

INDIA HOUSE, MANCHESTER

Pre-Commencement Noise Impact Assessment

Prepared for: **The Guinness Partnership**

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1.0 Introduction

The Guinness Partnership (the Client) has commissioned SLR Consulting Ltd (SLR) to carry out a pre-commencement noise impact assessment for the approved ground floor residential re-development at India House, 75 Whitworth Street, Manchester, M1 6HB (the Site).

This assessment has been provided with respect to the Manchester City Council requirements of Condition 6 and Condition 7 of the decision notice dated 28th May 2021 (application reference 124656/FO/2019) in relation to building envelope sound insulation and building services mechanical noise impact.

Whilst reasonable effort has been made to make this report easily understandable, it is technical in nature. To assist the reader, a glossary of terminology is included in Appendix 01.

2.0 Site Description

The Site is located within the Grade II listed building India House on Manchester's Whitworth Street; the refurbishment of ground floor offices and basement will provide eight no. residential ground floor apartments and concierge facility; there are no external amenity areas intrinsic to the design.

The noise climate at the front of the Site has been described as dominated by local road traffic including regularly passing busses during the day and night-time periods. The sound climate at the rear of the building has been described as dominated (to a lesser extent) by road traffic from the surrounding network and intermittent rail traffic.

No significant commercial noise sources have been identified from the site survey; transportation noise has been noted as dominant during the day and night periods.

No entertainment venues have been identified in the immediate vicinity of the Site; it has been noted that the building façade sound insulation design will be dictated by dominant transportation noise sources during the day and night-time periods.

A whole-house mechanical ventilation strategy has been proposed for all self-contained apartments with a central heat recovery unit located within a protected area in the basement car park.

3.0 Planning Condition Criteria & Guidance

3.1 Manchester City Council

Manchester City Council (MCC) has stipulated Conditions 6 and 7 on the project in relation to noise, which have been reproduced below. Each condition is split into parts a) relating to the submission of a planning report in support of the scheme and b) pre-completion commissioning measurements and validation.

3.1.1 Planning Condition 6 (building envelope sound insulation)

Condition 6 of the decision notice has been reproduced in full below:

6) a) Before the development commences a scheme for acoustically insulating the proposed residential accommodation against noise from Whitworth Street shall be submitted to and approved in writing by the City Council as local planning authority. There may be other actual or potential sources of noise which require consideration on or near the site, including any local commercial/industrial premises. The approved noise insulation scheme shall be completed before any of the dwelling units are occupied. Noise survey data must include measurements taken during a rush-hour period and night time to determine the appropriate sound insulation measures necessary. The following noise criteria will be required to be achieved:

- Bedrooms (night time - 23.00 - 07.00) 30 dB LAeq (individual noise events shall not exceed 45 dB LAmax,F by more than 15 times)*
- Living Rooms (daytime - 07.00 - 23.00) 35 dB LAeq*
- Gardens and terraces (daytime) 55dB LAeq*

Additionally, where entertainment noise is a factor in the noise climate the sound insulation scheme shall be designed to achieve internal noise levels in the 63Hz and 125Hz octave centre frequency bands so as not to exceed (in habitable rooms) 47dB and 41dB, respectively.

b) Upon completion of the development and before any of the apartments are first occupied, a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall give the results of postcompletion testing to confirm that the required internal noise criteria is 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 noise criteria. The report and any necessary measures shall be approved in writing by the City Council as Local Planning Authority and the development shall be implemented in full in accordance with the approved details before the development is first occupied.

Reason - To ensure an acceptable development in the interests of residential amenity, pursuant to policy DM1 of the Core Strategy.

3.1.2 Planning Condition 7 (building services mechanical noise impact)

Condition 7 of the decision notice has been reproduced in full below:

7) Any 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.

Before development commences on any externally mounted plant, 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.

b) Upon completion of the development and before any of the external plant is first operational, a verification report will be required to validate that the work undertaken throughout the development conforms to the above noise criteria. The report shall give the results of post-completion testing to confirm that the proposed noise limits are being achieved once the plant and any mitigation measures have been installed. Any instances of non-conformity with the above criteria shall be detailed along with any measures required to ensure compliance. The report and any necessary measures shall be approved in writing by the City Council as Local Planning Authority and the development shall be implemented in full in accordance with the approved details before the plant is first brought into use.

Reason - To safeguard the amenities of the occupiers of nearby residential accommodation, pursuant to policies SP1 and DM1 of the Core Strategy.

3.2 British Standard BS 8233:2014

Condition 6 references noise limits in BS823:2014 Guidance on sound insulation and noise reduction for buildings is the provision of recommendations for the control of noise in and around buildings. Relevant sections of this guidance document are detailed below.

BS 8233:2014. The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table 3-1.

Table 3-1
BS 8233 internal ambient noise level guidelines

Activity	Location	07:00 – 23:00 L _{Aeq,16 hour} (dB)	23:00 – 07:00 L _{Aeq,8 hour} (dB)
Resting	Living Room	35	-
Dining	Dining Room/Area	40	-
Sleeping (daytime resting)	Bedroom	35	30

3.3 ProPG: Planning & Noise – Professional Practice Guidance

As BS 8233:2014 does not specify internal limits for maximum noise levels within bedrooms during the night-time, reference has been made to ProPG, which states:

‘For a reasonable standard in noise-sensitive rooms at night (e.g. bedrooms) individual noise events should not normally exceed 45 dB L_{AFmax} more than 10 times a night.’

It has been noted, however, that MCC Condition 6 requires that individual noise events do not normally exceed 45 dB L_{AFmax} more than 15 times a night.

3.4 British Standard BS 4142:2014 +A1:2019

Condition 7 references noise limits in accordance with the requirements of British Standard BS 4142:2014 +A1:2019 *Methods for Rating and Assessing Industrial and Commercial Sound* (BS 4142). Relevant sections of this guidance document are detailed below.

British Standard BS 4142:2014 +A1:2019 notably describes methods for rating and assessing sound of an industrial or commercial nature. It has been referenced where required in policy and guidance documents to assess the potential impact of sound of an industrial and/or commercial nature, at existing and proposed noise-sensitive receptor locations within the context of the existing sound environment.

In this assessment, industrial/commercial sources have been present on the Site with respect to proposed development emission, where the onus lies with the developer to mitigate any associated impacts arising from existing and proposed sources of commercial noise.

Certain acoustic features can increase the significance of impact from a comparison of the specific sound level to the background sound level where these features are likely to affect perception and response. Where such features are present at the assessment location, a character correction (or penalty) to the specific sound level is made to obtain the rating level. This can be approached from subjective, objective and reference methods.

