

4 Hardman Square Manchester

Plant Noise Assessment Report

29822/PNA/Rev3

4 July 2024

For:

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Spinnaker Court
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Plant Noise Assessment Report 29822/PNA/Rev3

Document Control

Rev	Date	Comment	Prepared by	Authorised by
3	04/07/2024	Updated to reflect plat locations on received GAS		
			Will Robertson Assistant Consultant BSc(Hons), TechIOA	Jake Howarth Senior Associate BEng(Hons), MIOA
2	16/05/2024	Updated to address EHO comments	Will Robertson Assistant Consultant BSc(Hons)	Jake Howarth Senior Associate BEng(Hons), MIOA
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Plant Noise Assessment Report 29822/PNA/Rev3

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1.0 Introduction

Planning Permission (ref. 135123/FO/2022) was granted on 24 January 2023 for an “*extension to the sixth floor; creation a new rooftop terrace; internal refurbishment to the existing ground floor, mezzanine, first, second, third, fourth and fifth floor to facilitate new amenities; creation of plant area; enhancements to features on the external building; replacement of louvres; erection of PV systems and associated works.*”

A number of conditions have been imposed as part of the planning permission. One of these conditions (Condition 7a) relates to atmospheric building services plant noise emissions to neighbouring premises and needs to be discharged prior to commencement of work on this part of the development. Condition 7 states that a supplementary acoustic report is required to demonstrate compliance with the Council's noise criteria.

In addition to the above, BREEAM is being targeted for this scheme. As such, the Pol05 BREEAM credit is being targeted.

As such, Hann Tucker Associates has been commissioned to assess the potential plant noise impact form the proposed building services on neighbouring noise sensitive premises, with the aim of discharging Condition 7a attached to Full Planning Permission (ref. 135123/FO/2022) set by Manchester City Council and showing compliance with the Pol05 BREEAM criteria.

2.0 Objectives

Based on the previously undertaken environmental noise surveys and plant noise data provided, to assess the potential plant noise impact form the proposed building services on neighbouring noise sensitive premises.

To present the methodology and findings in a report with the aim of discharging Condition 7a set by Manchester City Council.

To assess the external plant selection noise emissions and assess the impact on nearby noise sensitive receptors, in line with BREEAM 2014 Pol05.

To outline possible mitigation measures as required.



3.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

4.0 BREEAM 2014

4.1 Suitably Qualified Persons

A prerequisite of the BREEAM assessment is that a suitably qualified acoustician is appointed to carry out the assessment.

The assessment was compiled by Jake Howarth and Will Robertson of Hann Tucker Associates. The qualifications and professional statuses for the main assessor are summarised below:

Professional Qualifications and Status	
Position	Qualifications
Senior Associate	BEng(Hons) Acoustics, Salford University Member of the Institute of Acoustics (MIOA) Over 9 years' experience in Acoustic Consultancy

4.2 Pol 05 – Noise Pollution

There is one available credit for Pol 05 under BREEAM UK Refurbishment and Fit-out 2014. The requirements are provided below:

1. Where there are, or will be, no noise-sensitive areas or buildings within 800m radius of the assessed site.

OR

2. Alternatively, where the building does have noise-sensitive areas or buildings within 800m radius of the site, one credit can be awarded as follows:

- a. Where a noise impact assessment in compliance with BS74451 has been carried out and the following noise levels measured/determined:

- i. Existing background noise levels at the nearest or most exposed noise-sensitive development to the proposed development or at a location where background conditions can be argued to be similar.



- ii. The rating noise level resulting from the new noise source (see CN7).
3. The noise impact assessment must be carried out by a suitably qualified acoustic consultant holding a recognised acoustic qualification and membership of an appropriate professional body (see Relevant definitions in the Additional information section).
4. The noise level from the proposed site/building, as measured in the locality of the nearest or most exposed noise sensitive development, is a difference no greater than +5dB during the day (07:00 to 23:00) and +3dB at night (23:00 to 07:00) compared to the background noise level.
5. Where the noise source(s) from the proposed site/building is greater than the levels described in criterion 4, measures have been installed to attenuate the noise at its source to a level where it will comply with criterion 4.

5.0 Planning Condition

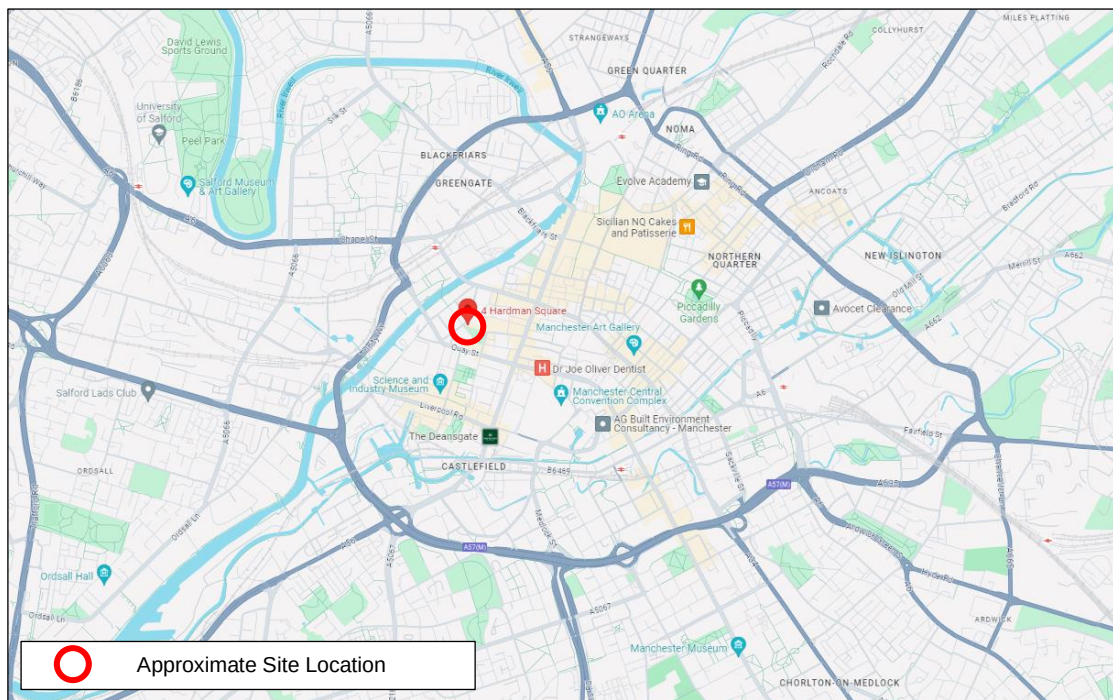
The Local Authority have included a planning condition relating to noise emissions from building services plant in Condition 7, as detailed below:

- “Condition 7 a) Ancillary plant, equipment, servicing and louvres shall be selected and/or acoustically treated in accordance with a scheme 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. Prior to commencement of the development 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 first occupation of the development.*
- b) Prior to first use of the development a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic report. The report shall undertake post completion testing to confirm that the noise criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria and timescales for the implementation of those measures.”*

6.0 Site Description

6.1 Location

The site is located on Hardman Square and falls within Manchester City Council’s jurisdiction. See Location Map below.

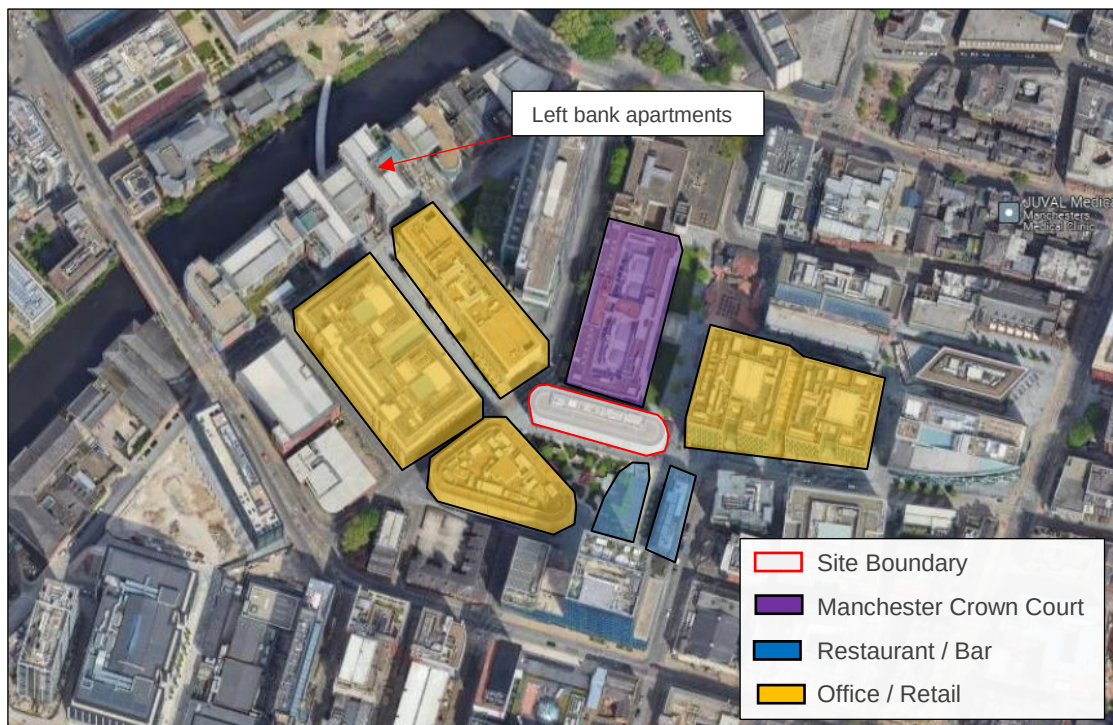


Location Map (Map Data ©2024 Google)

6.2 Description

4 Hardman Square is a 6-storey building which lies on the north side of Hardman Square, Manchester. It is bounded by office and commercial properties. To the east (approximately 20 metres away) is an office block with commercial units on the ground floor, such as The Alchemist and Thaikhun. To the southeast is The Ivy Spinningfields. To the south is a building with ground floor commercial units and 8No additional storeys of office space above. To the north and west are additional office buildings, including Manchester Crown Court. To the immediate west of the building is Gartside Street.

Identified in the previous noise impact assessment “29822-RP-NIA1-R1-TJEB Noise Impact Assessment”, the nearest residential receptors are the apartments in the building approximately 125 metres to the northwest of the site, along Left Bank. See Site Plan below.



Site Plan (©2024 Google Images)

7.0 Noise Survey

7.1 Methodology

Unattended noise monitoring was undertaken on site over a 4-day period to establish full daytime and night-time noise levels over a typical weekday and weekend period. The monitoring was carried out between 15:00 hours on Thursday 26 May 2022 and 15:00 hours on Monday 30 May 2022 with equipment set up to record broadband and spectral (octave band) sound pressure levels over discrete 5 and 15-minute periods.

The survey was performed by Rory Nicholls BEng(Hons) AMIOA. All measurements were collated in general accordance with BS 7445-1:2003 Description and Measurement of Environmental Noise. Measurements were taken continuously of the A-weighted (dBA) L_{90} , L_{eq} and L_{max} sound pressure levels over 15-minute periods.

