

TECHNICAL NOTE

MVHR Noise Impact Assessment

SUBJECT	PROJECT NO.	DATE
MVHR Noise Impact Assessment – Consulate General of Ireland, Manchester	100114757	19 August 2025
AUTHORS	DOCUMENT REFERENCE	
George Xanthoulis CEng MIOA Luke Hatton MIOA	2025/AUG/04	

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
1.0	Issue	GX	JWT	SM	SM	31/07/2025
2.0	Updated MVHR noise data	GX / LH	GX	SM	SM	19/08/2025

Client signoff

Client			
Project	MVHR Noise Impact Assessment	Project No.	100114757
Client signature / date			

1. Introduction

AtkinsRéalis Acoustics, Noise & Vibration (ANV) has been commissioned to undertake a Noise Impact Assessment (NIA) for the proposed installation of a mechanical ventilation with heat recovery (MVHR) unit at the Consulate General of Ireland, located on Level 6 of the Hyphen Building, Manchester. The assessment supports the planning process by quantifying and evaluating potential noise impacts on nearby sensitive receptors.

The analysis is based on MVHR unit locations as defined in the architectural and mechanical design documentation provided by the project Design Team. The site layout, including the proposed MVHR position, is illustrated in Figure 1. The assessment methodology follows Manchester City Council's Planning and Noise Technical Guidance (October 2022) and BS 4142:2014+A1:2019 (Methods for rating and assessing industrial and commercial sound).

Key data sources include:

- Mechanical, Electrical, Public Health & ICT Schedules (Ref: 00114757-ATRL-XX-06-SP-M-550002 P02)
- Level 06 Ventilation Layout (Drawing Ref: 100114757-ATR-XX-06-DR-ME-531000)
- Google Maps imagery
- Environmental Noise Survey Report by Sandy Brown (Ref: 16080-R01-B, dated 22 March 2016), establishing baseline environmental noise levels at 67–75 Mosley Street, Manchester

Appendix A provides a glossary of acoustic terminology. Appendix B includes relevant MEP schedule excerpts with MVHR sound power level data.

Correspondence with the project team indicates that the MVHR unit is expected to operate primarily during standard office hours (08:00–18:00), with occasional extended use until approximately 20:00–21:00 to accommodate events.

