
17 Shudehill, Manchester

Environmental Noise Assessment Report

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Prepared by: BDP Acoustics
11 Ducie Street
PO Box 85
Piccadilly Basin
Manchester
M60 3JA



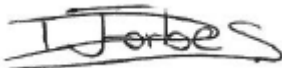


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Report written by:

D. Forbes BEng (Hons) AMIOA
Assistant Acoustic Consultant



Report checked by:

A. Taylor BSc (Hons) MAES MIOA
Senior Acoustic Consultant



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1. Introduction

BDP Acoustics has been appointed by Outlooks Property to undertake an environmental noise assessment for a proposed residential development at 17 Shudehill, Manchester (referred to as “the Project” and “the site” throughout this report).

The Project consists of the conversion of an existing vacated 2-storey residential apartment into 2 separate residential apartments. The site is located on the first and second floors of 17 Shudehill, Manchester.

The current neighbouring properties adjoined to the site building are understood to be:

- Commercial premises ‘Phone&Vape 4U’ on the ground floor of the development building;
- ‘The Washhouse’ bar located at 19 Shudehill, Manchester;
- Residential properties located at 15 Shudehill, Manchester.

Figure 1 presents the location plan for the site.

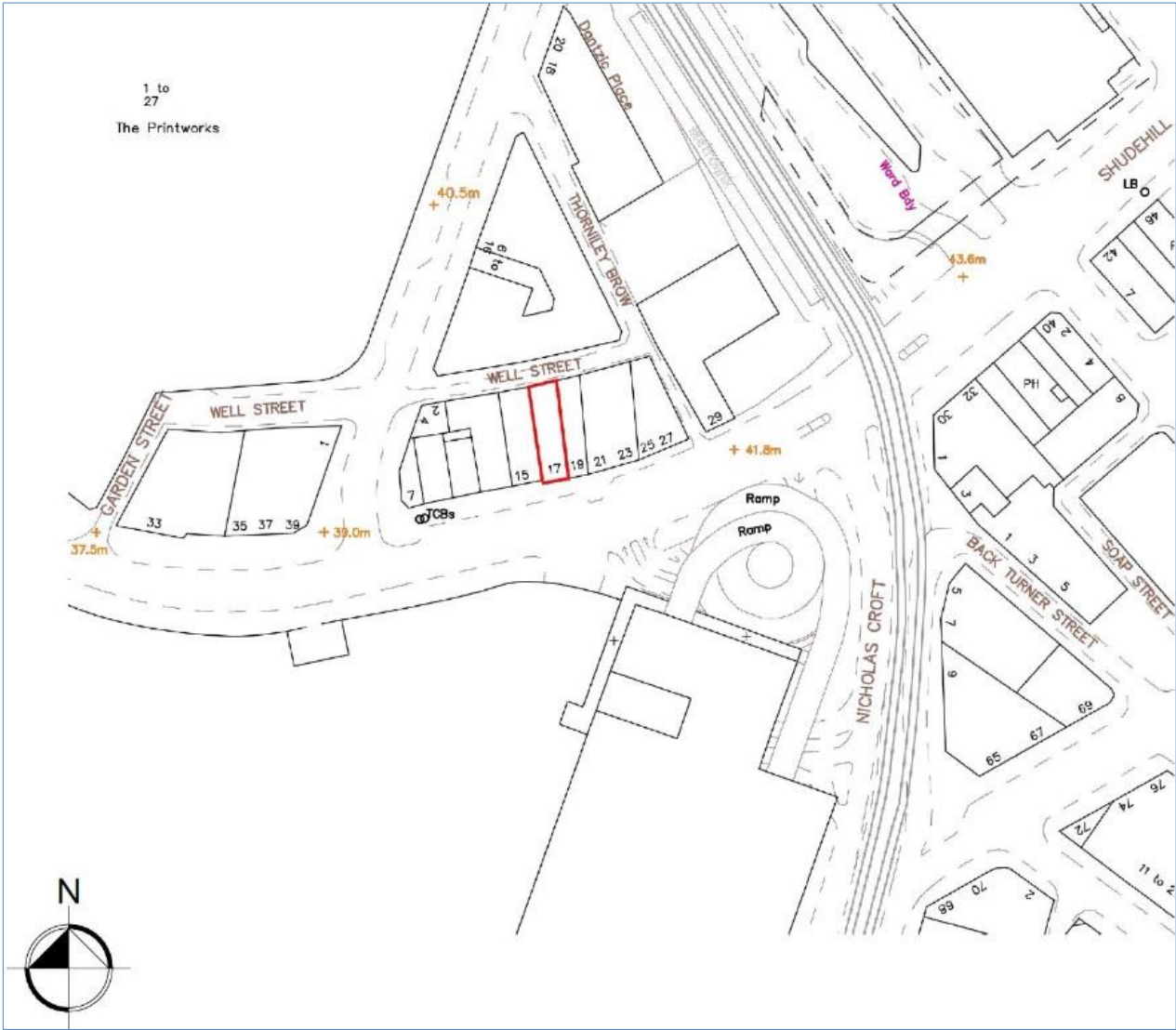
This report details the assessment undertaken and consists of the following:

- Review of current planning guidance and acoustic standards related to the Project;
- Proposed acoustic design criteria based on the relevant standards;
- Information on the environmental noise surveys undertaken;
- Recommendations for building envelope sound insulation specifications for the Project;

- Recommendations for sound insulation specifications between the Project and neighbouring properties;
- Recommendations regarding external noise limits for any fixed plant installations associated with the Project at nearest noise sensitive receptor properties, based on Local Planning Authority requirements.