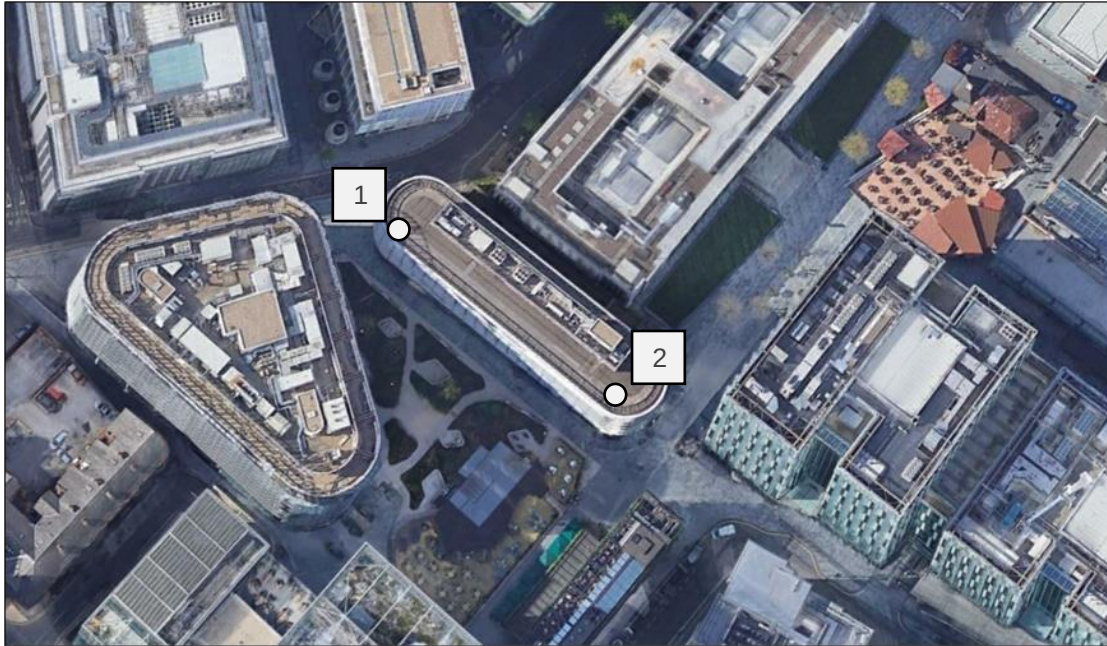
7.2 Measurement Positions

The measurement positions were as described and illustrated below.

Position	Type	Description
1	Unattended	To the southwest corner of the site. Microphone in free-field conditions approx. 28m above local ground level.



Position	Type	Description
2	Unattended	To the southeast corner of the site. Microphone in free-field conditions approx. 28m above local ground level.



Site Plan (Map data @2022)

7.3 Weather Conditions

For the unattended survey between Thursday 26 May 2022 and Monday 30 May 2022, local weather reports indicated no notable periods of prolonged and/or heavy rainfall, with temperatures ranging from 8 °C (night) to 17 °C (day) and wind speeds less than 5 m/s.

During our time on site, skies were largely clear with patchy cloud cover, wind conditions were light and from a westerly direction and road surfaces were dry.

Weather conditions were deemed suitable for obtaining representative noise readings.

7.4 Instrumentation

The instrumentation used during the survey is presented in the table below.

Position	Description	Manufacturer	Type	Serial Number	Last Calibration
1	Sound Level Meter	Larson Davis	824	3533	15/07/2021
2	Sound Level Meter	Larson Davis	LxT	4568	15/07/2021
1 & 2	Type 1 Calibrator	Larson Davis	CAL200	3083	06/05/2021



Each unattended sound level meter was housed in a weatherproof case with the microphone connected via an extension cable. All microphones were fitted with a windshield.

Each sound level meter was calibrated prior to and on completion of the survey. No significant deviations occurred (not more than 0.3 dB).

7.5 Results

The results of the unattended survey have been plotted on Time History Graphs 29822/TH1 to 29822/TH2 enclosed. These graphs present the 15-minute A-weighted (dBA) L_{90} , L_{eq} and L_{max} levels at both positions throughout the duration of the survey.

A summary of the results, as used to inform subsequent assessments against current guidelines, is presented in the table below. The L_{A90} values presented are the lowest levels determined through an arithmetic average of each 15-minute interval across the 4-day measurement period, in line with Appendix A of Manchester City Council's Planning & Noise Technical Guidance.

All results are free-field levels.

Position	Daytime (07:00 – 23:00 hrs)			Night-time (23:00 – 07:00 hrs)	
	$L_{Aeq,16hr}$	$L_{A90,15min}$	$L_{A1,15min}$	$L_{Aeq,8hr}$	$L_{A90,15min}$
1	57	51	71	55	49
2	59	52	75	56	49

A summary of the octave band L_{90} levels at Position 1 are shown below.

Period	Background Sound Levels (dB) per Octave Band Centre Frequency (Hz)						
	63	125	250	500	1000	2000	4000
Daytime (07:00 – 23:00 hrs)	57	55	53	51	50	45	35
Night-time (23:00 – 07:00 hrs)	58	55	52	48	47	42	33