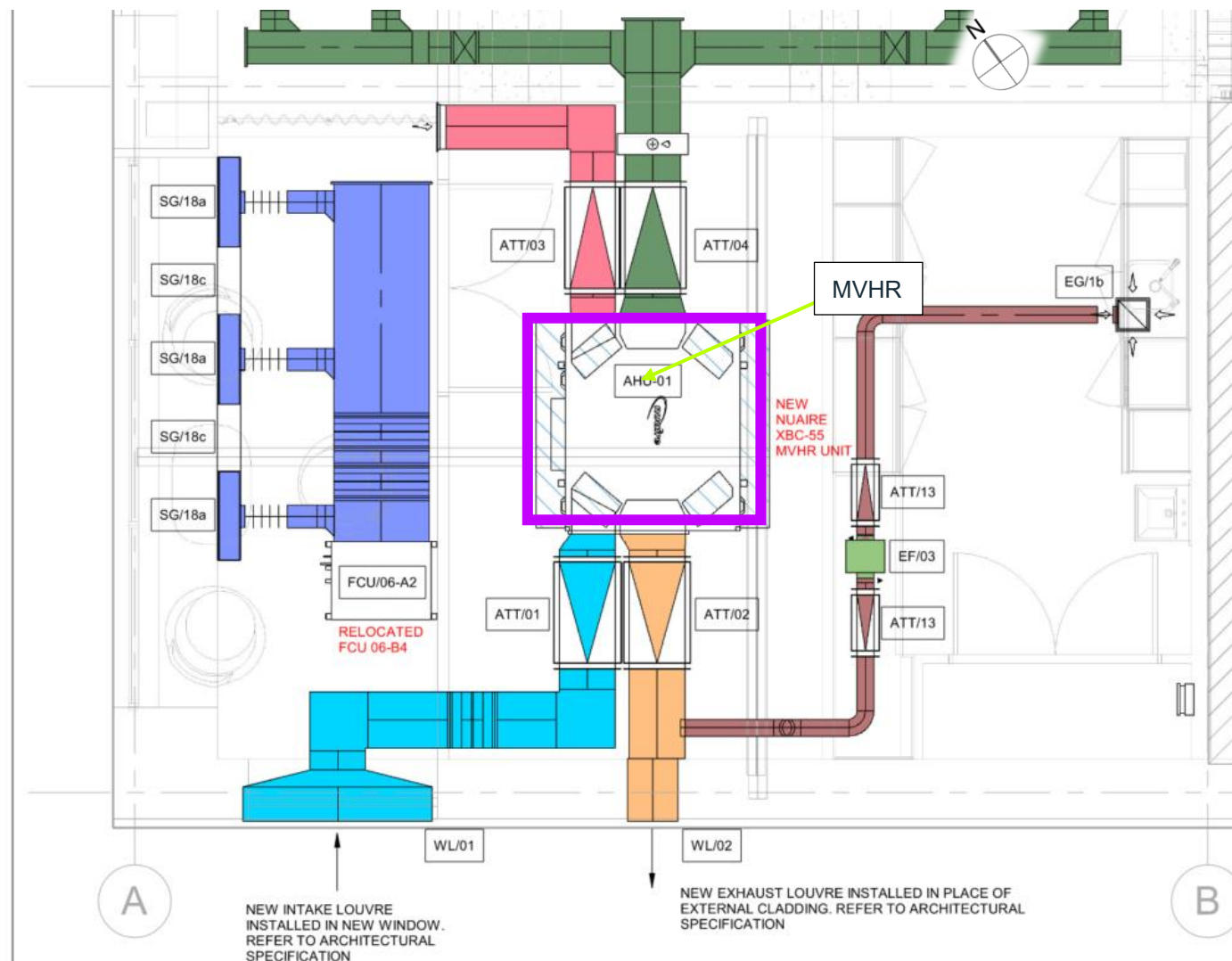


Figure 1 - MVHR location

2. Assessment Criteria

2.1 Guidance & Noise Survey Results

2.1.1 Manchester City Council's Guidance

Manchester City Council's Planning and Noise Technical Guidance (October 2022) outlines the Local Authority's expectations for managing noise emissions from a wide range of developments. For the purposes of this assessment, the relevant criteria are those applicable to industrial and commercial noise sources, including mechanical plant such as MVHR systems.

The guidance states that the cumulative rating level of noise emissions from such sources—calculated in accordance with BS 4142:2014+A1:2019 (Methods for rating and assessing industrial and commercial sound)—should be designed to achieve a level at least 5 dB below the typical background sound level (L_{A90}) at the nearest noise-sensitive receptor. This threshold is intended to ensure that the noise impact is classified as “low” under BS 4142, thereby minimising the potential for adverse effects on residential or other sensitive uses.

The rating level must incorporate any acoustic feature corrections for tonality, impulsivity, intermittency, or other characteristics that may increase the perceptibility of the noise. Where such features are present, appropriate penalties must be applied in accordance with BS 4142.

The guidance also requires that the cumulative impact of all relevant plant items be considered, rather than assessing each source in isolation. This includes accounting for simultaneous operation of multiple units.

Finally, the operational hours of the plant must be clearly defined. Where operation extends into the evening or night-time periods—when background sound levels are typically lower—additional scrutiny is required to ensure compliance with the 5 dB below background criterion.

This assessment adopts the above requirements as the basis for evaluating the proposed MVHR installation.

2.1.2 BS 4142:2014+A1:2019

BS 4142:2014+A1:2019 provides the standard methodology for assessing the potential impact of sound from industrial and commercial sources on nearby residential or other noise-sensitive receptors. It is the primary reference for evaluating mechanical plant noise in planning contexts and is explicitly cited in Manchester City Council's noise guidance.

The standard defines the rating level as the specific sound level of the source under assessment, adjusted to account for any acoustic features that may increase its perceptibility or intrusiveness. These features include tonality, impulsivity, intermittency, and other characteristics that distinguish the sound from the residual acoustic environment. Where such features are present, penalties of up to +6 dB are applied to the specific sound level to derive the final rating level.

The background sound level (L_{A90}) is determined through measurement of the existing acoustic environment in the absence of the specific source. The difference between the rating level and the background level is used to assess the likelihood of adverse impact:

- A difference of +10 dB or more is typically indicative of a significant adverse impact.
- A difference of +5 dB is likely to indicate an adverse impact, depending on context.

- A rating level below the background level suggests a low impact, particularly where the margin is -5 dB or greater.

The standard emphasises the importance of contextual factors, including the character of the area, the sensitivity of receptors, and the temporal pattern of the noise. It also requires that assessments be based on representative operating conditions and realistic worst-case scenarios.

