Birmingham City Council

REGULATION and ENFORCEMENT

Planning Consultation Guidance Note
Noise & Vibration

Version 6 - Issued March 2020

1. Purpose of this Document

Edition 6 – March 2020 (This document replaces Edition 5 dated September 2017).

This document is intended to provide guidance to Birmingham City Council Environmental Protection Officers when reviewing planning applications and making recommendations to the Planning Management service, on matters relating to noise and vibration.

The document may also assist those seeking planning permission, and their advisors, by drawing to their attention the noise and vibration issues that may need to be addressed. However, the document is for guidance only and is based on addressing the large number of more straightforward proposals. Where more complex development or challenging locations are proposed advice may be sought from the Environmental Protection Unit (EPU) in respect of specific applications for which a charge will be made. The consideration of acoustical matters in support of a planning proposal is a complex and technical matter and it is expected that competent persons will be engaged by the developer to deliver this service.

The document provides general guidelines, drawing on information to be found in a number of international, national and local documents. Occasionally, the review of a planning application may raise issues not fully addressed in this guidance, and other guidance or criteria may then be utilised.

This document is intended to support and promote the policies concerning noise in the BCC Core Strategy and reflect the guidance concerning noise in the National Planning Policy Framework (NPPF) and the Noise Policy Statement for England (NPSE). This document considers the majority of situations which arise in planning applications; situations that have not been considered in this document will be assessed in line with the policies in the Core Strategy and the guidance in the NPPF. In all cases the evaluation of an application is based on a balanced assessment of the proposed development and the resulting impacts on acoustic amenity.

Where this guidance refers to a named document (National / International Standard, Guidance Document or policy document) the relevant version is the one listed in this guidance. However, if the named document has been updated or revised, the new version may be used as a source of guidance provided it continues to address issues relevant to this guidance.

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2. Statement of the Principles of EPU planning guidance

Recommendations to Planning Management concerning the noise impact of any proposed development will be based on the following aims:-

a) The avoidance of significant adverse impacts on noise-sensitive receptors from existing or new noisy developments and/or the avoidance of significant adverse impacts on existing noise generating uses as a consequence of the siting of new noise-sensitive developments.

b) That suitable mitigation to minimise adverse impacts from noise and vibration will be provided where appropriate.

c) The improvement of health and quality of life through effective noise and vibration management.

In order to assess the likely impacts it is expected that applications will be supported with an effective and relevant noise assessment as outlined below:

1. Any development including any noise generating uses shall be supported by an assessment of the impact of any noise and vibration generated by the development on the amenity of any noise sensitive use. Where an adverse impact is predicted the development proposals shall include details of how this adverse impact will be avoided or reduced.

2. Any development containing noise sensitive uses shall be supported by an assessment of the impact of any existing sources of noise and vibration on the amenity of the proposed occupants of the development. Where an adverse impact is predicted the development proposals shall include details of how this adverse impact will be avoided or reduced.

Further guidance on the determination of the impacts of proposals is included in Section 4 but the following approach will be taken in principle to support the delivery of the principles in the NPSE[1];

- Where the proposals are expected to have a significant adverse impact then this department will recommend the application is refused. This is the level above which the noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present.

- Where the proposals are expected to have no observed effect then this department will not object on noise grounds. Noise is regarded as having no adverse effect so long as the exposure is such that it does not cause any change in behaviour or attitude. Where mitigation is needed to achieve these levels EPU will recommend that appropriate conditions are attached to any permission.

- Where the proposals are predicted to have an adverse impact then EPU recommendations will be based on the context of each application.

Further guidance on mitigation of noise impacts is included in Section 5 but the design of mitigation measures should follow the principle of good acoustic design.

[1] Noise Policy Statement for England (NPSE), March 2010, Defra

This takes an integrated approach to achieve optimal acoustic conditions in both internal and external noise-sensitive locations and is not just compliance with recommended internal and external noise exposure standards. Any mitigation shall achieve an optimum acoustic outcome without design compromises that will adversely affect living conditions and the quality of life of the inhabitants.

In assessing mitigation schemes the following hierarchy of measures should be considered in descending order of preference:

1. Engineering – reduction of the noise generated at source by redesign, relocation or containment
2. Design and layout – maximise the distance between noise source and receptor, using existing topography or existing structures or purpose-built barriers to screen the proposed development site from significant sources of noise.
3. Using the layout of the scheme or orientation of buildings to avoid location of noise sensitive rooms on adversely impacted facades
4. Using planning conditions/obligations to restrict activities allowed on the site at certain times and/or specifying permissible noise levels (differentiating as appropriate between different times of day, such as evenings and late at night),
5. Using the building envelope to mitigate the impact of noise to acceptable levels through noise insulation.

For the purposes of this document noise-sensitive premises are taken to be places where the building occupants may be resting, sleeping or studying which includes residential premises, hotels, hostels, hospitals and schools.

3. Information required to determine the noise impact of a proposal

3.1. Requirements

The impact of noise should be considered for each application where proposed or existing noise sensitive occupiers may be affected by proposed or existing noise sources as a result of the development. The assessment should have been carried out by a competent person who has appropriate training and experience in the field of environmental acoustics. In addition, there shall be a consideration of potential noise impacts arising from demolition and construction works for the proposed development and for large schemes or where there is likely to be prolonged or significant impacts, a demolition/construction management plan is likely to be required.

In some cases, a noise assessment may simply show by predictive calculation that a proposal will have no noise implications, and in others a detailed and complex study with proposals for further mitigation measures may need to be considered and the effectiveness analysed. The EPU work closely with Planning Officers where such proposals may materially affect the application (e.g. a high acoustic barrier may not be acceptable on visual grounds).To assist in determining the requisite level of detail necessary an assessment overview is included in Table 1 below and further detail is provided in the remainder of this Section.

Development type	**Noise source**	**Noise survey requirements**
Residential	Major road[2] / motorway	24-hour noise survey – however the assessment may need to be extended to reflect possible variations between weekday/night and weekend/night
	Railway	Noise survey - based on time table to include freight where applicable Additionally, vibration monitoring needed if development within 30m of a railway line
	Airport	Use noise contours from Appendix 2
	Commercial noise	**Attended** survey to determine worst and typical cases – BS4142 Assessment of impact both daytime and night-time where noise may occur at times throughout the 24-hour period
	Industrial noise	**Attended** survey to determine worst and typical cases – BS4142 Assessment of impact both daytime and night-time where noise may occur at times throughout the 24-hour period
	Entertainment noise	**Attended** survey and assessment of impact

[2] A major road should be regarded as any classified A or B road, bus routes and roads subject to significant freight movements

	No significant transportation or other noise sources	Survey not normally required ; however consideration should be given to other sources that impact on the noise environment such as major construction
Industrial and or Commercial		BS4142 assessment at all noise sensitive premises and consideration of transport impacts and possible vibration
Entertainment		Impact assessment based on octave / third octave band data and consideration of noise generated by patrons
Hotel		Location of an hotel is a commercial decision. EPU do not make recommendations for road traffic noise. However, if the hotel is adjacent to significant noise generating industrial, commercial or entertainment sources a detailed assessment of noise will be required due to the potential impacts on existing businesses

Table 1 Requirements for assessment

3.2. Measurement and report methodology:

The following requirements and guidance should be considered when preparing and undertaking any noise assessment:-

- Where the assessment considers the impact of existing noise sources on a proposed development it is expected that the impact of the noise sources will be based on measured noise levels at both the source and potential receptor location, rather than predicted values based purely on calculation. Consideration of distance, barriers and orientation where appropriate is acceptable. Noise from road traffic or railways should be based on measured data and we will not accept calculated data using the methodology in CRTN, CRN or TRL END corrections to obtain night time traffic noise levels. This is due to the observed variations between measured values based on previous surveys when compared to the predicted values.

- In order to better guide the decision-making process, it is important to know what noise sources exist in the locality of a proposed development and the extent of their impacts (e.g. operating hours and activities of source premises). Consideration should also be given to presenting the impact of each source on the development and including details of any remedial measures proposed to reduce the impact.

- There may be occasions where the noise generating use exists but is not in operation (for example the premises holding a planning consent for a commercial use may be vacant, operating reduced hours or only in limited use). In such circumstances the noise impact assessment should reflect the impacts based on current conditions but also consider potential impacts if the premises were to operate in full use of the existing planning consent.

- The onus for gathering this information will lie with the applicant as part of a full and comprehensive acoustic survey to effectively characterise the noise environment in the locality. It is therefore in the interests of all parties that suitable time be set aside for the acoustic survey to ensure it is as comprehensive as possible.

- The submitted noise report should be the final version rather than a draft version. This department does not have the resources to review and correct draft reports and may recommend refusal where draft or incomplete reports are submitted.

