



PLANT NOISE IMPACT ASSESSMENT

HAMPSHIRE BUILDING REFURBISHMENT

BARTON PEVERIL COLLEGE

NOVEMBER 2024

PLANT NOISE IMPACT ASSESSMENT HAMPSHIRE BUILDING

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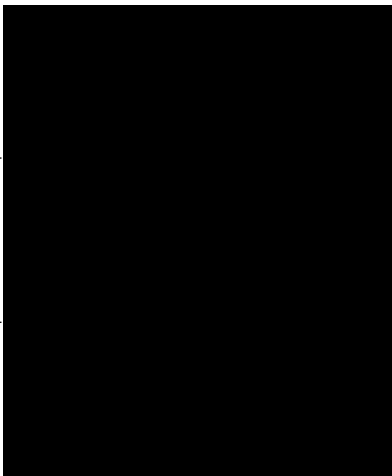


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REVISION HISTORY

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1 INTRODUCTION

Anderson Acoustics Ltd has been commissioned by Barton Peveril College (via Bidwells) to undertake a noise impact assessment in support of a planning application to install 2 no. MVHRs at Barton Peverill College Hampshire Building roof.

The assessment has been carried out to:

- Establish the plant noise emission limits that will be required outside noise sensitive receptors to maintain occupant amenity; and
- Predict noise emission levels from the proposed installation at sensitive receptors and provide mitigation advice where required to comply with the noise emission limits, as necessary.

2 SITE DESCRIPTION

2.1 Site location

The site and location of refurbishment works (Hampshire Building and Chestnut Building) is shown in Figure 2-1. The nearest residential premises are on Gilbury Close and Cedar Road, to the west of the building. A noise survey was carried out by Ion Acoustics on 29 November – 2nd December 2022 as part of the new Art Block development

The location of the monitoring position MP1 is shown in Figure 2-1. MP1 is a reasonable proxy location to represent the background sound level at the nearest noise sensitive receptors at Gilbury Close, however an absolute noise criterion has been agreed with the Planning Officer for avoidance of doubt.

Noise levels were reported to comprise mainly road traffic on Chestnut Avenue, the A335, and the more distant M27 and M3 motorways. Aircraft noise from Southampton Airport was also audible. There was some activity around the building from vehicles and motorbikes/scooters.

Figure 2-1: Site plan – Hampshire/Chestnut building, nearest noise sensitive receptors and noise survey location MP1



2.2 Noise Sensitive Receptors

The nearest noise-sensitive receptors (NSR) considered in this assessment are understood to be the residential properties located at the west/northwest of the site, across Gilbury Close. The assessment will be undertaken at numbers 31, 33 and 35 as they are closest to the proposed roof mounted plant.

The location of the nearest NSR and proposed external plant is identified in Figure 2-2:

Figure 2-2: Site location plan, roof mounted plant & NSRs



The location of the MVHRs & atmosphere side ducts (intake and exhaust) is identified in Figure 2-3:

Figure 2-3: Roof mounted plant on site location plan



3 ASSESSMENT CRITERIA

The applicable Local Authority requirements and associated assessment guidance are shown below. These should be read in conjunction with the government's overarching planning principles with respect to noise, which are summarised in Appendix B along with a description of relevant acoustic terminology.

3.1 Planning Conditions

It is understood that no Planning Conditions have been imposed to the development.

3.2 Local Planning Policies

Eastleigh Borough Council has not published specific noise related planning policy.

3.2.1 Plant noise limits set for the adjacent Arts School building

The Stage 4 plant noise emission limit that was set as part of the Planning Application for the adjacent Arts School building was for the noise rating level to be at least 10 dB below background except where background noise is low, in which case absolute noise limits are more appropriate as set out in BS 4142:2014+A1:2019), as shown in Figure 2-4.