A glossary of acoustic terms is presented in Appendix I – Glossary of Acoustic Terms.

Figure 1: Location plan for the site provided to BDP Acoustics by Civitas Planning Ltd



2. Relevant Standards and Guidance

The following documents have been considered when developing the report assessment criteria.

2.1 Noise Policy Statement for England (NPSE)

The NPSE provides guidance on the management of noise from sustainable development. The statement sets out three key aims in paragraph 1.7:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impact on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life.”*

2.2 Planning Practice Guidance – Noise (PPGN)

PPGN offers clarity on NPSE and states the following, under the heading “How to determine the noise impact”:

“Local planning authorities’ plan-making and decision taking 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; and*
- *Whether or not a good standard of amenity can be achieved.”*

2.3 National Planning Policy Framework (NPPF)

The NPPF sets out the Government’s planning policies for England and how these are expected to be applied. It replaces a number of previous planning policy documents, including Planning Policy Guidance 24: Planning and Noise (PPG 24). Unlike PPG24 which it replaced, NPPF does not contain any methodology for objective assessment. The relevant Local Planning Authority must therefore consider the suitability of any proposed scheme themselves, based on evidence such as this environmental noise assessment report.

2.4 BS 8233: 2014 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’

This code of practice recommends suitable acoustic rating criteria for various indoor environments and uses. BS 8233 recommends levels for overall noise design of a building based on existing guidelines issued by the World Health Organisation (WHO) in 1999, for areas where a controlled acoustic environment is necessary. The following criteria for unoccupied bedrooms, living rooms and dining rooms are stated as desirable.

Table 1: BS 8233:2014, ‘Recommended internal ambient noise levels for dwellings’

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

2.5 BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

This edition of BS4142 was prepared under the direction of the Health and Environment Sector Board. The general basis for the standard is derived from the application of previous editions, together with accumulated experience. Some aspects, including guidance on character corrections, are based upon research which has been reported since publication of the previous edition of this standard.

2.6 Local Planning Authority (LPA)

2.6.1 Manchester City Council 'Planning & Noise Technical Guidance' December 2015

Advice has been sought from Manchester City Council (MCC) in regards to suitable noise level criteria and assessment methodology for internal noise levels within, and noise egress from, the proposed development. The recommendations detailed in the following sections are referenced from MCC's 'Planning & Noise Technical Guidance (December 2015)' document and agreed as suitable by Sue Jones, the LPA's Environmental Health Officer (EHO).

2.6.1.1 Internal noise levels

MCC give guidance in relation to internal noise levels within new developments within sections 3.6.1.1 and 3.6.1.2 of their 'Planning & Noise Technical Guidance (December 2015)' document. Section 3.6.1.1 states the following in relation to internal noise limits for residential properties:

"Manchester City Council has adopted the following internal noise limits for residential properties:

- Bedrooms (night time - 23.00 - 07.00) 30 dB L_{Aeq} (individual noise events should not normally exceed 45 dB $L_{Amax,F}$ by more than 15 times)*
- Living Rooms (daytime - 07.00 - 23.00) 35 dB L_{Aeq}*
- Gardens and terraces (daytime) 55 dB L_{Aeq}*

2.6.1.2 Noise from neighbouring entertainment venues

Section 3.6.1.2 of the MCC 'Planning & Noise Technical Guidance (December 2015)' document states the following in relation to internal noise limits within residential properties from neighbouring entertainment venues:

"...When considering the potential impact of a proposal for an entertainment venue consultants should consider the overall noise level (L_{Aeq}) and the 63 Hz and 125 Hz octave band noise levels (L_{eq}).

The guidance continues to state:

"In the 'Procedure for the assessment of low frequency noise complaints – Revision 1', Moorhouse et al (2011) use limits for low frequency noise levels in 1/3 octave bands between 10Hz and 160Hz.

For the assessment of low frequency music noise, it is more practical to consider the 63 Hz and 125 Hz octave bands. The Noise Council's Code of Practice on 'Environmental Noise Control at Concerts' suggests limits on both these octave bands.

The DEFRA report 'Noise from Pubs and Clubs – Phase 1' suggests limits on 1/3 octave bands. However the problem with this particular suggestion, and one of the reasons it is not widely used, is due to the difficulty in obtaining 1/3 octave band sound insulation performance data for various construction materials."

Based on the above, MCC go on to say:

“Therefore a criterion that would achieve a condition of ‘inaudible’ / ‘virtually inaudible’ which is applicable for new residential developments that are structurally connected to entertainment venues (or vice versa) would be:

‘Music noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (L_{eq}), respectively’.

This criterion may also be applicable for new residential developments that are structurally separate from an existing entertainment venue.”

2.6.1.3 Noise egress

MCC's 'Planning & Noise Technical Guidance (December 2015)' document states the following guidance in relation to noise egress from any fixed plant, equipment or machinery associated with new developments:

- *“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.”*

3. Proposed Assessment Design Criteria

Based on the guidance referenced in Section 2, the following subsections detail the proposed assessment design criteria to minimise the noise impact on the occupants of the residential apartments associated with the Project proposals and nearest residential noise sensitive receptors. Criteria have been proposed such that it will adhere to LPA requirements.

3.1 Internal Noise Criteria

3.1.1 Intrusive noise level criteria under background ventilation conditions

The intrusive noise criteria includes noise contributions from:

- External sources outside the building premises (including, but not limited to, noise from road, rail and air traffic, industrial and commercial premises).

