ESEA Contemporary • External Plant Noise Impact Assessment (Rev 01)

Clarifications Added: 10 November 2026

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Contents

Contents 2
01 • Introduction 3
01.1 • Project Overview 3
01.2 • Acoustic Assessment of Proposed External Plant 3
02 • Site Description 4
02.1 • Noise Sources 4
02.2 • Sensitive Receivers 4
03 • Noise Survey 5
03.1 • Measurement Locations 5
03.2 • Measurement Equipment 5
03.3 • Weather Condition 5
04 • Survey Results 7
05 • Plant Acoustic Consideration 9
05.1 • Criteria 01 – Manchester City Council Planning and Noise Technical Guidance Document 9
05.2 • Criteria 02 – BS 4142 Assessment 9
05.3 • Criteria 03 – BS 8233 Assessment 9
06 • Plant Noise Impact Assessment 10
06.1 • Proposed Plant Noise 10
07 • Plant Noise Impact Assessment 11
08 • Conclusion 13

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External Plant Noise Impact Assessment • Esea Contemporary

Job:	Esea Contemporary	Circ:	LSA
Number:	00569		
Date:	10 November 2026		
Subject:	External Noise Survey	Revision	01

01 • Introduction

01.1 • Project Overview

The Esea Contemporary Gallery is an art gallery in Manchester. It comprises several spaces, including galleries, studios and offices, located at the Ground Floor and Basement level of a mixed-use building.

Mechanical plant equipment serving the gallery consists of an air handling unit and a VRV condenser, situated on a rooftop plant area at the top of the 5-storey building. The intermediate floors house residential apartments, and are served by separate, dedicated plant.

The mechanical plant serving the gallery, installed in 2003, is at the end of its expected service life, utilises outdated refrigerants and its efficiencies do not comply with current performance and environmental standards.

The proposed projects aim to replace the existing mechanical plant serving the gallery with modern, high-efficiency, ventilation and VRV air conditioning plant, as part of a broader building de-carbonisation project being undertaken by the gallery.

01.2 • Acoustic Assessment of Proposed External Plant

This report seeks to identify the acoustic impact of the replacement external plant serving the refurbished heating, cooling & ventilation systems.

The purpose of this report is to:
- Identify the ambient background noise level at the site.
- Identify surrounding noise sensitive locations.
- Estimate the noise impact of the new plant on the identified noise sensitive locations.
- Advise whether additional noise mitigation actions will be required.

The estimated noise impact will be assessed against the criteria set out and referred to in the following:
- Manchester City Council Planning and Noise Technical Guidance Document
- BS 4142:2014+A1:2019 - 'Method for rating industrial noise affecting mixed residential and industrial areas'
- BS 8233:2014 - ‘Sound Insulation and Noise Reduction for Buildings – Code of Practice’

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02 • Site Description

The Esea Contemporary Gallery is located within Manchester's bustling Northern Quarter. The surrounding area predominantly comprises commercial buildings, restaurants, and pubs, with some residential properties interspersed.

The site forms part of a mixed-use city centre environment characterised by significant activity and continuous day and night-time use.

The gallery's existing plant is in a poor operating condition and requires replacement.

02.1 • Noise Sources

The following noise sources were identified during the site survey;

- Bars and restaurants surrounding the gallery.
- Road traffic.
- Plant noise from this and adjacent developments.

It should be noted that during the external noise survey:

- The existing air handling unit serving the site was not operational (it was isolated due to mechanical failures).
- The existing VRV cooling unit was not operational (due to a unit fault).

02.2 • Sensitive Receivers

Figure 2.01 shows the location of the existing external plant and the surrounding buildings. The proposed plant will be more efficient, and of smaller capacity and physical size, but situated in the same locations.

Several noise sensitive locations were identified from surrounding buildings, summarised below:

- **RESI/01 & RESI/02**: The upper stories of the building in which the gallery is located are understood to house residential tenants. These are below the rooftop plant area.
- **RESI/03**: Opposite the gallery to the southwest, are residential spaces on the top floor, with windows facing the proposed rooftop plant.
- **RESI/04 & RESI/05**: Behind the gallery to the northeast, are residential spaces on the upper floors, with windows facing the proposed rooftop plant.

During the modelling of the proposed plant, the residential property identified as being most at risk of potential noise impact from the new plant installation was RESI/03.