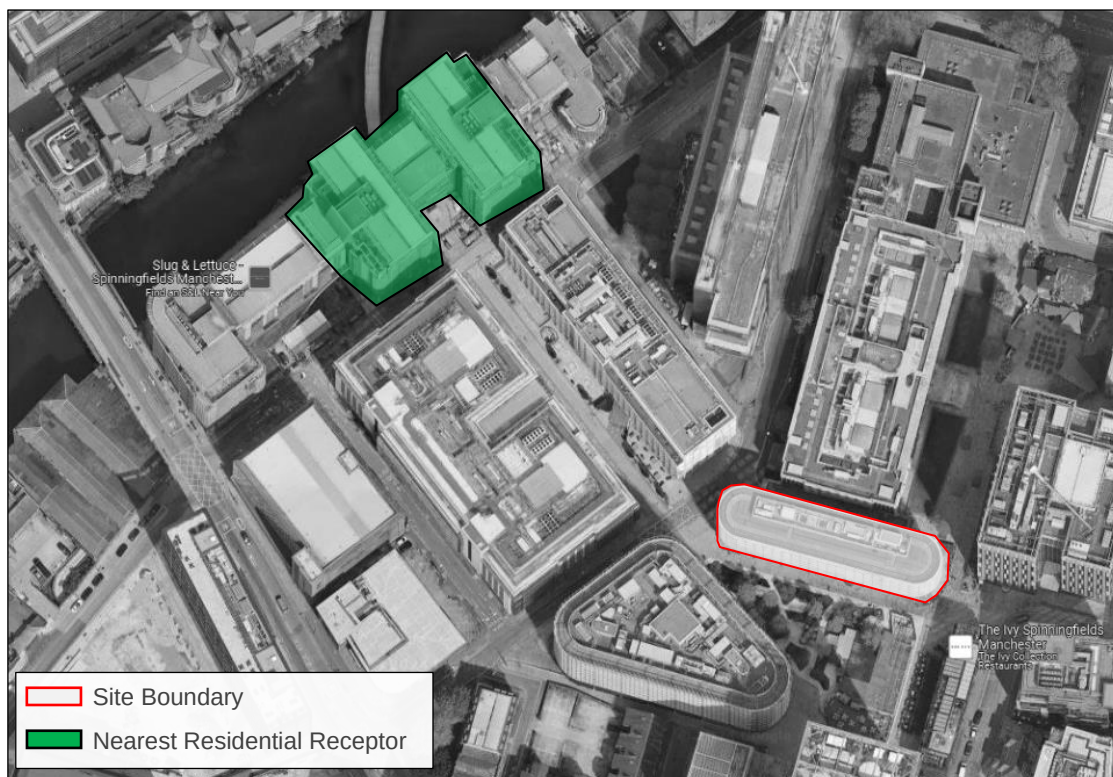
7.6 Discussion of Noise Climate

Due to the nature of the survey, i.e. unattended, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period the noise climate was noted to be dominated by vehicular movements on Gartside Street, Hardman Street and Bryon Street.

8.0 Plant Noise Emission Criteria

8.1 Nearest Noise Sensitive Receptor

As previously identified in “29822-RP-NIA1-R1-TJEB Noise Impact Assessment”, the nearest residential receptors are the apartments in the building approximately 125 metres to the northwest of the site, along Left Bank. This was concluded as all local receptors (e.g. surrounding offices) have fixed windows. This is shown on the plan below.



Plan detailing nearest residential receptors (Map data ©2024)

8.2 Fixed Plant & Equipment

It is proposed that the following plant noise emission criteria be achieved incident at the nearest noise sensitive residential windows, in free-field conditions, with all plant operating simultaneously.



BS 4142 Plant Noise Rating Limit, $L_{A,T,r}$ (dB)	
Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
46	44

The above criteria are in line with the Local Authority requirements of 5 dB below the representative background noise level, however the requirements for BREEAM 2014 compliance are less onerous. As such, achieving the above criteria would both be compliant with Planning Condition 7 and BREEAM 2014 Pol05.

Based on the results of the 2022 noise survey and communication with the Local Environmental Health Officer, the criteria at the nearest commercial have been relaxed by 5 dB. As such, it is proposed that the following noise levels are achieved at the nearest commercial receptor, which has been identified as 3 Hardman Street, approximately 10 metres from the perimeter of 4 Hardman Square.

BS 4142 Plant Noise Rating Limit, $L_{A,T,r}$ (dB)	
Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
51	49

Noise shall be assessed in accordance with BS 4142:2014 with corrections applied for any plant emitting noise of a tonal or irregular quality. The above limits shall be subject to the final approval of the Local Authority.

8.3 Emergency Plant

Based on the limits set on previous schemes within Manchester City Council's jurisdiction, it is proposed that the noise level from any emergency plant is no more than 10dBA greater than the ambient noise level (measured as an L_{Aeq} noise level) at any proposed or existing residential receptor.

As there is no measured data at the nearest noise sensitive receptor, the proposed plant noise rating limits are based off of the measured L_{Aeq} levels at measurement Positions 1 and 2 as seen below.



Position	BS 4142 Plant Noise Rating Limit, $L_{A,T,r}$ (dB)	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
1	67	65
2	69	66

9.0 Plant Noise Assessment

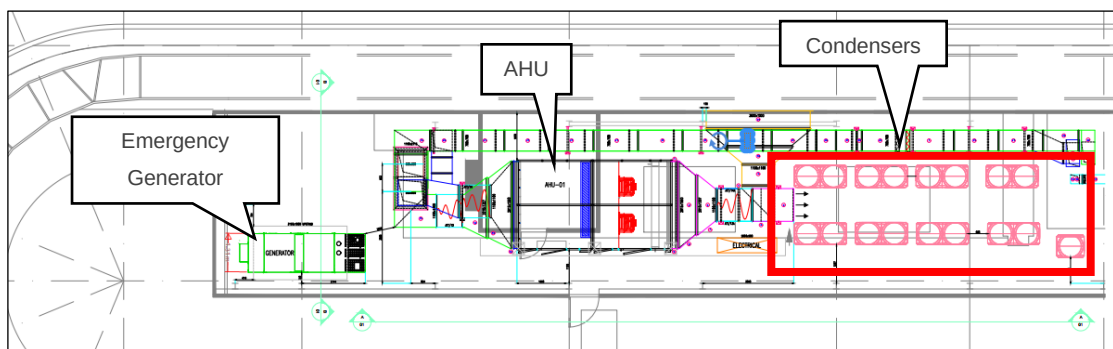
9.1 Proposed Plant

We understand the proposed building services plant are all located at roof level and situated within the external plant area. The plant comprises of the following:

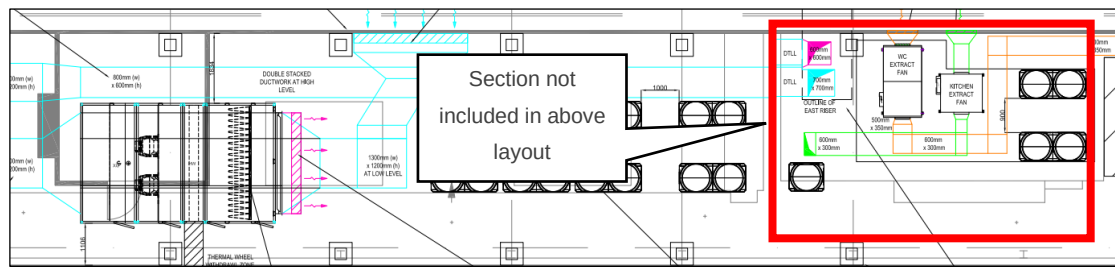
No. of Units	Plant Description
1	Emergency Generator
10	PUHY-500YNW-A2
1	PURY-P200YNW-A2
1	Kitchen Extract Fan
1	Toilet Extract Fan
1	AHU– TEMPAIR 97TT INT (Supply)
	AHU– TEMPAIR 97TT INT (Extract)

The normal operational hours are to be between 07:00 and 18:00, with the exception of the Emergency Generator which is expected to run for a short servicing period once per annum and in emergency situations. All future tenant plant will need to be designed to comply with the MCC planning conditions, in conjunction with the above landlord plant.

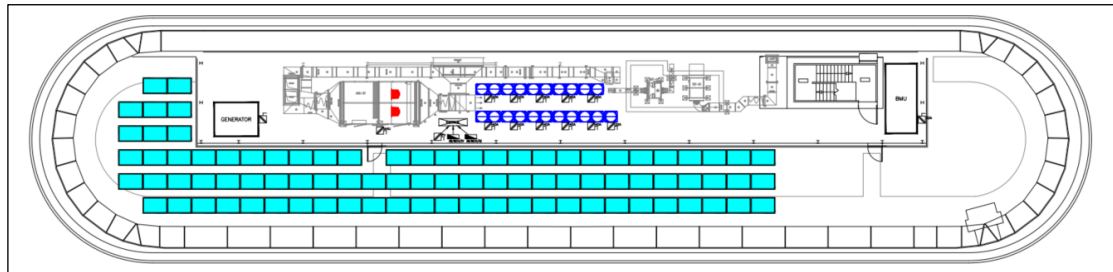
The proposed plant layout can be seen below:



Proposed Building Services Layout (c/o Gerrard Building Services Engineers LTD)



Proposed Building Services Layout (c/o Gerrard Building Services Engineers LTD)



Proposed Roof Layout (c/o H&O Electrical)

9.2 Noise Data

The emergency single-figure noise data as provided by Aura Technical Services is presented in the table below:

Plant Description	Sound Pressure Level at 7 metres (dBA)
Emergency Generator	68

We understand the manufacturer's noise data for the equipment to be as presented in the tables below:

Plant Description	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at 1 metre at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
PUHY-500YNW-A2	79	67	66	62	56	53	50	44	64
PURY-P200YNW-A2	77	61	61	58	51	47	44	42	60

Plant Description	Sound Power Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
Toilet Extract Fan (100% Speed)	80	78	79	81	79	75	70	63	83
Kitchen Extract Fan (100% Speed)	91	70	77	61	61	64	50	42	72
AHU Supply Fan	82	82	79	76	73	69	66	69	79



Plant Description	Sound Power Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
AHU Extract Fan	82	86	81	83	78	75	71	70	84

The sound levels shown have been based upon manufacturer's data.

It is essential that we are appraised of any alterations or additions to this list. Should the selection of any item of plant differ from those detailed in Section 9.1, provided their sound power levels are comparable to (or less than) those shown then it should not be necessary to make significant changes to our current recommendations.

Future tenant plant is to be designed and selected as part of tenant fit-outs, which is not available at the time of writing.

9.3 Mitigation Measures

The Attenuator Schedule (P0055/GBSE/005) provided by Aura Technical Services Ltd details the attenuation requirements for the proposed ducted building services plant.

It should be noted that:

- In all cases it would be possible to alter attenuator width and height providing the cross-sectional area is maintained and the width to height aspect ratio does not exceed 3:1.
- All alterations must be confirmed by ourselves.

9.4 Normally Operating Plant

We understand that the proposed units will only be operational from 07:00 to 18:00 hours.

It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained. All proposed external plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems. In order to be robust, however, a +3dB feature correction as advised in BS 4142:2014 has been applied for the possible presence of *"... characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment ..."*



9.5 Residential Receptor Assessment

9.5.1 Normally Operating Plant

The following table summarises our predictions of the cumulative atmospheric noise emissions from the proposed standard plant, in conjunction with the mitigation measures, to 1m from the nearest noise sensitive residential window at the residencies along Left Bank. To be robust, screening from the buildings in between the external plant area and the receptor have not been considered in this assessment. More detailed calculations can be found in Appendix C.

Roof Plant	Sound Pressure Level (dBA)
	Daytime (07:00 – 19:00 hours)
Combined Calculated Noise Level of PUHY-500YNW-A2 at Receptor	41
Calculated Noise Level of PURY-P200YNW-A2 at Receptor	20
Calculated Noise Level of Toilet Extract Fan at Receptor	21
Calculated Noise Level of Kitchen Extract Fan at Receptor	22
Calculated Noise Level of AHU Fans at Receptor	27
Combined Calculated Noise Level of All Roof Plant at Receptor	41
Criteria	46
Criteria Achieved	✓

Our calculations above indicate that the proposed standard plant, in conjunction with the mitigation measures outlined in Section 9.3, should be capable of achieving the Planning Condition 7 imposed by Manchester City Council as outlined in Section 5.0.

9.5.2 Emergency Plant

The following table summarises our predictions of atmospheric noise emissions from the proposed emergency generator to 1m from the residential receptors.

Emergency Plant	Sound Pressure Level (dBA)	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
Calculated Noise Level of Emergency Generator at Receptor	45	
Criteria	67	65
Criteria Met	✓	✓



It is worth noting that even without the relaxed criteria, the emergency plant should still meet the requirement of 5 dB below background at the nearest noise sensitive receptor during the daytime period.