This assessment applies BS 4142 methodology to quantify and rate the noise emissions from the proposed MVHR unit, in line with both national standards and local planning policy.

2.1.3 Summary of Baseline Noise Survey – Sandy Brown (2016)

An unattended environmental noise survey was conducted by Sandy Brown Associates at 67–75 Mosley Street, Manchester, between 25 and 29 February 2016. Background sound levels were measured using the $L_{A90,15min}$ index, with the below typical values, as stated by Sandy Brown Associates:

- Daytime: 58 dB $L_{A90,15min}$
- Evening: 55 dB $L_{A90,15min}$
- Night-time: 48 dB $L_{A90,15min}$

In line with Manchester City Council's planning guidance and BS 4142:2014+A1:2019, the recommended plant noise limit is 5 dB below the typical background level at the nearest noise-sensitive receptor. Where tonal or attention-catching characteristics are present, octave-band limits should also be applied. These values form the reference conditions for assessing the proposed MVHR unit.

2.2 Adopted Plant Noise Limits

Based on the anticipated operational hours of the MVHR unit, primarily 08:00–18:00, with occasional use extending to 20:00–21:00 to accommodate events; the evening period (19:00–23:00) is considered the most appropriate reference timeframe for setting plant noise limits. This reflects the lower background sound levels typically observed during these hours and ensures a conservative approach to noise control.

In line with Manchester City Council's guidance and BS 4142:2014+A1:2019, the cumulative rating level ($L_{A,r,Tr}$) of noise emissions from the MVHR unit must not exceed 5 dB below the typical evening background level at the NSR façade. Based on the Sandy Brown environmental noise survey (Report Ref: 16080-R01-B), the typical evening background level was measured at 55 dB $L_{A90,15min}$, resulting in an adopted limit of:

- 50 dB $L_{A,r,Tr}$ at 1 metre from the façade of the nearest NSR

Where the plant exhibits tonal or attention-catching features, octave-band spectral limits are applied to ensure compliance across the frequency range. These limits are also derived from the Sandy Brown survey data and are summarised below:

Table 1 - Maximum Permissible Sound Pressure Levels at 1m from NSR Façade (Evening Period)

Octave Band Centre Frequency (Hz)	dBA
Maximum SPL at 1m from NSR (dB)	50

3. Noise Sources

The exact location of the MVHR unit has been defined by the design team and is illustrated in Figure 1. Based on the equipment schedule provided by the project team, the sound power level data used to derive the rating sound level ($L_{A,r,Tr}$) are presented in Table 2. The relevant noise sources for this assessment are the intake and discharge terminals, as these are located on the atmosphere side. The supply and return terminals are room-side and are therefore excluded from the scope of this assessment.

Table 2 - Sound Power Levels (SWL) of MVHR

Noise Source	Sound Power Level (dB)							
	Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Intake	79	73	72	60	61	58	49	38
Discharge	84	80	81	68	69	68	62	60

4. Noise Impact Assessment

4.1 Noise Methodology

The assessment of industrial and commercial sound is carried out in accordance with BS 4142:2014+A1:2019 using the following procedure:

- The specific sound level ($L_{Aeq,Tr}$) is calculated at the assessment location based on the source sound power level, corrected for hemispherical propagation, directivity, distance, and any relevant attenuation (e.g. barrier effects, ground absorption, and air absorption).
- Where the sound exhibits acoustic features such as tonality, impulsivity, or intermittency, penalties of up to +6 dB are applied in accordance with BS 4142 to derive the rating level ($L_{Ar,Tr}$).
- For multiple sources, contributions are combined using logarithmic summation.
- The rating level ($L_{Ar,Tr}$) is then compared against the adopted limit. In this assessment, the criterion requires that the rating level be at least 5 dB below the typical evening background sound level ($L_{A90,T}$) to be classified as a low impact, in accordance with Manchester City Council's Planning and Noise Technical Guidance.

4.2 Nearest Noise Sensitive Receptors

The nearest noise-sensitive receptors (NSRs) are the residential apartments at 52–56 George Street, Manchester M1 4HF, located approximately 10 metres from the proposed MVHR unit. Some of these units have been identified through online listings as operating short-term stays (e.g. Airbnb).

Figure 2 illustrates the location of the MVHR unit's fresh air intake and exhaust air louvres in relation to the nearest NSRs.