- Worst case scenarios should be considered,
  - averaged values for L_{AFmax}, $L_{Aeq,T}$ or $L_{A90,T}$ will not normally be accepted;
  - background noise measurement times must be representative of quieter periods when noise generating activities are expected to occur;

- Unattended measurements are not appropriate for assessing the impact of commercial, industrial or entertainment noise as the measured data cannot be correlated with specific activities at the premises being assessed;

- Where unattended measurements are used for railway or road traffic noise unless individual noise events can be clearly attributed to a source (such as from sound recording or railway timetables) we will not accept assumptions of the source of noise particularly where it is intended to discount a discrete event;

- Measurement time periods for noise indices should be appropriate to the location and situation. Where this guidance stipulates time periods these should be used unless there are specific circumstances why they are not appropriate (which should be stated and justified);

- Background and ambient noise levels shall be representative of the existing noise levels at the most sensitive time during the proposed period(s) of operation.

- Where different operating regimes are proposed (for example daytime, evening and night time) background and ambient noise levels shall be determined for each operating period.

- When assessing the impact of L_{AFmax} it is normally appropriate to discount the highest values (based on the comments in WHO Guidelines for community noise)[3]; in order to discount data the noise survey must cover the entire night time period and consist of measurements over suitable averaging periods[4] to permit effective statistical assessment – we would normally regard it acceptable to discount no more than the highest 5% of data.

- Percentile levels (ie L_{A90}) determined over a certain time interval cannot accurately be extrapolated to other time intervals[5].The mean average of a series of measured background sound levels is not numerically equal to the overall period background sound level that would otherwise be obtained by a single

[3] Guidelines for Community Noise Edited by B. Berglund et al WHO 1999 (paragraph 3.4)
[4] Assessing L_{max} for Residential Developments: The AVO Guide Approach - Proceedings of the Institute of Acoustics Vol. 41. Pt. 1. 2019
[5] BS8233:2014 Paragraph 3.1.8

measurement spanning individual measurement periods[6].Therefore EPU will not normally accept values of $L_{A90,1hr}$ or $L_{A90,15min}$ derived from shorter measurement periods. Section 8 of BS 4142:2014 provides additional guidance on the measurement of background noise levels.

- Any deviation from guidance or British Standards needs to be detailed in the report along with the reason for these deviations.

3.3. Required information for noise assessments

The following information shall be included in any assessment or report submitted in support of a planning application.

1. Introduction
    a. Outline the purpose and scope of the report
    b. A brief description of the proposal considered by the assessment
    c. Include the site address or other location details (e.g. land adjacent to 123 Any Road….)
2. Methodology
    a. Describe any standards / policies to be used and give a brief outline of why they have been chosen
    b. Provide more detail and justifications why accepted standards have not been used
    c. Outline the process to be followed
    d. A clear plan indicating locations of noise sources, sensitive receptors, measurement positions and any mitigation measures if appropriate
3. Noise measurements
    a. Detail the location, dates and times of all measured data relied upon and provide summaries of the results obtained
    b. If it has not been possible to measure at the actual location of the proposed development, state why an alternative location is considered representative
    c. Provide explanations for any abnormal or anomalous results
    d. Give brief details of the equipment used and a confirmation that it has been verified within an appropriate time (usually bi-annually) and that appropriate site calibration checks were carried out. Note that all equipment used should comply with appropriate standards (e.g. IEC 61672 or its predecessors for Sound Level Meters)
    e. Detail the meteorological conditions during the monitoring period
        i. Wind speed
        ii. Wind direction
        iii. Temperature
        iv. Precipitation

[6] BS 4142:2014 + A1:2019 Paragraph 8.1.4 Note 2

Note: It will generally be acceptable to state that meteorological conditions were satisfactory for measurement purposes and only provide more detail if they are borderline

4. Predictions
    a. Where it has been necessary to predict noise levels, brief explanations of how these have been derived including any assumptions made (e.g. downwind propagation) and what standard have been followed (e.g.ISO 9613)
    b. If a software package has been used, the package needs to be identified (e.g. Lima, Cadna, NoiseMap, SoundPlan) along with a brief description as to its use and the input data and modelling parameters shall be provided
    c. Brief details of the geographical and source data used – where data for new sources has been derived from measured data at another location the report shall include the original data and details of the assessment carried out
    d. Details of any validation checks carried out
5. Assessment
    a. Give details of the assessments made based on the measured and/or predicted data at the façade of the nearest existing or proposed noise-sensitive premises
    b. State any assumptions made
    c. Show any calculations or predictions made in sufficient detail so that they could be checked for accuracy and validity. If the calculations are complicated, the details may be included as an appendix
    d. An indication of uncertainty or errors associated with measurements or assessment

6. Mitigation

    Where mitigation is necessary for a development to satisfy noise criteria provided in this document the report should include a full specification of the mitigation. For example, barrier height, location or location(s) maximum sound power level(s) for items of plant. Give details of any mitigation measures that are / may be required and the anticipated effect

        i. Alternative plant or machinery
        ii. Reorientation of buildings or design to avoid noise sensitive receptors on noise-affected facades
        iii. Barriers or bunds
        iv. Building envelope performance including enhanced glazing and doors

7. Recommendations

    Detail what steps should be taken by the developer to meet the relevant criteria

        i. Building envelope specification including glazing – this shall also include clearly annotated drawings showing in plan and elevation the recommended treatements
        ii. Ventilation specification – this shall also include assessment of potential air quality impacts and where mechanical ventilation is being proposed the report shall include design criteria (including ventilation system design, flow rates, an assessment of overheating risk and the combined noise impact of noise break-through from the building envelope and the noise generated by the whole ventilation system)

iii. Heights, locations and specifications of barriers or bunds

iv. Appropriate technical specifications for plant or machinery (e.g. refrigeration compressors, extract systems)

v. Any other data required by the developer to meet the required noise standards / guidance

8. Conclusions

   a. A brief resume of the process described above and a confirmation that if the recommendations are carried out satisfactorily that appropriate standards / guidance will be complied with and the resulting noise environment will not adversely impact amenity

9. Appendices

   a. Scale plans showing the site location and the location of any measurement or prediction positions in sufficient detail to enable them to be readily identified. Aerial photos from online mapping sources may be useful

   b. Unabridged noise monitoring / measurement results on which the assessment is based

   c. Details of any calculations relied upon

3.4. Criteria for external and internal noise levels

Design documents often specify acceptable noise levels within the building. Where there is a need to specify an external noise level then it is recommended this be done by adding 10 dB to the internal criteria. This adjustment is based on the assumed noise reduction of a partially open window.

3.5. How to deal with multiple site / façade standards

Where two or more performance criteria apply for at a point on a site or façade then the highest standard of noise mitigation shall be applied to the whole façade.

3.6. Road traffic noise surveys

In order to determine the impact of road traffic on a particular development it will be necessary for an acoustic assessment to be undertaken to determine the $L_{Aeq,T}$. It is recommended by EPU that a full 24-hour assessment be undertaken for all applications. A full 24-hour survey is required for sites adjacent to or in close proximity to motorways, trunk roads, major roads (classified A and B routes, bus routes and other roads subject to significant freight movements). However, the assessment will also need to reflect possible variations between weekday/night and weekend/night and therefore may need to be carried out over an extended period.

3.7. Railway noise surveys

Noise from rail traffic may affect properties bounding railway lines. To determine the impact of the rail traffic on a particular development then it is necessary for an acoustic assessment to be undertaken to determine the $L_{Aeq,T}$ and L_{AFmax}. As many of the railway lines in Birmingham carry freight during the night it is necessary for a full 24-hour assessment to be undertaken. The assessment should provide both $L_{Aeq,T}$ and details of L_{AFmax} with the

frequency of occurrence. Additionally, vibration monitoring will be necessary if development is proposed within 30 m of a railway line.

3.8. Entertainment Noise

Internal noise levels in residential dwellings can be very low, particularly late at night and in the early hours of the morning when entertainment venues may still be operating. In some cases, the noise levels may be significantly below the lower measurement limits of the instrumentation used to measure the noise. Care must be taken to ensure that the measured noise levels are not influenced by the noise floor of the instrumentation used. To enable proper consideration of each application the assessment should include full details of the operation schedules of the entertainment premises.

4. Determination of impact of proposal

The impact of any proposal will be based on the following noise hierarchy

Response	Examples of outcomes	Effect Level	Action	Approximate BS 4142 assessment
Not present	No effect	No Observed effect	No specific measures required	**-10**
Present and not intrusive	Noise can be heard but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No observed adverse effect	No specific measures required	**-3** **-2** **-1**
Lowest observed adverse effect level (LOAEL)				**0**
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation closing 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	**+2** **+4** **+5** **+7** **+8**
Significant observed adverse effect level (SOAEL)				**+9**
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response e.g. avoiding certain activities during periods of intrusion, where there is no alternative ventilation provision having to keep windows closed most of the time. Potential for sleep disturbance resulting in premature awakening and difficulty getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed adverse effect	Avoid	**+10**
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable adverse effect	Prevent	

Table 2 Summary of noise hierarchy from PPG (Noise)

5. Design and Planning Principles

5.1. Introduction to the section

This chapter reviews a number of topics relating to how a scheme should be designed or to the stance taken by EPU under specific circumstances. The principles for mitigation of noise impacts are outlined in Section 2 and should follow the principle of good acoustic design.

