BURO HAPPOLD

All Saints Library

Noise Impact Assessment

1350B-BHE-XX-XX-RP-AC-200001

0065290

26 January 2026

Revision P02

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Glossary

Term	Definition
Ambient Noise (as defined in BS 4142:2014+A1 2019)	Totally encompassing noise in a given situation at a given time; it is usually composed of noise from many sources, near and far.
Background Noise (as defined in BS 4142:2014+A1 2019)	A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of a given time interval, T, measured using the Fast time weighting and quoted to the nearest whole number of decibels.
C_{tr}	Spectrum adaptation term calculated using traffic noise as described in BS EN ISO 717-1:2020. This term is provided with weighted single values such as $D_{nT,w}$ or R_w to match with particular requirements (building acoustic or traffic noise spectrum).
Decibel, dB	Decibel (dB) is a dimensionless unit commonly used to demonstrate sound levels. It is derived from the logarithm of the ratio between the measured level and the reference value. For sound pressure level (L_p) the reference value is $2x10^{-5}$ pascals. For sound power (L_w) reference value is $1x10^{-12}$ Watts.
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
IANL	Indoor Ambient Noise Level. For schools Table 1 in BB93 (2015) specifies the upper limit for indoor ambient noise levels within teaching areas. The design criteria is set for a 30-minute average level (i.e. $L_{Aeq,30mins}$). However, where there is negligible change in the noise level, BB93 states that a much shorter time period (e.g. $L_{Aeq,5min}$) can be used. BB93 also states that for rooms identified having limits of $L_{eq,30min}$ 35 dBA or less, the noise should not regularly exceed $L_{1,30min}$ 55 dBA.
$L_{90,T}$ ($L_{A90,T}$)	Sound pressure level exceeded for 90% of the measurement period. Referred to as background noise level.
$L_{Ar,Tr}$	Rating Noise Level (as defined in BS 4142:2014+A12019), the specific noise level plus any adjustment for the characteristic features of the noise.
$L_{eq,T}$ ($L_{Aeq,T}$)	The equivalent continuous noise level of a time-varying noise. It is the steady noise level that, over the period under consideration, contains the same amount of sound energy as the time-varying noise over the same period.
$L_{Fmax,T}$ ($L_{AFmax,T}$)	The maximum sound pressure level measured during the measurement period T using the fast time constant.
L_p	The sound pressure level, in decibels, of a sound is 20 times the logarithm to the base of 10 of the ratio of the sound pressure to the reference pressure ($2x10^{-5}$ pascals). The reference pressure shall be explicitly stated and is defined by standard.
Noise Rating (NR)	Curves developed by the International Organization for Standardization (ISO) to determine the acceptable indoor environment for hearing preservation, speech communication and annoyance. These can be compared to NC curves and also can be approximated to equivalent dBA levels.
Reverberation Time (RT)	Time required for the steady sound pressure level in an enclosed space to decay by 60 dB, measured from the moment the sound source is switched off. Reverberation time is described in ISO 354:2003.
R_w (C, C_{tr})	Weighted Sound Reduction Index: Single-figure value of sound reduction according to BS EN ISO 10140-2:2021 used for rating partition systems, door-sets or glazing, based on the values of sound reduction index R at different frequencies. The higher the R_w the better the performance.
Specific Noise Level (as defined in BS 4142:2014+A1 2019)	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.
Weightings (as defined in BS EN 61672:2013):	A-Weighting: Frequency weighting devised to attempt to take into account the fact that human response to sound is not equally sensitive to all frequencies; it consists of an electronic filter in a sound level meter, which attempts to build in this variability into the indicated noise level reading so that it will correlate, approximately, with human response.). C-Weighting: One of the frequency weightings corresponding to the 100-phon contour and the closest to the linear or un-weighted value.

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2 Introduction

2.1 Overview

Buro Happold Acoustics have been commissioned to complete a Noise Impact Assessment (NIA) to support a Planning Application for the proposed redevelopment of the Manchester Metropolitan University Library.

It is understood that the existing library is to be demolished, a section retained and refurbished, and a new building constructed. This report is relevant to the new building portion of the site.

Figure 2—1 presents a graphical rendering of the proposed new Library.

Figure 2—2 presents the red line boundary for the new build as well as where the existing library is to be retained and refurbished, as received on 28/01/2026.

2.2 Scope & Contents

The scope of this report is to provide information to the Local Planning Authority, Manchester City Council (MCC) regarding the acoustic design of the scheme.

Assessment of operational noise levels has also been undertaken to see that the impact of plant installations at the site should not negatively affect Noise Sensitive Receptors (NSRs).

The proposed methodology for this assessment was issued to the MCC Environmental Protection Team. MCC agreed to the proposed approach via email on 1st October 2025.

The agreed methodology for the assessment is as follows:

- Overview of national and local planning guidance
- External noise survey
- Building envelope and control of noise break-in
- Plant rating limits – in line with MCC guidance
- Plant noise break-out calculations using indicative selections to demonstrate compliance with proposed limits.

2.3 Reference to Products or Manufacturers

Wherever this report refers to a specific product or manufacturer, this can be taken to mean *"any equal approved product providing the same or better level of acoustic performance*". Buro Happold have no vested interest in any one product or manufacturer.



Figure 2—1 Illustrative Visual of proposed library (Source: Hawkins\Brown stage 3 report 1350B-HBA-XX-XX-RP-A-000001)