- Tonality: A correction of 0 dB to + 6 dB for sound ranging from not tonal to prominently tonal.
- Impulsivity: A correction of up to + 9 dB can be applied for sound that is impulsive.
- Intermittency: A penalty of + 3 dB can be applied if on/off conditions are readily distinctive within the reference time interval over the period of the greatest amount of on-time.
- Other characteristics: A penalty of + 3 dB can be applied in the absence of all other defined characteristics, where the specific sound contains a distinctive feature in the residual acoustic environment.
- The rating sound level is equal to the specific sound level if there are no acoustic features present or expected to be present.

The significance of sound depends upon both the margin by which the rating level exceeds the background sound level and the context in which the sound occurs. An initial estimate of the impact of the specific sound is made by subtracting the measured background sound level from the rating level.

- Typically, the greater the difference, the greater the magnitude of the impact;
- 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; and
- 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. It is an indication that the specific sound source has a low impact, depending on the context.

BS 4142 has stipulated that context is important when assessing the impact of sound of a commercial and/or industrial nature. Amongst a range of advocated considerations, this can include mitigation, residual sound levels, location and absolute sound levels in the consideration of context.

The scope of BS 4142 recognises that human response to sound can be subjective as affected by many factors, both acoustic and non-acoustic. The significance of its impact can depend on various factors such as the exceedance to the background level, its absolute level, time of day and change in environment, as well as local attitudes to the source of sound and character of the neighbourhood.

4.0 Environmental Sound Survey

SLR has carried out a baseline sound survey at the site between Friday 7th June and Monday 10th June 2019 as part of the planning stage acoustic assessment (report reference “416.05769.00007 India House, Manchester - Acoustic Design Report”. dated July 2019). The results of the sound survey have been summarised in this section and detailed in Appendix 02.

4.1 Soundscape and Context

Two measurement positions P1 and P2 were chosen at the front and rear of the building respectively. The following observations have been made as witnessed from the site survey visit:

- P1 (front) – noise predominantly from continuous road traffic along Whitmore Street, with regular peak levels noted attributable to bus movements (a bus stop has been noted directly outside India House).
- P2 (rear) – road traffic noise has been observed as dominant with intermittent noise from the railway line to the south (with ‘screeching’ track noise and train horns audible) and vehicle movements associated with the adjacent car park to the south. Intermittent construction noise has also been noted, associated with high-rise construction south of the railway.

4.2 Survey Summary

4.2.1 Position P1 (front)

A summary of the measured noise levels from monitoring location P1 has been provided in the tables below. A time-history chart showing the full survey duration has been given in Appendix 02 Figure 02-3.

Table 4-1
Summary of measured noise levels at monitoring location P1, dB

Time period	Logarithmic average $L_{Aeq,T}$	10 th highest L_{AFmax}	Modal L_{A90}	Median L_{A10}
Daytime (07:00 – 23:00) T = 16-hours				
Friday 7 th June; 13:30 - 22:59	71	89	62	74
Saturday 8 th June; 07:00 - 22:59	71	90	59	74
Sunday 9 th June; 07:00 - 22:59	71	89	58	73
Monday 10 th June; 07:00 - 13:05	70	88	61	73
Night-time (23:00 – 07:00) T = 8-hours				
Friday 7 th June / Saturday 8 th June; 23:00 – 07:00	69	86	55	72
Saturday 8 th June / Sunday 9 th June; 23:00 - 07:00	69	87	60	72
Sunday 9 th June / Monday 10 th June; 23:00 - 07:00	68	86	51	72

4.2.2 Position P2 (rear)

An attended survey was carried out at P2 to the rear in 5-minute periods between 11:55 and 13:05 on Monday 10th June 2019; a summary of the measured noise levels has been provided in the tables below.

Table 4-2
Summary of attended measured noise levels at P2, dB

Time Period	L _{Aeq,5min}	L _{AFmax,5min}	L _{A90,5min}	L _{A10,5min}
11:55 – 12:00	62	76	57	65
12:00 – 12:05	63	78	57	62
12:05 – 12:10	63	80	57	64
12:10 – 12:15	62	79	57	63
12:15 – 12:20	61	80	56	62
12:20 – 12:25	61	75	56	64
12:25 – 12:30	60	74	57	62
12:30 – 12:35	62	81	58	64
12:35 – 12:40	65	84	58	67
12:40 – 12:45	63	77	58	65
12:45 – 12:50	63	84	58	66
12:50 – 12:55	62	80	57	64
12:55 – 13:00	61	77	57	63
13:00 – 13:05	62	64	60	63

5.0 Assessment: Condition 6

Where the existing external walls are of solid thick masonry construction, the overall sound insulation performance of the building envelope will be dictated by the acoustic specification of the glazing.

An acoustic mark-up showing the minimum required glazing specifications has been given in Appendix 03, relating to the specification Table 5-1 below.

Where existing windows of the Grade II listed building will be retained/restored, a design strategy to install secondary glazing has been established as part of a whole-house mechanical ventilation strategy.

The proposed glazing specification has been based on existing double-glazed units and a secondary pane as described in the table below and illustrated in Appendix 04. An indicative alternative Option 2 has also been given based on a new window system, calculated in Appendix 03 Figure 03-1.

Table 5-1
Simplified sound reduction indices for glazing.

Facade	Minimum Glazing Rating	Existing Glazing Rating*	Upgrade Option 1 Secondary Glazing	Upgrade Option 2 New Glazing
Northwest facade (facing Whitmore Street)	41 dB $R_w + C_{tr}$	≈27 dB $R_w + C_{tr}$	10.8mm laminated glass 100mm void Existing glazing	See Table 03-1 in Appendix 03.
Southwest façade (facing the adjacent building and access road)	37 dB $R_w + C_{tr}$		6mm glass 100mm void Existing glazing	
Southeast façade (facing the railway line and car park)	34 dB $R_w + C_{tr}$		6mm glass 70mm void Existing glazing	
<u>NOTES:</u> * The performance of the existing glazing is based upon an estimated 4/6/4 configuration. There are however some rooms on the ground floor facing Whitmore Street that already have secondary glazing installed.				

The above glazing specification has been based on noise break-in calculations including the 10th highest regularly occurring $L_{Amax(F)}$ level. This represents a robust assessment where planning Condition 6 stipulates a less-onerous requirement to use the 15th-highest maxima level.

No industrial noise sources have been identified as significant to the assessment, where dominant transportation noise has been considered as dominant and dictating the acoustic design of the façade.

Condition 6 stipulates a requirement to protect against entertainment sources at low frequency:

“Where entertainment noise is a factor in the noise climate the sound insulation scheme shall be designed to achieve internal noise levels in the 63Hz and 125Hz octave centre frequency bands so as not to exceed (in habitable rooms) 47dB and 41dB, respectively.”