The intrusive noise criteria excludes contributions from:

- Activity noise within the building premises (e.g. noise from building occupants and equipment within the building).
- Building service noise.
- Rain noise.

Proposed intrusive noise criteria for residential apartments are detailed below, and are proposed to be achieved within the proposed residential apartments when complying with Part F background ventilation requirements:

- *Indoor ambient noise levels should not exceed 35 dB $L_{Aeq,16hr}$ within living rooms and bedrooms during the daytime (07:00-23:00 hours);*
- *Indoor ambient noise levels should not exceed 30 dB $L_{Aeq,8hr}$ within bedrooms during the night-time (23:00-07:00 hours);*
- *Individual noise events should not normally exceed 45 dB L_{AFmax} within bedrooms more than 15 times during the night-time (23:00-07:00 hours).*

3.1.2 Noise break-through from adjoining commercial properties

We propose the following internal noise criteria for noise break-through to residential accommodation from adjoining commercial properties:

- *Noise from the adjoining commercial premises 'Phone&Vape 4U' and 'The Washhouse' bar premises should not exceed 35 dB $L_{Aeq,16hr}$ within residential accommodation living areas and 30 dB $L_{Aeq,8hr}$ within residential accommodation bedrooms; and*
- *Low frequency noise, from entertainment activities within the adjoining 'The Washhouse' bar premises, should not exceed 47 dB and 41 dB in the 63Hz and 125Hz octave centre frequency bands respectively, within all habitable areas of residential accommodation.*

3.2 External Plant Noise Emission Criteria

3.2.1 Plant noise limits at noise sensitive receptor (NSR) properties

The nearest and/or most exposed residential NSR properties to the project have been identified to be the adjoining residential properties listed within Section 1 of this report.

The following external noise emission criteria are proposed to achieve the LPA requirements:

The cumulative rating noise level (dB $L_{A,r,Tr}$) resulting from all fixed plant and equipment noise sources forming part of the proposed development should not exceed a level 5dB below the measured pre-development typical background noise level (dB L_{A90}) when assessed in accordance with BS 4142 at the position of the nearest or most exposed noise sensitive receptor(s).

4. Environmental Noise Survey

4.1 Introduction

Environmental noise surveys have been undertaken at the site between the 7th and 12th October 2021 in order to assist in the following:

- Establishing the baseline noise climate at the site;
- Assessment of the building envelope strategy;
- Establishing noise limit criteria for external noise emissions.

4.2 Methodology

A series of unmanned logging measurements were undertaken by BDP Acoustics at a number of locations considered to be representative of the noise climate at the external façades of the current site and nearest / most exposed NSR properties. The approximate measurement positions are presented in Figure 2 and were selected to:

- Gather data representative of noise levels incident upon the Project façades during daytime and night-time periods, including worst-case, i.e. noisiest, daytime “rush hour” periods and worst-case, noisiest, night-time periods (Friday and Saturday nights) while nearby entertainment venues such as bars and clubs were open, in order to inform building envelope recommendations for the site;
- Gather data representative of noise levels at the nearest / most exposed NSR properties during daytime and night-time periods for determination of plant noise emission limits.

Manned observations were also undertaken at the site between 2300 – 0000 hours on the Friday night in order to undertake a subjective assessment of noise sources dominating

the noise levels at the various building façades and within the property during the worst-case, i.e. noisiest, night-time period while nearby clubs and bar venues were open.

As the survey was unmanned, weather conditions were not observed at the site. However, historical weather data has been gathered for the survey period from a regional weather station located at Manchester Airport. Historical weather data notes that weather conditions during the survey period were dry, with wind speeds varying up to 14mph in varying directions, and temperatures between 8 – 20°C.

The various measurements were taken using 2no. Rion NA-28 sound level meters and 1no. B&K 2260 sound level meter which were all field calibrated prior to commencing the surveys and upon completion with no significant drift observed. Each sound level meter and calibrator used on site had been calibrated to traceable standards and calibration certificates can be provided upon request.

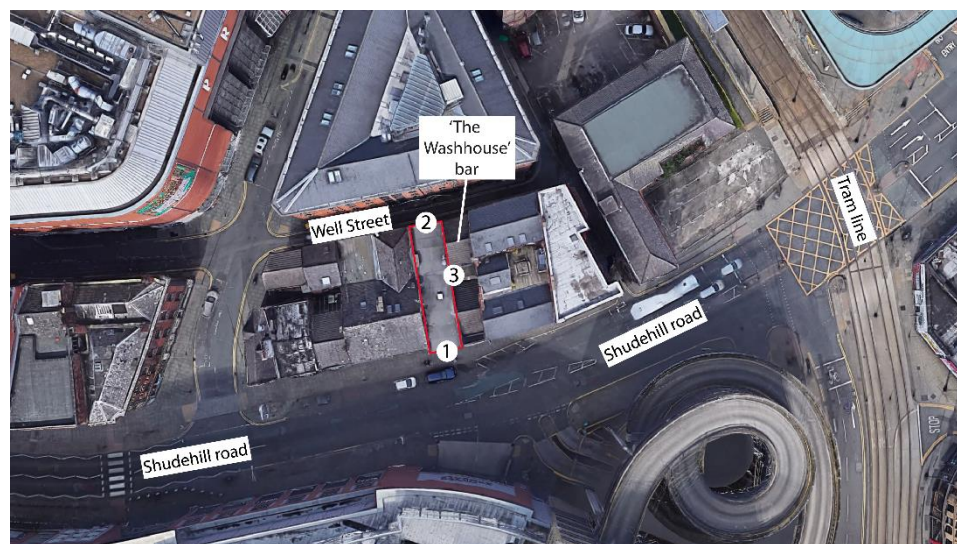
At each measurement position the octave band and A-weighted fast-response levels were recorded for a comprehensive suite of noise level metrics.