Figure 2.01 – Site Overview (Existing)

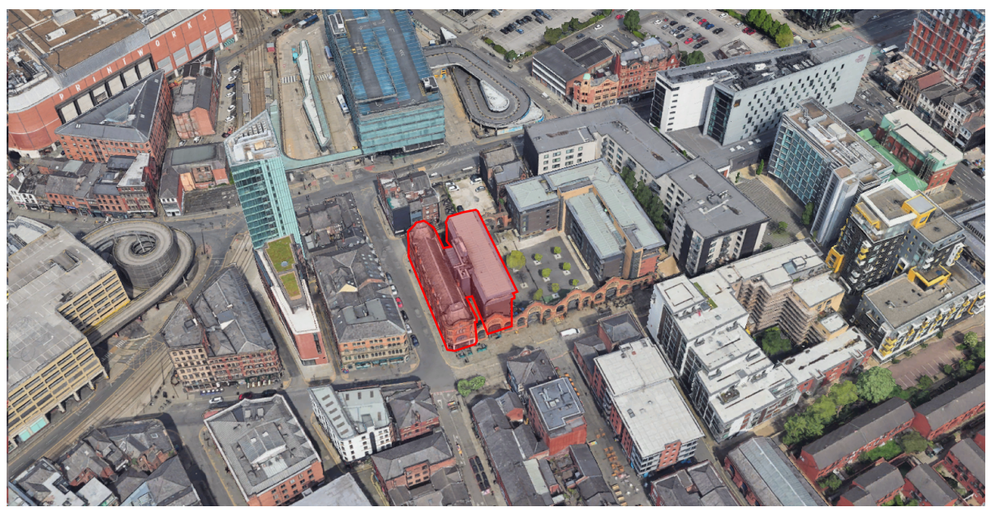


Figure 2.02 – Site and Surrounding Area

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03 • Noise Survey

An external noise survey was carried out between 15.30 hours on 27th May 2026 and 15.30 hours on 28th May 2026, to assess the existing background noise conditions on the site.

03.1 • Measurement Locations

Acoustic measurement equipment was located at **Location A** adjacent to the location of the plant to be replaced, highlighted in Figure 3.01, and set-up to record background acoustics over a 24-hour period.

Figure 3.02 shows the equipment setup.

03.2 • Measurement Equipment

The measurement equipment set up consisted of the following:

- A Rion NL-31 Real Time Analyser (Calibrated 14 April 2025)
- A Rion RC-74 External Calibrator (Calibrated 21 November 2025)

The real time analyser was calibrated using the external calibrator before testing to a measurement of 94dB.

The sound meter was sited in an environmental case with microphone connected to the sound level meter via an extension cable. The microphone was fitted with a windshield and located away from any reflective surfaces.

Measurements were taken continuously of the A-weighted (dBA) sound pressure levels over 15- minute periods across both day and night periods

03.3 • Weather Condition

The following climate conditions were recorded for the site:

Wind Speed:	<10mph
Precipitation:	Generally dry and clear. Light rain in early hours of the morning.
Temperature:	12-26 ºC



Figure 3.01 – Site Overview With Noise Source and Measurement Location.



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Figure 3.02 - Measurement Setup

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04 • Survey Results

Measured data was rounded and statistically analysed in accordance with BS 4142 to determine the background LA_{90} values for the following periods:

- Daytime is defined as 07:00-23:00.
- Night time is defined as 23:00-07:00.

The external noise measurements recorded are shown in Figure 4.01 between 15.30 hours on 27th May 2026 and 15.30 hours on 28th May 2026.

BS4142 states that the representative background noise level should not automatically be assumed to be the minimum value.

From analysis summarised in Figures 4.02 and 4.03, the minimum background noise level for each period was adopted, ie:

	Time	$LA_{90(15min)}$ dBA			$LA_{eq(15min)}$ dBA		
		Min	Max	Med	Min	Max	Med
Daytime	07:00 – 23:00	**59**	61	60	60	65	61
Night-time	23:00 – 07:00	**58**	59	58	59	64	60

Table 4.01 –Background Noise Level at Measurement Location A (15min)

Please note, from Figure 4.01, the minimum external background noise levels were observed to occur between 0.300 hours and 04.00 hours on 28th May 2026.

From BS4142, it is considered that the background noise levels adopted within this study are considered.