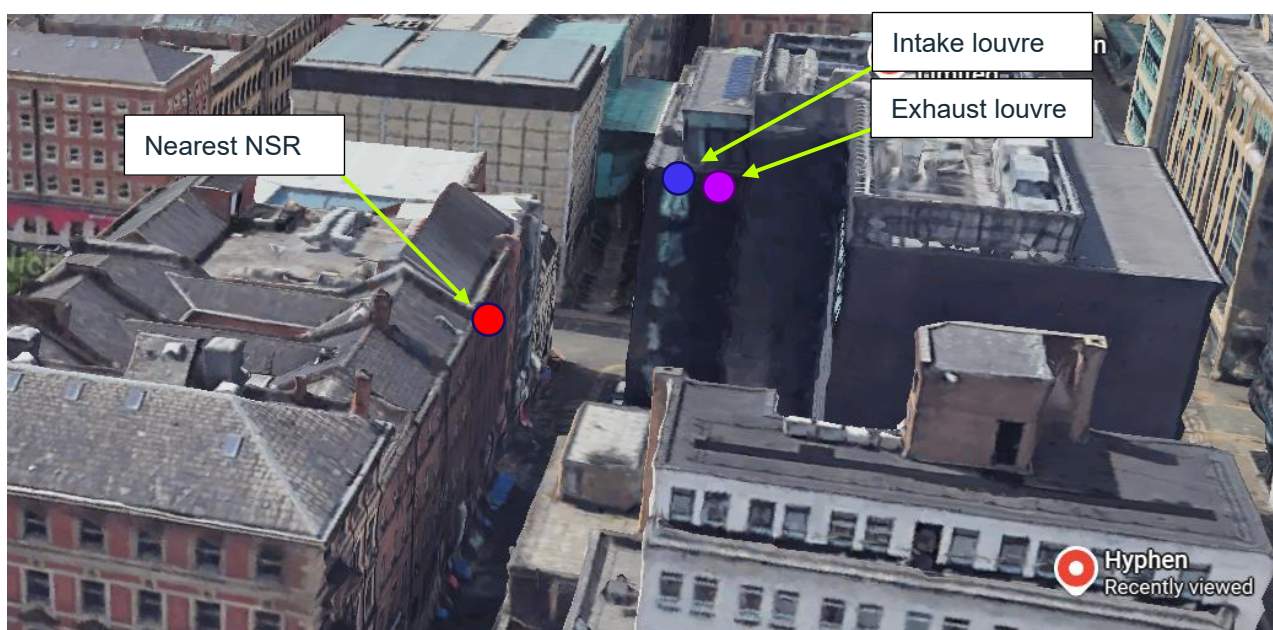


Figure 2 - External Ventilation Interface Components of MVHR System

4.3 Noise Impact Without Mitigation

Spreadsheet-based calculations were used to determine the specific sound levels ($L_{Aeq,Tr}$) at the nearest noise-sensitive receptor (NSR) for both the intake and discharge terminals. A +6 dB acoustic feature correction was applied to each source to account for tonality, in accordance with BS 4142:2014+A1:2019, due to the presence of a dominant spectral component at 250 Hz.

For the intake, the duct configuration includes two bends, which provide sufficient insertion loss to reduce the rating level ($L_{Ar,Tr}$) to within the adopted criterion.

For the discharge, which lacks acoustic treatment and has a direct duct path to the louvre, the resulting rating level exceeds the adopted limit by 7 dB, indicating a likely adverse impact without mitigation.

4.4 Proposed Noise Control Measures

Although not strictly required for compliance, a low-performance, approximately 500mm long attenuator may be installed at the fresh air intake, as indicated in the MEP layout, to provide additional acoustic margin.

For the discharge, where the duct runs directly to the louvre without significant insertion losses, a 600mm long attenuator is recommended. The attenuator should achieve a minimum 7 dB(A) insertion loss. Example attenuator insertion loss values are shown in Table 3, however an overall 7 dB(A) insertion loss can be achieved through different 1/1 octave band insertion losses, depending on the attenuator manufacturer:

Table 3 - Example Insertion Loss for Discharge Attenuator (Octave Band Centre Frequencies)

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k	dB(A)
Discharge SWL	84	80	81	68	69	68	62	60	76
Example Attenuator Insertion Loss (dB)	1	2	7	10	11	9	8	7	
Attenuated Discharge SWL	83	78	74	58	58	59	54	53	69
Difference									7

5. Conclusion

AtkinsRéalis Acoustics, Noise & Vibration (ANV) has undertaken a Noise Impact Assessment (NIA) for the proposed installation of a mechanical ventilation with heat recovery (MVHR) unit at the Consulate General of Ireland, located on Level 6 of the Hyphen Building, Manchester. The assessment has been conducted in accordance with Manchester City Council's Planning and Noise Technical Guidance (October 2022) and BS 4142:2014+A1:2019.