All measurements were taken at a distance of 1m from the façade. Note that the measured noise levels from the external noise survey are presented as uncorrected façade noise levels in this report, however a – 3dB correction has been applied to the measured façade noise levels where free-field equivalent noise levels are required for calculation purposes (e.g. noise break-in calculations and calculation of external plant noise emission limits).

Sound level meters located on the Shudehill road and Well St façades were located at First Floor level, while the sound level meter located on ‘The Washhouse’ façade was at Second Floor level, overlooking the roof of ‘The Washhouse’ bar.

All equipment was installed and collected by Dan Forbes AMIOA. Manned observations were conducted by Dan Forbes AMIOA during the daytime (when installing and collecting equipment) and by Gavin Stevenson MIOA during the aforementioned night-time period.

Figure 2: BDP markup showing approximate survey measurement positions (approximate site boundary indicated by red line)



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4.3 Observations

The environmental noise surveys indicated that the ambient noise climate at the site was dominated by road traffic noise from local roads during both the daytime and night-time. It was noted that no music noise from 'The Washhouse' bar could be heard within the proposed development building.

Other observed contributions to the ambient noise climate included:

- noise from people on the nearby streets;
- tram noise;
- occasional low level construction noise from a distant construction site;
- plant noise emanating from louvres of nearby premises (only audible on Well St façade);

- occasional noise from 'The Washhouse' bar waste water pipes, when present (only audible on 'The Washhouse' façade);
- occasional plant equipment noise on 'The Washhouse' roof, when operational (only audible on Second Floor of 'The Washhouse' façade).

During the night-time observations, music noise from distant entertainment venues (not the adjacent 'The Washhouse') was noted to be faintly audible outside the site premises but inaudible within the site premises.

The background noise climate was dominated by road traffic noise at all times of day.

4.4 Results

A summary of the measured results from the noise surveys can be found in Table 2, Table 3 and Table 4.

Graph plots of all measurements are presented in Appendix II – Noise Survey Data Plots. Full measured results in tabular form can be provided upon request.

Table 2: Summary of uncorrected façade noise level measurements at Position 1 (Shudehill road façade)

Date(s)	Day(s)	Time period (Day / Night)	$L_{Aeq, 16hr/8hr}$ (dB)	$L_{AFmax, 5mins}$ Range (dB)	$L_{A90, 5mins}$ Range (dB)
07/10/2021	Thurs	Day (1800-2300hrs)*	70*	77 - 98	55 - 76
07/10/2021 - 08/10/2021	Thurs/Fri	Night (2300-0700hrs)	67	71 - 93	47 - 77
08/10/2021	Fri	Day (0700-2300hrs)	69	76 - 95	56 - 67
08/10/2021 - 09/10/2021	Fri/Sat	Night (2300-0700hrs)	68	74 - 105	53 - 66
09/10/2021	Sat	Day (0700-2300hrs)	69	78 - 97	51 - 74
09/10/2021 - 10/10/2021	Sat/Sun	Night (2300-0700hrs)	67	73 - 91	50 - 65
10/10/2021	Sun	Day (0700-2300hrs)	68	69 - 106	53 - 66
10/10/2021 - 11/10/2021	Sun/Mon	Night (2300-0700hrs)	64	69 - 91	47 - 60
11/10/2021	Mon	Day (0700-2300hrs)	69	75 - 99	53 - 64
11/10/2021 - 12/10/2021	Mon/Tues	Night (2300-0700hrs)	65	66 - 95	47 - 59
12/10/2021	Tues	Day (0700-0940hrs)*	70*	79 - 93	56 - 69

*Note, the indicated daytime periods were shorter than 16 hours due to times of installing and collecting the equipment.

Table 3: Summary of uncorrected façade noise level measurements at Position 2 (Well Street façade)

Date(s)	Day(s)	Time period (Day / Night)	$L_{Aeq, 16hr/8hr}$ (dB)	$L_{AFmax, 5mins}$ Range (dB)	$L_{A90, 5mins}$ Range (dB)
07/10/2021	Thurs	Day (1800-2300hrs)*	66*	62 - 93	56 - 59
07/10/2021 - 08/10/2021	Thurs/Fri	Night (2300-0700hrs)	59	57 - 99	51 - 58
08/10/2021	Fri	Day (0700-2300hrs)	62	63 - 104	53 - 60
08/10/2021 - 09/10/2021	Fri/Sat	Night (2300-0700hrs)	63	63 - 104	52 - 61
09/10/2021	Sat	Day (0700-2300hrs)	66	60 - 106	52 - 61
09/10/2021 - 10/10/2021	Sat/Sun	Night (2300-0700hrs)	64	62 - 103	52 - 61
10/10/2021	Sun	Day (0700-2300hrs)	62	61 - 102	52 - 60
10/10/2021 - 11/10/2021	Sun/Mon	Night (2300-0700hrs)	58	56 - 89	51 - 60
11/10/2021	Mon	Day (0700-2300hrs)	60	62 - 99	53 - 66
11/10/2021 - 12/10/2021	Mon/Tues	Night (2300-0700hrs)	61	55 - 98	50 - 58
12/10/2021	Tues	Day (0700-0940hrs)*	58*	63 - 85	53 - 56

*Note, the indicated daytime periods were shorter than 16 hours due to times of installing and collecting the equipment.