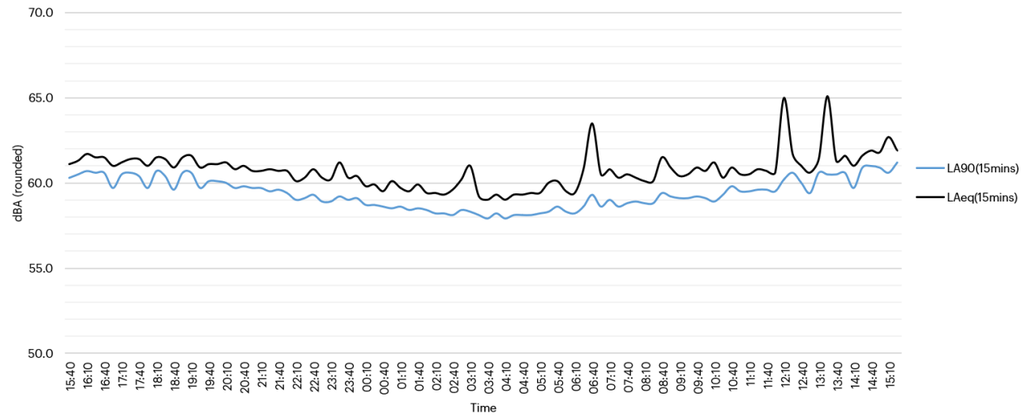


Figure **4.01** – Location A Survey Results

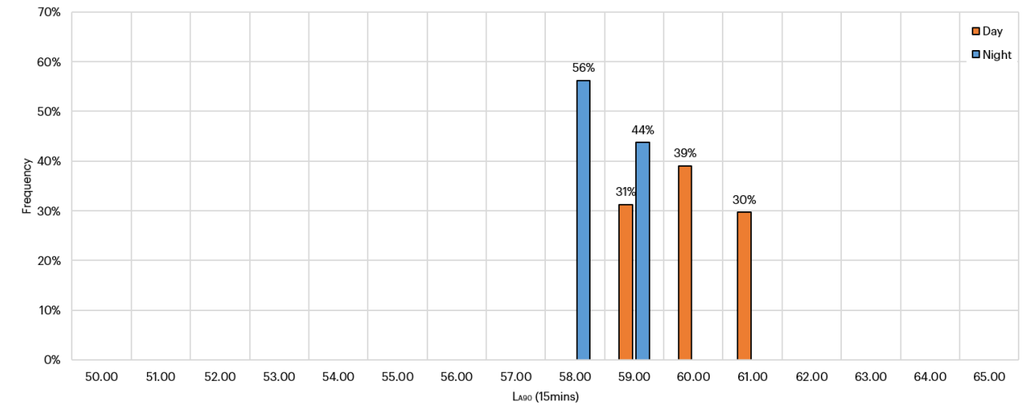


Figure 4.02 – Location A $L_{A90(15min)}$ Analysis

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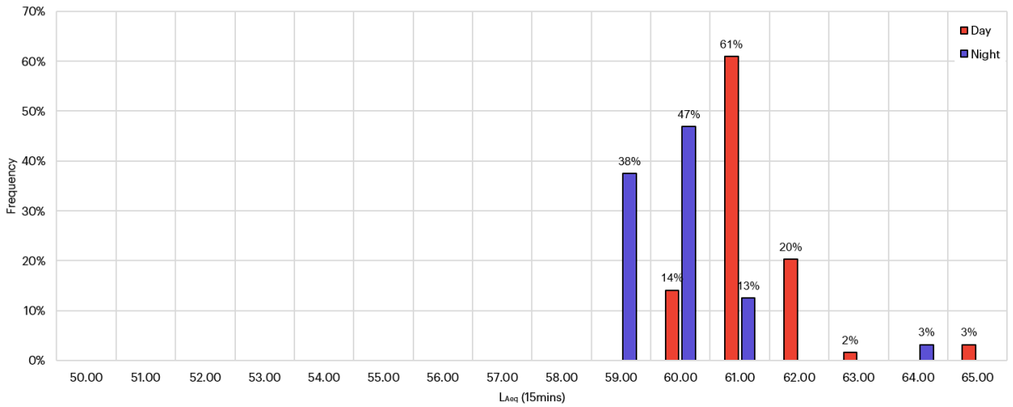


Figure 4.03 – Location A $L_{Aeq(15min)}$ Analysis

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05 • Plant Acoustic Consideration

Manchester City Council's Noise Technical Guidance Document outlines the following standards as guidance for the assessment of external noise impact.