In assessing mitigation schemes the following is the hierarchy of measures that should be considered in descending order of preference:

1. Engineering – reduction of the noise generated at source by redesign, relocation or containment.
2. Design and layout – maximise the distance between noise source and receptor, using existing topography or existing structures or purpose-built barriers to screen the proposed development site from significant sources of noise.
3. Using the layout of the scheme or orientation of buildings to avoid exposure of noise sensitive rooms to adversely impacted facades.
4. Using planning conditions/obligations to restrict activities allowed on the site at certain times and/or specifying permissible noise levels differentiating as appropriate between different times of day, such as evenings and late at night.
5. Using the building envelope to mitigate the impact of noise to acceptable levels through noise insulation.

5.2. Noise reduction at source to facilitate noise-sensitive development

Where there is an existing discrete noise source such as from industrial, commercial or entertainment premises the first option for consideration is reduction of noise levels from that source. The noise assessment should detail the options that have been considered which may include operational controls to minimise the source noise (such as hours of use), insulation or attenuation at source, enclosure of outdoor sources or provision of a noise barrier.

Where such options exist, there may be an economic benefit to the applicant to assist in reducing noise at source rather than to meet increased insulation requirements and this will also provide for greater protection for external amenity areas or minimise the impacts on the new receptors.

The NPPF has introduced a concept of the ‘agent of change’. This requires the applicant (the agent of change) to identify the effects of existing businesses that have a significant adverse effect on new residents or users. The agent of change will need to consider not only the current activities, but also those activities that businesses or other facilities are permitted to carry out, even if they are not occurring at the time of the application being made. The applicant will need to agree an approach with the responsible party. EPU will in turn evaluate the technical merits of the proposed solution. In these circumstances these source-control measures must be in place prior to the occupation or operation of the new development.

It can also be helpful for developers to provide information to prospective purchasers or occupants about mitigation measures that have been put in place, to raise awareness and reduce the risk of post-purchase/occupancy complaints.

5.3. Eliminating noise problems through the design of noise-sensitive premises

Many potential noise problems can be resolved through the careful design of noise-sensitive premises. The following checklist should be considered as early as possible in the design of a scheme:

- Has noise from the surrounding area been taken into consideration in arranging the site layout? For example, positioning residential units as far away as possible from an adjacent noise source, screening outdoor amenity areas, etc.
- Has the surrounding noise climate been taken into consideration in arranging the internal layout of residential units? For example, locating bedrooms on quiet facades.
- Has consideration been given to increasing the noise insulation standard for windows and doors to potentially noisy facades? For example, residential units backing onto a railway line.
- Where a development will overlook a significant noise source (e.g. major road, railway line, industrial or entertainment premises, etc) it is desirable that part of the habitable space in each unit does not overlook the significant noise source. Single aspect units where all the habitable space overlooks the significant noise source should be avoided.
- Avoid 'sealed environments'.

5.4. Façade insulation

The noise exposure hierarchy table in the PPG Noise identifies having to close windows, where there is no alternative ventilation, to reduce noise levels as an adverse impact. The severity of the impact depends upon how often it is necessary to close the windows. An option that is sometimes considered to achieve a satisfactory internal noise environment is sealing of the building envelope (i.e. through the provision of non-openable windows). However this is considered a poor acoustic solution and as such should only be considered where this is necessary for air quality reasons. Where sealing of the building is deemed appropriate it will be necessary to avoid overheating and provide sufficient ventilation to provide comfort cooling and in such circumstance trickle vents are not considered appropriate.

For noise from transportation sources, the ProPG[7] (which provides guidance on new residential development) concurs with the PPG(Noise) when it comes to the need to close windows in order to achieve a satisfactory noise climate within habitable rooms. The ProPG includes the following comments with regard to opening windows and indoor noise levels.

> Using fixed unopenable glazing for sound insulation purposes is generally unsatisfactory and should be avoided; occupants generally prefer the ability to have control over the internal environment using openable windows, even if the acoustic conditions would be considered unsatisfactory when open. Solely relying on sound insulation of the building envelope to achieve acceptable acoustic conditions in new residential development, when other methods could reduce the need for this approach, is not regarded as good acoustic design. Any reliance upon building envelope insulation with closed windows should be justified in supporting documents. (Paragraph 2.22)

[7] Planning and Noise. Professional Practice Guidance on Planning and Noise, New residential development. IoA, ANC and CIEH May 2017.

and

> It should be noted that the acoustic performance of the building envelope will be reduced in the event windows are opened for ventilation or cooling purposes, typically reducing the insulation to no more than 10 to 15 dB(A). Most residents value the ability to open windows at will, for a variety of reasons, and LPAs should therefore normally request that designers principally aim, through the use of good acoustic design, to achieve the **internal noise level guidelines in noise-sensitive rooms with windows open**. Where internal noise levels are assessed with windows closed the justification for this should be included in the Acoustic Design Statement. (Paragraph 2.33)

To address such issues the ProPG encourages “good acoustic design”

> Good acoustic design is not just compliance with recommended internal and external noise exposure standards. Good acoustic design should provide an integrated solution whereby the optimum acoustic outcome is achieved, without design compromises that will adversely affect living conditions and the quality of life of the inhabitants or other sustainable design objectives and requirements. Paragraph 2.21

To assist the ProPG includes a supplementary Document 2 – Good Acoustic Design[8].

The ProPG only considers noise from transportation sources. Occupants are usually more tolerant of a noise without a specific character than, for example, that from neighbours which can trigger complex emotional reactions. (BS 8233:2014 (Para 7.7.1)). Therefore, this department will not normally support closed windows and alternative ventilation to mitigate noise from entertainment, industrial and commercial uses.

5.5. Ventilation provision for residential and hotel uses

The primary document for determining any standard of ventilation is Approved Document F, Means of Ventilation, issued under the Building Regulations 2000. Ventilation within any residential or hotel premises must comply with the provisions of this document.

Where enhanced glazing or other mitigation is necessary to ensure the indoor noise climate is acceptable it will be necessary to provide a scheme of ventilation in order to remove the need to open windows other than for purge ventilation. The ventilation scheme will be expected to provide thermal comfort during summer months; acoustic trickle vents will not be sufficient in such circumstances.

Further information concerning cooling, ventilation and noise has been presented to the Institute of Acoustics[9] and there is also guidance issued by the Association of Noise Consultants.[10]

The primary factors that will be considered are the need to achieve whole building ventilation and achieving thermal comfort in summer months.

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[8] Planning & Noise :Professional Practice Guidance on Planning & Noise, New Residential Development – Supplementary Document 2 – Good Acoustic Design. IoA, ANC and CIEH May 2017

[9] Noise, Ventilation and Overheating in Residential Developments. A Chilton et al. Proceedings of the Institute of Acoustics Vol 38 Part 1. 2016.

[10] Association of Noise Consultants - Acoustics Ventilation and Overheating – Residential Design Guide; January 2020

5.5.1 Basic design statement

- Any requirement for ventilation shall be met either via acoustic vents, a scheme of mechanical ventilation, or another method of ventilation which is comparable to the above. In any case the ventilation proposed must not compromise the acoustic integrity of the building envelope. Trickle vents are only suitable where the overall noise mitigation of the building envelope meets acceptable internal criteria with windows open.
- The design must clearly demonstrate that the combined impact of noise break-through from the building envelope and noise generated by any mechanical ventilation at maximum rate meet the internal noise criteria provided in Section 7.7.2 of BS 8233.
- As outlined in section 5.4, EPU will not support any strategy that recommends the use of non-openable windows for residential properties as a means of securing the internal acoustic environment.
- Where openable windows are provided EPU will not accept a strategy that relies on the occupier of the noise sensitive premises having to close the window during noisy activities other than for noise without character such as transportation noise.

5.5.2 Special circumstances

There will be instances where the characteristics of the noise require special consideration, such as the low frequency bass from music, and in these instances EPU will expect the design statement for the ventilation to take this into account. If this indicates that a non-standard or bespoke system is required, then EPU will expect this to be installed.

5.5.3 Air Quality considerations

In all instances where mechanical ventilation is proposed the design statement should consider the air quality around the development to ensure the highest quality of intake air.

5.5.4 Overheating Basic design

Where future residents may need to keep windows closed to mitigate noise from industrial, commercial or entertainment sources (especially overnight) the application should include an overheating assessment in accordance with CIBSE TM59[11] to demonstrate that indoor temperatures will be acceptable in the absence of open windows. Any scheme to mitigate overheating should be included in the approved plans for the development.