No entertainment noise sources have been identified in the immediate vicinity of the Site. It has been considered that the façade design and glazing specification is robust, where significant (dominant) transportation noise has been mitigated with the glazing specifications and ventilation strategy proposed.

6.0 Assessment: Condition 7

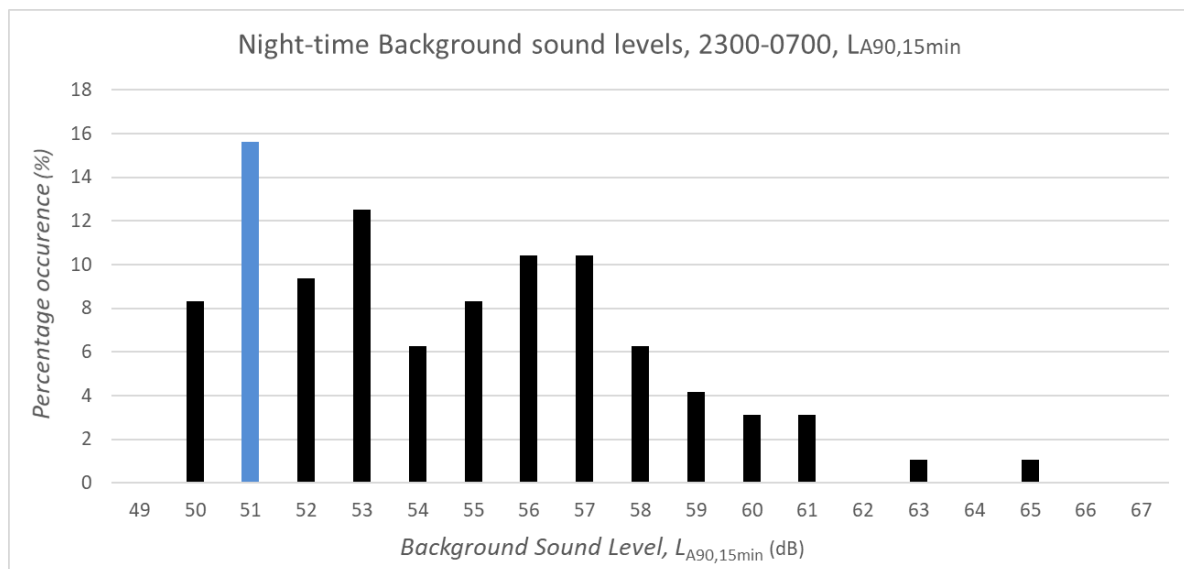
6.1 Building Services Plant Noise Limits

Condition 7 describes the requirement for external building services plant emissions to achieve a rating level of 5 dB ($L_{Aeq,T}$) below the typical background sound level at the nearest noise sensitive location.

Plant emissions limits at the nearest identified noise sensitive receptor have been established from the baseline noise survey summarised in Section 4 of this report. Where building services plant will potentially operate 24/7, the night-time period has been considered for a worst-case assessment.

A histogram of background sound levels measured during the night-time period is shown below where a representative background sound level of 51 dB L_{A90} has been determined from the distribution of measured noise levels.

Figure 6-1
Histogram – Measured Night-time Background Sound Levels, Whitworth St



Based on the Condition 7 requirement for noise emissions, a noise limit of ≤ 46 dB $L_{Aeq,Tr}$ has been established at the nearest noise sensitive location.

6.2 Mechanical Building Services Design Strategy

The mechanical design describes a central heat recovery unit that will providing continuous supply and extract ventilation to each apartment with the unit located within a protected area in the basement car park, level B1.

Inlet and exhaust terminals have been noted to discharge to the rear of the building behind the existing bars to car park ventilation openings (see mechanical services layout drawing, Appendix 05). Galvanised, insulated, supply and extract ducts shall be routed through the car park at high level and rise into each apartment complete with smoke dampers where they pass through the floor slab, linked to the buildings fire alarm system.

Purge ventilation shall be achieved via mechanical extract fans (1 No. per property), also located in the basement car park area, level B1. These fans are sized to achieve four air changes per hour and shall be operated independently by the occupant, as required, via a switch labelled 'Purge Ventilation'. It is proposed that these fans will discharge directly into the naturally ventilated car park (see mechanical services layout drawing, Appendix 05).

6.3 Building Services Plant Assessment

The following building services plant selection has been considered:

- Heat Recovery Unit HRU 1 – Nuair XBC25 and proprietary silencers
- Extract Fans EF 1-8 – Nuair 'DAVE' DE2 extract fan units ducting centrally to car park naturally ventilated area (will be negligible)
- AC Condenser Mitsubishi DX

The mechanical services layout has been provided in Appendix 05 including sound power data for the HRU and extract fans.

The nearest noise sensitive location has been identified as:

- Nearest first-floor residential window relative to the HRU 1 intake/discharge termination louvre, on the rear façade at basement level, nominally 6 m distance.

The extract fans DE2 are low-noise devices within each apartment and ducted to terminate within the car park basement and will therefore have negligible impact at the identified assessment receptor location. The HRU casing and any condenser plant, housed within the basement car park, has also been considered to have negligible impact at the assessment location.

The HRU 1 intake and discharge ducts (diameters 250 mm) have been noted to terminate via a single 500 x 400 louvre on the rear façade at basement level (annotated in Appendix 05). Where proprietary atmosphere silencers are installed in the ductwork, the noise emissions at the nearest residential window have been predicted to be significantly below the required rating level at the receptor location.

7.0 Conclusions

Minimum acoustic glazing specifications have been established from the site survey and noise break-in calculations, with respect to the requirements of Condition 6. The proposed glazing specifications given in Appendix 04 have been reviewed against the requirements of planning Condition 6 as suitable.

Mechanical building services plant has been reviewed with respect to the requirements of planning Condition 7. Noise emission limits have been established from the site survey and conditional requirements; it has been shown that the noise emissions will be suitably controlled based on the scheme design shown in Appendix 05 and including atmosphere-side propriety in-duct silencers.

8.0 Further Work

Parts b) of conditions 6 and 7 requires post-completion validation work to discharge the conditions.

Condition 6 b) requires post-completion testing to validate compliance with the internal ambient noise level criteria. This forms future works as part of SLR's scope of works.

Condition 7 b) requires a post-completion validation report to show that the plant noise emissions have been suitably controlled and the planning condition limits met. This can be carried out as future works as part of SLR's scope of works. Where it may not be practical to measure noise emissions at the receptor location or quantify the emissions levels in the ambient sound climate, verification may need to be based on visual inspection and/or comparative measurements and subjective evaluation.

APPENDIX 01

Glossary of Terminology

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table 01-1
Sound Levels Commonly Found in the Environment

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

Acoustic Terminology

dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2×10^{-5} Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
L_{Aeq}	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{10} & L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.

