



Evans Dakota Hotels Ltd
Bailey Lane, Manchester
Fixed Plant Noise Impact Assessment
DC4542-NR4



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 impact of noise from the proposed roof plant forming part of the Dakota Hotel development permitted under planning permission Ref: 140206/FO/2024 located 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 (NPPF) and the appropriate British Standards and recognised guidance and reference documents relevant to this site.

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.

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

1.1 Site Description

1.1.1 Current Site Conditions

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.

The development consists of the construction of a new hotel building to 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 containing the wider site, with Figure 1.2 showing a close up of the roof plant deck and orientation of the proposed equipment.

Condition 16 of the extant planning permission requires as follows:

“Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location. Prior to commencement of the use hereby approved the scheme shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site. The scheme shall be implemented in full before the use commences or as otherwise agreed in writing by the City Council as local planning authority.”

1.1.2 Proposed Site Conditions

1.2 Noise Sensitive Receptor (NSR) Locations

Noise contributions will be considered at the following sensitive receptor locations based on their proximity to the site:

- NSR1 – Terraced properties No 105 to 109 Hilary Road (Grid Ref: 382005, 386098); and,
- NSR2 – Flats No 81 to 103 Hilary Road (Grid Ref: 382028, 386062).

NSR locations are shown in Appendix C.