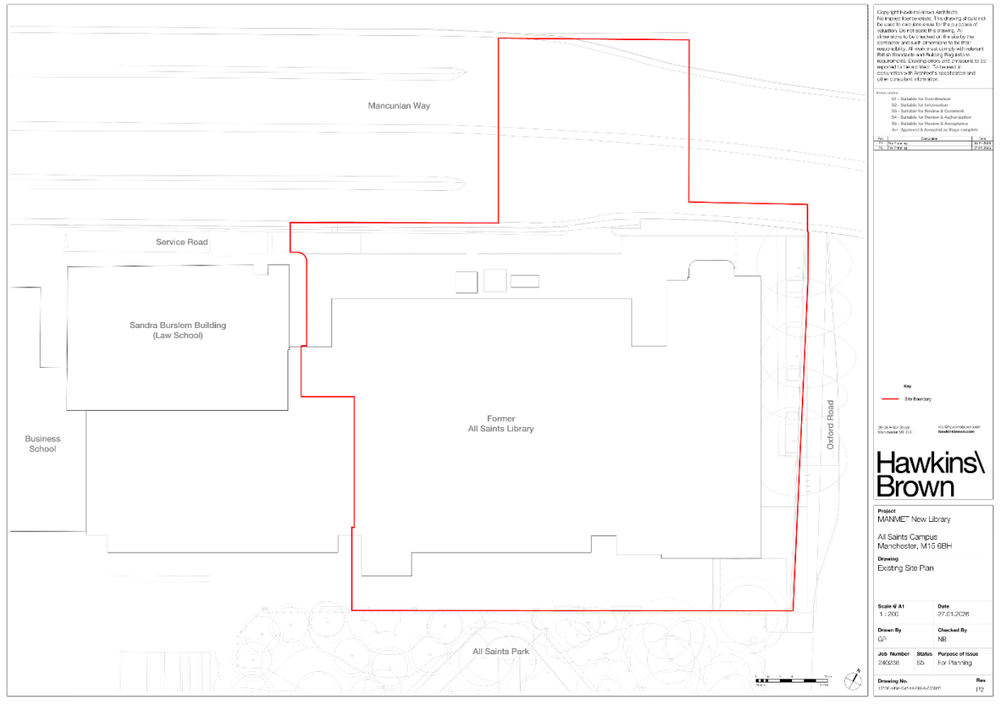


Figure 2—2 Red line boundary (Source: Hawkins\Brown 1350B-HBA-SW-XX-DR-A-080020)

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3 Acoustic Design Criteria

3.1 Relevant Guidance Documentation

This report is informed by the following standards and guidelines:

- The National Planning Policy Framework, 2024 (NPPF)
- The Noise Policy Statement for England, 2010 (NPSE)
- Planning Practice Guidance, 2021
- Manchester City Council - Planning and Noise Technical Guidance (October 2022)
- British Standard (BS) 8233:2014 – Guidance on sound insulation and noise reduction for buildings
- BREEAM New Construction 2018 (Education Building)
    - Hea 05 – Acoustic performance
    - Pol 05 – Reduction of noise pollution.
- BS 4142:2014+A1:2019 – Methods for rating and assessing commercial and industrial sound
- World Health Organisation (WHO) – Guidelines for community noise.

3.2 English Planning Policy on Noise Impact – The NPPF and NPSE

The NPPF is the overarching Planning Policy document that applies to all new developments in England. The guidance and assessment criteria given (or referred to) in this document can, therefore, be applied to all other standards in terms of assessing the suitability of granting Planning Permission concerning noise impact.

The NPPF states that planning policies and decisions should aim to:

> *"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; and*
>
> *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

With specific reference to noise impact, the NPPF document refers to the Noise Policy Statement for England (NPSE). The NPSE provides guidance, which enables decisions to be made regarding the acceptable noise burden to place on society, using three key phrases:

- No Observed Effect Level (NOEL)
- Lowest Observed Adverse Effect Level (LOAEL)
- Significant Observed Adverse Effect Level (SOAEL).

To provide a consistent frame of reference (and to allow a view to be taken on the suitability of the application regarding the relevant planning guidance), the levels or criteria given in other relevant documents used in the assessment can be re-framed, as shown in Table 3—1.

Table 3—1 NOAEL, LOAEL and SOAEL

Effect Level	Description
NOEL	The NOEL is the level of noise impact below which no effect can be detected, and there would be no discernible negative effect on health or quality of life.
LOAEL	The LOAEL is the lowest level of noise impact above which adverse effects on health or quality of life can be detected. Designing noise impacts to be equal-to-or-less-than, the LOAEL should see that any adverse effects on health or quality of life are negligible.
SOAEL	The SOAEL is the level above which significant adverse effects on health and quality of life occur. Designs should always seek to avoid a noise impact, which would be categorised as a SOAEL.

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3.3 Planning Practice Guidance (2021)

The National Planning Practice Guidance (PPG) "advises on how planning can manage potential noise impacts in the new development" and provides guidelines that are in line with the NPPF.

The PPG states that local planning authorities should take account of the acoustic environment and in doing so consider:

- whether or not a significant adverse effect is occurring or likely to occur
- whether or not an adverse effect is occurring or likely to occur
- whether or not a good standard of amenity can be achieved.

This guidance introduced the additional concepts of NOAEL (No Observed Adverse Effect Level), and UAEL (Unacceptable Adverse Effect Level), presented in Table 3—2.

Factors to be considered in determining whether noise is a concern are identified, including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, the character of the noise, and cumulative effects.

Table 3—2 Planning Practice Guidance (PPG 2021)

Perception	Example Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not so much that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in the behaviour and/or attitude. E.g. turning up volume of television; speaking more loudly; where there is no alternative means of ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of live.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in the behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in the acoustic character of the area	Significant Observed Adverse Effect	Avoid through the use of appropriate mitigation whilst taking into account the social and economic benefit
Present and very disruptive	Extensive and regular changes in the behaviour and/or inability to mitigate the effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent through use of appropriate mitigation

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4 Environmental Noise Climate

A number of noise surveys have been carried out on and around the University library site. These have been categorised in relation to if they have been used to determine either:

- Ambient noise levels
- Or, background noise levels

Details of each are given in the following sections.

4.1 Ambient Noise Climate

4.1.1 Introduction

An environmental noise survey was undertaken between 09:00 on Wednesday, December 14th, and 09:00 on Monday, December 19th, 2022, at a single position near the All Saints library building to capture ambient sound levels predominantly from Mancunian Way (A57). At the measurement, the microphone had a direct line of sight to the A57.

An additional attended noise survey was undertaken on Thursday, 11th January 2024, between the hours of 16:28 and 19:10 at six positions, three of which were along Oxford Road in front of the eastern façade of the current All Saints building and three in front of the southern façade between the library and All Saints Park. The purpose of these additional measurements was to understand the contributions of Oxford Road to the ambient noise climate around the site and to use the measurements to develop a model of the expected noise levels incident on the various elevations of the building.

All measurement positions from both surveys are indicated Figure 4—1 and Table 4—1.

4.1.2 Survey Methodology

For the long-term unattended survey, conditions were dry between 14/12/22 and 19/12/22, with average wind speeds of ≤ 3 m/s and temperature of approximately 7 °C.

For the short-term attended survey, 11/01/24, the weather conditions were dry but overcast, with average wind speeds of ≤ 4m/s and temperatures of approximately 5 ℃.

All measurements in both surveys were taken at a height of approximately 1.5 m in free-field conditions. A description of the measurement positions is provided in Table 4—1.

The noise survey equipment used in both surveys is detailed in Table 4—2.