APPENDIX 02

Baseline Survey Details

Figure 02-1
Aerial view of the existing site and the immediate surrounding area, including the baseline sound survey monitoring positions



Figure 02-2
Photographs of the monitoring positions for the baseline sound survey

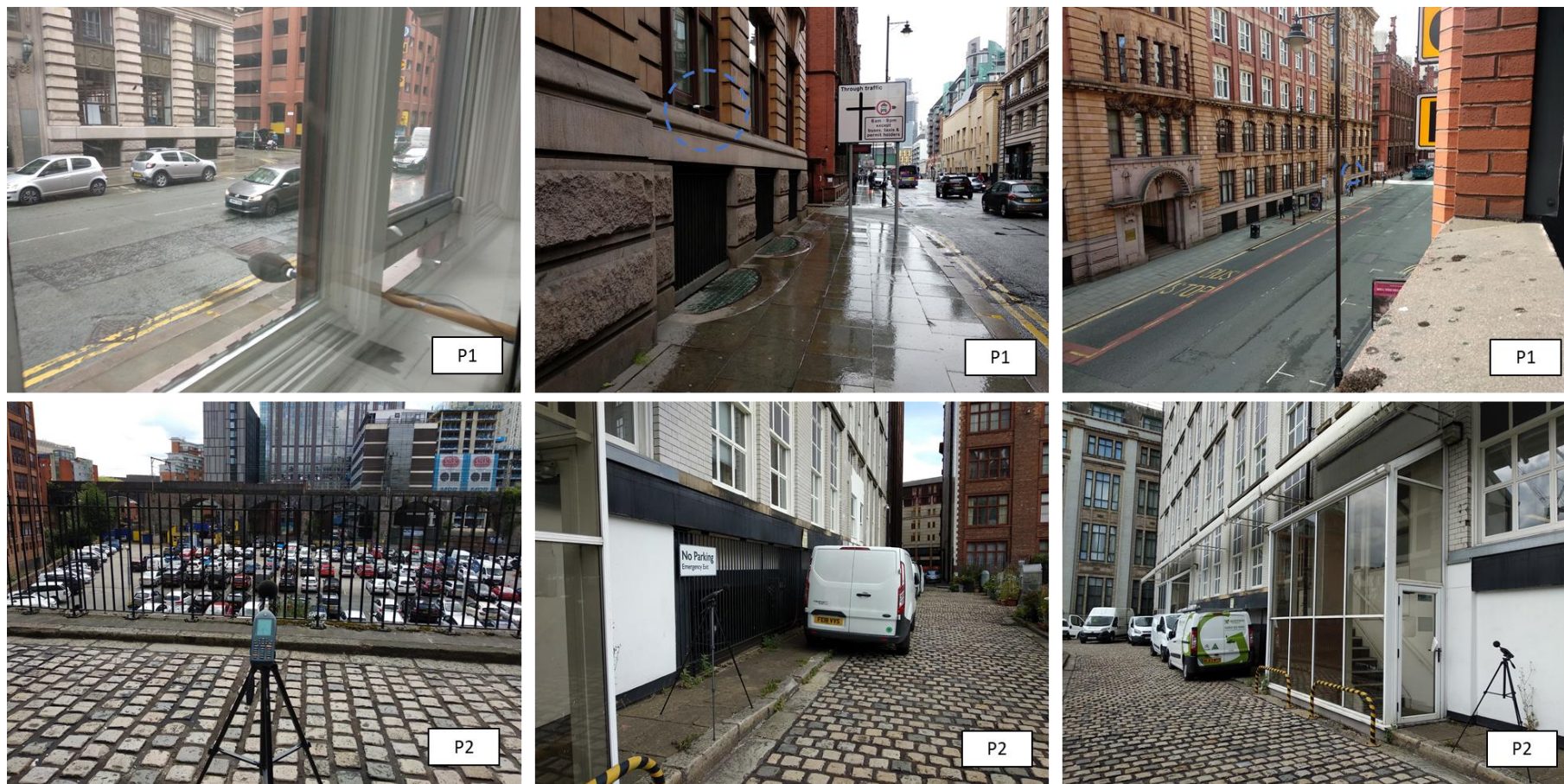


Figure 02-3
Graph of measured noise levels from the baseline sound survey at monitoring position P1

