



Evans Dakota Hotels
Bailey Lane, Manchester
Residential Type Use – Noise Impact Assessment
DC4482-NR1v2



Report Version Issue Log

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Limitations to this Report

This report entails a physical investigation of the site with a sufficient number of sample measurements to provide quantitative information concerning the type and degree of noise affecting the site. The objectives of the investigation have been limited to establishing sources of noise material to carrying out an appropriate assessment.

The number and duration of noise measurements have been chosen to give reasonably representative information on the environment within the agreed time, and the locations of measurements have been restricted to the areas unoccupied by building(s) that are easily accessible without undue risk to our staff.

As with any sampling, the number of sampling points and the methods of sampling and testing cannot preclude the existence of “hotspots” where noise levels may be significantly higher than those actually measured due to previously unknown or unrecognised noise emitters. Furthermore, noise sources may be intermittent or fluctuate in intensity and consequently may not be present or may not be present in full intensity for some or all of the survey duration.

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1.0 INTRODUCTION

Evans Dakota Hotels Ltd has appointed Dragonfly Consulting to carry out a Noise Impact Assessment to assess the ingress of noise and recommend appropriate noise mitigation measures, at the junction of Bailey Lane and Enterprise Way, Wythenshaw, Manchester.

The noise assessment has been conducted with reference to the National Planning Policy Framework and the appropriate British Standards, recognised guidance & reference documents relevant to this site as well as Evans Dakota Hotels' own acoustic requirements for guest bedrooms.

This report describes a noise survey of the site and the subsequent analysis to determine the noise environment of the proposed development. It then compares the results with the adopted criteria and, where applicable, recommendations are made with respect to the design of the development.

Measurement of external noise levels have been completed for the proposed development to allow demonstration that suitable internal noise levels will be achieved within guest bedrooms in the final completed development.

To support this document a glossary of technical terminology is included in Appendix A.