Figure 2-4: Arts School Building proposed plant noise limits at residential receptors set at Stage 4

Period	Representative Background Noise Level, L_{A90}	Limit Type	Proposed planning Plant Noise Limits, $L_{A,r,Tr}$	Relative Difference, dB
Day (07:00-19:00)	45dB	Relative	35dB	-10
Evening (19:00-23:00)	41dB	Absolute	32dB ¹	-9
Night (23:00-07:00)	39dB	Absolute	32dB ²	-7
¹ Absolute limit of 32dB $L_{A,r}$ proposed.				
² Absolute limit of 32dB $L_{A,r}$ proposed.				

Whilst the location MP1 provides a reasonable proxy location to represent the NSR for this project as it is a similar distance from the main road, measured background noise levels could potentially be slightly lower than the above reported levels due to screening from, the college buildings.

In practice and in accordance with BS 4242: 2014 it is customary to truncate the target noise rating level for plant emissions where existing background sound levels are low.

Therefore, an absolute limit has been agreed with the Local Authority as discussed below.

3.2.2 Consultation with the Local Planning Authority

Guidance from Paul Bieda, Environmental Health Officer and Clare Martin, Senior Planning Officer, via email correspondence on the 25th & 30th October and 4th & 5th November is summarised as follows:

"Our guidelines for new plant based on BS 4142 are clear for night time levels at the noise sensitive receptor [NSR] in this case the residential houses in Gilbury Close.

There will be variations from any existing plant ie line of sight/height of college roof for calculation in spherical plain.

It is normal to take the new plant manufacturers sound power and apply a distance correction, otherwise current background levels can be measured to demonstrate the dB reduction at the NSR.

In both cases acoustic baffles may be required for the new plant for mitigation at the NSR."

Following the discussions, the EHO has approved an absolute limit of 35 dB $L_{A,r,Tr}$ maximum rating noise level at 1 m from the nearest NSRs window based on the following justification:

It is stated in BS 4142 Annex A (informative) that:

“in addition to the rating/background sound level comparison, the primary concern is the potential for disturbance of residents who could be sleeping with open bedroom windows. Other guidance, such as BS 8233, might also be applicable in this instance.”

BS 8233 indicates that, based on the assumption of a partially open window, a level of 35 dBA outside equates to an internal level of around 20 dBA, which is 10 dB below the target ambient noise levels for bedrooms.

Therefore, based on the guidance in BS 4142 and BS 8233 in terms of the night-time conditions, the target rating levels applicable to 1 m from the façade of the nearest residential premises are limited to 35 dB at night time. This would ensure that internal ambient noise levels within sensitive receptors are not undermined whilst balancing the practicalities of specifying the proposed fixed plant.

3.3 Summary of Assessment Criteria

Target plant noise rating levels at 1m outside the nearest residential façade window location are 35 dB $L_{A,r,Tr}$ as accepted by the Local Authority.

As a robust approach, the predicted noise rating level will also be compared against the lower rating level limit of 32 dB $L_{A,r,Tr}$ which was targeted for the adjacent Arts School development.

4 PLANT NOISE IMPACT ASSESSMENT

The noise impact assessment has been based on the following information.

4.1 Noise Sensitive Receptors

31-35 Gilbury Close (see Figure 2-1).

4.2 Noise Generating Plant Items

Information on the proposed plant has been provided by CBG Consultants M&E engineers, based on drawing: 12103-CBG-01-RF-DR-M-25001 P05 (10/10/2024).

Both daytime and night-time is assumed as a worst-case scenario.

The proposed MVHR units are Nuaire XBOXER XBC+ 25.