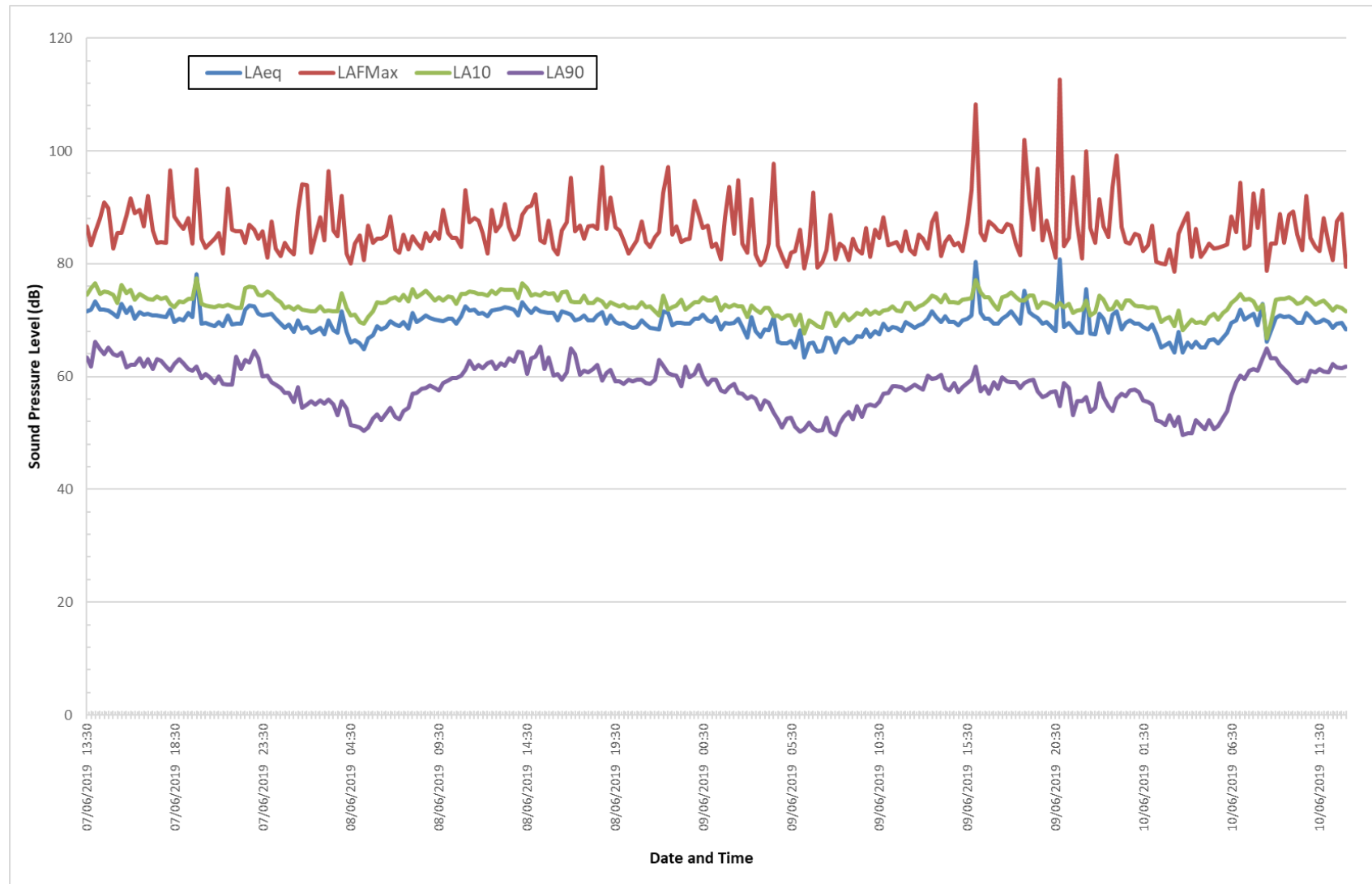
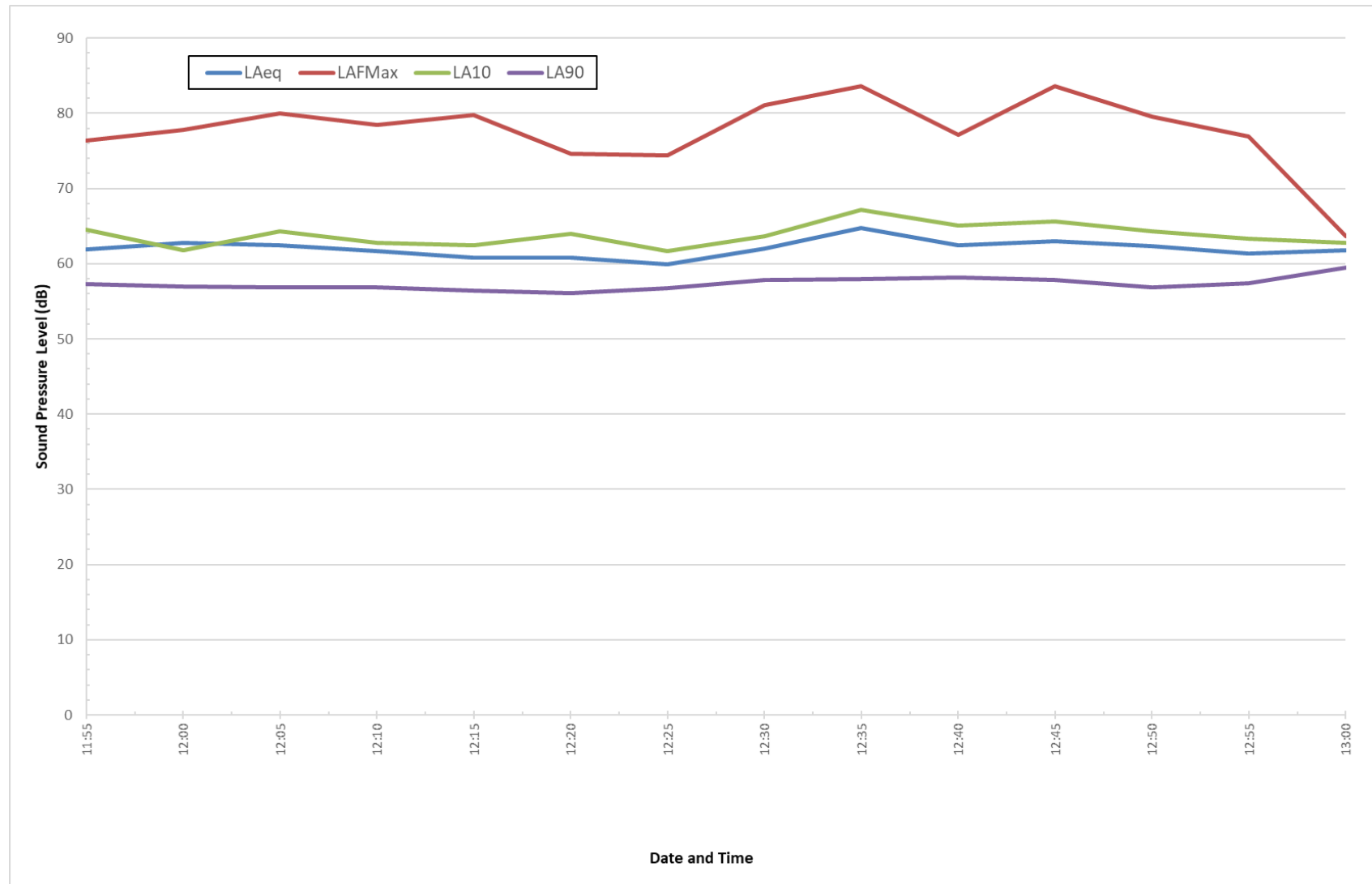
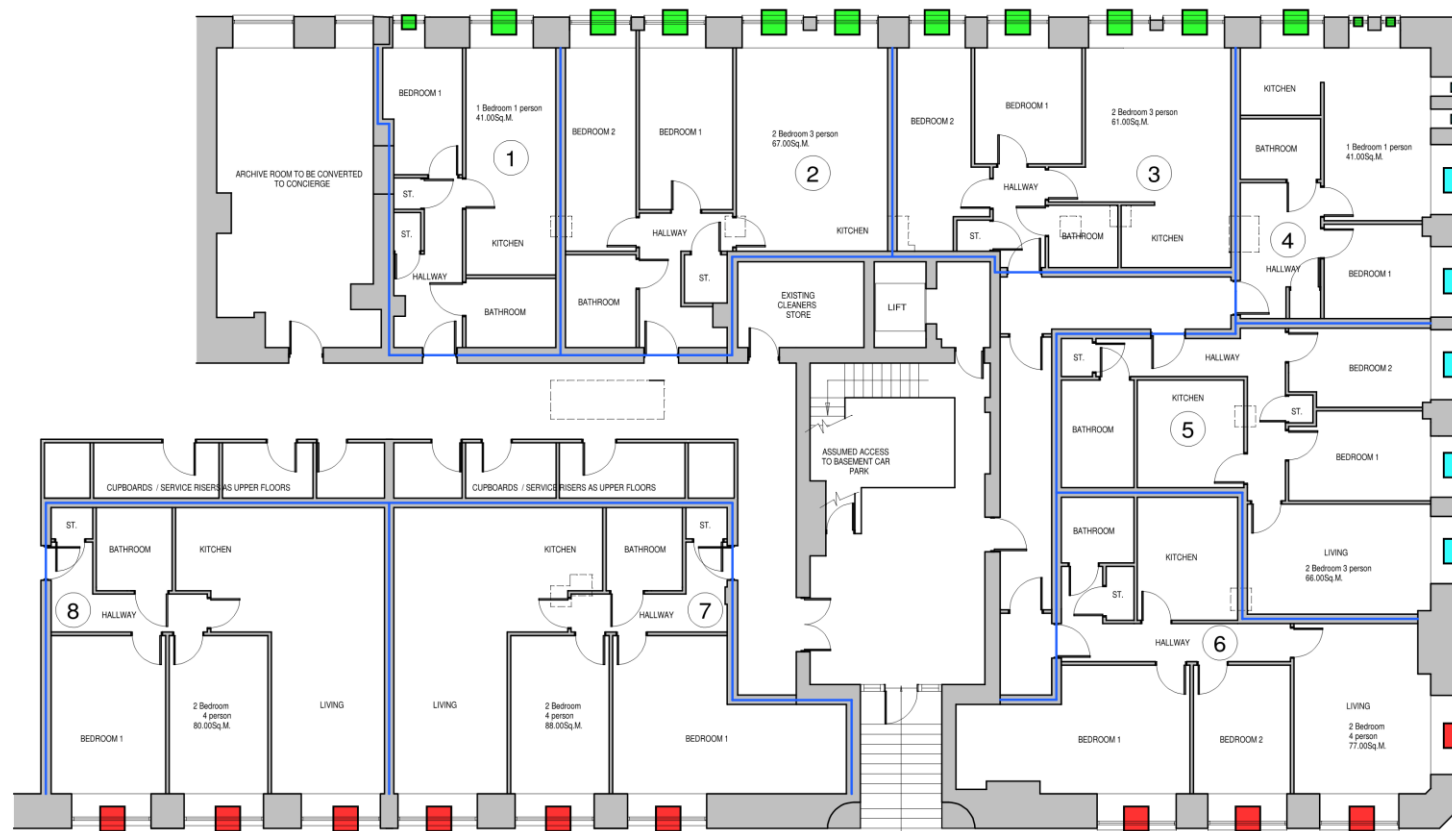