1.1 Site Description

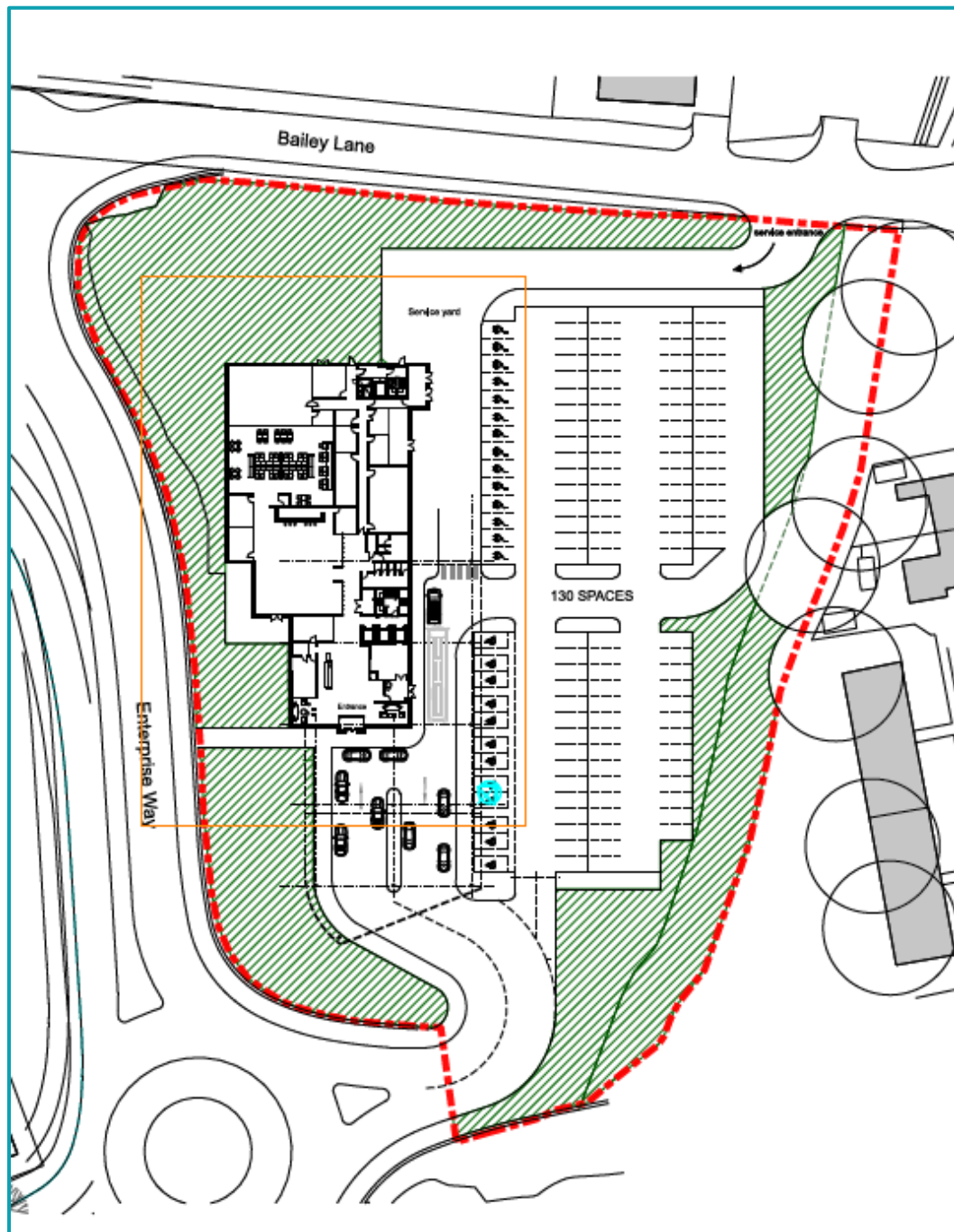
1.1.1 Current Site Conditions

The site is currently open undeveloped land, partially tarmac covered and open to both Bailey Lane and Enterprise Way. To the immediate north and west of the site are commercial office premises, to the east is existing residential dwellings and to the south is the Manchester Airport estate.

1.1.2 Proposed Site Conditions

The development consists of the conversion of the construction of a new hotel building at St Anne's Wharf to form a 114-bedroom hotel development. The development will also include bar and restaurant areas along with service spaces and kitchens to support the use. A proposed site plan is shown at Figure 1.1.

Figure 1.1
Proposed Site Plan



2.0 GUIDANCE

2.1 Consultation with Local Authority

A pre-application planning consultation has not been completed with Manchester City Council (MCC). MCC issues detailed guidance for developers within its guidance document 'Planning & Noise - Technical Guidance' issued in May 2022.

This document does not contain any guidance specific to the development of hotels, however it is considered that the guidance set out for both residential developments and commercial developments may be relevant, based on the pseudo-residential nature of a hotel and the fixed plant noise sources associated with cooling, heating and fume extraction.

In reference to residential uses, the guidance states the following at Section 3.7.1.1:

The Council has adopted the following noise limits for residential properties:

- Bedrooms (night time - 23.00h - 07.00h) 30 dB L_{Aeq} (individual noise events should not normally exceed 45 dB $L_{Amax,F}$ by more than 10 times)
- Living Rooms (daytime - 07.00h - 23.00h) 35 dB L_{Aeq}
- Gardens and terraces (daytime) 55 dB L_{Aeq}

In relation to noise from fixed plant and commercial sources the guidance further states:

"BS 4142 should be used to assess the likely impact of noise from industrial and commercial sources at noise sensitive premises (section 3.5). One of the indications of the impact of a BS 4142 assessment is the lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

The Council consider that new developments should contribute and enhance the area in which they are located and where possible i.e. prevent 'noise creep', contribute to the improvement of people's health and quality of life as per the NPSE. With this in mind, the design objective should be:

The development should be designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location."

2.2 Local Planning Requirements

The following local planning requirements have been identified within Policy DM1 of the Manchester Local Plan:

"Development Management

All development should have regard to the following specific issues for which more detailed guidance may be given within a supplementary planning document:-

- *Appropriate siting, layout, scale, form, massing, materials and detail.*

- *Impact on the surrounding areas in terms of the design, scale and appearance of the proposed development. Development should have regard to the character of the surrounding area.*
- *Effects on amenity, including privacy, light, noise, vibration, air quality, odours, litter, vermin, birds, road safety and traffic generation. This could also include proposals which would be sensitive to existing environmental conditions, such as noise.*

2.3 National Planning Requirements

2.3.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. At the heart of the NPPF is a presumption in favour of sustainable development. It requires Local Plans to be consistent with the principles and policies set out in the NPPF with the objective of contributing to the achievement of sustainable development.

The NPPF states that the planning system has three overarching objectives in achieving sustainable development including a requirement to 'contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.'

Paragraph 180 of the NPPF states:

"Planning policies and decisions should contribute to and enhance the natural and local environment 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."

Additionally, Paragraph 191 of the NPPF states:

"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 life..."

2.3.2 Noise Policy Statement for England

The document 'Noise Policy Statement for England' sets out the following vision for ongoing noise policy:

"Promote good health and a quality of life through the effective management of noise within the context of Government policy on sustainable development."

This vision should be achieved through 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.”*

To achieve this vision, the Noise Policy Statement sets 3 noise levels to be defined by the assessor:

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.

SOAEL – Significant Observed Adverse Effect Level

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

The Noise Policy Statement considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable. Where the assessed noise levels fall between the LOAEL and the SOAEL noise levels, the Policy Statement requires that:

“...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... This does not mean that such adverse effects cannot occur.”

Where noise levels are below the LOAEL, it is considered there will be no adverse effect. Once noise levels are below the NOEL, there will be no observable change.

2.4 British Standard (BS) 7445-1:2003

The assessment of noise impact for this development has been undertaken by measuring internal noise levels in a dwelling in accordance with the guidance detailed in BS 7445-1:2003 *Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and Procedures*.