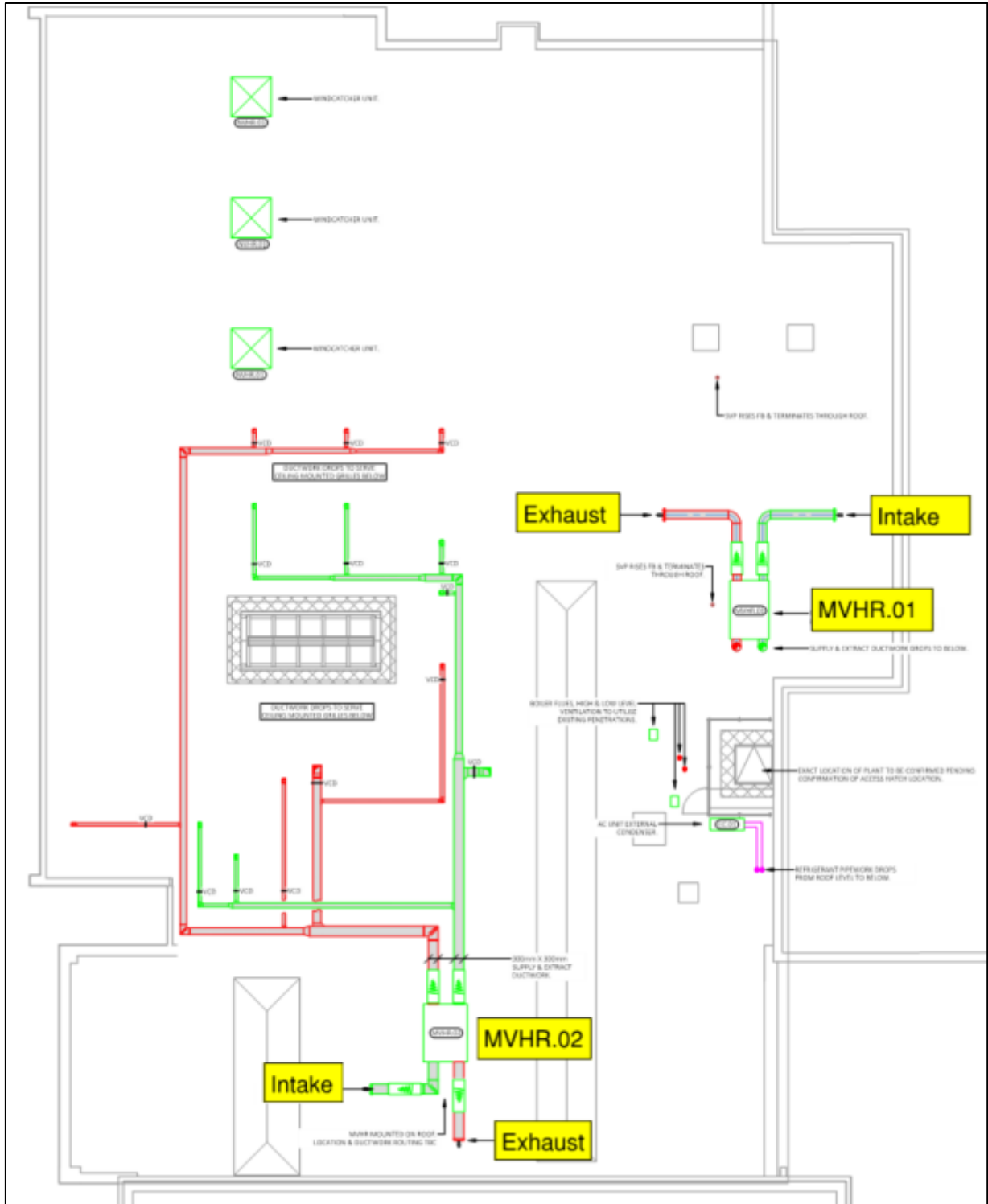
The distance from each item to the nearest NSR is included in

Table 4-1: Proposed plant installations

Plant Reference	Location	Plant Item	Distance from Rooftop Plant Area
MVHR01	Hampshire building roof	Exhaust duct	~42 m
		Intake duct	~42 m
		Casing Breakout	~43 m
MVHR02		Exhaust duct	~44 m
		Intake duct	~42 m
		Casing Breakout	~43 m

The below site plans show the proposed plant installation.

Figure 4-1: New rooftop plant location



4.3 Plant Noise Data

Manufacturer's noise data for the proposed equipment is detailed in Table 4-2.