5.6. The granting of planning consents which result in noise-sensitive uses in close proximity to or adjoining noise generating uses

Where a noise generating use exists but is not in full operation (for example the premises holding a planning consent for a commercial use may be vacant, operating reduced hours or only in limited use), measurements of current noise levels may indicate that the existing noise climate is unlikely to result in complaints or any loss of amenity to a proposed residential development.

[11] TM59 Design methodology for the assessment of overheating risk in homes. CIBSE 2017.

However, it may be reasonably foreseeable that future operational changes are likely to result in future loss of amenity to occupiers of the proposed development. In these cases, granting planning permission may in effect restrict the flexibility of an existing premises to operate or develop within its use class. In these cases, EPU may adopt a precautionary approach and recommend that the application be refused. EPU will seek to consult with the planning officer in such cases to understand the broader approach within the locality.

Where a development containing the noise source(s) is attached to noise sensitive premises the applicant shall undertake a noise assessment to assess the impact of the commercial operation upon the residents. The report should include a scheme of mitigation (where necessary) to minimise the adverse impact of the commercial activity. Where the proposed activity is expected to generate tones, the assessment may need to be undertaken in Octave or Third Octave bands.

However, for small offices and retail outlets (generally falling within uses classes A1/A2) where there will be no amplified sound a noise survey will not be necessary where the airborne sound insulation separating the premises exceeds 60dB $D_{nT,W.}$

Consideration should also be given to structure borne noise and vibration from machinery, fixed plant and ventilation systems, and from footfall, the opening and closing of doors, etc. For vibration the guidance in Section 7 shall be followed.

5.7. Mitigation following a recommendation of refusal

Occasionally an application for a noise sensitive development will be submitted and EPU will recommend refusal because it is deemed that the development will be adversely affected by noise but based on the broader planning balance the grant of permission may be deemed appropriate.

In these circumstances and upon formal request from the planning officer, EPU will review the case and seek proportionate mitigation. The mitigation is likely to require a high standard of soundproofing and mechanical ventilation and protecting the internal amenity will be of paramount importance. In such cases EPU will require a detailed design and specification prior to grant of permission and the approved scheme will be expected to be incorporated into the approved plans.

6 Specific Guidance for Proposed Developments

6.1 Introduction to the section

Where applications contain noise sensitive uses or noise sources which may have an impact upon existing noise-sensitive uses the applicant will be required to provide supporting information to allow this impact to be evaluated. The assessment of developments should be in line with the NPPF and supporting guidance and BCC planning management guidance. This section provides guidance on specific development types.

6.2 Outline, Speculative and Mixed-Use Applications

Some planning applications contain very little information on which an assessment of the potential noise impact can be based such as outline planning applications or there is little information about the likely end-user, for example with speculative commercial developments. In such circumstances, to ensure that the amenity of residents of nearby noise sensitive premises is safeguarded, the EPU will make an assessment based on the likely worst-case scenarios with respect to noise impact. This may lead to the EPU recommending refusal or a large number of conditions to address all foreseeable situations. Clearly the more detail that is provided by the applicant, the more the EPU will be able to limit uncertainties and thereby reduce the number of conditions required. In circumstances where, even with reasonable mitigation measures, the development is unlikely to satisfy the requirements of this document then the EPU will recommend refusal.

Where a mixed-use development is to be considered the EPU will assess the parts of the development containing noise sources as if the proposed noise sensitive areas already exist based on a worst-case commercial use. For example an A1-A5 mixed use ground floors without specific end use defined prior to development will be required to prove insulation suitable for A4 drinking establishment with regulated entertainment and address noise from A3/A5 extraction systems.

6.3 Assessment of Residential Developments

The impact of any proposal will be based upon the noise hierarchy in the Planning Practice Guidance (PPG) Noise, included as Table 2 in this document.

When building residential developments the following steps should be taken

1. Consider the impact from rail and road transportation as specified in Section 6.3.1.

2. Consider the impact from commercial and industrial noise sources as specified in Section 6.3.2.

3. Give regard to any entertainment premises in the vicinity by following the approach specified in Section 6.3.3.

4. if the development site falls within the airport noise contours and apply the relevant insulation standard as described in Section 6.3.4.

5. If the application site may be subject to vibration the application may need carry out an assessment in line with the guidance in Section 7.

Where two or more standards apply for a site or façade then the highest standard of insulation shall be applied. If in doubt the developer should seek advice from EPU.

Where mitigation schemes involving noise insulation are provided for industrial, commercial or entertainment noise sources or where secondary glazing is specified EPU may require commissioning testing of the insulation scheme prior to occupation. Where commissioning testing is required it shall demonstrate that:-

1. the building envelope achieves the approved sound reduction performance, and
2. the internal noise environment to habitable rooms shall (under all conditions of the test) meet
    - the proposed noise criteria of the scheme,
    - the daytime and night-time internal noise level criteria requirements detailed in section 7 and in particular Table 4 of British Standard 8233:2014 'Guidance on sound insulation and noise reduction for buildings',
    - the 2017 ProPG on Planning and Noise – 'New residential developments', and
    - the requirements of this document.

6.3.1 Noise from road and rail transport

Exposure to transportation noise may have a significant impact on the health of residents. In order to promote the health and well-being of the occupants of the proposed developments it will normally be necessary to ascertain the noise exposure. In order to obtain this data detailed surveys may need to be undertaken to the methodology specified in Section 3. The noise survey should consider $L_{Aeq,16hr}$,$L_{Aeq,8hr}$ and L_{AFmax} (between 23:00 and 07:00).

A scheme of noise mitigation will be required where the façade noise level exceeds:-

- 50 dB $L_{Aeq,16hr}$ daytime, and/or
- 45 dB $L_{Aeq,8hr}$ night-time and/or
- 60 dB L_{AFmax} between 23:00 – 07:00

when measured and assessed in accordance with Sections 3 and 4.

The scheme of mitigation should be designed to ensure internal noise levels do not exceed:-

- the criteria provided in Section 7.7.2 of BS 8233, and
- no more than 5% of the L_{AFmax} values between 23:00 – 07:00 exceed 45 dB.

Internal noise levels should be calculated using the methods provided in BS8233:2014 and/or BS EN 12354:3.

Where the façade noise level exceeds 72 dB $L_{Aeq,16hr}$ daytime or 67 dB $L_{Aeq,8hr}$ night-time EPU will not normally support the planning application.

The assessment of the internal noise levels arising from noise breaking through the building envelope shall normally be based on the proposed composite sound reduction of the whole building envelope. The assessment shall include the acoustic performance and area of the glazing, the surrounding wall plus the performance of any ventilators (in the open position) based on the proposed building design. Details of the acoustic performance data and other information used to determine the necessary mitigation shall be included in the noise assessment. In such cases EPU would expect the noise mitigation scheme to be included on the approved drawings.

In the case of traditional low rise developments with brick/block walls, where the area of glazing to each façade of a habitable room does not exceed $2m^2$ and where there is no

mechanical ventilation, a simplified approach may be appropriate, and the Table in Appendix 3 provides further guidance in such cases.

Where some form of mechanical ventilation is proposed resultant noise levels due to the operation of the ventilation system at maximum rate should not exceed NR 30. However the combined impact of noise break-through from the building envelope and noise generated by any mechanical ventilation at maximum rate shall at all times meet the requirements of this section and the internal noise criteria provided in Section 7.7 of BS 8233.

As well as protection for the building, good site layout (possibly including the use of barriers or bunds) should be considered to protect external amenity areas such as usable gardens or balconies. In such areas the steady noise level should not exceed 50dB $L_{Aeq,T}$.

6.3.2 Noise from industrial and commercial sources

To assess the impact of existing industrial and commercial noise sources on new residential developments, applicants should undertake an assessment in line with BS4142 as part of their application. The approach in Section 3 may be adopted as the basis for this assessment and background noise assessments should normally be based on a situation without the influence of industrial noise sources.

- If the BS 4142 type assessment suggests that a significant adverse impact is likely to occur, then EPU will normally recommend refusal.

- If the BS 4142 type assessment suggests an adverse impact is unlikely then EPU are unlikely to refuse the application on noise grounds.

- Where the assessment suggests that there will be an adverse impact EPU will expect the application to include details of how the applicant will mitigate and minimise this impact to future residents The EPU recommendation will be based on the context of each individual application.

- Where openable windows are provided EPU will not accept a strategy that relies on the occupier of the noise sensitive premises having to close the window during noisy activities other than for noise without character such as transportation noise.

In addition maximum noise levels attributable to the industrial or commercial source should not exceed 60 dB L_{AFmax} at the façade.

EPU will not consider schemes including closed windows and alternative ventilation to mitigate noise from industrial and commercial uses unless all other options in the noise hierarchy detailed in Section 5.1 have been evaluated and incorporated or discounted for technical reasons. In such cases EPU will review the mitigation scheme proposed balancing the mitigation scheme against the likely impacts.