The assessment considered the intake and extract terminals of the MVHR unit, as these are located on the atmosphere side. The supply and return terminals, being room-side, were excluded. Baseline environmental noise levels were established using data from a 2016 unattended survey by Sandy Brown Associates. The typical evening background sound level ($L_{A90,15min}$) was measured at 55 dB, resulting in an adopted plant noise limit of 50 dB $L_{A_{r,Tr}}$ at 1 metre from the nearest noise-sensitive receptor (NSR) façade.

The intake ductwork includes two bends, which provide sufficient insertion loss to reduce breakout noise below the adopted criterion. However, the discharge path, which lacks acoustic treatment, results in a predicted rating level that exceeds the limit by 7 dB. A +6 dB penalty for tonality has been applied in accordance with BS 4142, due to a tonal component identified at 250 Hz.

To achieve compliance, an attenuator is recommended on the discharge duct. Example insertion loss values have been specified across octave bands from 63 Hz to 8 kHz. Although not required for compliance, a low-performance attenuator may also be installed at the intake to provide additional acoustic margin.

With the proposed mitigation in place, the cumulative rating level is expected to meet the adopted criterion, ensuring a low impact classification under BS 4142 and compliance with local planning policy.

Appendix A. Glossary

Table A-1 - List of acoustic terms used in the technical note.

Acoustic Term	Explanation
A-weighting	A frequency weighting applied to sound measurements to reflect the sensitivity of human hearing, particularly de-emphasising low and high frequencies.
dB	Decibel. A logarithmic unit used to express sound levels.
dBA or dB(A)	A-weighted decibel level, adjusted to approximate the frequency response of the human ear.
$L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level over a time period T. Represents the average acoustic energy over that period.
$L_{A90,T}$	A-weighted sound level exceeded for 90% of the time period T. Used to represent background sound levels.
$L_{Aeq,Tr}$ (Specific Sound Level)	The equivalent continuous A-weighted sound pressure level produced by the specific source under assessment, over the reference time period T_r .
$L_{Ar,Tr}$ (Rating Level)	The specific sound level plus any penalties for acoustic features such as tonality, impulsivity, or intermittency. Used to assess impact under BS 4142.
Sound Power Level (L_w)	The total acoustic energy emitted by a source, expressed in dB re 1 pW. Independent of distance and environment.
Sound Pressure Level (L_p)	The sound level at a specific location, expressed in dB re 20 µPa. Varies with distance and environmental conditions.
Directivity Factor (Q)	A numerical factor representing the influence of source orientation and nearby reflective surfaces on sound propagation.
Barrier Attenuation	The reduction in sound level due to the presence of a physical obstruction between the source and receiver.
Logarithmic Summation	A method for combining multiple sound levels, accounting for their cumulative acoustic energy.
Tonal Noise	Sound containing a distinct frequency component, often perceived as a hum or whine. Subject to a penalty under BS 4142.
Impulsive Noise	Short-duration, high-intensity sound events with rapid onset, such as bangs or thumps. Subject to a penalty under BS 4142.
Noise-Sensitive Receptor (NSR)	A location where noise may cause disturbance, typically residential dwellings, schools, or healthcare facilities.

Appendix B. MVHR Product Datasheet

The product datasheet of the MVHR used in the assessment is provided below.

B.1 Nuaire XBC 55

Sound										
Sound power levels re 1 pWatts (Hz):										
dBA is spherical measured at 3 meters										
Hz	63	125	250	500	1k	2k	4k	8k	dBA	dBA at 100%
Breakout	70	64	58	44	42	40	36	25	32	+3
Induct Intake	79	73	72	60	61	58	49	38	46	+3
Induct Supply	83	79	81	68	69	67	62	58	55	+3
Induct Discharge	84	80	81	68	69	68	62	60	55	+3
Induct Extract	80	74	72	60	61	59	49	40	47	+3
For 100% speed:	+2	+1	+3	+3	+3	+3	+4	+3		

Figure 3 - Excerpt from Equipment Schedules