This document defines the basic quantities to be used for the description of noise in community environments and describes basic procedures for the determination of these quantities.

The methods and procedures described in this British Standard are intended to be applicable to sounds from all sources, individually and in combination, which contribute to the total noise at a site. This British Standard does not specify limits for environmental noise.

2.5 BS 8233:2014

The scope of BS 8233:2014: Sound insulation and noise reduction for buildings is the provision of guidance for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations; the primary intention of these is to guide the design of new buildings or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the

external noise climate. The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table 2.1.

Table 2.1
Indoor Ambient Noise Levels in Spaces When They Are Unoccupied

Activity	Typical Situations	Design Range $L_{Aeq, T}$ dB	
		0700h to 2300h	2300h to 0700h
Resting	Living rooms	35	--
Dining	Dining Room / Area	40	--
Sleeping	Bedrooms	35	30

BS 8233 states in Note 4 that:

“Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,f}$ depending on the character and number of events per night. Sporadic noise events could require separate values.”

As such, it is typically considered appropriate to define a limit for regular maximum noise levels of 45dB(A) with sporadic events not exceeding 50dB(A) to 55dB(A).

2.6 ProPG: Planning and Noise

The document ‘ProPG: Planning & Noise - Professional Practice Guidance on Planning & Noise’ provides advice for Local Planning Authorities, developers and their respective advisors and compliments government planning, noise policy and guidance. The document seeks to:

- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- Encourage the process of good acoustic design in around new residential developments;
- Outline what should be taken into account in deciding planning applications for new noise sensitive developments;
- Improve understanding of how to determine the extent of potential noise impact and effect;
- Assist in the delivery of sustainable development.

Following the guidance in paragraph 17 of the NPPF, planning should always seek to secure high quality design and a good standard of amenity for all existing and future occupants of land and buildings. ProPG describes an acoustic design process which seeks to deliver the best acoustic outcome for the site.

2.6.1 Good Acoustic Design Objectives

With reference to the guidance set out within the ProPG, the following design objectives are considered to represent good acoustic design and are recommended for this site:

- Full consideration of the acoustic environment from the earliest possible stage of the development process;

- An integrated approach should be taken to achieve optimal acoustic conditions, both internally (inside noise sensitive parts of the building) and externally (in spaces to be used for amenity purposes);
- The basis of good acoustic design should avoid ‘unreasonable’ acoustic conditions and prevent ‘unacceptable’ acoustic conditions as defined by the ProPG. Necessary design compromises should ideally not adversely affect living conditions and the quality of life of inhabitants;
- Using fixed unopenable glazing for sound insulation purposes is generally unsatisfactory and should be avoided;
- 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;
- Evidence should be provided that good acoustic design processes have been followed.

The ProPG empowers the assessing acoustician to assess the acceptability of any noise impact and to establish the need for acoustic mitigation measures by considering the guidance detailed in BS 8233:2014 (see Section 3.2) whilst also giving consideration to the context of the site, along with other non-acoustic factors that may affect the need to bring forward a site that is not acoustically ideal.

However, in determining what acoustic conditions would be ‘unreasonable’ and ‘unacceptable’, the ProPG also sets out the following guidance:

“The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5dB, the more that most people are likely to regard them as “unreasonable”. Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as “unacceptable” by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing “unacceptable” noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form”.

Additionally, ProPG makes an addendum to Note 4 of the internal noise level guidelines as stated in BS 8233:2014 (Figure 2 in the ProPG document), referring to the acceptability of internal night-time L_{Amax} noise levels:

“...In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB L_{Amax} more than 10 times a night...”.

2.6.2 BS 4142:2014+A1:2019

British Standard 4142:2014+A1:2019 – *Methods for rating and assessing industrial and commercial sound*. This new edition of BS 4142 clarifies the application of the standard and introduces the consideration of uncertainty as part of the assessment methodology. The standard provides a method for rating and assessing sound of an industrial or commercial nature, including:

- Sound from industrial and manufacturing process;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;

- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises;
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as from FLTs or that from train or ship movements on or around an industrial/commercial site.

The standard is intended for use for both the assessment of complaints and the assessment of the impact of commercial and industrial noise on both new and existing residential developments.

The method described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes at which the sound is incident. The standard specifically excludes itself for the use of determination of nuisance.

The procedure contained in BS 4142 for assessing the likelihood of complaint requires the calculation of the noise level from the source to be assessed at a location immediately outside the relevant dwelling; this is described as the 'specific sound level'. Where the specific noise source already exists, its noise level can be derived by measuring the total noise present, or 'ambient noise', and subtracting from it the noise from sources that are not under consideration. Noises not under consideration are called the 'residual noise'.

A 'rating level' is then calculated from the specific sound level. The rating level is then compared with the measured background noise level at that measurement location. If the specific noise source does not yet exist but the details of the intended plant are known, the specific sound level can be derived from first principles using manufacturers' and other data.