When assessing possible mitigation measures BS4142 clarifies that the assessment and rating approach included within that standard are not intended to be used to assess the extent of the impact at indoor locations. Additionally the criteria provided in Table 4 of BS8233 are based on noise without character and are not normally appropriate for the assessment of commercial or industrial noise.

Where internal noise levels are assessed these should be calculated using the methods provided in BS8233:2014 and/or BS EN 12354:3. The assessment of the internal noise levels shall normally include the acoustic performance and area of the glazing, the surrounding wall plus the performance of any ventilators (in the open position). Details of the acoustic performance data and other information used to determine the necessary mitigation shall be included in the noise assessment.

In certain circumstances, for example where outdoor amenity space is unaffected by the noise, it may be appropriate to support an application provided the building is designed to provide an appropriate indoor acoustic environment. However the NPPF highlights that care should be taken when considering mitigation to ensure the envisaged measures do not make for an unsatisfactory development.

6.3.3 Noise from entertainment premises

As a general principle the aim should be that music and noise emanating from existing entertainment premises (including noise generated by patrons) should not be audible within the proposed noise sensitive premises. Where there are entertainment premises within the vicinity of proposed a noise sensitive premises a full and thorough assessment of the likely impact of these entertainment premises on the proposed development shall be undertaken. The assessment should be carried out in third octave bands and A weighted levels. For further details please see the IOA measurement guidance[12].

The determination of any impact should be based on both the noise levels and the outcomes identified based on the guidance in Sections 3 and 4. Applicants should note that having to close windows due to noise is considered to be an adverse impact in the noise hierarchy.

Dependant on the outcome of the noise impact assessment this department will make the following recommendation to Planning Management.

- Where the entertainment noise is predicted to have no impact at the noise sensitive development (ie the level of noise emanating from the entertainment premises is less than the representative background levels in both third octave bands and broadband) this department will not object to the application on noise grounds.

- Where the entertainment noise is predicted to have a significant adverse effect within the noise sensitive development this department will recommend the application is refused.

- Where the entertainment noise is predicted to have an adverse effect within the noise sensitive development then EPU recommendations will be based on the context of each application.

- Where openable windows are provided EPU will not accept a strategy that relies on the occupier of the noise sensitive premises having to close the window during noisy activities other than for noise without character such as transportation noise.

[12] Good Practice Guide on the Control of Noise from Pubs and Clubs. Criteria and Measurement Guidelines. John Hinton and Alistair Somerville. IOA Acoustics Bulletin Nov/Dec 2003

When devising noise mitigation schemes the hierarchy detailed in Section 5.1 shall be followed and the further guidance in section 5 shall be considered. EPU will not support closed windows and alternative ventilation to mitigate noise from entertainment uses unless all other options in the noise hierarchy detailed in Section 5.1 have been evaluated and discounted for technical reasons. In such cases EPU will review the mitigation scheme proposed.

Where internal noise levels are assessed these should be calculated using the methods provided in BS8233:2014 and/or BS EN 12354:3. The assessment of the internal noise levels shall normally include the acoustic performance and area of the glazing, surrounding wall plus the performance of any ventilators (in the open position). Details of the acoustic performance data and other information used to determine the necessary mitigation shall be included in the noise assessment.

6.3.4 Air Traffic Noise

Assessment of the noise impact due to aircraft shall be based on the most recent noise contours produced by Birmingham Airport Ltd. These contours are based on the peak summer day traffic (0700-2300) and are available from the airport or from EPU. Appendix III shows the noise contour map for 2014 and shows the 57, 63 and 66 dB contours.

Where a proposed development falls:

1. Outside the 54 dB contour - no special measures are required.

2. Between the 54 dB and 57 dB contours - the following measures are required:

   - All windows and doors to habitable rooms shall provide a sound reduction index of at least 25 dB R_W+C_{tr}.
   - Ventilation to habitable rooms shall provide a sound reduction index of at least
     31 dB $D_{n,e,W}+C_{tr.}$

3. Between the 57 dB and 63 dB contours - the following measures are required:

   - All windows and doors to habitable rooms shall provide a sound reduction index of at least 30 dB R_W+C_{tr}.
   - Ventilation to habitable rooms shall provide a sound reduction index of at least 38 dB $D_{n,e,W}+C_{tr.}$

4. Between the 63 dB and 66 dB contours - the following measures are required:

   - All windows and doors to habitable rooms to provide a sound reduction index at least equivalent to that required by the current Birmingham Airport Sound Insulation Scheme[13].

[13] Birmingham Airport has operated a Sound Insulation Scheme since 1978. The scheme provides improved sound insulation to existing properties in areas most affected by aircraft noise. The current scheme covers properties within the 2002 63dB contour. This contour has not changed significantly since then. The current scheme provides high acoustic performance double glazing (8.5 mm glass/ 6mm airgap /16mm glass) and Silavent acoustic ventilation (fan-assisted). For further information consult the Birmingham Airport website at http://www.birminghamairport.co.uk/.

- Ventilation to habitable rooms to provide a sound reduction index at least equivalent to that required by the current BIA Sound Insulation Scheme.
- Ceilings to the top storey shall consist of two layers of 12.5 mm plasterboard (with staggered joints) and any loft access must be well sealed.
- No habitable rooms should be constructed within the roof space. This position is likely to be reinforced by a lifetime condition on the development.
- There should be no flat roofs to habitable spaces.

5. Within the 66 dB contour - EPU will recommend refusal.

Where some form of mechanical ventilation is proposed noise levels due to the operation of the ventilation system should not exceed NR 30. However the combined impact of noise break-through from the building envelope and noise generated by any mechanical ventilation at maximum rate shall at all times meet the requirements of this section and the internal noise criteria provided in Section 7.7 of BS 8233.

6.4 Criteria for schools, hospitals and hotels

The design of schools and hospitals is covered within specific technical documents, which contain a large number of design criteria for the differing types of rooms. The key documents are:-

- Schools are covered within Building Bulletin 93,
- Hospitals are covered within Health Technical Memorandum 08-01.

Where applications are received for schools or hospitals EPU will not specify any noise levels to be met at the planning stage but will recommend that consideration be given to the achieving the levels within the relevant document.

The location and construction of an hotel will normally be based on a business case. The EPU will not usually prescribe noise and vibration criteria for hotel bedrooms where the noise source is road traffic. In such cases we recommend that hotel bedrooms shall be designed and located such that the unoccupied noise levels do not exceed the criteria specified in Table 4 of BS8233:2014 (alternative criteria used by some hotel groups are provided in Annex H of BS8233 2014) and no more than 5% of the L_{AFmax} values between 23:00 – 07:00 exceed 45 dB. We further recommend that hotel bedrooms shall be designed and located such that vibration levels do not exceed 0.14 mm/s peak particle velocity, or the assessment of vibration levels results in a low probability of adverse comment when assessed in accordance with BS 6472.

However, where the proposed location of an hotel is such that the bedrooms are potentially impacted by commercial, industrial or entertainment noise we would expect a detailed assessment of noise impacts as outlined in section 6.3 above due to the potential impacts on the existing businesses should disturbance occur.

6.5 Industrial and Commercial Noise Sources

For most proposed industrial and commercial noise sources an assessment in line with BS4142 should be carried out at the façade of noise sensitive premises.

The noise level of the source used to calculate the rating level shall be reported as $L_{Aeq,T}$ where T shall normally follow the guidance in BS 4142 (1 hour for daytime and 15 minutes

for night time). Where a single cycle of a night time operation exceeds 15 minutes the L_{Aeq} for a complete cycle shall be measured.

Background and ambient noise levels shall be representative of the existing noise levels at the most sensitive time during the proposed period(s) of operation. Where different operating regimes are proposed (for example daytime, evening and night time) background and ambient noise levels shall be determined for each operating period.

In addition to the above assessment the applicant should assess the maximum noise levels (L_{AFmax}) from the development that are expected to occur between the hours of 19:00 and 07:00. The maximum noise levels (L_{AFmax}) from the development assessed at the façade of any noise sensitive premises shall not exceed the L_{A90} by more than 10 dB, however where the existing background noise level is 45 dB L_{A90} or less, the maximum noise levels shall not exceed 55 dB L_{AFmax}.

6.6 Noise from entertainment premises

It is assumed that pubs, clubs, community halls and similar premises will be used for holding regular entertainment events. Therefore it will be necessary to design these premises to reduce the emission of music and associated noise. These principles may equally apply to places of worship where amplified or unamplified music, speech or singing may occur and such developments shall be assessed in accordance with this section.

It is expected that all applications for this type of premises should properly address noise issues. As a general principle music and noise from customer activity (talking, shouting and applauding) emanating from any entertainment premises including external areas (balconies, gardens and smoking areas) should not be audible within any noise sensitive premises.