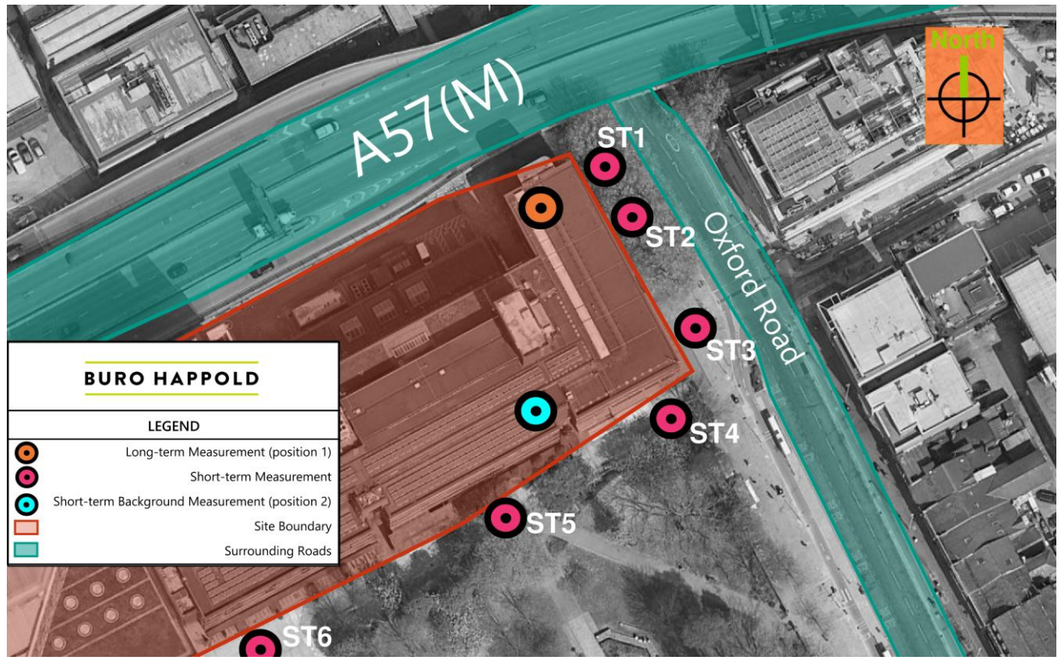


Figure 4—1 Measurement positions (source: Google Earth)

Table 4—1 Measurement position descriptions

Measurement Position	Description	Approximate distance to the source
LT1	North end of All Saints rooftop	19m
ST1	Eastern elevation, bus stop to north on opposite road, pedestrian crossing to south	13m
ST2	Eastern elevation, bus stop to north on opposite road, pedestrian crossing to south	13m
ST3	Southern point of eastern elevation, bus stops to south, pedestrian crossing to north	15m
ST4	Southern elevation, pedestrian walkway between library and All Saints park	25m
ST5	Southern elevation, pedestrian walkway close to library entrance	70m
ST6	Western point of southern elevation, north of lower Ormond street	120m

Table 4—2 Noise survey equipment used

Survey Type	Item	Manufacturer	Serial Number
Long-Term Unattended	Sound Level Meter	SoundExpert® LxT	0007081
	Pre-amplifier	PRMLxT1L	N/A
Short-Term Attended	Sound Level Meter	Bruel & Kjaer 2250	3011171
	Microphone capsule	Bruel & Kjaer 4189	3195817
	Acoustic Calibrator	Bruel & Kjaer 4231	2130756

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4.1.3 Measurement Results

Explanations of the measurement indices are as follows:

- **$L_{Aeq,T}$** – the average A-weighted sound pressure level within a measurement period. Typically thought of as the average ambient noise level at a particular time and likely to be due to a combination of various noise sources, near and far
- **$L_{AF,max}$** – the maximum instantaneous A-weighted sound pressure level. This typically corresponds to a short-duration event with a very high sound pressure level (SPL), such as a motorbike passing by or a car horn.

4.1.3.1 Long-Term Measurements

The measured baseline noise level data has been processed to determine the typical ambient and maximum noise levels, as shown in Table 4—3.

4.1.3.2 Short-Term Measurements

The post-processing of the data has involved removing non-representative 10-second events. The broadband $L_{Aeq,10mins}$ and $L_{AF,max}$ measured at each short-term position, are given in Table 4—4. Sound level spectra are given for each measurement position in Table 4—5. The $L_{eq,20mins}$ spectrums provided are logarithmically averaged across the two measurement periods at each measurement position, and the L_{Fmax} spectrums are given for the max event that occurred at each measurement position; for short-term positions 1-4, these were commonly caused by buses.

4.1.4 Discussion

The ambient noise levels are dominated by continuous road traffic noise from Mancunian Way in the north and Oxford Road in the east. Oxford Road features cycle lanes, and several bus stops, and a constant flow of buses was observed when undertaking the noise measurements dominating the ambient and max events on the East of the site. At the measurement positions to the south of the site, the building provides screening from Mancunian Way, and the ambient levels reduce as the position increases with increased distance from Oxford Road. It was observed, however, that during breaks in Oxford road traffic, the ambient noise level was due to continuous traffic from Mancunian Way.

Table 4—3 LT1 Noise data summary

Position	Acoustic parameter	dB(A)	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
LT1	$L_{eq,07:00-23:00}$	**71**	62	62	63	69	64	53
	L_{Fmax*}	**86**	82	79	76	82	81	73

* This is based on the 90th percentile of the recorded L_{max} to represent regularly occurring events

Table 4—4 Short-term broadband data summary

Measurement Position	Date	Start Time	Elapsed Time (hh:mm:ss)	$L_{Aeq,10mins}$	$L_{AFmax,10mins}$
ST1	11/01/24	16:28	00:10:00	69	79
	11/01/24	17:58	00:10:00	71	81
ST2	11/01/24	16:42	00:10:00	69	78
	11/01/24	18:09	00:10:00	70	84
ST3	11/01/24	17:00	00:10:00	67	79
	11/01/24	18:20	00:10:00	68	81
ST4	11/01/24	17:56	00:10:00	63	79
	11/01/24	18:33	00:10:00	62	79
ST5	11/01/24	17:17	00:10:00	56	68
	11/01/24	18:47	00:10:00	57	70
ST6	11/01/24	17:33	00:10:00	55	64
	11/01/24	19:00	00:10:00	53	66

Table 4—5 Short-term noise spectrum summary

Measurement Position	Measurement Parameter	Octave Band Measurements					
		125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
ST1	$L_{eq,20mins}$	69	67	66	66	62	55
	L_{Fmax*}	85	85	78	75	72	65
ST2	$L_{eq,20mins}$	68	69	66	66	61	54
	L_{Fmax*}	78	90	81	73	71	66
ST3	$L_{eq,20mins}$	67	67	64	63	59	53
	L_{Fmax*}	79	85	79	74	70	64
ST4	$L_{eq,20mins}$	63	63	60	58	53	46
	L_{Fmax*}	75	82	79	70	65	60
ST5	$L_{eq,20mins}$	60	57	54	52	48	40
	L_{Fmax*}	59	66	68	68	57	49
ST6	$L_{eq,20mins}$	40	53	50	51	45	36
	L_{Fmax*}	56	58	67	58	53	54

*These are the spectra of the max events that occurred at each measurement position

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4.2 Background Sound Level Survey

4.2.1 Overview

An additional background sound level survey was undertaken between July 20th and 25th, 2023, to identify the typical background sound level at the nearby sensitive receptors.