Figure 02-4
Graph of measured noise levels from the baseline sound survey at monitoring position P2



APPENDIX 03

Façade Sound Reduction



LEGEND

GLAZING

34 dB $R_w + C_{tr}$

37 dB $R_w + C_{tr}$

41 dB $R_w + C_{tr}$

NOTES

Glazing that is not coloured have no specific acoustic requirement, unless commented upon.

This drawing refers to the sound insulation of the façade only, it does not cover the internal sound insulation of walls and doors.

The R_w is the weighted sound reduction index of an element, measured under laboratory conditions.

The C_{tr} is a low frequency noise correction. This is a negative number so that an $R_w + C_{tr}$ value is always lower than the R_w .

The $R_w + C_{tr}$ value is the equivalent of an $R_{w,eq}$ value, as the C_{tr} is a low frequency correction often applied to traffic noise.

Refer to the Acoustic Design Report for design targets for internal sound insulation across walls and floors, indoor ambient noise levels and room acoustics/reverberation time.



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Project
INDIA HOUSE

Drawing Title
**FAÇADE SOUND INSULATION RATINGS
GROUND FLOOR**

Scale
DO NOT SCALE

Date
JULY 2019

Drawing Number
416.05769.00007 - FSI001

Revision
0

Comments

Figure 03-1

Façade noise break-in calculation based upon a small bedroom fronting on to Whitmore Street.

BS 8233:2014 Façade Noise Break In Calculation

SLR

Room

Room / Elevation / Exposure Level

Bedroom 2 - Flat 6

Development

India House, Manchester

Volume

31 m³

RT

0.5

0.5

0.5

0.5

0.5

0.5

0.5

A = 0.161V / RT

30.0

30.0

30.0

30.0

30.0

30.0

30.0

External Noise Level

Safety Factor

Façade Level Type

Free Field Correction

+3 dB

L2m

-3 dB

+3 dB

L2m

-3 dB

+3 dB

L2m

-3 dB

(usually 3 dB)

Noise Level at Façade

63 Hz

125 Hz

250 Hz

500 Hz

1 kHz

2 kHz

4 kHz

dB(A)

Leq16hour (day)

78.0

70.1

69.3

65.3

66.4

63.9

58.6

70.7

Leq8hour (night)

74.0

66.9

66.1

63.2

65.1

62.4

57.4

69.0

Lmax10th highest (night)

97.0

86.3

83.3

82.7

86.3

82.1

75.1

89.2

Façade

Total Façade Area

8 m²

10*log(S/A)

-0.8

-0.8

-0.8

-0.8

-0.8

-0.8

-0.8

63 Hz

125 Hz

250 Hz

500 Hz

1 kHz

2 kHz

4 kHz

dB(A)

%

External Wall

Area

3.8 m²

2x100mm block-50mm gap+plaster
Rw(Ctr) 55(-3)

R

48.0

47.0

45.0

49.0

57.0

67.0

74.0

10Log(((S/Stat)))*(10^(-R/10)))

-51.4

-50.4

-48.4

-52.4

-60.4

-70.4

-77.4

Predicted noise level in room - Leq16hour (day)

25.8

18.9

20.1

12.1

5.2

-7.3

-19.6

14.5

Predicted noise level in room - Leq8hour (night)

21.8

15.7

16.9

10.0

3.9

-8.8

-20.8

11.9

Predicted noise level in room - Lmax10th highest (night)

44.8

35.1

34.1

29.5

25.1

10.9

-3.1

31.1

6%

7%

5%

Glazing

Area

4.6 m²

16.8/(6to20)/6.8 Pilkington Optiphon
Rw(Ctr) 47(-6)

R

26.0

29.0

40.0

45.0

47.0

54.0

68.0

10Log(((S/Stat)))*(10^(-R/10)))

-28.7

-31.7

-42.7

-47.7

-49.7

-56.7

-70.7

Predicted noise level in room - Leq16hour (day)

48.6

37.7

25.9

16.9

16.0

6.5

-12.8

26.4

Predicted noise level in room - Leq8hour (night)

44.6

34.5

22.7

14.8

14.7

5.0

-14.0

23.2

Predicted noise level in room - Lmax10th highest (night)

67.6

53.9

39.9

34.3

35.9

24.7

3.7

44.3

93%

93%

98%

Predicted Noise Levels in Room

Combined Noise Levels - Leq16hour (day)