The specific, ambient and residual noise levels are measured in terms of $L_{Aeq,T}$ values and the background noise level is measured in terms of an L_{A90} value.

BS 4142 considers that certain acoustic features can increase impact of a new noise source over that expected from a simple comparison between the specific noise level and the background noise level. These features can be assessed in one of three ways:

- Objective method - comparing adjoining third octave band noise levels (if available) for the sound source;
- The reference method by analysing measured plant noise levels using the Joint Nordic method;
- Using the prescribed subjective methodology.

These features and the penalties applied to calculate a rating level when assessing subjectively as defined by BS 4142 are as follows:

- Tonality – For sound ranging from not tonal to prominently tonal, the Joint Nordic Method gives a correction of between 0 and +6dB for tonality.
 - 2dB for a tone which is just perceptible;
 - 4dB where it is clearly perceptible;
 - 6dB where it is highly perceptible.

- Impulsivity – A correction of up to 9dB can be applied for sound that is highly impulsive, considering both the rapidity of change in sound level and the overall change in sound level.
 - 3dB just perceptible impulsivity;
 - 6dB clearly perceptible impulsivity;
 - 9db highly perceptible impulsivity.
- Intermittency – Where the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time period that contain the greatest amount of 'on' time. This can necessitate measuring the specific sound over a number of shorter periods that are in combination less than the reference time interval in total.
 - If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied.
- Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive from the residual acoustic environment, a 3dB penalty can be applied.

In order to assess the significance of the impact, the background noise level is subtracted from the rating level. The standard considers that the greater the difference, the greater the significance.

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

The standard goes on to highlight that these values are not absolute. There are a number of factors that should be taken in to account when assessing the impact and significance of the noise including:

- The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low;
- Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night;
- Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts. The margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse;
- The character and level of the residual sound compared to the character and level of the specific sound;

- The sensitivity of the receptor and if the receptor already includes acoustic design features to mitigate noise.

3.0 ASSESSMENT METHODOLOGY

3.1 Potential Sources of Environmental Noise

The following assessment methodologies has been detailed in accordance with BS 8233:2014 and the Professional Practice Guidance (ProPG) on Planning and Noise and BS 4142:2014.

Table 3.1
Assessed Sources of Environmental Noise

Noise Source	Applicable Assessment Methodology
All Noise Sources External to the Site	BS 8233:2014
Fixed Plant	BS 4142:2014+A1:2019

3.2 Selection of Noise Criteria

With reference to the guidance detailed in Section 2, the following criteria have been selected to determine the threshold of effect levels in the context of the National Planning Policy Framework and Noise Policy Statement for England.

Table 3.2
External Noise Sources Assessment Criteria: BS 8233:2014

Effect Level	Criteria	Justification
Lowest Observed Adverse Effect Level (LOAEL)	Internal Noise Levels at adjacent sensitive receptor locations below 35 dB $L_{Aeq, 16hr}$ / 30 dB $L_{Aeq, 8hr}$ / 45 dB L_{AfmMax}	Noise Levels within BS 8233:2014 target criteria.
Significant Observed Adverse Effect Level (SOAEL)	Internal Noise Levels at adjacent sensitive receptor locations exceed 40 dB $L_{Aeq, 16hr}$ / 35 dB $L_{Aeq, 8hr}$ / 50 dB L_{AfmMax}	None – Planning guidance requires that impacts must be reduced below the SOAEL though mitigation, with adverse impacts above the Lowest Observable Adverse Impact Level (LOAEL) but below the SOAEL being mitigated as far as is reasonable.

Table 3.3
Assessment Criteria: BS 4142:2014+A1:2019

Effect Level	Criteria	Justification
Lowest Observed Adverse Effect Level (LOAEL)	Free-field external noise levels at adjacent sensitive receptor locations within +5 dB of representative background noise level	Noise levels + 5 dB above background are considered an indication of where adverse noise impacts may occur in the context of BS 4142. Noise levels below this level are an indication that it is less likely that the specific sound source will have an adverse impact
Significant Observed Adverse Effect Level (SOAEL)	Free-field external noise levels at receptor above +10 dB of representative background noise level	None Mitigate to achieve LOAEL Criteria

With reference to the guidance within BS 8233 and the 'ANC Green Book: Environmental Noise Measurement Guide' (ANC, 2019), the predicted internal levels have been assessed against the following criteria:

- $L_{Aeq,16h}$ (Daytime) – internal levels must not exceed 35 to 40dB $L_{Aeq,16h}$;
- $L_{Aeq,8h}$ (Night-time) – internal levels must not exceed 30dB $L_{Aeq,8h}$;
- L_{AFMax} (Typical) – the 95th percentile of all 1min night-time L_{Amax} noise levels must not exceed 45dB L_{AFMax} .