A single noise survey location was adopted on the rooftop of the All Saints library, as detailed in Table 4—6.

4.2.2 Sound monitoring equipment used

A list of equipment used during the noise survey is presented in Table 4—7.

The sound level meter was calibrated before and after the background sound level survey was carried out. No significant drift in calibration level was witnessed (≤0.5 dB). Calibration certificates for all equipment items detailed above are available upon request.

4.2.3 Weather conditions

Weather conditions during the noise survey were generally appropriate. No heavy rain was noted, and periods, where wind speeds ≥ 5 m/s were observed, were excluded from the survey. The weather observed for the noise survey period can be found online on the website https://www.timeanddate.com/weather/uk/manchester/historic.

4.2.4 Identifying the typical background sound level

A methodology to identify a typical background sound level is presented in the document *"Planning and Noise – Technical Guidance (October 2022)"* published by Manchester City Council.

An example is presented in Appendix A of the document and is reproduced in Figure 4—2.

Fundamentally:

- The arithmetic average of a 15-minute time slot is taken, for example, in the row shown in green, the $L_{A90,15minutes}$ dB values at 3:33 am across the dates 8-21 October are arithmetically averaged in Column P
- The lowest value of Column P is then adopted as the typical background sound level.

This method has been followed by Buro Happold.

Table 4—6 Description of noise survey locations

Measurement position	Description	Notes
2	Rooftop	Automated measurement position to the South end of the All Saints building. Background sound levels were captured here, intended to set limiting plant noise levels (see Section 4)

Table 4—7 Noise monitoring equipment

Item	Manufacturer	Serial Number
Sound Level Meter	Bruel & Kjaer 2250	2506362
Pre-amplifier	Bruel & Kjaer 0032	18030
Microphone capsule	Bruel & Kjaer 4189	2198156
Site Calibrator	Bruel & Kjaer 4231	2327011

APPENDIX A

EXAMPLE
BS4142 'Typical' background noise level calculation

Measured LA90 levels

Time	8-9 Oct	9 to 10 Oct	10 to 11 Oct	11 to 12 Oct	12 to 13 Oct	13 to 14 Oct	14 to 15 Oct	15 to 16 Oct	16 to 17 Oct	17 to 18 Oct	18 to 19 Oct	19 to 20 Oct	20 to 21 Oct	P arithmetic average
23:03	43.1	50.8	53.9	52.7	41.5	44.7	38.7	39.9	51.2	48.1	51.0	42.9	44.4	46.4
23:18	43.3	54.8	56.3	55.8	40.2	46.5	38.3	39.6	58.8	52.6	50.3	43.5	46.6	48.2
23:33	43.6	58.9	58.4	62.8	39.1	50.0	38.0	39.0	64.0	51.3	48.2	43.6	50.4	49.8
23:48	43.7	62.1	59.6	62.8	37.8	47.4	37.2	38.2	61.8	52.0	50.1	44.9	51.9	50.0
00:03	42.5	52.8	51.1	54.4	38.3	46.6	35.3	38.9	48.7	48.0	48.8	45.2	46.4	45.9
00:18	41.8	50.0	47.3	46.7	39.7	46.0	34.7	37.1	45.4	47.3	45.8	42.1	45.5	43.8
00:33	40.5	47.7	48.0	44.0	37.4	46.1	35.3	36.5	47.1	47.4	45.9	40.4	42.4	43.0
00:48	40.9	48.5	46.4	44.1	36.9	44.5	34.3	36.4	49.1	48.5	46.5	41.6	45.0	43.3
01:03	39.2	48.0	45.6	47.2	36.9	44.8	33.6	34.4	51.0	44.4	45.5	41.2	45.8	42.9
01:18	39.8	53.7	43.4	44.7	36.0	48.0	32.7	34.3	52.6	45.7	47.0	40.7	47.5	43.5
01:33	40.5	49.8	45.6	45.7	35.7	49.9	33.0	33.8	56.6	45.4	47.3	40.5	47.2	43.9
01:48	40.1	55.5	48.2	47.2	35.6	47.0	32.1	36.5	57.5	46.2	47.5	41.4	47.0	44.8
02:03	39.6	55.9	47.6	46.8	34.4	47.1	34.5	34.0	56.2	49.2	45.8	40.9	50.3	44.8
02:18	41.1	57.8	49.6	47.7	34.0	49.3	32.1	34.1	58.4	48.6	47.0	40.3	49.4	45.3
02:33	47.6	57.0	51.1	48.3	33.8	52.3	32.0	34.0	60.8	47.5	49.1	39.4	49.5	46.3
02:48	43.1	59.3	48.8	47.5	33.1	54.8	32.5	33.3	61.8	49.6	48.5	38.7	54.0	46.5
03:03	40.4	57.2	48.6	46.4	33.4	51.3	32.8	32.9	54.6	46.4	47.7	39.2	52.8	44.9
03:18	40.6	44.4	49.8	49.3	34.0	39.7	33.3	33.6	38.1	48.5	47.9	38.1	43.3	41.6
03:33	40.2	39.1	48.7	51.0	34.0	38.5	32.9	34.6	37.5	51.7	47.6	38.8	41.9	41.3
03:48	39.6	38.4	52.3	49.7	33.9	40.0	33.8	34.8	38.1	51.4	49.2	38.3	42.3	41.7
04:03	39.4	39.0	53.8	51.8	35.1	40.7	32.7	35.7	37.8	50.8	51.0	38.4	42.1	42.2
04:18	39.3	38.6	54.2	54.9	36.7	39.6	34.0	35.0	38.6	48.6	52.4	39.5	43.0	42.6
04:33	39.9	39.3	52.1	53.1	37.4	38.4	34.9	36.5	38.8	49.6	51.8	40.2	44.6	42.8
04:48	39.9	40.1	52.7	54.2	37.7	38.3	34.6	37.6	45.3	49.3	55.7	39.8	44.2	43.8
05:03	40.2	40.0	51.7	58.4	38.4	40.3	36.1	39.3	46.9	48.7	55.6	40.3	43.5	44.6
05:18	41.1	40.8	53.9	53.6	38.7	40.8	36.6	39.4	47.2	50.5	56.1	43.4	45.4	45.2
05:33	41.5	42.7	53.7	45.2	42.8	41.7	38.7	39.8	47.4	50.3	43.5	43.1	45.3	44.3
05:48	43.2	42.9	55.2	42.2	42.7	41.8	38.9	40.8	47.8	48.2	40.8	44.0	48.9	44.4
06:03	43.8	43.7	55.7	40.2	42.4	43.1	39.3	41.6	48.0	42.3	40.9	44.8	50.2	44.3
06:18	44.9	45.2	42.7	37.5	44.6	44.5	40.9	43.3	48.2	41.8	40.7	45.4	51.0	43.9
06:33	46.0	46.1	42.3	36.6	44.6	45.4	43.4	44.5	48.4	42.7	40.9	46.0	52.5	44.6
06:48	47.6	46.8	43.5	37.3	45.1	46.2	46.1	45.4	49.4	42.1	41.8	47.3	51.8	45.4