Table 4-2: Noise data for proposed equipment

Unit Reference	Noise Data Type	Duty	Sound Power Level (dB) at Octave Band Centre Frequency (Hz)						
			63	125	250	500	1k	2k	4k
MVHR.01 MVHR.02	Intake inlet In-duct L_w	N/A	77	71	69	71	66	62	54
	Exhaust outlet In-duct L_w	N/A	83	84	78	81	72	72	70
	Breakout L_w	N/A	69	68	55	58	45	44	44

In the absence of attenuator schedules and insertion loss data, the following insertion loss is assumed, based on the length included in the mechanical roof plan drawing (1 m) and 30% free area.

The insertion loss for the proposed attenuators is included in Table 4-3:

Table 4-3: In-duct attenuators insertion loss spectral data

Attenuator Description	Assumed Insertion Loss (Hz)						
	63	125	250	500	1k	2k	4k
Length: 1 m. Free area: 30%	5	10	16	25	34	34	29

It is understood that the final specification will be selected by the Mechanical Contractor at the Construction Stage.

Limits at the nearest teaching space window of the building itself will also be considered to control noise ingress via the open rooflight, to achieve 45 dBA internally.

4.4 Calculation of Noise Levels

The calculation method used to predict the specific plant noise level has been summarised below.

- Hemispherical propagation
- Duct losses e.g. bends included
- In-duct attenuator losses based on estimated as presented in Table 4-3
- Grille-end reflection included
- Acoustic screening from existing roof edge/balustrade has not been considered in the assessment of rooftop plant as a worst-case scenario
- Direct line of sight considered between each plant item and the NSR as a worst-case scenario.
- 100% operation duty
- +5 dB character correction as a worst case

4.5 Noise Impact Assessment (Proposed Installation)

Table 4-4 provides the results of the assessment.

Table 4-4: BS4142 assessment outcome for NSR 1 (Proposed Installation).

Assessment Step	Details
Assessment location	NSR: 1 m outside the nearest window
Time Period	Operating hours: 24 hours
Distance	42 m
Distance attenuation	32 dB
Cumulative Specific Noise Level at 1m from NSR1 $L_{Aeq,T}$	23 dB
Feature Correction	+5 dB
Rating Level $L_{Ar,Tr}$	28 dB
Target Criterion	≤ 35 dB $L_{Ar,Tr}$

It can be seen that predicted noise rating level comfortably achieves the proposed criterion of ≤ 35 dB $L_{Ar,Tr}$, provided that the atmosphere side attenuators achieve the insertion loss performance in Table 4-3. The lower criterion of 32 dB $L_{Ar,Tr}$ which was set for the adjacent Arts School building is also comfortably achieved.

Therefore, additional attenuation measures are not considered to be required.

4.6 Assessment Uncertainty

As detailed in Annex B of BS 4142, there is an inevitable degree of uncertainty associated with the sound level measurement and prediction procedures that inform the conclusions of assessments of this type.

In this case, as detailed in Appendix C, the effect of uncertainty on the outcome of this assessment is considered to be not significant.

5 SUMMARY

Anderson Acoustics Ltd has been commissioned by Barton Peveril College to carry out a noise impact assessment for the proposed roof installation of 2 no. MVHRs on the roof of the existing Hampshire building.

This report identifies the proposed plant items and their locations in relation to the nearest noise sensitive properties. Calculations have been made to assess the resultant rating levels at the nearest noise sensitive dwellings in accordance with BS 4142.

Our assessment predicts that plant noise levels are expected to comply with the criterion agreed by the Local Authority, provided that the proposed attenuators achieve the insertion loss performance in Table 4-3 and therefore no further mitigation measures are required

The intake and exhaust attenuator performance has been estimated. It is understood that the proposed plant, attenuators length and duct layouts are indicative only at this stage and that the final design will be undertaken by the proposed contractor during construction. Therefore, this noise impact may need to be reviewed and updated for the final design.