Figure 1.1
Proposed Site Plan

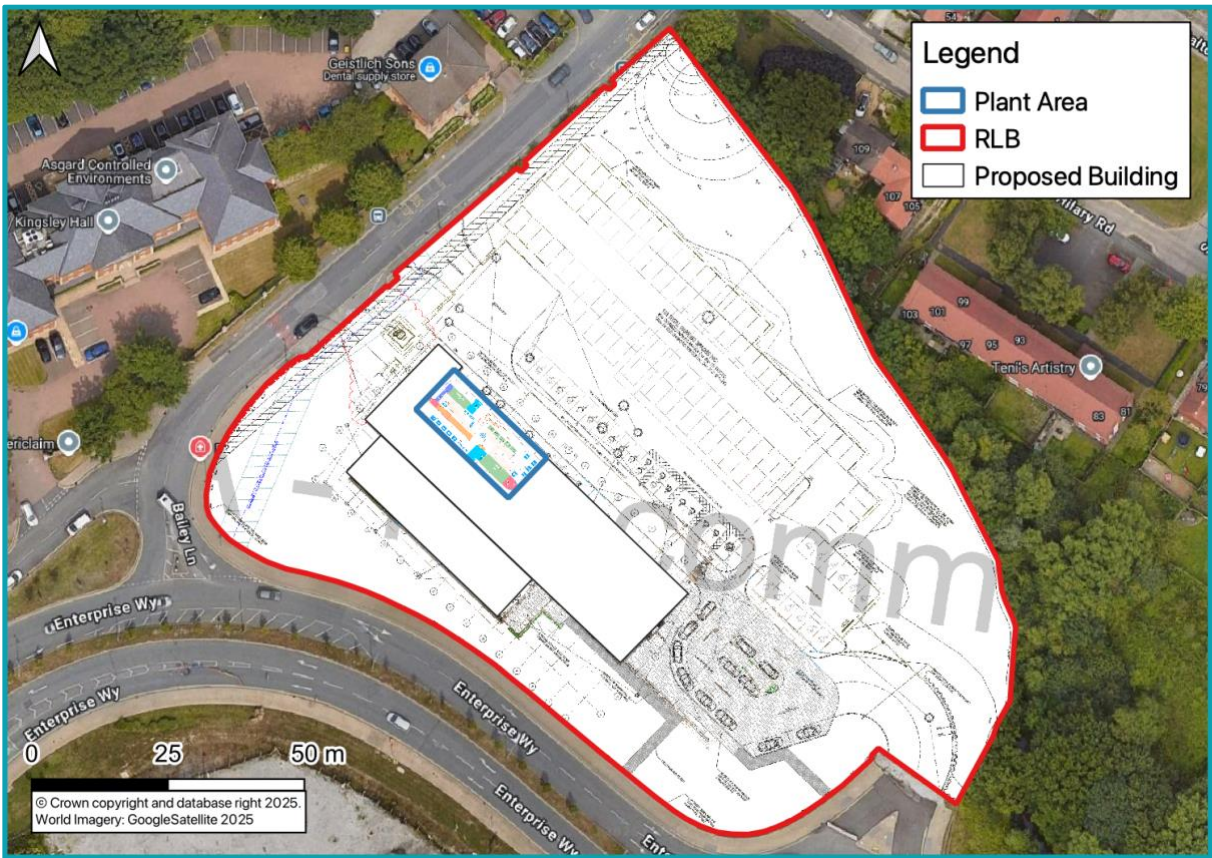
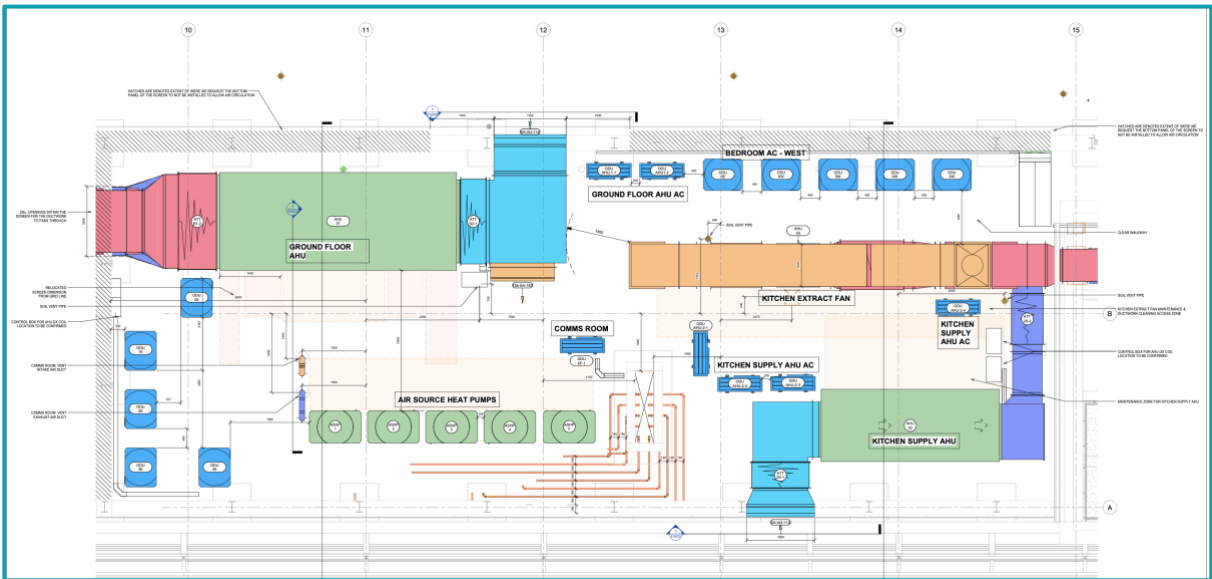


Figure 1.2
Proposed Plant Deck Layout



2.0 GUIDANCE

2.1 Consultation with Local Authority

Direct consultation has not been completed with Manchester City Council (MCC) in relation to the assessment of the proposed plant as this is a discharge of condition application. In addition, 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 relation to noise from fixed plant and commercial sources the guidance 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."

This aligns with the requirements of Condition 16.

2.2 Local Planning Requirements

2.2.1 Manchester City Council – Core Strategy Development Plan Document – 2012-2027

The following local planning requirements, relevant to this report, have been identified within Policy DM1 of the Manchester City Council Core Strategy Development Plan Document:

"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 187 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 198 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 Standards and Guidance

2.4.1 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.

2.4.2 BS 4142:2014+A1:2019

BS 4142:2014+A1:2019 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods 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 upon which sound is incident.

2.4.3 ISO 9613 Attenuation of Sound during Propagation Outdoors

ISO 9613 presents a calculation methodology for the determination of the attenuation of sound outdoors. The methodology enables the prediction the levels of environmental noise at a distance from a variety of sources.