Arithmetic Average of Column P	44.6
Minimum value column P	41.3
Maximum value column P	50.0
Mean value of full data set	44.6
Minimum value full data set	32.0
Maximum value full data set	64.0

41dB is taken as the typical background as it is the minimum value of the averaged individual 15 minute periods

Figure 4—2 Example method to identify the typical background sound level

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4.2.5 Nearby Noise Sensitive Receivers

A summary of the nearby Noise Sensitive Receptors (NSRs) considered in this report is listed below:

- **NSR 1** – Residential dwellings on Oxford Road – Approx. 30 m east of the site boundary

The nearby NSRs are annotated in green in Figure 4—3 below..



Figure 4—3 Annotated Aerial Image (Source: Google Earth)

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4.3.1 Background Sound Levels at NSRs

A summary of background sound levels as measured at NSRs is presented in this section.

Data presented in this section is in terms of the following:

- **$L_{A90,T}$** – the A-weighted sound pressure level exceeded 90% of the measurement period, i.e., a level perceived as a constant background noise level. Typically, it is largely unaffected by local traffic pass-bys or transient events. More usually attributable to constantly running building services plant or distant road traffic, what would be heard when there is no local traffic present (or other readily identifiable noise sources)
- For reference, the measurement samples are 1 hour during the daytime and 15 minutes at night.

The typical $L_{A90,T}$ dB background sound levels set in line with Manchester City Council Criteria during the daytime and night-time period are shown in Table 4—8.

Table 4—8 Measured background sound levels

Measurement Period	Background sound level $L_{A90,T}$ (dB)
Daytime (07:00-23:00 hours)	51
Night-time (23:00-07:00 hours)	**50**

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5 Building Envelope

5.1 Introduction

The Internal Ambient Noise Level (IANL) should be controlled within acceptable noise levels to provide a suitable internal acoustic amenity.

The IANL consists of contributions from external noise sources such as road, rail, and air traffic and internal building services noise. The aim is to acoustically design the development so that the cumulative noise from external and internal sources does not exceed the IANL requirements.

5.2 Acoustic Requirements

Internal ambient sound level targets have been determined based on BB93. Where the criteria are met, the requirements of BREEAM Hea 05 would be met by default.

BB93 also gives reference to not exceeding $L_{A01,30mins}$ 60 dB to mitigate the noise disturbance from intermittent events such as aircraft or trains. As the target IANL of all spaces in the library does not exceed $L_{Aeq,30mins}$ 40 dB, with the exception of toilets which are located away from any façade, this is achieved by default and does not require further assessment.

5.3 How Façade Sound Insulation Requirements are Calculated

The façade sound insulation requirements are calculated using the façade noise levels and the acceptable internal ambient noise levels established by the various criteria relevant to each space. Façade sound insulation requirements are typically given in terms of R at each octave-band centre frequency and summarised as single-figure values in terms of $R_w + C_{tr}$. These are defined as:

- **Sound Reduction Index, R** – is a measure of the sound-insulating properties in a particular frequency band. In this case, the sound reduction index is given at each octave band centre frequency between 125 and 4000 Hz
- **Weighted Sound Reduction Index, R_w** – is a single figure value that describes the standardised performance of partitions when measured in a laboratory
- **Correction Traffic, C_{tr}** – is a single correction value applied that considers the urban traffic noise spectrum.

Calculation procedures follow the "more rigorous calculation method" outlined in BS 8233:2014, based on the equation presented in Figure 5—1.

5.4 Assessment Assumptions/Variables

Assessment assumptions vary depending on the type of space. These typically relate to:

- Reverberation time
- Element areas (glazing, opaque façade elements, roof)
- Room volume.

Assessment assumptions/variables should be presented alongside the relevant calculation.

$$L_{eq,2} = L_{eq,ff} + 10\log_{10}\left(\frac{A_0}{S}10^{\frac{-D_{ne}}{10}} + \frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S}10^{\frac{-R_{rr}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

$L_{eq,ff}$	*is the equivalent continuous sound pressure level outside the room elements under consideration*[1]
A_0	*is a reference absorption area of 10 m^2 and is independent of frequency*
S_f	*is the total façade area in square metres (m^2) of the room in question*
S_{wi}	*is the area in square metres (m^2) of the windows of the room*
S_{ew}	*is the area in square metres (m^2) of the external wall of the room*
S_{rr}	*is the area in square metres (m^2) of the ceiling of the room*
S	*is the total area in square metres (m^2) of elements through which sound enters the room, i.e $S_f + S_{rr}$*
$D_{n,e}$	*is the insulation of the trickle ventilator measured according to BS EN ISO 10140*
R_{wi}	*is the sound reduction index (octave band value) of the window*
R_{ew}	*is the sound reduction index (octave band value) of the external wall*
R_{rr}	*is the sound reduction index (octave band value) of the roof/ceiling*
A	*is the equivalent absorption area of the receiving room being considered*
3	*is a correction factor*

Figure 5—1 "More rigorous calculation method" for noise ingress (Source: BS 8233:2014)

[1] It is the free-field sound level (i.e. in the absence of the façade), measured or estimated at the intended position of the element under consideration. It is related to the level $L_{eq,1}$ measured within a few millimetres of the actual façade by the relation $L_{eq,ff} \approx L_{eq,1} - 6$, and to the level $L_{eq,2m}$ measured 2 m away from the façade by the relation $L_{eq,ff} \approx L_{eq,2m} - 3$

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5.5 Ventilation Strategy

It is understood that a mechanical ventilation system is proposed for the development such that ventilation can be provided through attenuated openings in the façade and ducted into rooms as required.