48.6

37.7

26.9

18.1

16.3

6.7

-12.0

26.7

<= 35

Pass

Combined Noise Levels - Leq8hour (night)

44.6

34.5

23.7

16.0

15.0

5.2

-13.2

23.5

<= 30

Pass

Combined Noise Levels - Lmax10th highest (night)

67.6

53.9

40.9

35.5

36.2

24.9

4.5

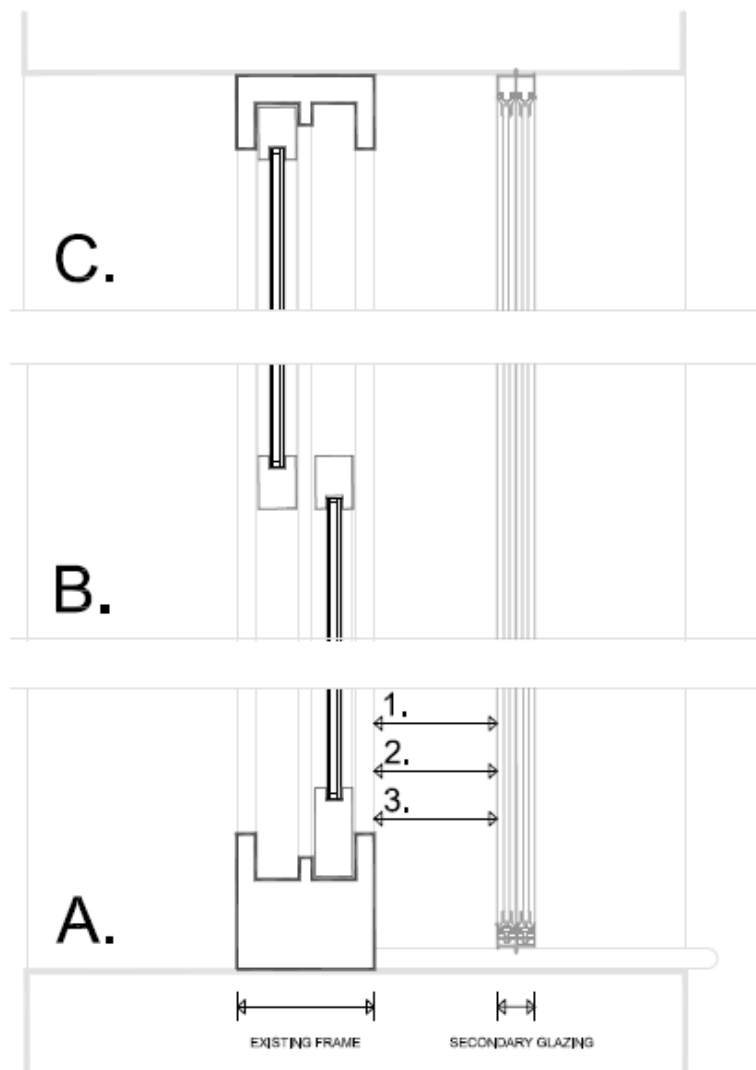
44.4

<= 45

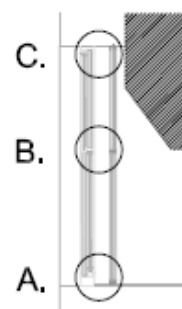
Pass

APPENDIX 04

Glazing Specification



TYPICAL SECTION.



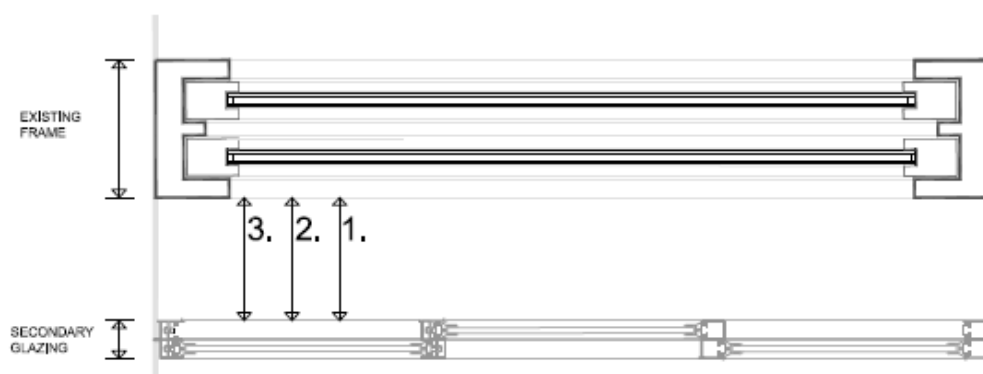
KEY SECTION.

LEGEND.

1. 70mm void between existing frame and secondary glazing frame and glazed with 6mm glazing
Window nos. 18 - 30 Inc.
2. 100mm void between existing frame and secondary glazing frame and glazed with 10.8mm laminated glass.
Window nos. 1 - 10 Inc.
3. 100mm void between existing frame and secondary glazing frame and glazed with 6mm glass.
Window nos. 11 - 17 Inc.

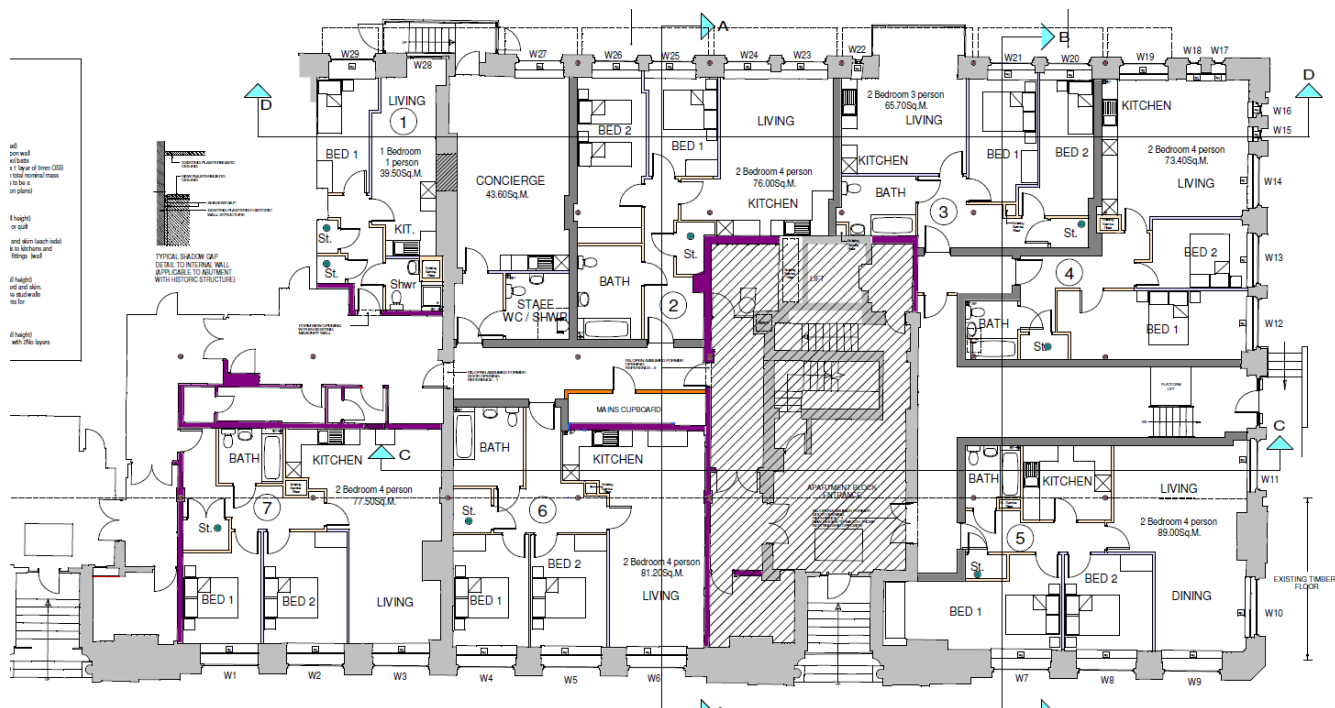
NOTES.

