteria.

Based on the results of the break-in calculations, the acoustician should advise the developer / design team when trickle ventilators are not a suitable background ventilation strategy, and include a suitable recommendation for a mechanical scheme in the acoustic report to accompany the planning application.

In areas where there are particularly high noise levels and attaining the internal target levels for bedrooms may be particularly difficult, consideration will be given to the installation of sealed glazed units with the provision of mechanical ventilation. It is up to Building Control and developers to ensure that adequate provision for 'purge ventilation, as required under the Building Regulations Part F is met.

Quality control & workmanship

Quality control and workmanship should always be considered very carefully. Noise control measures can fail to perform adequately if they are not built as the designer intended. Such failures can have serious implications for noise control e.g. incorrect fitting of windows will reduce the performance of the glazing system.

Effective sound insulation and noise control often require careful detailing on the part of the designer and a high standard of workmanship on the part of the contractor.

Correct execution of the detailing should be checked on site and the completed development should be fully commissioned where required before handover. As a result, post completion testing/reporting will likely be required as part of a planning condition.

Noise control is only one aspect of environmental design and designers should be aware that the solution to a noise problem can cause difficulties elsewhere e.g. thermal insulation, solar gain, cold bridging, ventilation and condensation. Much information on the environment in and around buildings is available and should be considered at an early stage of the design process.