05.1 • Criteria 01 – Manchester City Council Planning and Noise Technical Guidance Document

Criteria 01 is applicable to assess the sound of fixed plant/equipment where it will impact an existing noise-sensitive receptor.
Section 3.7.1.5 of the Technical Guidance Document states the following as guidance for the assessment of the noise impact of mechanical plant.

- *The noise assessment should be based on BS 4142, and any application for fixed plant, equipment or machinery must demonstrate that: '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'."*

05.2 • Criteria 02 – BS 4142 Assessment

Criteria 02 is applicable to assess the sound of a commercial nature where sources are brought to an existing noise-sensitive receptor.

BS 4142 describes a method of determining the level of noise of a commercial nature and to assess whether the noise in question is likely to give rise to complaints from surrounding residences by comparing the plant noise levels with a determined background noise level.

The likelihood of complaints in response depends on various factors.

BS 4142 states that:

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5dB 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 context.

In addition to, the properties of the noise source should be considered:

- Tonality: For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.
- Intermittency: When 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 interval which contains the greatest total amount of on time. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied

05.3 • Criteria 03 – BS 8233 Assessment

Criteria 03 is applicable where new noise sources are brought to existing noise-sensitive receptors.

BS 8233 provides target internal ambient noise levels for a range of space types; the noise levels of a steady external noise should not exceed these values.

Allowance should be made of up to 15dB attenuation through an open window, therefore permitting a maximum guideline value of 45dBA external to the noise sensitive window during evenings and other quiet periods to stay within the permitted 30dBA maximum in a bedroom area.

Activity	Location	Day 07:00 – 23:00	Night 23:00 – 07:00
Resting	Living Room	35 dBA	-
Dining	Dining Area	40 dBA	-
Sleeping	Bedroom	35 dBA	30 dBA

Table 5.01 – BS8233 Target Internal Noise Level for Dwellings

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06 • Plant Noise Impact Assessment

06.1 • Proposed Plant Noise

The proposed plant installation consists of:

- 1 No. Daikin ADT03ECN1 modular air handling unit – Supplying and extracting air to serve the occupied spaces.
- 1 No. Daikin REYA10A9 VRV condenser unit – Serving fan coil units used for heating and cooling within certain spaces.

The measured sound power level for each unit is outlined in Table 6.02 adjacent, as per the manufacturer's noise data.

The following should be noted:

- As the plant consists of inverter driven motors designed to match a consistent load, the plant noise is not considered to exhibit tonal or intermittent characteristics.

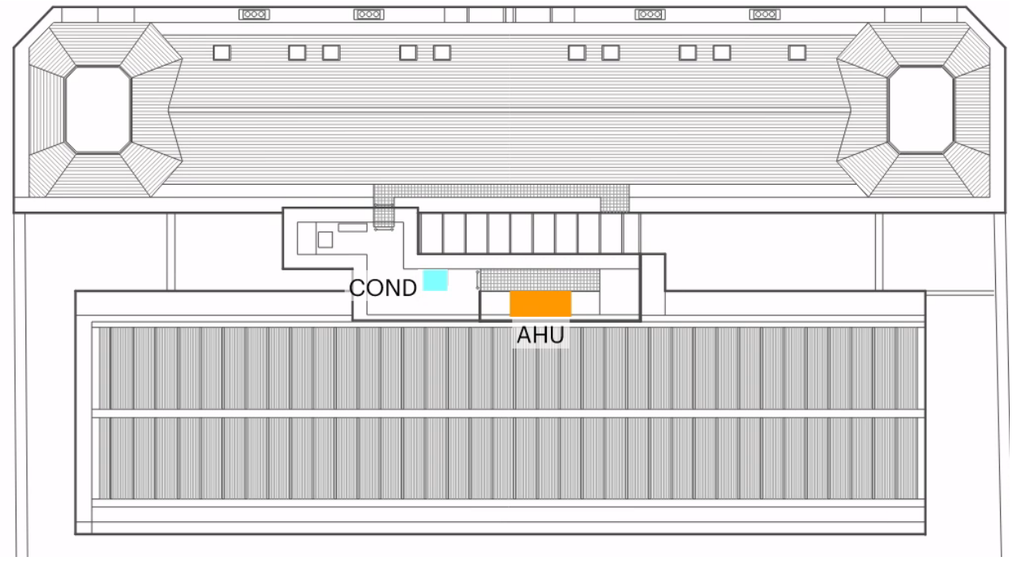


Figure 6.01 – Proposed Plant Layout

Unit	Reference	Sound Pressure Level								
		63	125	250	500	1000	2000	4000	8000	Overall
ADT03ECN1	AHU	64	62	73	71	73	72	74	68	80
REYA10A9	COND	-	81	82	79	74	71	68	62	86

Table 6.02 - Plant Noise Levels

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07 • Plant Noise Impact Assessment

This assessment shall estimate the impact of the resultant plant noise at the locations identified as the nearest noise sensitive openings.