9.6 Commercial Receptor Assessment

As previously discussed, the site is surrounded by commercial buildings and the worst-affected commercial building which is deemed to be 3 Hardman Street has been assessed below as there is a clear line of site to the proposed plant.

9.6.1 Normally Operating Plant

Based on newly received layouts which detail the distances of the plant from the east edge of the site, the following table summarises our predictions of the cumulative atmospheric noise emissions from the proposed standard plant, in conjunction with the mitigation measures, to 1m from the nearest window of the closest office block with line of site to the plant.

Roof Plant	Sound Pressure Level (dBA)
	Daytime (07:00 – 19:00 hours)
Combined Calculated Noise Level of PUHY-500YNW-A2 at Receptor	50
Calculated Noise Level of PURY-P200YNW-A2 at Receptor	29
Calculated Noise Level of Toilet Extract Fan at Receptor	31
Calculated Noise Level of Kitchen Extract Fan at Receptor	28
Calculated Noise Level of AHU Fans at Receptor	35
Combined Calculated Noise Level of All Roof Plant at Receptor	50
Criteria	51
Criteria Achieved	✓

Our calculations above indicate that the proposed standard plant, in conjunction with the mitigation measures outlined in Section 9.3, would likely meet the criteria 1 metre from the nearest commercial receptor in the daytime.

Despite the external noise levels being expected to achieve the criterion at 1 metre from the façade of the office building, it is worth noting that the commercial buildings surrounding the site have sealed windows and as such the internal noise levels should not be impacted by noise levels that are not significantly above the existing ambient noise level.



9.6.2 Emergency Plant

The following table summarises our predictions of atmospheric noise emissions from the proposed emergency generator to 1m from the neighbouring premises.

Emergency Plant	Sound Pressure Level (dBA)	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
Calculated Noise Level of Emergency Generator at Receptor	50	
Criteria	69	66
Criteria Met	✓	✓

Note: A control of testing schedule between 10:00 hours and 16:00 hours from Monday to Friday shall need to be implemented, to adhere with the comments from the MCC Environmental Health Officer.

9.7 Court Noise Impact Assessment

As previously discussed, the court to the north of the site is screened by the roof and as such the predicted level at the court windows will be much lower than that assessed above. The following sections detail the noise level from the plant at Manchester Crown Court's windows.

9.7.1 Normally Operating Plant

The following table summarises our predictions of the cumulative atmospheric noise emissions from the proposed standard plant, in conjunction with the mitigation measures, to 1m from the nearest window of the court.

Roof Plant	Sound Pressure Level (dBA)
	Daytime (07:00 – 19:00 hours)
Combined Calculated Noise Level of PUHY-500YNW-A2 at Receptor	45
Calculated Noise Level of PURY-P200YNW-A2 at Receptor	25
Calculated Noise Level of Toilet Extract Fan at Receptor	25
Calculated Noise Level of Kitchen Extract Fan at Receptor	27
Calculated Noise Level of AHU Fans at Receptor	32
Combined Calculated Noise Level of All Roof Plant at Receptor	45
Criteria	46
Criteria Achieved	✓



Our calculations above indicate that the proposed standard plant, in conjunction with the mitigation measures outlined in Section 9.3, should be capable of achieving the Planning Condition 7 imposed by Manchester City Council as outlined in Section 5.0.

9.7.2 Emergency Plant

The table below summarises our predictions of atmospheric noise emissions from the proposed emergency generator to 1m from the neighbouring court.

Emergency Plant	Sound Pressure Level (dBA)	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
Calculated Noise Level of Emergency Generator at Receptor	62	
Criteria	69	66
Criteria Met	✓	✓

Note: A control of testing schedule between 10:00 hours and 16:00 hours from Monday to Friday shall need to be implemented, to adhere with the comments from the MCC Environmental Health Officer.

10.0 Conclusions

An environmental noise survey has been undertaken in order to establish the currently prevailing noise levels.

Hann Tucker Associates have undertaken acoustic assessment to demonstrate compliance with Pol05 BREEAM 2014 requirements.

A summary of our previous noise survey from 2022 has also been shown and the results presented.

Potential plant noise emissions have been predicted at the nearest noise sensitive residential and commercial premises, as well as Manchester Crown Court.

Mitigation measures have been assessed where necessary in order to comply with Condition 7. Further mitigation measures should not be required.

Our assessments suggest that the proposed building services plant, in conjunction with our recommended mitigations measures, should be capable of complying with the noise criteria as set out in Condition 7. As such, Condition 7a should be discharged subject to approval by MCC.



External plant noise levels are expected to achieve the targeted BREEAM 2014 Pol05 requirements at the nearest residential receptor.

Appendix A

The acoustic terms used in this report are defined as follows:

dB	Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).
dBA	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.
L _{90,T}	L ₉₀ is the noise level exceeded for 90% of the period <i>T</i> (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.
L _{eq,T}	L _{eq,T} is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, <i>T</i> .
L _{max}	L _{max} is the maximum sound pressure level recorded over the period stated. L _{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L _{eq} noise level.
L _p	Sound Pressure Level (SPL) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).
L _w	Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