Table 4: Summary of uncorrected façade noise level measurements at Position 3 ('The Washhouse' façade)

Start Time (dd/mm/yyyy hh:mm)	Duration, T (hh:mm:ss)	$L_{Aeq,T}$ (dB)	$L_{AFmax,5mins}$ Range (dB)	$L_{A90,5mins}$ Range (dB)
07/10/2021 18:00	05:00:00	50	52 - 69	47 - 53
07/10/2021 23:00	08:00:00	46	46 - 67	36 - 52
08/10/2021 07:00	16:00:00	50	52 - 74	41 - 53
08/10/2021 23:00	08:00:00	49	47 - 81	36 - 51
09/10/2021 07:00	16:00:00	50	50 - 69	40 - 52
09/10/2021 23:00	08:00:00	50	49 - 69	39 - 54
10/10/2021 07:00	16:00:00	51	48 - 81	39 - 54
10/10/2021 23:00	08:00:00	45	43 - 73	35 - 50
11/10/2021 07:00	16:00:00	48	50 - 72	41 - 50
11/10/2021 23:00	08:00:00	44	44 - 72	35 - 49
12/10/2021 07:00	02:45:00	48	52 - 67	41 - 46

5. Assessment

5.1 Noise Ingress

The following section details the assessment undertaken for noise ingress into the proposed residential apartments, both for environmental noise break-in and noise break-through from adjacent commercial premises.

This assessment has been based on the following information provided to BDP Acoustics:

- Proposed Location Plan and GA drawings provided by Outlooks Property on 24/08/2021;
- Previous application documents for the site, including Sections and Elevations drawings, provided by Outlooks Property on 05/11/2021;
- Noise reports for the adjacent 'The Washhouse' bar (ADC Acoustics Noise Impact Assessment report from April 2021 and MCC's Planning Permission – Application no. 129840/FO/2021) provided by Outlooks Property on 27/08/2021;
- Confirmation that existing window dimensions are to be retained from Outlooks Property on 05/11/2021.

5.1.1 Environmental noise break-in

5.1.1.1 Noise break-in calculations

Based on noise survey data gathered on-site, as detailed in Section 4, noise break-in calculations have been undertaken to determine the internal noise levels that would result in the proposed residential apartments due to environmental noise incident upon the façades of the proposed development.

5.1.1.2 Building envelope sound insulation recommendations

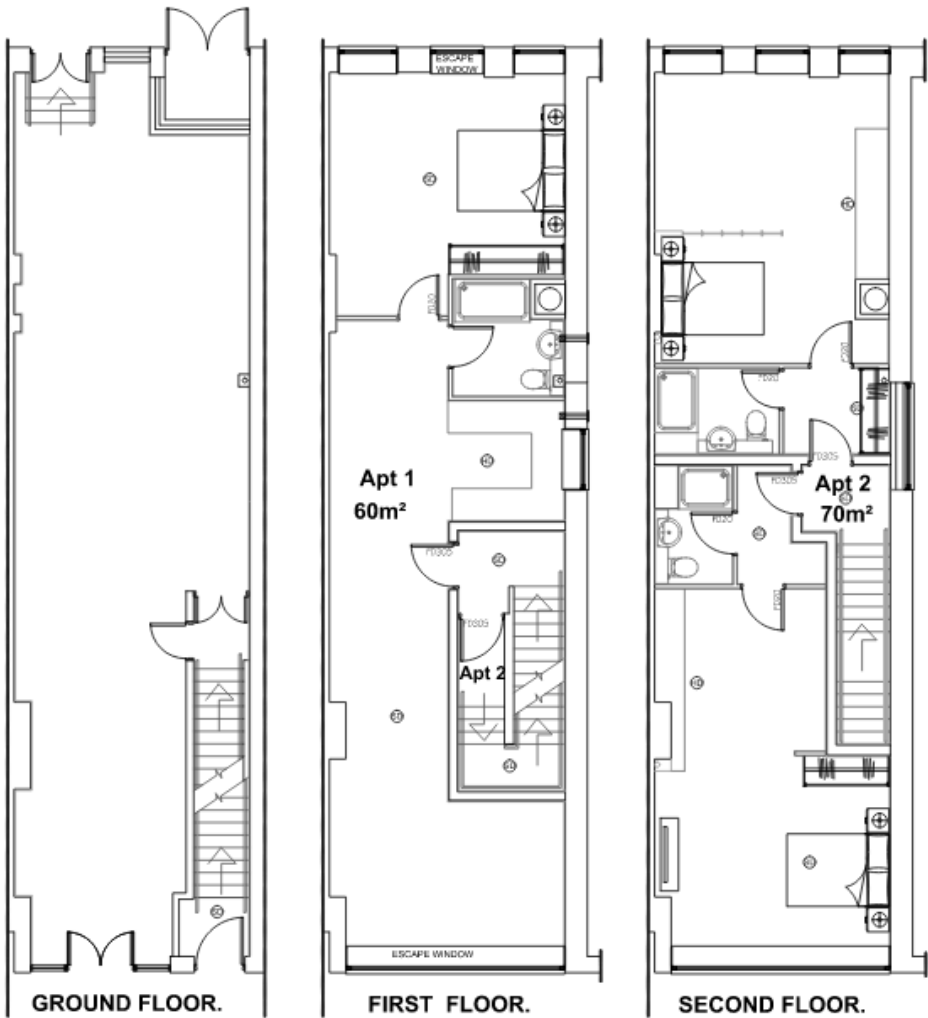
Based on the results of our noise break-in calculations, the following subsection outlines our building envelope sound insulation recommendations to enable compliance with the proposed assessment criteria in Section 3.1. The following assumptions were used for the purposes of the noise break-in calculations:

- Calculations were performed using the worst-case 16hr daytime and 8hr night-time free-field equivalent octave band L_{eq} values and the range of $L_{AFmax,5min}$ values measured at each façade during the noise survey;
- Calculations were based on the worst-case room dimensions per façade, i.e. smallest room with largest glazing to external wall ratio (based on drawings as detailed within Section 5.1. Refer to Figure 3 below for excerpt of proposed plans);
- An internal reverberation time of 0.5 seconds;
- A nominal masonry external building envelope construction incorporating an internal plasterboard lining achieving the sound insulation performance outlined in Table 5;
- Indicative background ventilation system based on acoustic trickle ventilation with ventilator area 8,500mm², and sound insulation performance as per Table 6;
- Suitable ventilators and ventilation areas should be specified by M&E engineers to comply with Part F background ventilation requirements.

Table 5: Assumed external wall airborne sound insulation performance

Octave Band Centre Frequency (Hz)	63	125	250	500	1k	2k	4k	R_w
Minimum SRI (dB)	28	37	46	54	63	71	71	57

Figure 3: Proposed layouts issued by GreenSky Architecture used for noise break-in calculations



5.1.1.3 Ventilator sound insulation performance

Calculations have been undertaken based on acoustically rated ‘through façade’ background ventilator to achieve the following minimum element-normalised level difference ($D_{n,e}$) requirements (Table 6).

Table 6: Minimum $D_{n,e}$ requirements for specified ‘acoustic trickle’ through façade ventilation (dB)

Octave Band Centre Frequency (Hz)	63	125	250	500	1k	2k	4k	$D_{n,e,w} + C_{tr}$
Minimum required $D_{n,e}$ (dB)	26	42	37	37	43	57	64	41

Note that the combined ventilator performance must achieve Building Regulations Approved Document F background ventilation requirements whilst achieving the specified sound reduction $D_{n,e}$ performance values above. Individual ventilators may require higher $D_{n,e}$ values in order to offset the loss in performance associated with the use of multiple units. For reference, 1 no. Ryton Through Wall Acoustic AAC125HP trickle ventilator per bedroom / living room was assumed in calculations.

Alternative specifications to those outlined above may be suitable to achieve the relevant internal noise criteria, however it is recommended that any alternatives are reviewed by an acoustic consultant.

It should be noted that if windows are opened, e.g. to provide purge ventilation, internal noise levels within rooms would be expected exceed the noise criteria stated Section 3.1.

5.1.1.4 External window sound insulation performance

Based on the ventilator sound insulation performance outlined above, noise break-in calculations indicate that the proposed internal noise level criteria specified within Section

3.1 will be achieved with external windows that achieve the octave band sound insulation values specified within Table 7.

Typical glazing constructions that can achieve the specified sound insulation performances have also been provided for reference. However, it should be noted that the proposed performance requirements apply to the complete glazing assembly (i.e. including frame and seals).

Table 7: Minimum octave band SRI (dB) requirements for external windows

Façade reference	Glazing assembly $R_w + C_{tr}$ rating	Typical double glazing build-up required (glass/airgap /glass)	Octave Band Centre Frequency (Hz)						
			63	125	250	500	1k	2k	4k
Façade facing Shudehill road	37dB $R_w + C_{tr}$	10mm glass /							
		16mm airspace / 14.8 mm laminated glass	20	26	33	39	40	44	60
Façade facing Well St*	31dB $R_w + C_{tr}$	5mm glass /							
		15mm airspace / 8 mm glass	29	22	24	33	41	36	41
Façade facing The Washhouse bar	31dB $R_w + C_{tr}$	5mm glass /							
		15mm airspace / 8 mm glass	29	22	24	33	41	36	41

Alternative specifications to those outlined above may be suitable to achieve the relevant internal noise criteria, however it is recommended that any alternatives are reviewed by an acoustic consultant.

5.1.1.5 Mechanical ventilation noise levels

If any continuously running mechanical ventilation systems are adopted within the scheme these should be designed to enable the internal noise limits stated in Section 3.1 to be achieved.

5.1.2 Noise break-through from adjacent neighbouring premises

Noise break-through calculations have been undertaken to predict the internal noise levels in the proposed residential apartments due to noise transfer through party wall and floor elements of the adjoining 'The Washhouse' bar premises (19 Shudehill, Manchester) and 'Phone&Vape 4U' shop respectively.

The following assumptions were used for the purposes of the noise break-in calculations:

- Calculations were based on the worst-case room dimensions per façade, i.e. smallest room with largest party wall/floor area ratio (based on drawings as detailed within Section 5.1);
- An internal reverberation time of 0.5 seconds.

5.1.2.1 'The Washhouse' bar

Whilst entertainment noise from the operation of The Washhouse bar was noted to be subjectively inaudible within the Project building during the manned noise survey periods, calculations for break-through noise from 'The Washhouse' bar adjacent to the proposed development have been conducted based on entertainment noise level limits set within the MCC Planning Permission document for 'The Washhouse' bar development, Application no. 129840/FO/2021 (based on "boisterous bar levels" within the ADC Acoustics Noise Impact Assessment report for the bar).

Note that the ADC Acoustics report states that the “boisterous bar levels” within their assessment were used for a “worst case” assessment as ‘The Washhouse’ operate background music only. The assumed Washhouse bar noise levels used for the noise break-through calculations are presented within Table 8 below for reference.