With regard to the determination of the L_{Amax} design case, the ANC Green Book Notes:

“Only in the most extreme situations would it be appropriate to adopt the highest measured L_{Amax} value... as a descriptor of an appropriate design case. In most situations, an average, typical or modal value, specific to the time period in question, needs to be selected or derived from the survey data. The frequency of occurrence of specific L_{Amax} events is critical in determining their typicality (hence the importance of sample period selection during scoping) ... Some common approaches to selecting the Design Case L_{Amax} , for instance, include ranking events during an assessment period and selecting the n th value (NB sample period is critical), taking a 90th(sic) percentile ‘high average’ level or simply selecting an appropriate looking value ‘by eye’.”

As can be seen above, the approach adopted within the assessment is more onerous than recommended within the ANC Green Book. By adopting the 95th percentile as the design case it is considered that the assessment presents a reasonable worst-case approach.

4.0 ENVIRONMENTAL NOISE SURVEY

Measurements were completed at the existing site to establish external noise levels during both daytime and night-time periods. Measurements were completed over a weekday, to ensure they were not unduly affected by factors associated with the night-time economy.

Daytime and night-time measurements were undertaken from the 22nd to the 23rd of February 2024.

The noise measurements established typical internal ambient noise levels in proximity to the external façade in the position that future bedrooms will be located.

4.1 Survey Methodology

The equipment used during the survey is detailed in Appendix B. The sound level meters were calibrated before and after the measurements and no significant calibration drifts were found to have occurred (>0.2dB). All of the noise monitoring equipment had been calibrated to a traceable standard within the twenty-four months preceding the survey. Calibration certificates are available on request.

Two (2no.) measurement locations were surveyed in order to determine compliance with the Planning Condition. The measurement locations are hereby referred to in this report as follows:

- 'Location 1' – sound level meter positioned internally approximately 1.5m from the ground at the northern boundary of the site – Grid Ref (381947, 386089);
- 'Location 2' – sound level meter positioned internally approximately 1.5m from the ground at the south western boundary of the site – Grid Ref (381976, 386005)

The measurement locations are shown in Appendix C.

4.2 Survey Results

Details of the relevant measured noise levels are given in Table 4.1 below. Full data sets are available upon request.

Table 4.1
Summary of Measured Noise Levels – free field, dB

Location	Date	Period	Time	L _{Aeq, T}	L _{A10}	L _{A90}	L _{AFMax}
1	22/02/2024	Daytime	1500h-2300h	58.2	59.7	55.1	81.1
	22/02/2024-23/02/2024	Night-time	2300h-0700h	56.1	57.2	51.6	83.9
	23/02/2024	Daytime	0700h-1345h	59.8	61.5	56.1	81.8
2	22/02/2024	Daytime	1500h-2300h	59.3	60.6	56.3	80.4
	22/02/2024-23/02/2024	Night-time	2300h-0700h	56.2	57.6	51.5	78.2
	23/02/2024	Daytime	0700h-1345h	60.0	61.6	56.9	81.6

4.3 Observations and Comments

During the attended portions of the survey, the acoustic environment was dominated by road traffic noise. Whilst some noise from aircraft movements could be heard, it was not dominant. This is due to the position of the site, as there are no direct aircraft overflights of the location.

4.3.1 BS 4142:2014+A1:2019 Background (L_{A90}) Statistical Analysis

In accordance with the methodology detailed at Section 8 of BS 4142:2014+A1:2019, representative background noise levels have been determined through statistical analysis of all 15-minute samples and are expressed as integers (with 0.5 dB being rounded up).

The results of the statistical analysis of measured background noise levels are presented in a graphical format for both daytime and night-time, in Figures 4.1 and 4.2 below. The records highlighted in teal in each figure denote the representative background levels used within this assessment.