Appendix B

Time History Graphs

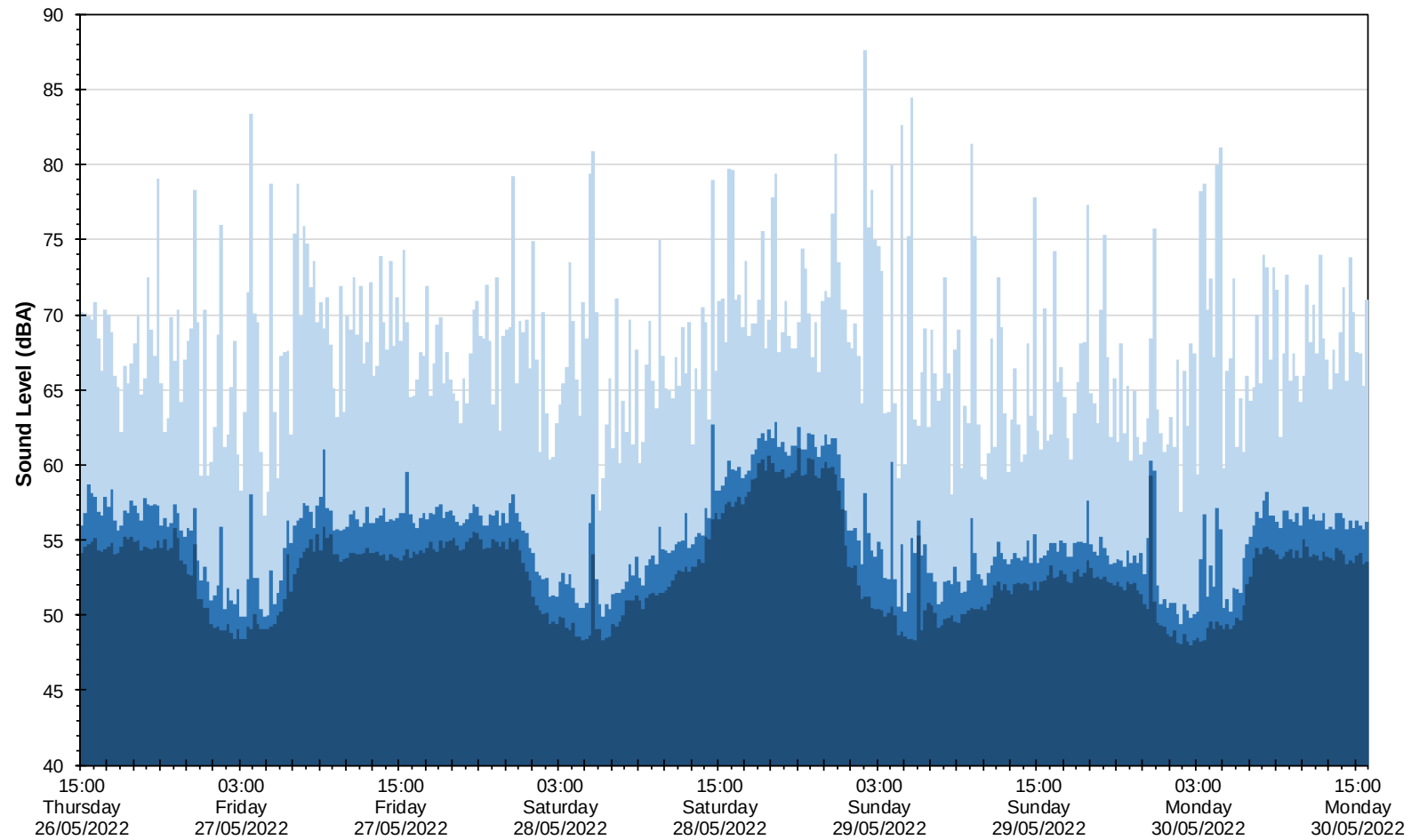
4 Hardman Square, Spinningfields

Position 1

L_{eq} , L_{max} and L_{90} Noise Levels

Thursday 26 May 2022 to Monday 30 May 2022

■ L_{Amax}
■ L_{Aeq}
■ L_{A90}



Date and Time

29822/TH1

4 Hardman Square, Spinningfields

Position 2

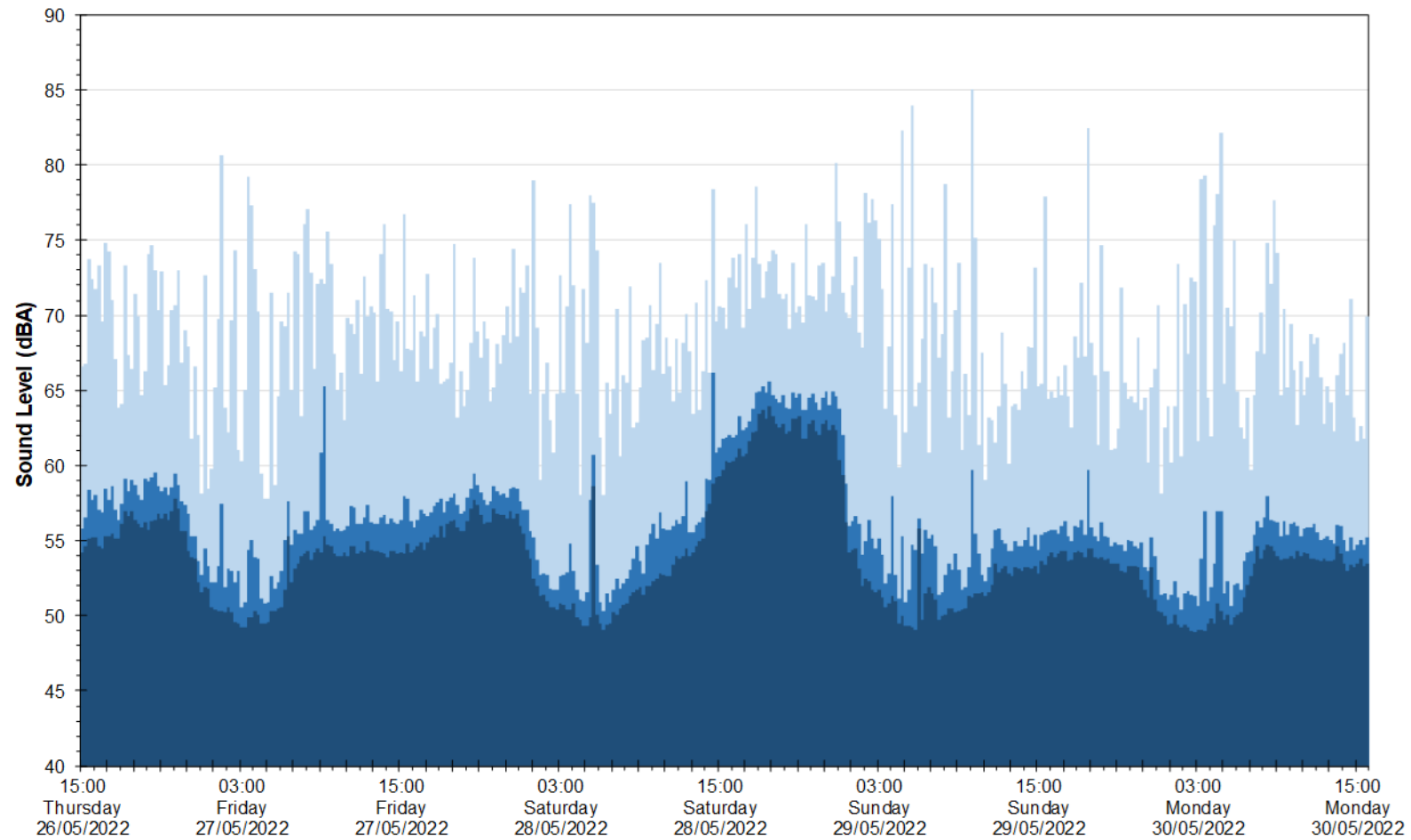
L_{eq} , L_{max} and L_{90} Noise Levels