It is understood that the precise type of system is under development and further commentary can be provided once this is better defined. However, the ventilation system must be designed such that the target internal ambient noise levels are met.

5.6 Minimum Façade Requirements

The expected noise levels at the façade are based on the noise survey as detailed in Section 4, and are free-field noise levels.

Break-in calculations have been undertaken to determine the minimum acoustic performance requirements of the façade. An overview of the spaces considered, and the corresponding assumptions, for the noise ingress calculations are shown in Table 5—1.

Due to the high volume of road traffic on both Mancunian Way and Oxford Road, the north and east façades require a higher level of sound reduction. Below are the minimum acoustic glazing performances rationalised by façade:

- North and East Façade : **$R_w + C_{tr}$36 dB**
- South and West Façade: **$R_w + C_{tr}$30 dB** (with the exception of spaces located on the north-west corner of the building)

These performance targets are inclusive of the glazing and associated framing system with an assumed minimum performance for the opaque façade elements of **R_w+C_{tr} 42 dB**.

5.6.1 Proposed Glazing

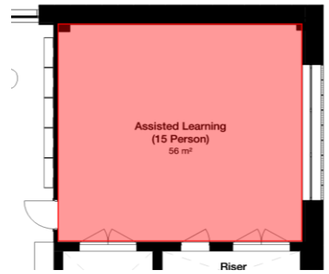
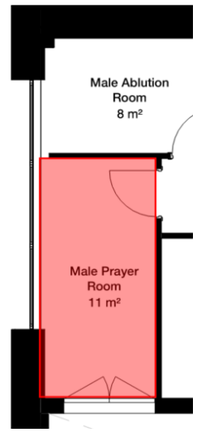
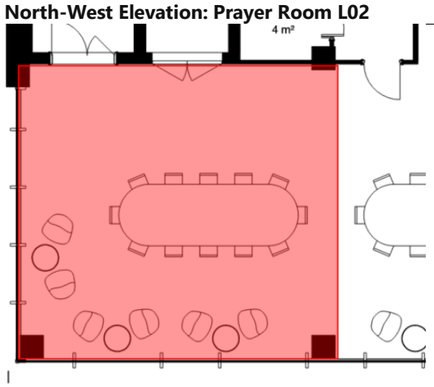
It is understood that the proposed glazing configuration is likely to be:

12.38mm (66.1) LamiGlass (PVB) / 14mm cavity / 8.38mm (44.1) LamiGlass (PVB)

as shown in Figure 5—2. This is expected to be sufficient in meeting the minimum acoustic requirements (R_w + C_{tr} 36 dB).

This glazing configuration has been provided as an indicative performance of the proposed glazing. Achievement of minimum, octave-band centre frequency sound reduction values is paramount to see that the internal noise criteria is achieved.

Table 5—1 Rooms considered in break-in calculations

Room	Parameters
 **North-East Elevation: Assisted Learning L02**	**IANL criteria:** L_{Aeq} 30 dB **Expected Façade Noise Level:** $L_{Aeq,T}$ 70 dB **Room dimensions**: 7.5m (d) x 7.5m (w) x 3.1m (h) **Reverberation time:** 0.4 s **Glazing area:** ~25% façade (12m^2) **Opaque element performance**: R_w+C_{tr} 42 dB
 **North-West Elevation: Prayer Room L02**	**IANL criteria:** L_{Aeq} 35 dB **Expected Façade Noise Level:** $L_{Aeq,T}$ 66 dB **Room dimensions**: 4.8m (d) x 2.3m (w) x 3.1m (h) **Reverberation time:** 1.0 s **Glazing area:** ~50% façade (8m^2) **Opaque element performance**: R_w+C_{tr} 42 dB
 **South-West Elevation: Open Plan Library L01**	**IANL criteria:** L_{Aeq} 40 dB **Expected Façade Noise Level:** $L_{Aeq,T}$ 64 dB **Room dimensions:** 7.6m (d) x 8.3m (w) x 3.1m (h) **Reverberation time:** 1.0 s **Glazing area:** 100% façade (49m^2)

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GUARDIAN GLASS

Acoustic Performance

Glazing Configuration

12.38mm (66.1) LamiGlass (PVB)

14mm Cavity

8.38mm (44.1) LamiGlass (PVB)

Sound Reduction Indices

Frequency, Hz / dB*						Rw	C	Ctr	OITC	STC
125	250	500	1000	2000	4000	40	0	-4	35	41
29	33	38	41	47	63					

*The values expressed in the frequency table correspond to the central values of the 1/3 octave band

Disclaimer: The acoustic performance data provided in the reports is based on a test protocol or an estimation and may be used if user actual glazing is identical to input data described herein. Acoustic performance data herein is only applicable for glazing dimensions 1,23 m x 1,48 m (as per testing standard). Estimation of acoustic performance is based on component-similarity assumptions which are derived from measured data and interpolation to expand the database of values from test protocols. Due to inherent variations in acoustic performance when testing in accordance with EN ISO 10140-3/EN ISO 10140-2, some variation in the calculated performance can also be expected. As such, the weighted performance, Rw, and adaptation terms, C and Ctr, should typically be considered to be accurate within ±2 dB. However, wider deviations can occur. Actual performance may vary according to the glazing dimensions, frame system, noise sources and many other parameters. The acoustic performance data herein should not be used as a substitute for tests of actual glazing. For more information, please consult Assumptions and Terminology section in Guardian Acoustic Assistant. By accessing this calculator, you agree not to alter or modify the generated report data and information, by any means. Any manual alteration will be your own responsibility and will annul all the content of the report.

Monday, September 1, 2025 | Acoustic database 20221229

Any alternative solution should be verified against the proposed octave-band performance values above and either meet or exceed the TL value at each of the listed frequency bands (125 Hz – 4000 Hz) as a minimum

Figure 5—2 Example specification of standard thermal double glazing (Source: Guardian Glass)

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5.7 Buro Happold Façade Proposal

It is understood that the Buro Happold Façade engineering team has developed an outline design for the opaque elements of the façade. The current proposed façade construction is understood to be predominantly a steel frame system (SFS) with two variations. One with a terracotta rainscreen cladding, as illustrated in Figure 5—3, and the other with a metal cladding.

The proposed build-ups are understood to consist of:

***Terracotta* (Figure 5—3)**	**Metal**
Façade package:	
• 40 mm ceramic tiles • 100 mm void with vertical support rail • 200 mm mineral wool insulation • 12 mm Cementitious board • 150 mm insulated SFS studs • Vapour Control Layer	• metal cladding (thickness TBC) • 100 mm void with vertical support rail • 150 mm mineral wool insulation • 12 mm Cementitious board • 150 mm insulated SFS studs • Vapour Control Layer
Internal dry lining package • Internal wall lining – assumed 1x12.5mm Wallboard	

The current build-up of the façade system and the internal lining is expected to achieve a performance in excess of the R_w+C_{tr} 42 dB assumed as part of the noise ingress calculation. Therefore, sufficient in providing suitable mitigation from noise break in.