APPENDIX A

GLOSSARY OF ACOUSTICS TERMINOLOGY

Acoustics Glossary

Refer to <https://andersonacoustics.co.uk/resources/acoustics-glossary/> for details

APPENDIX B

NOISE POLICY, GUIDANCE AND CRITERIA

B.1 National Policy

The national policy of relevance comprises the **Noise Policy Statement for England (NPSE, 2010)** and the online **National Planning Policy Framework (NPPF, regularly updated)** and its associated **planning practice guidance on “Noise”** (also regularly updated). The guidance is necessarily generic and primarily geared towards local authorities preparing their own policies and associated guidance. The documents are described below.

B.1.1 Noise Policy Statement for England (NPSE, 2010)

The **NPSE** is the Government’s overarching statement on noise policy for England, and applies to all forms of noise other than occupational noise, setting out the long-term vision of Government noise policy, which 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.”

Which is supported by the following noise policy 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; and
- Where possible, contribute to the improvement of health and quality of life.”

When discussing the meaning of “significant adverse” and “adverse” within an “**Explanatory Note**”, the **NPSE** states:

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

“NOEL – No Observed Effect Level - This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

“LOAEL – Lowest Observed Adverse Effect Level - This is the level above which adverse effects on health and quality of life can be detected.”

To which the **NPSE** added the following related concept:

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

The **Explanatory Note** continues:

“It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”

The **NPSE** concludes by explaining in a little more detail how the LOAEL and SOAEL relate to the three aims listed above. Logically, it starts with the aim of avoiding significant adverse effects on health and quality of life, then addresses the situation where the noise impact falls between the LOAEL and the SOAEL, when “*all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development.*” The final aim envisages proactive

management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development.

B.1.2 National Planning Policy Framework (NPPF, 2021)

First published in 2012, and most recently updated in July 2021, the **NPPF** sets out the Government's planning policies for England, and how these are expected to be applied. Noise is referenced within the **NPPF** as follows. These are effectively the **NPPF**'s policies on noise.

"170. Planning policies and decisions should contribute to and enhance the natural and local environments by:

"...e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans..."

"185. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

"a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life⁶⁰...

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."

Reference number 60 of the above quotation points to the **Explanatory Note** to the **NPSE** (see above).

The following policy is also relevant to noise.

"187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

As mentioned above, the Government has published accompanying web-based planning guidance for a number of categories, including noise (see below).

B.1.3 NPPF Planning Practice Guidance, Noise (PPG-N, 2019)

Following initial release in 2014, the planning practice guidance now forms part of the **NPPF**, referred to as "**relevant planning practice guidance**", which includes guidance on the category of "**Noise**". The guidance is often referred to as PPG-Noise, **PPG-N** or PPG(N).

In keeping with the **NPSE** and **NPPF**, no values (in dB) are presented; however, plenty of guidance is provided as to the issues to consider in assessing noise and determining suitable thresholds. Whilst, in keeping with this report, reference is made to **BS 8233** (see **B.2.1** and **B.3.2**).

A "**noise exposure hierarchy table**" is provided, which summarises the noise exposure hierarchy based on the likely average response of those affected, and is reproduced below. It includes "**examples of outcomes**"

relevant to the NOEL, LOAEL and SOAEL effect thresholds described in the NPSE. These outcomes are in descriptive form; there is no numerical definition of the NOEL, LOAEL and SOAEL.

Table B.1: Noise exposure hierarchy table (as per PPG-N)

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
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
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

It is left to other guidance documents (e.g. [BS 4142](#) and [BS 8233](#) – see further below) and professional opinion to determine thresholds where required.

B.3 Assessment of plant noise

B.3.1 British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

The standard practice is for plant noise to be assessed outside (rather than inside) dwellings. This is primarily to account for people using their outside amenity space (e.g. gardens and balconies), but which also, effectively, accounts for conditions inside with windows open (providing limited sound insulation).

The relevant guidance is contained in **BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound***.

The assessment methodology evaluates the “specific sound level” of each industrial or commercial sound source, corrects for distinguishable features to derive the “rating level”, and compares this with the “background sound level”.