Table 8: “Boisterous bar levels” referenced from ADC Acoustics Report assumed for noise break-through calculations

Octave Band Centre Frequency (Hz)	63	125	250	500	1k	2k	4k	dBA
“Boisterous bar levels” from ADC Acoustics Report	80	78	76	83	83	79	73	86

Calculations for the separating wall between ‘The Washhouse’ bar and the proposed residential development have demonstrated that a party wall solution achieving the sound insulation performance specified within Table 9 below will enable the relevant assessment criteria for the project (including the low frequency criteria for entertainment noise specified within Section 3.1.2) to be achieved assuming the worst case activity noise levels referenced in the ADC Acoustics Noise Impact Assessment report for the ‘The Washhouse’ bar.

Table 9: Indicative sound insulation performance requirements for party wall to The Washhouse.

Separating element construction	Sound insulation performance rating, dB R_w	Sound insulation performance rating (dB), in Octave Band Centre Frequency (Hz)						
		63	125	250	500	1k	2k	4k
Party wall to ‘The Washhouse’	60	40	47	49	56	63	67	76

An example party wall build up that would be expected to achieve the sound insulation performance values above is outlined below for reference:

- 215 mm brick wall with an isolated plasterboard lining consisting of;
- 2 x 15mm Gyproc SoundBloc (or equivalent) on;
- Resilient rail/bar on timber stud frame (90mm x 45mm) at 600mm centres with a minimum 102mm cavity filled with;
- 75mm thickness of fibreglass (10kg/m³)

Alternative specifications to those outlined above may be suitable to achieve the relevant internal noise criteria, however it is recommended that any alternatives are reviewed by an acoustic consultant.

5.1.2.2 ‘Phone&Vape 4U’ commercial unit

Calculations for break-through noise from the ‘Phone&Vape 4U’ shop beneath the proposed development have been conducted based on typical restaurant noise level data measured by BDP. Whilst the shop currently operates as a retail outlet, typical restaurant noise levels have been used for a worst-case assessment. The assumed ground floor commercial unit noise levels used for the noise break-through calculations presented within Table 10 below.

Table 10: Commercial source noise levels used within ‘Phone&Vape 4U’ shop break-through calculations

Octave Band Centre Frequency (Hz)	63	125	250	500	1k	2k	4k	dBA
Typical restaurant noise levels	66	66	67	72	68	63	57	73

Calculations for the separating floor element between 'Phone&Vape 4U' shop and the proposed residential development have demonstrated that a party floor solution achieving the sound insulation performance specified within Table 11 below, will enable the relevant assessment criteria for the project to be achieved.

Table 11: Indicative sound insulation performance requirements for party floor to ground floor commercial unit

Separating element construction	Sound insulation performance rating, dB R_w	Sound insulation performance rating (dB), in Octave Band Centre Frequency (Hz)						
		63	125	250	500	1k	2k	4k
Party floor to Ground Floor commercial unit	57	19	33	47	57	64	69	69

An example party floor build up that would be expected to achieve the sound insulation performance values above is outlined below for reference:

- Floating floor construction consisting of;
- 22 mm chipboard and 19 mm plasterboard plank supported on;
- 75 mm 'Reflex Bearer' acoustic batten by CMS Acoustics;
- 50 mm mineral wool quilt laid between bearers, supported on;
- Timber base floor consisting of;
- 18mm OSB timber decking board (or equivalent timber based board) with mass per unit area of 10-11 kg/m²;
- 235 mm x 50 mm solid timber joists C16 grade timber at 450 mm centres;
- 100 mm glass based mineral wool insulation with density of 10-11 kg/m³;
- Ceiling of 2 layers of plasterboard with an overall mass per unit area of 23-25 kg/m²

Alternative specifications to those outlined above may be suitable to achieve the relevant internal noise criteria, however it is recommended that any alternatives are reviewed by an acoustic consultant.

6. Noise Egress

External plant noise emissions associated with the development should be suitably controlled in order to maintain residential amenity at nearby noise sensitive receptor (NSR) properties.

Details of proposed fixed plant installations and operating times are unknown at this stage, however to inform a reasonable worst-case assessment it is assumed that any plant associated with the proposed development is likely to be operational during the night time.

6.1 External plant noise emission limits

The following cumulative noise limits at the nearest/most exposed residential NSR properties to the development site are proposed for fixed items of plant associated with the development, in-line with the Local Planning Authority's guidance.

In addition to the limits presented in Table 12, external plant noise emissions should be suitably controlled to enable compliance with the internal noise level criteria proposed for the development site itself, as specified within Section 3.1.

Table 12: Proposed nearest or most exposed noise sensitive receptor (NSR) noise limits for fixed plant and equipment installations associated with the development

<i>Receiver location</i>	<i>Daytime / night-time period</i>	<i>Lowest measured free-field equivalent noise level, $L_{AF90,T}$ (dB)</i>	<i>Cumulative external plant noise limit, $L_{A,T,r}$ (dB)</i>
Closest noise sensitive residential façades facing onto Shudehill road	Daytime (07:00 – 23:00)	48	43
	Night-time (23:00 – 07:00)	44	39
Closest noise sensitive residential façades facing onto Well St	Daytime (07:00 – 23:00)	49	44
	Night-time (23:00 – 07:00)	47	42

It should be noted that the plant noise limits provided in Table 12 are for the cumulative rating of all items of plant, and subsequent allowance should be made for the number of noise sources. The limits detailed would need to be further reduced should the plant noise contain impulsive or tonal elements.