The applicant should provide an acoustic assessment covering the period when the noise from the proposed entertainment premises is expected to have the greatest impact on nearby noise sensitive premises. The assessment should be carried out using third octave bands and broadband A-weighted levels. For further details please see the IOA measurement guidance. [14]

6.6.1 Noise levels at all noise sensitive premises

Dependant on the outcome of the noise survey this department will make the following assessment based on the guidance in Sections 2 and 4. In the case of entertainment premises EPU will not object where the entertainment noise is predicted to be inaudible within the noise sensitive development (ie the level of noise emanating from the entertainment premises is less than the representative background levels in both third octave bands and broadband). However where the entertainment noise emanating from the premises is predicted to exceed the representative background level by 10 dB in either third octave bands or broadband EPU will recommend the application is refused.

6.6.2 Noise from car parks, deliveries etc.

Noise from car parks, materials handling, deliveries, refuse collections and customer activity linked to entertainment premises must not exceed the following maximum criterion:

[14] Good Practice Guide on the Control of Noise from Pubs and Clubs. Criteria and Measurement Guidelines. John Hinton and Alistair Somerville. IOA Acoustics Bulletin Nov/Dec 2003

- Between the hours of 19:00 and 07:00 the maximum noise levels (L_{AFmax}) at the receptor from the development shall not exceed the background noise level (L_{A90}) by more than 10 dB, however where the existing background noise level is 45 dB L_{A90} or less, the maximum noise levels shall not exceed 55 dB L_{AFmax}.

6.7 Multi Use Game Areas (MUGA)

Multi Use Games Areas (MUGA) usually fall into D2 use classes (assembly and leisure) and can include a combination of facilities such as football pitches, hockey pitches, basketball pitches, net ball pitches etc. and are usually community based projects or within school premises.
Guidance has been produced by Sport England on the acoustic implications and design considerations for artificial grass pitches which should be considered for MUGA proposals[15].

It is expected that a noise assessment will be provided in support of an application for a MUGA. Ball impact noise on kick boards and fencing is a significant factor as well as noise from whistles and people noise and any assessment will need to consider these sources and include measurement of the existing noise environment and predicted impacts from the development on the amenity of noise-sensitive receptors.

Noise mitigation measures may include:

- Ensuring kick boards are no more than 30cms in height from ground level.
- Acoustic treatment of kickboards.
- Ensuring that chain fencing is supported with rubber mounts.
- Restriction of hours.
- Siting MUGA's away from residential properties.
- Boundary treatment (noise barriers, fencing material or bunds).
- Management measures.

MUGA proposals within the curtilage of a school may be treated differently where the site has already been used as a children's play area, particularly if the play area will not be used at night and there were no complaints.

Recommendation for approval will depend upon proximity of the development to neighbouring residents, the size of the development, the predicted impacts and proposed mitigation.

Applications for single court/pitch MUGAs will normally be supported where there is no residential accommodation within 30 metres of the development and the hours of operation are within 08:00 – 20:00 hrs Monday – Saturday and 10:00 -18:00 hrs Sundays.

6.8 Day Nurseries

There are two principle noise sources – firstly noise associated with indoor activities which in most cases can be mitigated by good acoustic design upgraded insulation and layout. However where the building is attached to a noise-sensitive use we would expect the application to include a scheme for noise insulation appropriate to the intended use and the existing structure.

[15] Sport England Design Guidance Note – Artificial Grass Pitches (AGP) Acoustics 2015 - https://www.sportengland.org/media/4515/agp-acoustics-planning-implications.pdf

The second source (which can result in adverse impact and complaint) is noise from the outdoor areas of nurseries and other child care facilities which are used for play and assembly. The use of objective measurements to assess noise generated by human activity (e.g. children playing, large groups of people etc) is very difficult as the noise levels vary continuously with bursts of noise interspaced by periods of relative quiet and also the sources are constantly moving. Noise from children playing, talking, crying etc will be potentially intrusive if it is audible within either adjacent premises or adjacent residential amenity space.

Any application including an outdoor use should be supported by a noise assessment. This assessment should determine the noise impact from the use of the outdoor areas and should be based on measured levels for the source noise (where it exists currently) and representative ambient/background noise levels at the potentially affected noise-sensitive premises. Obviously in most cases as the noise source will not exist it will be acceptable for measurements to be provided from a suitable comparable facility and the assessment shall include all raw monitoring data, details of the activities during the measurements, a suitable site plan for the data provided indicating the measurement location and source and shall be for a period of at least 30 minutes. Where possible the distance between the source and measurement location for noise monitoring from a comparable facility should be similar to the separation between the edge of the proposed play space and the noise-sensitive receptor. It will not be acceptable to calculate distance attenuation by considering the play area as a point source at the centre of the play area given that the source is a number of moving children and hence cannot be typified as a point source.

The assessment criteria need to be specific to the proposed use and reflect the guidance in section 3. In general we will not accept including periods when there is no activity in the play area in any calculated average and also we will not accept the use of BS8233 as the noise source cannot be typified as ‘noise without character’ and it is therefore inappropriate. Any recommendations from a noise report should be incorporated into the planning application and outdoor play area management strategy as appropriate.

6.9 Demolition and Construction Noise

When assessing an application consideration shall also be given to possible noise and vibration impacts during demolition, site preparation and construction. The need for controls will be based on the location, proximity of noise-sensitive receptors and the proposed works. Whilst there are powers to control construction noise under sections 60 and 61 of the Control of Pollution Act 1974 through a prior consent process, it may be appropriate to seek controls also through the planning process particularly for very sensitive locations or extended construction periods.

The following provides guidance on the issues that should be considered and the type of controls that may be appropriate in respect of noise and vibration management:-

1. Hours of use – works that may be audible at the site boundary shall not take place outside the hours of Monday to Friday 8am to 6pm, Saturday 8am to 1pm and no work on Sunday and Bank Holidays,
2. the parking of vehicles of site operatives and visitors,
3. loading, unloading and storage of plant and materials – consideration shall be given to the type of reversing alarms on delivery vehicles and associated impacts, location of off-loading and storage areas, avoidance of materials being dropped should be considered,
4. piling - carry out piling operations using the quietest methods available,

5. noise and vibration control methodologies - there should be a clear statement that the principles of BS5228:2009 will be followed in terms of noise and vibration control and effective site management as outlined below,
6. mobile plant and machinery - all such plant used on site shall be fitted with white noise reversing alarms,
7. delivery routeing,
8. working outside the standard hours of work - certain operations (such as concrete power floating, erection and dismantling of towers cranes, work on the highway) cannot always be undertaken within preferred hours of operation for noisy activities. We would seek to avoid such noisy works being carried out whilst residents are sleeping, if however there is no other option, EPU must be notified and local residents informed in writing and provided with a contact telephone number for them to call should they have any queries or problems.

Any mitigation for reducing impacts of construction noise should apply effective site management which includes:-

- avoidance of amplified music on site,
- not using vehicles with reversing alarms before 08.00,
- not leaving noisy equipment/ vehicles running unnecessarily e.g. at night or early deliveries,
- undertaking the noisiest operations in the middle of the day,
- keep noisy deliveries to the middle of the day especially skip and cement deliveries,
- ensure all materials are carefully loaded and unloaded to avoid unnecessary noise (such as avoiding items being dropped),
- locate noisy static plant (e.g. diesel generators and crushers) away from noise-sensitive properties,
- ensure equipment is properly maintained,
- ensure noisy plant is adequately insulated/screened,
- advise local residents in writing that work is to take place and provide a contact telephone number for them.

7 Vibration

7.1 Introduction to the section

Although vibration issues are not encountered frequently in the planning process it is something that should be considered where the development would lead to vibration sensitive premises being in close proximity to industrial/commercial activities or to railway lines.

Because of the uncertainties involved in predicting vibration effects each case will be considered individually, and appropriate criteria agreed.

7.2 Vibration from railway traffic

For existing buildings within 30m of a railway line where change of use to residential use is proposed a vibration survey within the building should be carried out. For new-build developments within 30m of a railway line a vibration survey must be carried out on the building lines closest to the railway. It will be important to survey at times when the highest levels of vibration are likely to occur, and it should be noted that a number of railway routes in Birmingham carry freight traffic at night.

For small developments (for example a single house or semi-detached pair) within 30m of a railway line EPU may be commissioned to undertake a limited, daytime, vibration survey at the proposed development site for which a charge will be made. In situations where these measurements suggest a potential problem then the applicant may be required to undertake a more detailed study.

7.3 Vibration from industrial or commercial sources

For new residential development within 30m of industrial premises, a vibration survey may be required. For new industrial development the applicant must assess any possible vibration effects on nearby vibration sensitive premises. Where appropriate an assessment should also be made of the potential for structure-borne noise generation.

7.4 Vibration surveys

In circumstances where vibration is a potential source of disturbance it is expected that an appropriate vibration survey or prediction be carried out. Initially, to avoid complex investigations being carried out unnecessarily a screening survey should be carried out. If monitored vibration levels do not exceed 0.14 mm/s peak particle velocity in any axis, then no further survey is necessary. If this level is exceeded, then it is expected that an assessment would be carried out with reference to BS6472.