3.0 ASSESSMENT METHODOLOGY

3.1 Potential Sources of Environmental Noise

With reference to the guidance detailed within Section 2.0, Table 3.1 presents the specific methodology adopted for the assessment of noise arising from the development proposals.

Table 3.1
Assessed Sources of Environmental Noise

Noise Source	Applicable Assessment Methodology
Proposed Roof Plant	BS 4142:2014+A1:2019

3.2 Selection of Noise Criteria

The following criteria have been selected to determine the threshold of effect levels in the context of the National Planning Policy Framework (NPPF) and Noise Policy Statement for England (NPSE).

Table 3.2
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 +5dB of representative background noise level.	Noise levels +5dB 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 – 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.

4.0 ENVIRONMENTAL NOISE SURVEY

4.1 Survey Methodology

Daytime and night-time measurements were undertaken at two (2no.) measurement locations from the 22nd to the 23rd of February 2024 in order to establish external noise levels at the site and at the nearest noise sensitive receptors.

Measurements were completed over a weekday, to ensure they were not unduly affected by factors associated with the night-time economy. The noise measurements established typical internal ambient noise levels in proximity to the external façade in the position that future bedrooms will be located. 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 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.

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. 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). These calculations have been completed for Location 1 only as this is the receptor closest to the Noise Sensitive Receptors.

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. 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

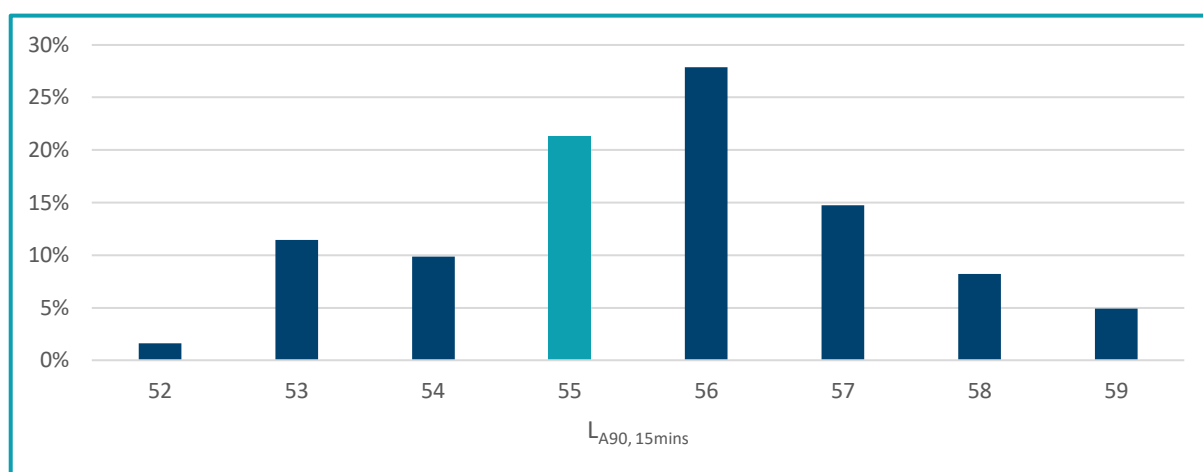
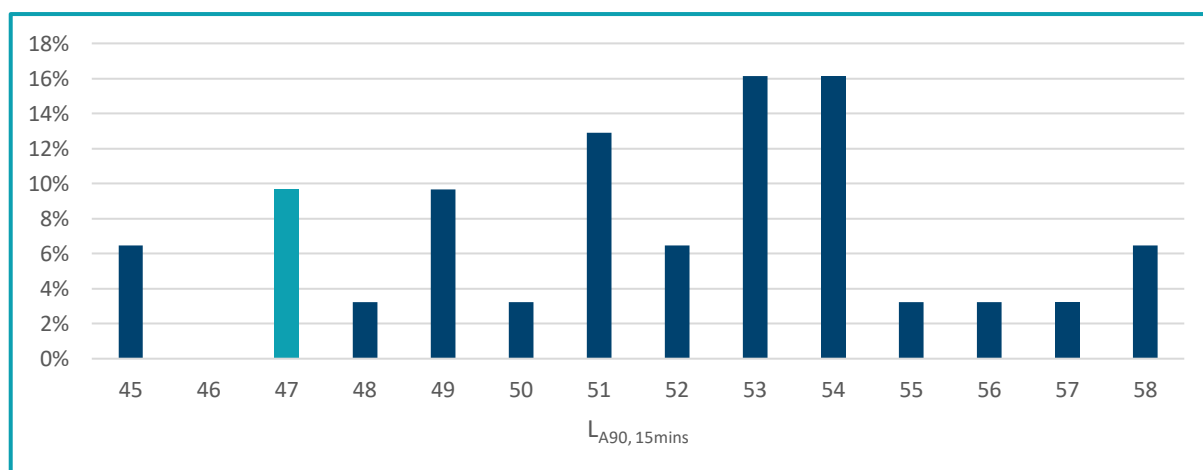