Figure 4.1
'Location 1' – Daytime Background (L_{A90}) Analysis

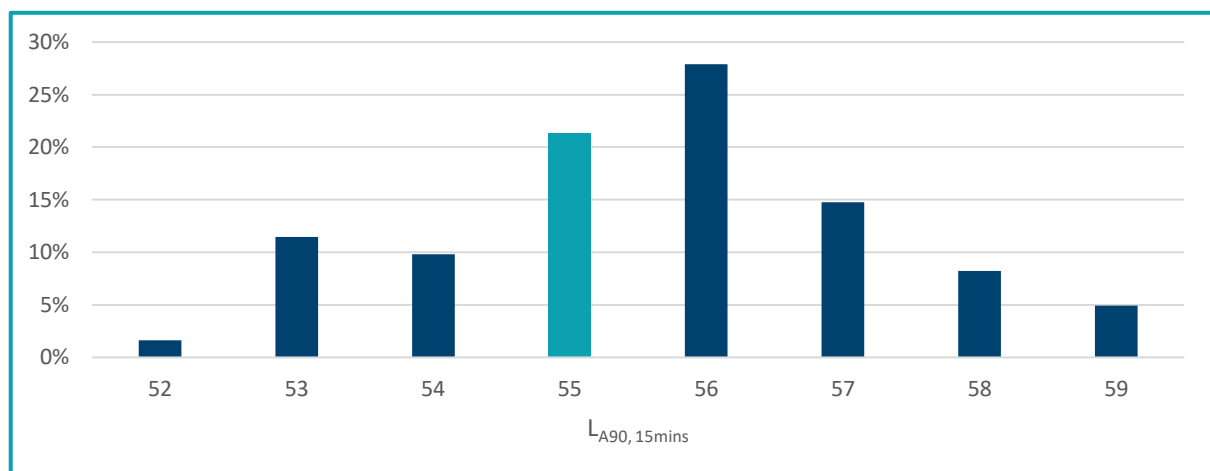
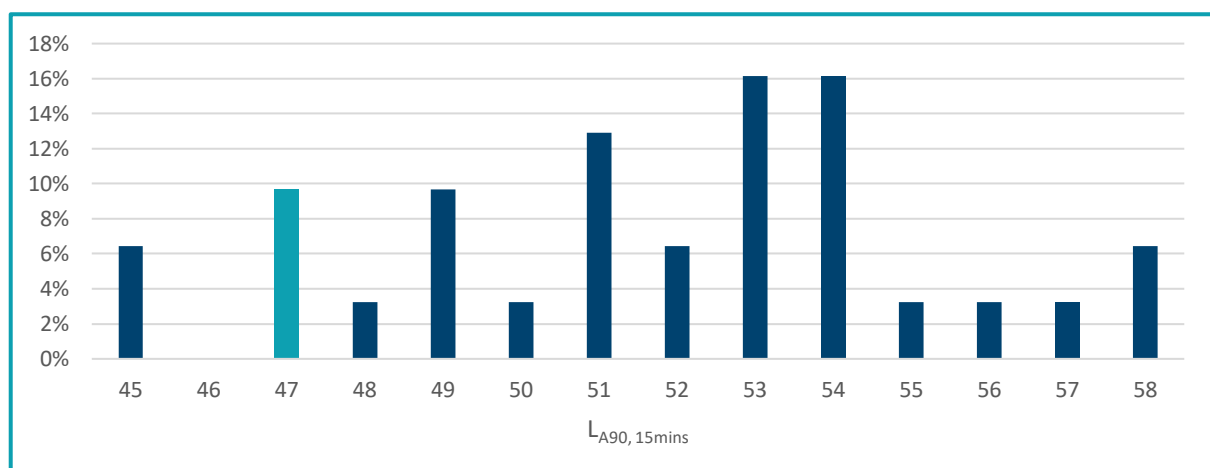


Figure 4.2
'Location 1' – Night-time Background (L_{A90}) Analysis



5.0 ASSESSMENT

5.1 Site Noise Risk Assessment

Further to the guidance detailed in the ProPG, the site has initially been assessed to establish the risk of noise adversely affecting the site. This assessment assists in quantifying whether further consideration of noise impact is required which may lead to the introduction of specific noise mitigation measures to ensure that the principles of good acoustic design are met.

Based on the noise risk assessment matrix detailed in Figure 1 of the ProPG, taking account of the measured noise levels and the context of the site, it is considered that this site is subject to noise that generates a medium to high risk of an adverse effect.

A medium to high risk suggests that detailed consideration should be given to how noise affects the site and any future development. Development should take account of that noise risk and reflect good acoustic design principles in the layout of dwellings and the use of space.

For a site considered to be of medium to high risk, it is not expected that noise should be a barrier to the development providing a robust acoustic design process has been followed.

The introduction section within the ProPG states:

“The scope of this ProPG is restricted to the consideration of new residential development that will be exposed predominantly (see Section 2) to airborne noise from transport sources (noting that good professional practice should have regard to any reasonably foreseeable changes in existing and/or new sources of noise). New apartments, flats and houses are the most common type of new residential development, however the guidance can also be applied to other types of residential developments such as residential institutions, care homes etc. Some of the content is relevant to other types of noise-sensitive development and to other sources of noise. However, detailed consideration of other noise sensitive development (such as schools and hospitals), other sources of noise (such as dominant noise from industrial, commercial or entertainment premises) and of ground-borne noise and vibration, is outside the scope of this document.”

5.2 Predicted Internal Noise Levels within the Hotel

As noise measurements were taken proximal to the position of the proposed hotel facades, no correction of noise levels has been made to account for distance between the road and the building. Therefore, this can be considered a ‘worst case’ assessment for the purposes of the planning process.

Therefore, measurements completed at Location 1 have been considered as representative of noise levels impacting on the northern and eastern façade of the site, Location 2 representative of noise levels impacting on the western and southern façade of the site.

Internal noise levels have been considered with windows closed. All bedrooms will be provided with alternative means of ventilation and cooling through mechanical ventilation and air conditioning to each room. As such it is assumed to be reasonable to assume that windows will be closed to manage the effects of noise and that sufficient means of comfort cooling can be provided.

The highest measured average noise levels and calculated typical maximum noise levels were selected as being the representative noise levels impacting on bedrooms on each façade of the site.