When considering potential impacts and mitigation of vibration, the assessment should consider both the peak particle velocity (PPV) and vibration dose values (VDV) as indicators of potential impact and disturbance. The assessment should consider variations between daytime and night-time vibration and whilst the VDV will give an indication of possible response to vibration the variation in PPV may be a critical concern particularly at night.

Where re-radiated noise is a potential problem then this should also be assessed. Data from these assessments should be made available to the EPU for consideration.

8 Discharge of Conditions

8.1 Introduction to the section

This section provides some outline guidance and advice on the information and data that is expected to be submitted in support of requests to discharge the commonly adopted noise-related planning conditions. There are a range of conditions that are frequently used to cover assessment, layout of developments, noise insulation and mitigation and commissioning testing which are considered below. There will be occasions when a bespoke condition is imposed, and the guidance below will still be helpful in framing the submission.

8.2 Conditions requiring a noise assessment

In most cases where noise is a concern a noise assessment will have been carried out at the application stage. This should demonstrate that the noise impact of a development can be adequately mitigated to avoid adverse amenity impact or will not adversely impact the operation of existing businesses and the potential loss of employment activities due to the introduction of a noise sensitive use in an existing area where the resulting noise climate may represent a nuisance. The main circumstance where a noise assessment may be required after determination is for outline schemes. In these circumstances an assessment as outlined in sections 3, 4 and 5 of this document should be carried out to demonstrate that noise and vibration levels for facades containing habitable rooms and for outdoor living spaces do not exceed the criteria in sections 4, 5, 6 and 7 of this document.

8.3 Conditions requiring a noise mitigation or insulation scheme

There are effectively two types of noise insulation schemes that are typically required by planning condition.

The first is where the development has been evaluated at the application stage and the required performance of the building envelope has been agreed and integrated into the planning condition. The condition will typically require the submission of a scheme of noise insulation for approval to meet the specified performance requirements. The three components of the scheme that typically need to be addressed are as follows:-

a) Building structure – in some cases a composite sound reduction index may be specified to include the whole building envelope. In this case we would require full design drawings for all components of the envelope along with full supplier specifications and demonstration of compliance with the required performance.
b) Glazing – again we would expect clearly annotated drawings (including elevations and plan layouts) indicating which windows are being treated and the manufacturers glazing configuration (the type of glass, the glazing thickness, the cavity width and type of gas in the cavity) and demonstration from suppliers' test data that glazing complies with the required performance. It is important to note the required weighted sound reduction index of the glass (Rw) may also have a spectrum adaption correction (such as Rw + Ctr). The effect of the Ctr correction is usually to reduce the effective sound reduction of the glazing and it is essential that the glazing selected meets the composite performance.
c) Ventilation - ventilation may be provided by mechanical through-wall vents, trickle vents attached to the window frame or a whole building MVHR system. Where it is proposed to use trickle vents, we would require clearly annotated drawings (including elevations, sections and plan layouts) indicating which windows are to be fitted with ventilation, the manufacturers' specification and demonstration that the vents meet the required weighted element normalised level difference (including any

corrections). Where a mechanical system is proposed we would require drawings showing layout and elevation locations of inlet and outlet to the systems, the design and specification for the mechanical ventilation system to include filters, ductwork location, input and extract rates for each room and room volumes (hence an air change rate). In addition the scheme shall include an assessment of the combined impact of the noise break-through from the building structure (including glazing) and the noise generated by the mechanical ventilation within the habitable room. The scheme shall also address the adequacy of the ventilation system to avoid over-heating conditions.

The second instance is where the condition requires a scheme of noise insulation between commercial and residential premises. In this case we would require full design details of the proposed measures (including plan, section and elevation drawings) along with full suppliers' specifications (including acoustic performance). In addition the performance of the proposed scheme in terms of noise reduction shall be specified and the predicted noise impact at the residential premises shall be demonstrated.

8.4 Conditions requiring commissioning testing

Where mitigation schemes involving noise insulation are provided for industrial, commercial or entertainment noise sources or where complex or secondary glazing is specified EPU may require commissioning testing of the insulation scheme prior to occupation. Where commissioning testing is required it shall demonstrate that:-

1. the building envelope achieves the approved sound reduction performance, and
2. the internal noise environment to habitable rooms shall (under all conditions of the test) meet
    - the proposed noise criteria of the scheme,
    - the daytime and night-time internal noise level criteria requirements detailed in section 7 and in particular Table 4 of British Standard 8233:2014 'Guidance on sound insulation and noise reduction for buildings',
    - the 2017 ProPG on Planning and Noise – 'New residential developments', and
    - the requirements of the planning condition.

The commissioning testing shall follow the general guidance in section 3 of this document. The planning condition may require the submission of a proposed commissioning testing plan. We would expect the testing to:-

- be based on a period selected to be representative of the local noise environment but in any case to be over a period of at least 24-hours (daytime and night-time),
- include a number of test locations that provide representative data for differing mitigation strategies, different façades and differing receptor height,
- avoid testing when there are extraneous noise sources that do not form part of the locality noise environment (such as construction activities within close proximity to the site)
- be based on measurements being made simultaneously inside the building and at the external façade (to ensure the external noise environment during the test is representative and also to permit assessment of the noise reduction performance of the building envelope),
- include periods with and without the mechanical ventilation in operation for sufficient periods to be able to assess both the building envelope and the mechanical ventilation performance (this may require testing over more than one 24-hour period),

- demonstrate that the building envelope is performing in accordance with the design and that internal noise levels arising from noise breaking through the building envelope and the mechanical ventilation meet the required performance criteria.

8.5 Conditions requiring mitigation schemes for plant and equipment

There may be conditions included requiring the submission of a scheme for installation and mitigation of plant and machinery with respect to noise performance. In the case of industrial plant and equipment the submission shall include drawings showing the layout of the plant and mitigation measures along with manufacturers' specifications and acoustic performance data. The submission shall also include the prediction or measurement of the noise impact at the nearest noise sensitive receptor based on sections 3, 4 and 6 above. This will usually involve comparing the rating levels for cumulative noise from all plant and machinery with the existing L_{A90} background levels at the receptor.

One of the more common conditions requires the submission of details of kitchen extract ventilation and odour control equipment. The following is a summary of the information required (some of which relates to odour but will be part of the overall system design and has been included for information and context):-

1. arrangements for removal of grease from the extraction system
2. design of the extraction system including extraction volume flow rates and input air supply
3. type of food to be cooked and associated suitable odour control equipment specification and layout (dwell time in filters, etc.)
4. detailed layout drawings of the extraction and odour control equipment indicating equipment layout and extraction ductwork and stack locations in both plan, section and elevation
5. provisions for cleaning of ductwork and plant and equipment maintenance
6. construction standards for ductwork and extraction system (such as HVCA DW/144 and DW/172)
7. stack discharge diameter and locations - the system shall include vertical discharge of the termination of the stack serving the extraction system to be at least 1 metre above the eaves of the building, 3 metres from any opening window, with a discharge velocity of at least 15m/s and shall not be fitted with any cap or cowl that restricts the vertical discharge of emissions
8. manufacturers specifications and acoustic performance details of fans and silencers
9. method of isolation of fans, equipment and ductwork from the building (such as anti-vibration mounts, ductwork isolation to avoid vibration transmission)
10. a noise impact assessment including calculations of noise emission from fans, silencers, ductwork and stack and the prediction or measurement of the noise impact at the nearest noise sensitive receptor based on sections 3, 4 and 6 above (usually based on comparing the rating levels for cumulative noise from all plant and machinery with the existing L_{A90} background levels at the receptor.

Appendix 1. Glossary of Terms

'**A' weighting (dB(A)):** A frequency dependent correction which weights sound to correlate with the sensitivity of the human ear to sounds of different frequencies.

Ambient Noise: A measure of the typical noise (excluding any unusual events) present at a site. This is usually described in terms of $L_{Aeq,T}$.

Anonymous noise: Noise that cannot be attributed to a single (specific source). For example noise from cars on a road would be considered anonymous whereas a noisy ventilation unit would not.

Audible: Sound that can be heard or is perceptible by the human ear.

Background Noise: A measure of the underlying noise (excluding any unusual events) which is present at a site before a new noise source is introduced. This is usually described in terms of the L_{A90} level: the sound pressure level exceeded for 90% of the time.

C_{tr} Spectrum adaptation term: A correction added to a sound insulation quantity (such as R_w) to take account of a specific (traffic noise) spectra. See BS EN ISO 717-1:1997. For example the difference between internal and external traffic noise levels in dB(A) is calculated using **$R_W + C_{tr}$** (equivalent to **$R_{traffic}$**)

Clearly audible: There is no acoustic definition for clearly audible and as such a noise source may be deemed to be clearly audible if it is both easily identifiable and deemed likely to adversely affect the amenity of residents of any (proposed) development.