Thursday 26 May 2022 to Monday 30 May 2022

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



Date and Time

29822/TH2

Appendix C

Atmospheric Noise Emission Calculations

PUHY-500YNW-A2 Standard Cooling Mode	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at Octave Band Centre Frequency (Hz) at 1 metre								dBA
	63	125	250	500	1k	2k	4k	8k	
Sound Pressure Level at 1m	79	67	66	62	56	53	50	44	64
Distance Correction (to 125 metres)	-36	-36	-36	-36	-36	-36	-36	-36	-
Quantity Correction (10No Units)	10	10	10	10	10	10	10	10	-
Barrier Correction	0	0	0	0	0	0	0	0	-
Intermittency Correction	+3	+3	+3	+3	+3	+3	+3	+3	-
Calculated Noise Level at Receptor	56	44	43	39	33	30	27	21	41

PURY-P200YNW-A2 Standard Cooling Mode	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at Octave Band Centre Frequency (Hz) at 1 metre								dBA
	63	125	250	500	1k	2k	4k	8k	
Sound Pressure Level at 1m	77	61	61	58	51	47	44	42	59
Distance Correction (to 125 metres)	-42	-42	-42	-42	-42	-42	-42	-42	-
Barrier Correction	0	0	0	0	0	0	0	0	-
Intermittency Correction	+3	+3	+3	+3	+3	+3	+3	+3	-
Calculated Noise Level at Receptor	38	22	22	19	12	8	5	3	20

Toilet Extract Fan	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at Octave Band Centre Frequency (Hz) at 1 metre								dBA
	63	125	250	500	1k	2k	4k	8k	
Sound Power Level	80	78	79	81	79	75	70	63	83
Attenuator Insertion Losses	-2	-4	-10	-19	-36	-24	-16	-12	-
Sound Power Level at Grille	76	78	76	70	51	57	59	54	71
Distance Correction (SWL to SPL to 125 metres)	-53	-53	-53	-53	-53	-53	-53	-53	-
Barrier Correction	0	0	0	0	0	0	0	0	-
Intermittency Correction	+3	+3	+3	+3	+3	+3	+3	+3	-
Calculated Noise Level at Receptor	26	28	26	20	1	7	9	4	21

Kitchen Extract Fan	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at Octave Band Centre Frequency (Hz) at 1 metre								dBA
	63	125	250	500	1k	2k	4k	8k	
Sound Power Level	91	70	77	61	61	64	50	42	72
Distance Correction (SWL to SPL to 125 metres)	-50	-50	-50	-50	-50	-50	-50	-50	-
Barrier Correction	0	0	0	0	0	0	0	0	-
Intermittency Correction	+3	+3	+3	+3	+3	+3	+3	+3	-
Calculated Noise Level at Receptor	41	20	27	11	11	14	0	0	22

AHU	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Supply Fans Sound Power Level	82	82	79	76	73	69	66	69	79
Attenuator Insertion Losses	-3	-4	-8	-18	-21	-12	-9	-7	-
Sound Power Level at Grille (after grille losses)	77	81	75	62	57	60	59	62	71
Distance Correction (to 125 metres)	-56	-56	-56	-56	-56	-56	-56	-56	-
Quantity Correction	+3	+3	+3	+3	+3	+3	+3	+3	-
Barrier Correction	0	0	0	0	0	0	0	0	-
Intermittency Correction	+3	+3	+3	+3	+3	+3	+3	+3	-
Calculated Noise Level of the Supply Fans at Receptor	27	31	25	12	7	10	9	12	21
Extract Fans Sound Power Level	82	86	81	83	78	75	71	70	84
Attenuator Insertion Losses	-3	-6	-13	-25	-19	-12	-9	-7	-
Sound Power Level at Grille (after grille losses)	77	84	74	66	67	69	67	66	76
Distance Correction (to 125 metres)	-56	-56	-56	-56	-56	-56	-56	-56	-
Quantity Correction	+3	+3	+3	+3	+3	+3	+3	+3	-
Barrier Correction	0	0	0	0	0	0	0	0	-
Intermittency Correction	+3	+3	+3	+3	+3	+3	+3	+3	-
Calculated Noise Level of the Extract Fans at Receptor	27	34	24	16	17	19	17	16	26
Combined Calculated Noise Level of the AHU Fans at Receptor	30	36	28	17	17	20	18	17	27

Emergency Generator	Sound Pressure Level (dBA)
Sound Pressure Level at 7m	68
Distance Correction (to 125m)	-23
Calculated Noise Level of Generator at Receptor	45