Figure 7.01 shows an initial assessment of the plant. Table 7.01 below summarises the results. RESI/03 has the highest calculated noise level as a result of the modelled plant noise sources.

Receiver Location	Sound Pressure Level Results								A-Weighted Noise Level (dBA)
	63	125	250	500	1000	2000	4000	8000	
RESI/01	18	23	32	32	33	30	28	16	38
RESI/02	17	24	32	33	32	28	26	14	38
RESI/03	14	23	34	38	38	37	37	27	44
RESI/04	13	21	31	34	37	38	39	29	44
RESI/05	16	24	34	38	39	38	36	25	44

Table 7.01 – Noise Impact Calculation

The estimated noise level at RESI/03 is 44dBA, as such:

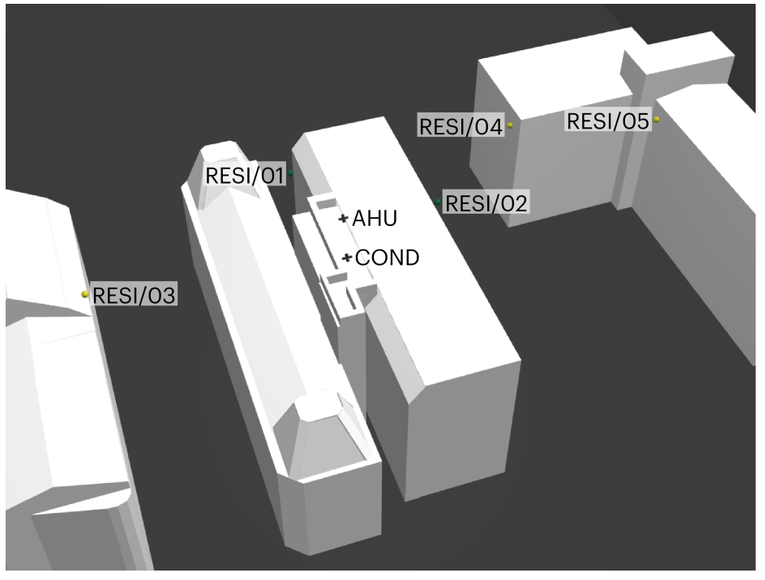
- Criteria 01 is satisfied, as the noise level is 14 dBA below the minimum existing ambient noise level measured at location A.
- Criteria 02 suggests a negligible noise impact on RESI/03 as the predicted noise level is 14 dBA below the existing minimum background noise level of 58 dBA.
- Criteria 03 is satisfied given the external noise level is <45 dBA, resulting in an internal noise level that does not exceed 30 dBA.

Considering the above, the noise generated by the external plant to RESI/03 is expected to have no impact on the noise sensitive listener at this location.

As the modelled noise levels at RESI/01, RESI/02, RESI/04 and RESI/05 are below the assessed RESI/03, the noise generated by the external plant will have no impact on the noise sensitive listener at these locations.



Figure 7.01 – 2D Representation of Noise Propagation Model



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Figure 7.02 –3D Representation of Noise Propogation Model

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08 • Conclusion

The results in Table 8.01 indicates:

- At RESI/03 the predicted plant noise passes Criteria 01, 02 and 03.

Hence the results indicate that the proposed external plant complies with the requirements of Manchester City Council, and has no risk of adverse impact to the noise sensitive listeners.

			Criteria 01		Criteria 02		Criteria 03	
Location	Time	Predicted Plant Noise at Window L_{Aeq}	Background L_{A90} (15mins)	Diff	Background L_{A90} (15mins)	Diff	Permitted L_{Aeq}	Diff
RESI/03	Day	44	59	-15	59	-15	50	-6
	Night	44	58	-14	58	-14	45	-1

Table 8.01 – Plant Impact Assessment at the Nearest Noise Sensitive Window