5.2.1 In-Façade Mitigation

Initial calculations have been undertaken in accordance with Annex G of BS 8233:2014 to determine appropriate façade noise mitigation solutions for the site.

Given that the project is at an early stage of development, predictions have been based upon an indicative layout with a typical room area of 27m² and a typical room height of 2.4m. The following faced dimensions have been assumed:

- Room Façade – 4.5m x 2.2m
- Glazed area of façade – 4.0m x 2.0m

Table 5.1 presents a summary of the proposed glazing specification. Please note, care should be taken to ensure the selected product meets the octave band performance requirements. As noted above it has been assumed that no through façade trickle vents have been included as ventilation will be provided by a mechanical ventilation system to meet Part F ventilation requirements.

Table 5.1
Example Glazing & Ventilation Strategy

Specification	Building Element	Example Unit	Minimum Recommended Sound Reduction Performance						R _w + C _{tr}	D _{ne,w}
			125	250	500	1000	2000	4000		
Specification 1	Glazing	Pilkington 8mm / (6 - 16mm) / 6mm	20	21	33	40	36	48	35	-

Façade performance calculations aren't limited to the impact of glazing and ventilation systems. To account for the attenuation afforded by the external wall, the calculations include the performance afforded by a typical cladding façade with a double skin plasterboard internal lining. Table 5.2 below details the expected external façade construction which has been assumed for the purpose of these calculations.

Table 5.2
SRI of External Wall, dB (R_w)

Frequency in Hz	125	250	500	1000	2000	4000	R _w
SRI of Façade	33	44	50	49	52	60.0	50

5.2.2 Predicted Internal Levels – Closed Window

Table 5.3 presents the results of the predicted internal noise levels following incorporation of the specification outlined in the Section above.

Table 5.3
Assessment of Noise Intrusion Levels – Closed Windows (Alternative Ventilation)

Ref	Specification	Room Type	Internal Noise Level		
			L _{Aeq,16h}	L _{Aeq,8h}	L _{AFMax}
North Facade	Specification 1	Bedroom	30.8	27.0	39.2
South Facade	Specification 1	Bedroom	31.4	27.0	40.9
East Facade	Specification 2	Bedroom	30.8	27.0	39.2
West Facade	Specification 2	Bedroom	31.4	27.0	40.9

As shown in the Table above, following incorporation of a suitable glazing strategy, internal noise levels within proposed hotel bedrooms are predicted to be compliant with the requirements of BS 8233:2014.

It is therefore considered that the calculated internal noise levels are below the LOAEL set for this project. The LOAEL is defined as:

LOAEL – Lowest Observed Adverse Effect Level – Internal noise levels achieve the requirements of the BS 8233:2014 standard assuming windows are closed, and an alternative source of ventilation is provided.

5.2.3 Predicted Internal Levels – Summary

It is therefore considered that the calculated internal noise levels are below the LOAEL set for this project. The LOAEL is defined as:

LOAEL – Lowest Observed Adverse Effect Level – Internal noise levels achieve the requirements of the BS 8233:2014 standard assuming windows are closed and an additional source of ventilation is provided.

These levels are below the LOAEL level set for this assessment and, as such, these levels are considered to be acceptable and meet the requirements of Manchester City Council, the NPPF and the Noise Policy Statement for England as well as those of Evans Dakota Hotels.

5.3 Proposed Plant Noise Limits

A proposed plant noise limit has been provided. This plant limit takes account of the local planning policy, national planning policy and the current site conditions to set a plant noise limit appropriate to the site.

Impacts above the LOAEL but below the SOAEL are considered to be acceptable when assessed against the requirements of the NPPF.

Taking account of the generally accepted approach to the setting of the LOAEL and SOAEL when assessing against BS 4142:2014 and with reference to the predicted rating noise level of the existing plant installation, it is considered that a maximum plant rating level of 5dB above background level is suitable and appropriate in this context.

However, the MCC guidance indicates that a plant noise level of 5dB below background is targeted by the authority. This target isn't justified against any underlying guidance and is not a value actively supported by BS 4142:2014. However, it is likely the authority will resist any application which does not follow their informal guidance.

Based on the current measured background noise levels, further to the guidance in BS 4142:2014 and with reference to the NPPF and NPSE and MCC guidance, the following plant noise limits are recommended:

Table 5.4
Proposed Plant Noise Limits Based on BS 4142:2014 at NSR, dB

NSR	Existing Measured Background (L_{A90})		Recommended Maximum Noise Rating Level (L_{A1Tr})	
	Daytime 0700 - 2300	Night-time 2300 - 0700	Daytime 0700 - 2300	Night-time 2300 - 0700
Residential Properties to the East of the Site	55	47	50	42

In order to ensure compliance with these limits, assuming a minimum separation distance from the nearest NSR to the plant compound of 65m, the maximum plant noise level at 1m from the plant compound would be 86dB(A) during the day and 78dB(A) during the night time periods.