The background sound level (represented by the $L_{A_{F90,T}}$ metric) will be, in fact, a range of levels, not one absolute value; although, naturally, deriving a sufficiently representative single-figure can help in terms of simplicity and clarity.

Measurements of background sound should be normally not less than 15 minutes, whilst the focus should be on obtaining a level for use in assessment that is representative of typical conditions at the noise-sensitive receptors.

The specific sound ($L_{A_{eq,T}}$) should relate to a reference period (‘Tr’) of one hour in terms of the daytime (07:00 to 23:00) and 15 minutes during the night-time (23:00 to 07:00). Where the specific sound occurs for less time than these periods, a time-correction is required. For example, if the sound only occurs for 30 minutes in any hour during the daytime, a -3 dB correction is applicable. If, however, the same period of operation applies at night, thus longer than the reference period, no correction applies.

Ideally, measurements would be taken of the “ambient sound” and “residual sound” at the assessment location (both in terms of $L_{A_{eq,T}}$), with these measurements used to calculate the specific sound (where ambient – residual = specific). However, if either the source(s) in question are yet to be installed or access isn’t possible to the relevant receptor location, then a predictive exercise is required.

The rating level is determined from the measured, calculated or predicted specific sound level, applying, if necessary, a correction factor to account for the acoustic features present in the sound in question, as experienced at the receptor, such as distinguishable, discrete, continuous note (a whine, hiss, screech or hum etc.) or distinct impulses (bangs, clatters or thumps etc.). Where no correction is warranted, the rating level (denoted $L_{Ar,Tr}$) is equal to the specific level ($L_{A_{eq,Tr}}$).

These correction factors can be approached in three ways:

- subjective method;
- objective method for tonality; and
- reference method.

The subjective method to calculate the rating level incorporates the following corrections (particularly appropriate for new sources that cannot be measured in-situ):

- Up to +6 dB due to tonality, subjectively this might be +2 for a tone that is just perceptible, +4 where it is clearly perceptible and +6 where it is highly perceptible; and/or
- Up to +9 dB for impulsivity, subjectively this might be +3 for impulsivity that is just perceptible, +6 where it is clearly perceptible and +9 where it is highly perceptible; and/or
- Up to +3 dB for intermittency, with the full value applicable if the intermittency is readily distinctive against the residual acoustic environment; and/or
- 3 dB where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment

Where the subjective method is not sufficient to assessing the audibility of tones, the objective method for tonality should be used. This involves analysing the one-third octave bands (25 Hz to 10 kHz) of the specific sound and applying a correction of +6 dB where a tone is prominent.

Where the subjective method is not sufficient for assessing the prominence of impulsive sounds, the reference method should be used. This involves analysing the onset rate of an impulsive sound and the amount of increase in level. A correction of between 0.0 and 9.0 dB is applied to the specific sound level.

Where the one-third octave method is not sufficient for identifying tones, the reference method for assessing the audibility of tones should be used. This analysis produces a sliding scale correction from 0.0 to 6.0 dB.

An “initial estimate” of the impact of the specific sound is calculated by subtracting the measured background sound level from the rating level. The following advice applies:

- a) Typically, the greater this difference, the greater the magnitude of the impact.
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- d) 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.

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. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur.

Where the initial estimate of the impact needs to be modified due to the context, the assessment should take into account all pertinent factors, including:

- 1) the absolute level of sound;
- 2) the character and level of the residual sound compared to the character and level of the specific sound; and
- 3) the sensitivity of the receptor and whether dwellings will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

Helpfully, **BS 4142** includes some example assessments. In one example, it is concluded that:

Although the plant noise is somewhat different in character to the residual acoustic environment the rating level of 30 dB is low and will have little impact on residents using their patio during the evening.

Under similar conditions it is stated:

In addition to the rating/background sound level comparison... where ...the primary concern is the potential for disturbance of residents who could be sleeping with open bedroom windows... Other guidance, such as BS 8233, might also be applicable in this instance.