Figure 4.2
'Location 1' – Night-time Background (L_{A90}) Analysis



5.0 NOISE MODELLING METHODOLOGY

5.1 Data Sources

Modelling calculations have been undertaken based on the spatial settings and data sources identified in Table 5.1.

Table 5.1
Noise Model Input Data

Parameter	Data Source	Assumptions
Site Plans	LO51-AFC-ZZ-01-RF-D-Z-810028 – P03 Dated: 26.06.25	Existing building heights modelled as 8.5m AGL (typical 2-storey building height) unless noted to be otherwise through global mapping software. Proposed building heights based on drawings.
Ground Heights	Environment Agency Open Data LiDAR Digital Terrain Model (2.0m resolution)	None
Ground Absorption	n/a	Mixed ground conditions on site (G=0.5) and soft ground conditions off site (G=1)
Reflections	n/a	3 rd order reflections have been accounted for within the noise model

5.2 Source Noise Assumptions

5.2.1 Fixed Plant

Details of the fixed plant items to be installed on a permanent basis on the roof have been provided and are listed below:

- Three (3no.) Air Handling Units (AHU);
- Five (5no.) Air-Source Heat Pumps (ASHP);
- Ten (10no.) Bedroom Air Conditioning Units; and
- Seven (7no.) AHU Air Conditioning Units.

A summary of the noise emissions of all assessed fixed plant noise sources associated with the development are presented in Table 5.2. The air handling units will utilise attenuators to ensure the roof plant does not result in any adverse noise impacts. The proposed attenuators are outlined in Table 5.3, overleaf.

Table 5.2
Assessed Noise Source Sound Power Levels, dB

Noise Source	Octave Band Sound Power Level (L _w), Hz (dB(Z))								Sum dB(A)
	63	125	250	500	1000	2000	4000	8000	
Mitsubishi Air Conditioning Unit (PURY-P250YNW-A)	78.0	62.5	61.5	59.0	52.0	48.5	48.5	43.0	60.5
Mitsubishi Air Conditioning Unit (PURY-P900SNW-A2)	77.0	67.5	69.5	68.0	62.5	58.0	53.0	49.0	68.5

Noise Source	Octave Band Sound Power Level (L_w), Hz (dB(Z))								Sum dB(A)
	63	125	250	500	1000	2000	4000	8000	
Air Handling Unit (AHU01) Supply Fan	66.0	81.0	76.0	73.0	67.0	65.0	61.0	59.0	74.7
Air Handling Unit (AHU01) Extract Fan	72.0	85.0	76.0	78.0	75.0	70.0	66.0	62.0	79.8
Air Handling Unit (AHU02) Supply Fan	75.0	90.0	81.0	84.0	82.0	78.0	72.0	67.0	86.3
Air Handling Unit (AHU03) Extract Fan	94.0	92.0	97.0	104.0	103.0	98.0	92.0	85.0	106.4
Mitsubishi Air Source Heat Pump (QAHV-N560YA-HPB)	85.0	72.0	73.5	71.0	66.7	62.0	58.0	53.0	72.5
Mitsubishi PUZ-ZM250YKA2	71.0	60.5	60.5	61.0	56.5	52.5	47.5	42.5	62.0
Mitsubishi PUZ-ZM200YKA2	67.5	62.5	60.5	61.0	56.5	52.5	47.5	42.5	62.0
Mitsubishi PUZ-ZM50VKA2	58.2	50.6	45.1	43.8	40.0	37.1	32.0	31.0	46.0

N.b. In accordance with ISO 9613-1, where spectral content of assessed noise sources is not available, such as indicative fixed plant limits, the attenuation terms for 500Hz are applied to determine noise contributions at adjacent sensitive receptor locations.