Compliance with the above proposed plant noise limit will not cause an unacceptable adverse impact and therefore meets the requirements of the NPPF and the MCC Local Plan.

5.4 Uncertainty

5.4.1 Survey

Given the duration of the survey and the use of the highest measured daytime and night-night noise levels to ascertain noise propagation across the site, it is considered that the limits of Class 1 sound level meters are the only limiting factor when considering survey uncertainty.

Standard equipment uncertainties have been considered by applying allowable tolerances minus the maximum allowable test laboratory uncertainties given in IEC 61672-1, as defined by Narang and Bell (Narang, P. and Bell, T., 2008. *New IEC standards and periodic testing of sound level meters. Proceedings of the Internoise, Shanghai, China, pp.26-29*).

The following table provides an overview of standard equipment uncertainties relevant to the SLM class utilised within the survey.

Table 5.5
Standard uncertainties using allowable tolerances minus test laboratory tolerances given in IEC 61672-1 (source: Narang and Bell, Table 14)

SLM Class	Frequency Weighting	Directional Response	Level Linearity	Toneburst Response	Calibrator (IEC 61672)	Supply Voltage	Combined Standard Uncertainty +/- dB
Class 1	0.5	0.5	0.4	0.25	0.125	0.05	0.9

5.4.2 Design Calculations

Where design calculations have been utilised to determine the required performance of the glazing and ventilation strategy for the scheme, the method outlined within Annex G of BS 8233 (which is based on the BS EN 12354-3 calculation methodology) has been followed. The expected precision of this calculation methodology is quoted as +/- 2dB.

5.4.3 Combined Uncertainty

Based on the information provided above, the combined Root Sum Squared (RSS) uncertainty for the assessment has been calculated as +/- 2.2dB.

5.5 Assertion of Competence

This assessment has been completed by Chris Chittock, Director of Dragonfly Consulting with direct responsibilities for the acoustics projects within the firm.

I hold a Bachelor of Science Degree, with Honours, in Audio Technology from the University of Salford. I am a Corporate Member of the Institute of Acoustics. I have over 19 years of experience within the field of acoustics in both the public and private sector.

I have completed several assessments under BS 8233:2014 and I assert that I am competent to undertake this assessment under the requirements of BS 8233:2014.

6.0 CONCLUSIONS

Evans Dakota Hotels Ltd has appointed Dragonfly Consulting to carry out a Noise Impact Assessment to assess the ingress of noise and recommend appropriate noise mitigation measures, at the junction of Bailey Lane and Enterprise Way, Wythenshaw, Manchester.

The noise assessment has been conducted with reference to the National Planning Policy Framework and the appropriate British Standards, recognised guidance & reference documents relevant to this site as well as Evans Dakota Hotels' own acoustic requirements for guest bedrooms.

This report describes a noise survey of the site and the subsequent analysis to determine the noise environment of the proposed development. It then compares the results with the adopted criteria and, where applicable, recommendations are made with respect to the design of the development.

6.1 Internal Noise Levels in Proposed Hotel Bedrooms

The assessment identifies that, with suitable double glazing and ventilation specifications, internal noise levels are below the LOAEL for this assessment and therefore below the criteria set out in BS 8233:2014 for daytime, night-time and the maximum criteria as set out by the ProPG.

The LOAEL is defined as:

LOAEL – Lowest Observed Adverse Effect Level – Noise Levels within BS 8233:2014 target criteria.

As such, these levels are considered to be acceptable and meet the requirements of Manchester City Council, the NPPF and the Noise Policy Statement for England as well as those of Evans Dakota Hotels.

6.2 Proposed Plant Noise Limits

Maximum plant noise limits at any noise sensitive receptor have been proposed based on the measured background noise levels. Compliance with the above proposed plant noise limit will not cause an unacceptable adverse impact and therefore meets the requirements of the NPPF and the MCC Local Plan.

Appendix A – Glossary of Terminology

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table A-1
Sound Levels Commonly Found in the Environment

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

Acoustic Terminology

dB (decibel) The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2×10^{-5} Pa).

dB(A) A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

L_{Aeq} This is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.

L₁₀ & L₉₀ If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. L₁₀ is the level exceeded for 10% of the time and is often used as a descriptor for road traffic noise. Similarly, L₉₀ is the level exceeded for 90% of the time and is often used to describe the background level. It is common practice to use the L₁₀ index to describe traffic noise.

L_{AMax} is the maximum A-weighted sound pressure level recorded over the period stated. L_{AMax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment.

Appendix B – Monitoring Equipment

Table B-1
Noise Monitoring Equipment

Equipment	Serial Number
01dB Fusion Sound Level Meter	14145
G.R.A.S 40CD Microphone	466815
01dB Fusion Sound Level Meter	14146
G.R.A.S 40CD Microphone	556143
Cirrus CR-515 Acoustic Calibrator	98862

Appendix C – Measurement Location Plan

Figure C-1
Measurement Location Plan



Measurement Locations