New secondary glazing units in positions shown (1, 2 and 3) are to be slimline aluminium sections specifically designed for Listed building windows, Conservation areas and Heritage properties by Granada Aluminium Secondary Glazing or similar approved.



TYPICAL PLAN.

nicol thomas



APPENDIX 05

Mechanical Services





XBC25 HORIZONTAL HEAT EXCHANGE UNITS PERFORMANCE & TECHNICAL INFORMATION

XBC25 FAN - SOUND DATA

Fan Speed	Sound Power Levels		Frequency (Hz)							Spherical dBA@3m	Fan Speed	External Static Pressure (Pa)								Spherical dBA@3m
	(dB re 1 pW)	63	125	250	500	1000	2000	4000	8000			63	125	250	500	1000	2000	4000	8000	
100%	Induct Intake	77	71	69	71	66	62	54	53	37	50%	63	57	55	57	52	48	40	39	23
	Induct Supply	82	83	78	82	72	72	68	70			68	69	64	68	58	58	54	56	
	Induct Discharge	83	84	78	81	72	72	70	71			69	70	64	67	58	58	56	57	
	Induct Extract	76	70	68	71	65	62	54	54			62	56	54	57	51	48	40	40	
	Casing Radiated	69	68	55	58	45	44	44	36			55	54	41	44	31	30	30	22	
75%	Induct Intake	71	65	63	65	60	56	48	47	31	25%	48	42	40	42	37	33	25	24	< 20
	Induct Supply	76	77	72	76	66	66	62	64			53	54	49	53	43	43	39	41	
	Induct Discharge	77	78	72	75	66	66	64	65			54	55	49	52	43	43	41	42	
	Induct Extract	70	64	62	65	59	56	48	48			47	41	39	42	36	33	25	25	
	Casing Radiated	63	62	49	52	39	38	38	30			40	39	26	29	< 20	< 20	< 20	< 20	

*Casing Radiated (Breakout).

ATTENUATOR DIMENSIONS (mm), DYNAMIC INSERTION LOSS (dB) & WEIGHTS (kg)

Attenuator Code	Attenuator Dimensions			Air path	Dynamic Insertion Loss (dB)								Attenuator Weight (kg)	Packed Weight (kg)
	Length	Width	Height		63	125	250	500	1000	2000	4000	8000		
XBC25-HS-MS10	1050	481	298	S / D	5	8	15	30	41	31	21	16	42	47
XBC25-HE-MS10	1050	262	298	I / E	4	4	10	22	26	15	10	8	33	36
XBC25-HS-MS12	1250	481	298	S / D	7	10	18	36	51	39	26	20	51	56
XBC25-HE-MS12	1250	262	298	I / E	5	6	12	27	34	20	13	9	40	43
XBC25-HS-MS16	1600	481	298	S / D	9	13	23	42	55	49	32	25	64	69
XBC25-HE-MS16	1600	262	298	I / E	6	8	15	33	43	25	15	11	50	53

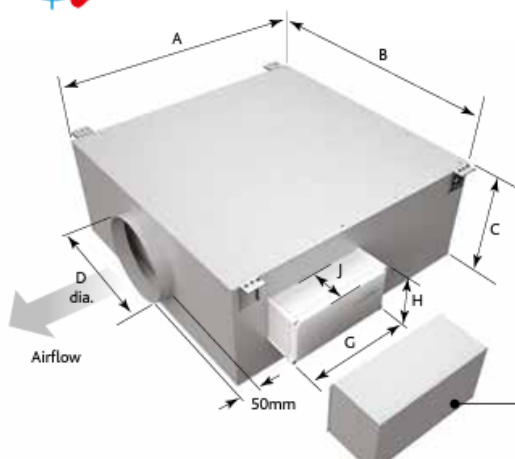
S / D = Supply / Discharge I / E = Intake / Extract. Coding: The S / D denotes the type of silencer required for the supply or discharge. The I / E denotes the type of silencer required for the extract or fresh air intake on the unit. All XBC matched silencers are double skinned.

EXTRACT FAN SIZE DE2 - SOUND DATA

Unit Code		Sound Power Levels dB re 1pW								Breakout dBA		LwA	Breakout dBA		Breakout dBA
		63	125	250	500	1K	2K	4K	8K	@ 100% @ 3m	@ 75% @ 3m		@ 50% @ 3m		
DE2-ES	Induct Inlet	70	66	61	59	55	53	54	52	24	62	18	<16		
	Induct Outlet	74	67	67	59	57	58	54	54		65				
	Breakout	56	50	47	42	37	36	34	30		45				
DE2A-ES	Induct Inlet	70	62	58	47	42	43	45	43	21	54	<16	<16		
	Induct Outlet	78	78	61	57	57	58	54	54		66				
	Breakout	58	53	43	35	35	31	30	26		42				



DAVE Extract units -
360° mounting



EXTRACT FAN SIZE DE2 - DIMENSIONS (mm)

Unit Code	Ecosmart control						
	A	B	C	D (Dia)	G	H	J
DE2-ES	605	696	300	200	370	150	100
DE2A-ES	1005	696	300	200	370	150	100

Access for Maintenance: Allow 300mm either above or below the unit.

For control box access allow a minimum clearance of 600mm from a wall or barrier.

Removable weatherproof control cover (if required).
Dimensions: 470mm wide x 173mm high x 120mm deep.

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