Table 5.3
Octave Band Attenuator Performance, dB

Attenuator Reference	Octave Band Attenuation (L_w), Hz (dB(Z))								Rw
	63	125	250	500	1000	2000	4000	8000	
ATT R1-1 (AHU 01 Exhaust)	5.0	9.0	13.0	17.0	23.0	17.0	14.0	9.0	20.0
ATT S2-1 (AHU 01 Fresh Air Inlet)	5.0	9.0	13.0	17.0	23.0	17.0	14.0	9.0	20.0
ATT S2-2 (AHU 02 Fresh Air Inlet)	6.0	10.0	15.0	21.0	27.0	22.0	17.0	12.0	23.0
ATT E3-1 (AHU 03 Exhaust)	4.0	10.0	17.0	30.0	39.0	29.0	25.0	16.0	28.0

5.3 Uncertainty

5.3.1 Survey

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 5.4
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

5.3.2 Modelling

CadnaA noise modelling software has been utilised to ascertain how noise propagates throughout the proposed development. The software directly incorporates the ISO 9613 calculation procedure which has an uncertainty rating of +/- 3dB.

5.3.3 Combined Uncertainty

Based on the information provided above, the combined Root Sum Squared (RSS) uncertainty for the assessment has been calculated as +/- 3.2dB.

6.0 ASSESSMENT

6.1 Fixed Plant Assessment

Although none of the fixed plant is expected to have tonal characteristics, a +4dB correction has been applied based on the risk that fixed plant could have clearly perceptible tonality which provides a worst-case, robust approach to the assessment in accordance with BS 4142:2014+A1:2019.

The results of the assessment are shown in Table 6.1. In accordance with BS 4142:2014+A1:2019 Paragraph 8.6, the background levels are expressed as integers (with 0.5 dB being rounded up):

Table 6.1
Assessment of Plant Noise Impact, dB

NSR	Existing Measured Background (L_{A90})		Predicted Noise Rating Level (L_{A+Tr})		Difference (+/-)	
	Daytime 0700h – 2300h	Night-time 2300h – 0700h	Daytime	Night-time	Daytime	Night-time
1	55	47	31.8	31.8	-23.2	-15.2
2			31.0	31.0	-24.0	-16.0

As shown in Table 6.1, noise contributions from fixed plant will be at least 23.2dB below the background during the daytime and 15.2dB during the night-time. Noise impacts arising from the cumulative operation of fixed plant items is therefore predicted to be below the LOAEL for the assessment. This also complies with MCCs condition that the proposed development should “*achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.*”

6.2 Assertion of Competence

This assessment has been completed by Travis Smith, Acoustic Consultant with responsibilities for completing acoustic reports on behalf of Dragonfly Consulting. I hold a Bachelor of Science in Geography from the University of Hull. I have experience of undertaking acoustic consultancy work since July 2022 and I am an Affiliate member of the IoA.

7.0 CONCLUSIONS

Evans Dakota Hotels Ltd has appointed Dragonfly Consulting to carry out a Noise Impact Assessment to assess the impact of noise from the proposed roof plant forming part of the Dakota Hotel development permitted under planning permission Ref: 140206/FO/2024 located 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.

7.1 Roof Plant Noise

This assessment shows that noise contributions from fixed plant will be below the background during both the daytime and night-time reference periods, inclusive of a +4 dB character correction for clear tonality utilised to present a worst-case assessment. Noise impacts arising from the cumulative operation of fixed plant items is therefore predicted to be below the LOAEL for the assessment.

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_{Aeq} 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