DMRB: The "Design Manual for Roads and Bridges" (DMRB) was introduced in 1992 in England and Wales. The DMRB sets a standard of good practice that has been developed principally for Trunk Roads. It may also be applicable in part to other roads with similar characteristics. (Volume 11, Section 3, Part 7 covers Noise and Vibration, see http://www.standardsforhighways.co.uk/dmrb/index.htm)

$D_{ne,W}$ Weighted element normalized level difference: A single-number quantity which characterizes the airborne sound insulation of a small building element. See BS EN ISO 717-1: 1997

$D_{nT,W}$ Standardised level difference: A single-number quantity which characterizes the airborne sound insulation between rooms. See BS EN ISO 717-1: 1997

Decibel (dB): A unit used for many acoustic quantities to indicate the level of sound with respect to a reference level.

EPU: Environmental Protection Unit, a service within the Environmental Health section of the Regulatory Services Department of Birmingham City Council.

Façade measurement: Noise measurements made outside an external wall of a structure (usually 1 metre from the wall).

Habitable room: A room used for sleeping or recreation / relaxation.

Inaudible: Sound that cannot be heard or is imperceptible to the human ear.

Industrial-type noise sources: Noise sources that are industrial in character. For example noise from plant and machinery, materials handling operations, or manoeuvring of heavy vehicles.

Institute of Acoustics: A professional body representing persons at all levels working in the field of acoustics. *http://www.ioa.org.uk/*

$L_{A90,T}$: Sound pressure level exceeded for 90% of the measurement period "T" or 'background level'.

$L_{Aeq,T}$: Equivalent continuous sound pressure level measured over the time period "T"

L_{Amax}: The maximum RMS A weighted sound pressure level

Mixed Use: Premises or development which will include both residential and non-residential uses

Noise: Unwanted sound.

Noise with a specific character: Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low frequency content .

Noise Action Plans and Quiet Areas: The Environmental Noise Directive 2002/49/EC (END) and the Environmental Noise (England) Regulations 2006 (as amended) require UK government to:

- Prepare strategic noise maps for large urban areas (referred to as agglomerations in the Directive), major roads, major railways and major airports.
- Prepare **action plans** based on the results of the noise mapping with the intention that these plans will aim to manage and reduce, where necessary, environmental noise, and preserve environmental noise quality where it is good in agglomerations (so-called '**quiet areas'**).

Noise assessment: Evaluation of noise climate by a suitably qualified person to assist in the determination of a planning application.

Noise-sensitive premises / developments: Principally comprising residential premises, hospitals, schools and hotels. Other premises types may be deemed such depending upon circumstances.

Noise Nuisance: A legal term used to describe noise at a level that is disturbing as perceived by a reasonable person. The meaning of nuisance is defined by precedent in common law.

Outdoor Amenity Area: An outdoor area adjacent to a residential building which is designed and intended primarily for the leisure and recreation of the occupants of the dwelling. This will include gardens, landscaped areas, and balconies.

***R*, Sound reduction index:** A quantity which characterizes the airborne sound insulation of a material or building element in a stated frequency band. See BS EN ISO 140-3:1995

R_W, Weighted sound reduction index: A single-number quantity which characterizes the airborne sound insulation of a material or building element measured in the laboratory. See BS EN ISO 717-1: 1997

Rating Level: The noise level of an industrial noise source which includes an adjustment for the character of the noise. Used in BS4142.

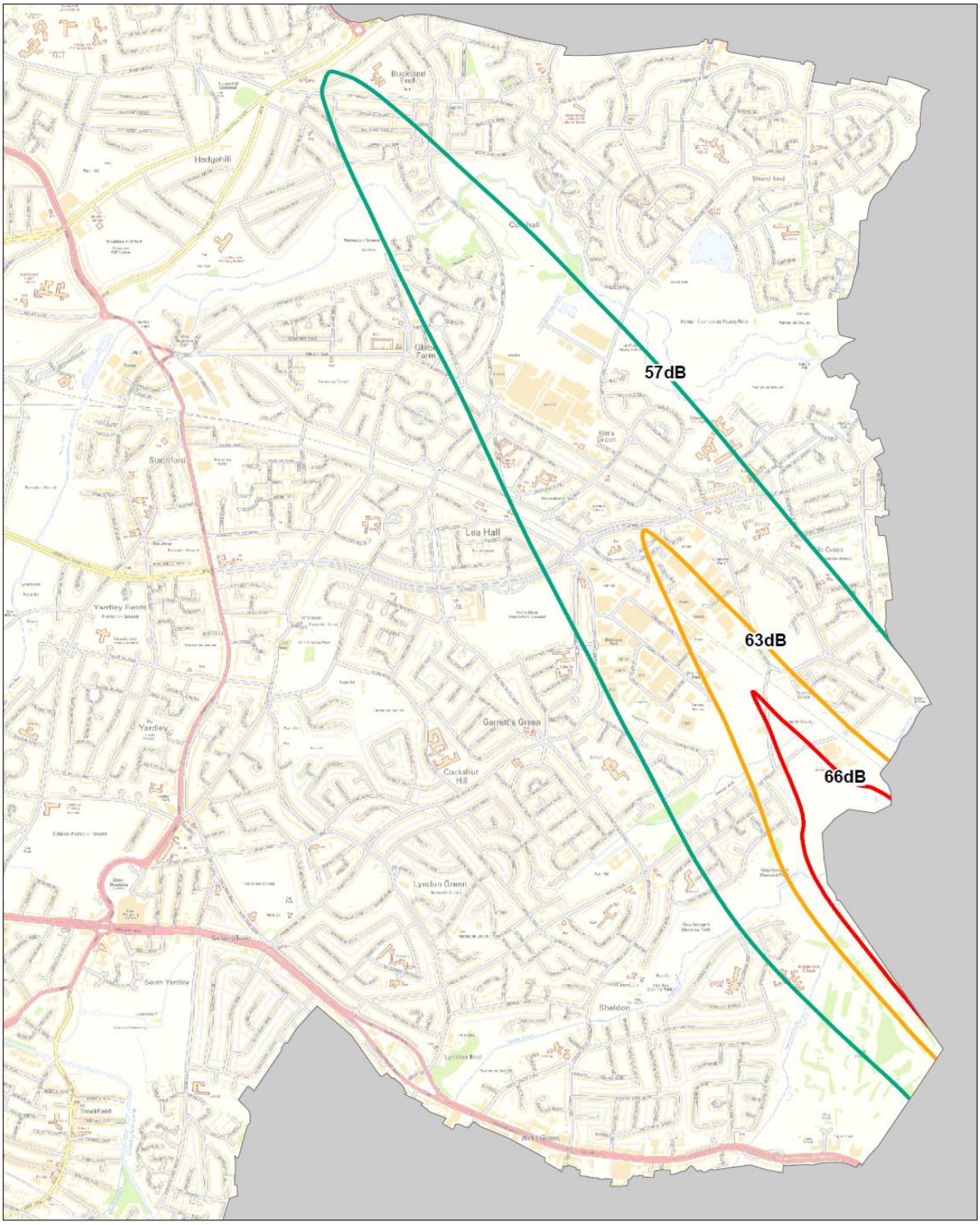
Sound insulation: A quantity which is used to characterize the reduction in sound pressure level across an element or partition. (See ***R*, R_W, $D_{nT,W}$, $D_{ne,W}$, C_{tr}**)

Structure borne noise: Noise that propagates through a structure, for example through a building.

Suitably qualified person: A person having a suitable combination of formal training and experience in the assessment of noise. Advice in the identification of suitably qualified persons can be obtained from the Association of Noise Consultants. *http://www.association-of-noise-consultants.co.uk/*

Appendix 2. Airport Noise Contours

Birmingham Airport Contours 2014



Appendix 3. Simple Acoustic specification for glazing and ventilation

The Table below is only appropriate for traditional low rise developments with brick/block walls, where the area of glazing to each façade of a habitable room does not exceed $2m^2$ and where there is no mechanical ventilation.

External Noise level Not Exceeding		**Acoustic Performance Requirement**	
Day (dB L_{Aeq})	Night (dB L_{Aeq})	Windows	Ventilators
		All windows and doors to habitable rooms to provide a sound reduction index (dB $R_W + C_{tr}$) of not less than	Ventilation to habitable rooms to provide a sound reduction index (dB $D_{n,e,W} + C_{tr}$) of not less than
<50	<45	No requirement see Note 1 below	
57	52	25	31
60	55	26	32
63	58	29	35
66	61	32	38
69	64	35	41
72	67	38	44
≥72	≥67	See Note 2 below	
Noise levels shall be rounded up to the nearest whole dB when determining the external noise exposure			

Note 1: Research provided by the World Health Organisation suggests that “general daytime outdoor noise levels of less than 50 dB LAeq are desirable to prevent any significant community annoyance". Where noise exposure is below this level no specific building envelope sound insulation is required.

Note 2: The EPU will not support approval. If consent is granted by Planning Committee then EPU will recommend standards unique to each application upon the request of Planning Management