An assessment, therefore, is effectively in two parts. The first part results in an initial indication of the impact, which is subsequently considered in terms the context unique to the situation at hand; and where this second part may require consideration of alternative guidance and metrics. Alternatively, the context can be considered upfront and a specific threshold (or set of thresholds) determined accordingly in place of the default values presented in points a) to d) quoted above.

B.3.2 British Standard 8233 (as per B.2.1)

As stated above, the scope of **BS 4142** is limited to the assessment of sound outside a property. This isn't always sufficient or relevant, however. Where the **BS 4142** assessment finds that mitigation is required, and the only remaining means of mitigation is at the property, then an additional approach is required. Likewise, where there is no outside amenity space to consider, where windows can be assumed to be closed, or where background levels are particularly low.

In such instances, **BS 4142** points to **BS 8233**, and thus the internal criteria presented in **Table B.2**. In this regard, **BS 8233** advises that when the sound in question has a “specific character” (due to features such as a distinguishable, discrete and continuous tone, irregular enough to attract attention, or has strong low-frequency content), lower noise limits might be appropriate. No such lower limits are presented in the Standard; although, it is discussed that a shorter assessment period (such as one hour, as opposed to the 16-hour daytime or 8-hour night-time periods) be considered where relevant to the pattern of operation of the source. This would equate to a more stringent approach.

An alternative to lowering the limits (without guidance on the amount) is considered to be the comparison of the standard limits with the indoor equivalent of the rating level, thus including any corrections for specific characteristics, as determined using **BS 4142**. In this way, the limits are effectively lower/more stringent.

With the assumption of a window being open, an outside to inside (and *vice versa*) correction of 15 dBA would apply. Based on the standard targets for living rooms and bedrooms, therefore, of 35 dBA (day) and 30 dBA (night), the equivalent (rating level) limits of 50 dBA and 45 dBA would apply.

Based on the combined guidance of **BS 4142** and **BS 8233**, therefore, it is considered that the plant noise limit outside the apartments should be whichever is the higher of the background level(s) + 0 (zero) dB or 45 dBA (day) or 40 dBA (night) as determined as a rating level ($L_{A,r,Tr}$) in accordance with **BS 4142**.

These are based on the assumption of an open window. If the relevant limit cannot be met, and the plant noise cannot be reduced, then consideration could be given to the closing windows, subject to ventilation and cooling requirements being accounted for.

APPENDIX C

UNCERTAINTY IN ASSESSMENT

UNCERTAINTY

Measured Levels

Measurement location

- Background sound levels were not measured. The assessment is based on an absolute noise limit of 35 dBA at 1 m from the nearest residential window as agreed by the Local Authority.
- The more onerous noise limits established in the prior approved Planning Application for the nearest residential NSRs of the adjacent Arts School building, have also been referenced as a guide.

Calculations

Assumed sound power levels

- Certified sound power level data based on laboratory measurements carried out in accordance with ISO 3741
- Assessment based on worst case scenario of plant operating at full load

Calculation process

- Despite screening between the proposed roof mounted plant location and sensitive receptors location due to the effect of the building and the roof balustrade, any attenuation from barrier screening was disregarded for the purpose of our calculations as a worst-case scenario
- Distance propagation from specific sound source to receiver based on scale drawings and Google Maps; any slight differences in distance will be negligible
- Calculations rounded up to nearest dB
- During normal operation, specific sound source is not expected to exhibit any tonal, impulsive or intermittent characteristics that would warrant a correction penalty, however a +5 dB penalty has been applied as a worst case at this stage.
- Unable to validate predicted specific sound level with measurements as the plant is yet to be installed
- Attenuator insertion loss performance has been estimated,
- MVHR model, noise data, ductwork layouts are indicative. The final design will be undertaken during construction.
- Assessment will be updated once final design undertaken.

Summary

The effect of uncertainty factors on the outcome of the assessment is considered to be not significant for the current indicative design. A new noise impact assessment will be required for the final design, to be developed by the MEP subcontractor during the Construction stage.