5.8 Roof

It is understood that the proposed roof construction will consist of a 315 mm thick reinforced concrete slab. This is considered sufficient in mitigating external noise break in and will result in negligible rain noise.

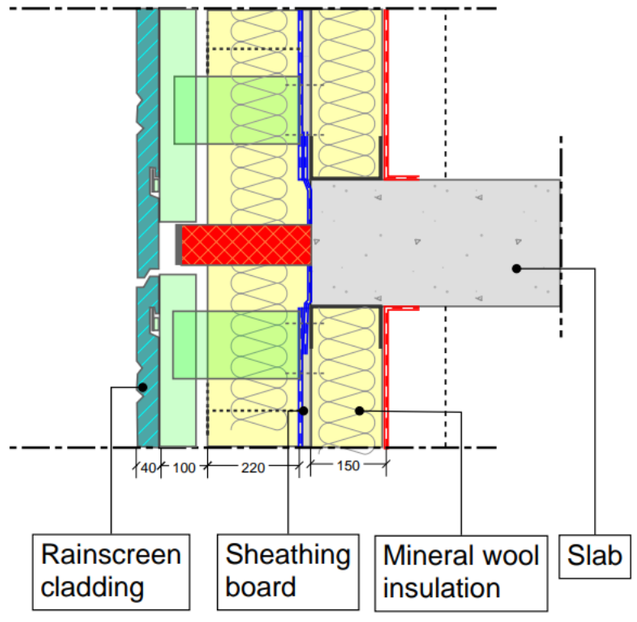


Figure 5—3 Example opaque construction – terracotta rainscreen (used for illustrative purposes, please refer to BH Facades for proposed build ups)

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6 Noise Break-out

6.1 Introduction

This section of the report provides limiting plant noise level targets. These target values are used as the design progresses to test the plant unit selections to see that suitable acoustic amenity can be maintained at existing Noise Sensitive Receptors (NSRs).

6.2 Relevant Criteria

Figure 6—1 and Figure 6—2 present limiting plant noise level criteria provided by Manchester City Council and BREEAM Pol 05, respectively.

Both sets of criteria refer to achieving a rating level ($L_{Ar,Tr}$ dB) in line with BS 4142:2014+A1:2019, 5 dB below the representative background sound level ($L_{A90,T}$ dB).

Based on the review, plant rating limits are set 5 dB below the representative background sound level.

Where the above limit is achieved, plant noise emissions should:

- Not cause barrier to development
- See that the Pol 05 credit is awarded to the scheme.

Noise and vibration from fixed plant / equipment

Noise from fixed plant, equipment or machinery can be very annoying and disruptive to people living nearby particularly where that item involved emits a noise with impulsive or tonal characteristics.

Many of the complaints Environmental Health receive about noise from plant, equipment and machinery specifically concern the character of the noise emitted. Any noise assessment needs to consider not only the overall level of noise emitted, but also its particular characteristics. 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 (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location'.

By designing the sound pressure level of any plant items to generate a noise impact of at least 5dB below the existing background level, any plant noise impact should be of a negligible level which should not give rise to complaints from users or occupiers of existing noise-sensitive usages. See Appendix A with regards to the expectation of how to calculate a 'typical' background level.

Past experience has shown that this criterion can be readily achieved. Where available, product specification data for new items should be submitted with the acoustic report. Consultants should be using these to compare with data from the noise survey and propose mitigation where the levels are above those specified in the criterion. Where this information is not available a consultant may choose to measure the noise, levels generated by the equipment in question where the equipment has already been installed elsewhere (and in accordance with BS 4142).

Where fixed plant, equipment or machinery is attached to a building the vibration caused by it can pass through the building structure and cause structure borne noise elsewhere in the building. Where it is to be installed in or on a building containing a noise sensitive use structure borne noise should be considered in the noise assessment and adequate control measures should be proposed. An example of where this would be required is where there is a proposal to install ventilation equipment on the roof of a residential apartment block or it could be an air source heat pump attached to the side of a building.

Figure 6—1 Manchester City Council limiting plant noise level criteria (Source: Manchester City Council - Planning and Noise Technical Guidance)

One credit

1 There are no noise-sensitive areas within the assessed building or within 800 m radius of the assessed site.

OR

2 Where there are noise-sensitive areas within the assessed building or noise-sensitive areas within 800 m radius of the assessed site, a noise impact assessment compliant with BS 4142:2014(218) is commissioned. Noise levels must be measured or determined for:

2.a Existing background noise levels:

2.a.i at the nearest or most exposed noise-sensitive development to the proposed assessed site

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2.a.ii including existing plant on a building, where the assessed development is an extension to the building

2.b Noise rating level from the assessed building.

3 The noise impact assessment must be carried out by a suitably qualified acoustic consultant.

4 The noise level from the assessed building, as measured in the locality of the nearest or most exposed noise-sensitive development, must be at least 5dB lower than the background noise throughout the day and night.

5 If the noise sources from the assessed building are 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 the criterion.

Figure 6—2 BREEAM Pol 05 Criteria

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6.3 Plant Noise Targets

Based on the background sound levels presented in Section 4, the rating plant noise targets have been set.

The limiting plant noise levels are presented in Table 6—1.

It should be noted that the background sound levels are based on:

- $L_{A90,1hour}$ dB during the daytime period
- $L_{A90,15minutes}$ dB during the night-time period.

Emergency plant limits are set at 10 dB above the night-time background noise level as shown in Figure 6—1.

6.4 Indicative Plant Proposals

Current proposals are for most plant to be contained on the rooftop, split between an external roof deck and internal plant room, as indicated in Figure 6—3.

The rooftop plant deck is understood to consist of the following items:

- 8 No. ASHPs for heating and cooling
- 8 No. CO2 pumps for hot water
- 12 No. DX Condenser Units.

It is understood that along the North elevation of the rooftop is a plant screen with 70% free area, and to the East and West elevations there are opaque glazed curtain walling ~6m tall.

It is proposed that the internal plant room is louvred on the south elevation, and will contain the following plant items:

- 3 No. AHUs for supply and return ventilation
- 1 No. AHU for WCs
- 1 No. Emergency Smoke Extract Fan
- 19 No. Pumps for heating, cooling and hot water.

6.4.1 Plant noise mitigation

Preliminary calculations have been undertaken to determine the expected plant noise levels at the nearest sensitive receptors to the East on Oxford Road.

The calculations suggest the cumulative noise level from the external rooftop plant and the internal plant room can meet the plant rating limits, given in Table 6—1, at the closest sensitive receptors.

These calculations are based on indicative selections, distance attenuation (shown in Figure 6—3), and the following mitigation measures put in place:

- Partial screening from the opaque screening to the East elevation of the external plant deck and relative building heights
- The cumulative noise level from all plant operating (day-to-day) in the internal plant room is attenuated such that the overall SPL in the plant room is ≤ $L_{Aeq,T}$ 70 dB
- Atmosphere side attenuators on air handling plant.

Table 6—1 Plant noise rating limits

Period	Background sound level $L_{A90,T}$ dB	Plant noise level limit $L_{Ar,Tr}$ dB	Emergency Plant limit $L_{Ar,Tr}$ dB
Daytime (07:00-23:00 hours)	51	≤ 46	≤ 60
Night-time (23:00-07:00 hours)	50	≤ 45	≤ 60

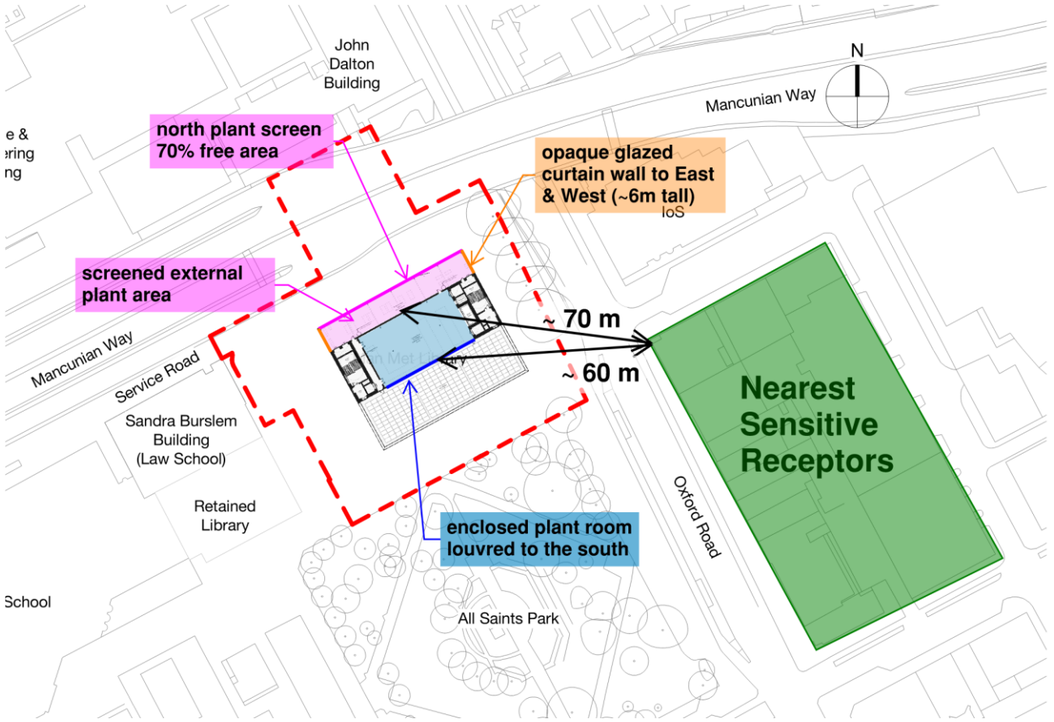


Figure 6—3 Roof level GA overlaid on landscape plan, indicating rooftop plant areas and noise sensitive receptors (source: Hawkins\Brown 1350B-HBA-SW-XX-DR-A-080010 and 1350B-HBA-XX-07-DR-A-080118)

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6.4.2 Emergency Plant

It is understood that the internal plant room on the roof contains an emergency smoke extract fan. To meet the emergency plant noise limits at the NSRs, allowances should be made for the following mitigation measures:

- Noise levels from all plant operating in the internal plant room including emergency plant (smoke extract) is attenuated such that the overall SPL in the plant room is ≤ $L_{Aeq,T}$ 90 dB
- To achieve the emergency plant targets, allowance should be made for an acoustic jacket for the smoke extract fan.

Allowances should be made for room-side attenuators on the smoke extract fan such that the noise level is ≤ $L_{Aeq,T}$ 65 dB to not mask the PAVA system in the event of an evacuation.

An emergency generator is proposed to be located externally to the north of the Library building on the ground floor. To meet the emergency plant limits at the NSR it is recommended that the cumulative level of the generator is designed to not exceed a SWL of 105 dBA. This includes allowances for an exhaust silencer, attenuation package to the unit itself and for suitably acoustically rated façade openings such as louvres and doorsets.

Buro Happold have been in discussion with Manchester Metropolitan University and understand that the emergency generator testing is proposed to be undertaken as follows:

- Testing between 09:00-15:00 hours
- Testing is to be undertaken every 6-months
- Weekly testing will be undertaken off load
- Testing will not be undertaken on weekends of Bank Holidays.

6.5 Summary

Based on indicative plant selections calculations suggest that the plant rating limits can be met. In order to meet the plant rating limits mitigation measures such as those set out in Sections 6.4.1 should be utilised. No penalties for tonality, impulsivity, or intermittency have been applied.

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7 Conclusions

It is concluded that the proposed development should be suitable in terms of internal acoustic conditions and in terms of the development's noise impact on sensitive receptors.

Environmental noise survey work was conducted to capture survey data on the various noise sources impacting the site.

The required sound insulation performance of external glazing and façade throughout the development has been calculated from noise levels captured during the noise survey model so that suitable internal conditions can be achieved in line with the pertinent guidance documents described in this document.

The report demonstrated that suitable internal noise levels can be attained within the development based on current façade proposals.

To limit noise break-out from the development (associated with building services plant noise), external noise level criteria are proposed.

Rating limits have been set to control the combined noise from building services to the following under different scenarios:

Where the site-wide plant is operating at typical duty:

- $L_{Ar,Tr}$ 46 dB during daytime periods (07:00 – 23:00 hours)
- $L_{Ar,Tr}$ 45 dB during night-time periods (23:00 – 07:00 hours).

By designing to these Rating level targets, suitable acoustic conditions can be maintained at the surrounding noise-sensitive developments, in line with the pertinent criteria contained within this report.

Calculations based on preliminary plant selections have been undertaken to demonstrate compliance with the plant rating limits.

This noise impact assessment demonstrates that these targets are readily achievable and as such the scheme is considered to be in line with National, Regional and Local Planning Policy and criteria.

Based on the above, noise is not considered to form a barrier to development.

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