7. Summary

BDP Acoustics has been appointed by Outlooks Property to undertake an environmental noise assessment for a proposed residential development at 17 Shudehill, Manchester (referred to as “the Project”).

Relevant standards and guidance have been referenced to propose noise limit criteria to assess the suitability of the site and provide building envelope and party wall/floor recommendations with respect to noise ingress to the Project residential apartments, and recommendations regarding noise egress from any future proposed building service plant.

Environmental noise surveys have been undertaken at the site between the 7th and 12th October 2021 in order to assist in the following:

- Establishing the baseline noise climate at the site;
- Assessment of the building envelope strategy;
- Establishing noise limit criteria for external noise emissions.

Calculations have been undertaken to assess the Project and our assessment indicates the following:

- Environmental noise break-in can be suitably mitigated to achieve the proposed internal noise level criteria with the provision of suitable building envelope solutions (specifically glazing and ventilation solutions), as specified within Section 5.1.1; and
- Noise break-through from adjacent neighbouring properties can be suitably mitigated to achieve the proposed internal noise level criteria by implementing party floor and wall solutions achieving the sound insulation performance values specified within Section 5.1.2.

Recommendations have also been given for external plant noise emissions associated with the development in order to maintain residential amenity at nearby residential noise sensitive receptor properties.

Appendix I – Glossary of Acoustic Terms

A-Weighting

Normal hearing covers the frequency range from approximately 20Hz to 20kHz but sensitivity is greatest between about 500Hz and 8kHz. The "A-Weighting" is an electronic filters network incorporated in sound level meters which approximately corresponds to the frequency response of the ear. The unit of measurement of A-weighted sound level is dBA or dB(A).

Apparent Sound Reduction Index R'

Ten times the logarithm to the base 10 of the ratio of the sound power W_1 which is incident on a partition under test to the total sound power transmitted into the receiving room if, in addition to the sound power W_2 transmitted through the separating element, the sound power W_3 , transmitted through flanking elements or by other components, is significant.

In general, the sound power transmitted into the receiving room consists of the sum of several components. Also in this case, under the assumption that there are sufficiently diffuse sound fields in the two rooms, the apparent sound reduction index in ISO 140-4 is evaluated from:

$$R' = D + 10\log(S/A) \text{ dB}$$

Where:

D is the level difference

S is the area of the separating element

A is the equivalent sound absorption area in the receiving room.

Architectural Acoustics

Relationship between sound produced in a space and its occupants, taking into account such issues as external noise, internal sound insulation, room acoustics and building service noise.

Break-in

Noise transmission into a structure from the outside.

Break-out

Noise transmission from inside a structure to the outside.

C_{tr}

A 'spectrum adaptation term' used to correct the $D_{nT,w}$ figure in order to reflect low frequency performance of the wall or floor tested. See BS EN ISO 717-1:1997.

Decibel, dB

This is a relative unit of measurement which in acoustics is the unit to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). The dB is a logarithmic unit used to describe a ratio between the measured level and a reference or threshold level of 0dB (re. 20 micro-Pascals). We therefore use a logarithmic scale to describe sound pressure level, intensities and sound power levels. Subjectively, an increase of 10dB corresponds to a doubling in the perceived loudness of sound.

Equivalent Continuous Sound Level, L_{eq} or L_{Aeq}

The equivalent continuous sound level, L_{eq} is a notional sound level. It is the sound level, which, if maintained for a given length of time, would produce the same acoustic energy as a fluctuating noise over the same time period. (The formula for the above is implemented electronically in all good sound level meters and it is customary to measure rather than calculate the equivalent continuous sound level.) L_{Aeq} (A-weighted L_{eq}) is widely used to measure any environmental noise which varies considerably with time.

Façade Position

A measurement position located 1m away from a reflecting surface, typically a building façade. At a façade position, the sound level is recognised to be +3dB higher than a measurement taken at the same position without the presence of a reflecting surface.

Free Field

A sound field region with no adjacent reflecting surfaces.

Octave and Third Octave Bands

The human ear is sensitive to sound over a range of approximately 20Hz to 20kHz, and is generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum is divided into frequency bands (continuous range of frequencies between two limiting frequencies), and the sound pressure level is measured in each band. The most commonly used frequency bands are octave bands, in which the mid-frequency of each band is twice that of the band below it. (For instance the octave bands above and below the 500Hz octave band are 1kHz and 250Hz respectively). For finer analysis, each octave band may be split into three one-third octave bands or in some cases, fine frequency bands.

Rating Level, L_{A,T_r}

The specific sound level plus any adjustment for the characteristic features of the sound, as described in BS 4142:2014+A1:2019.

Sound Insulation

Airborne sound insulation refers to the process of separating, by a physical barrier, a space to be protected from a noise source or space containing a noise source.

Specific Sound Level, L_s or L_{Aeq,T_r}

The equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .

Statistical Level: L_{90} or L_{A90}

Sound pressure level that is exceeded for 90% of the measurement time. Consequently it is indicative of the general background noise level in the absence of any higher level short duration events that occur during the period.

Statistical Level: $L_{max,T}$ or L_{Amax}

A noise level index defined as the maximum RMS sound pressure level measured during the measurement period, T . L_{max} is sometimes used for the assessment of occasional loud noises, 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.

The Weighted Apparent Sound Reduction Index R'_w

A single number quantity for airborne sound insulation rating, relating to the value, in decibels, of the reference curve at 500Hz after shifting it in accordance with the method specified in ISO 717-1.

Time Weighting

One of the standard averaging times (Fast (F), Slow (S)) used for the measurement of RMS sound pressure level in sound level meters, specified in BS 5969.

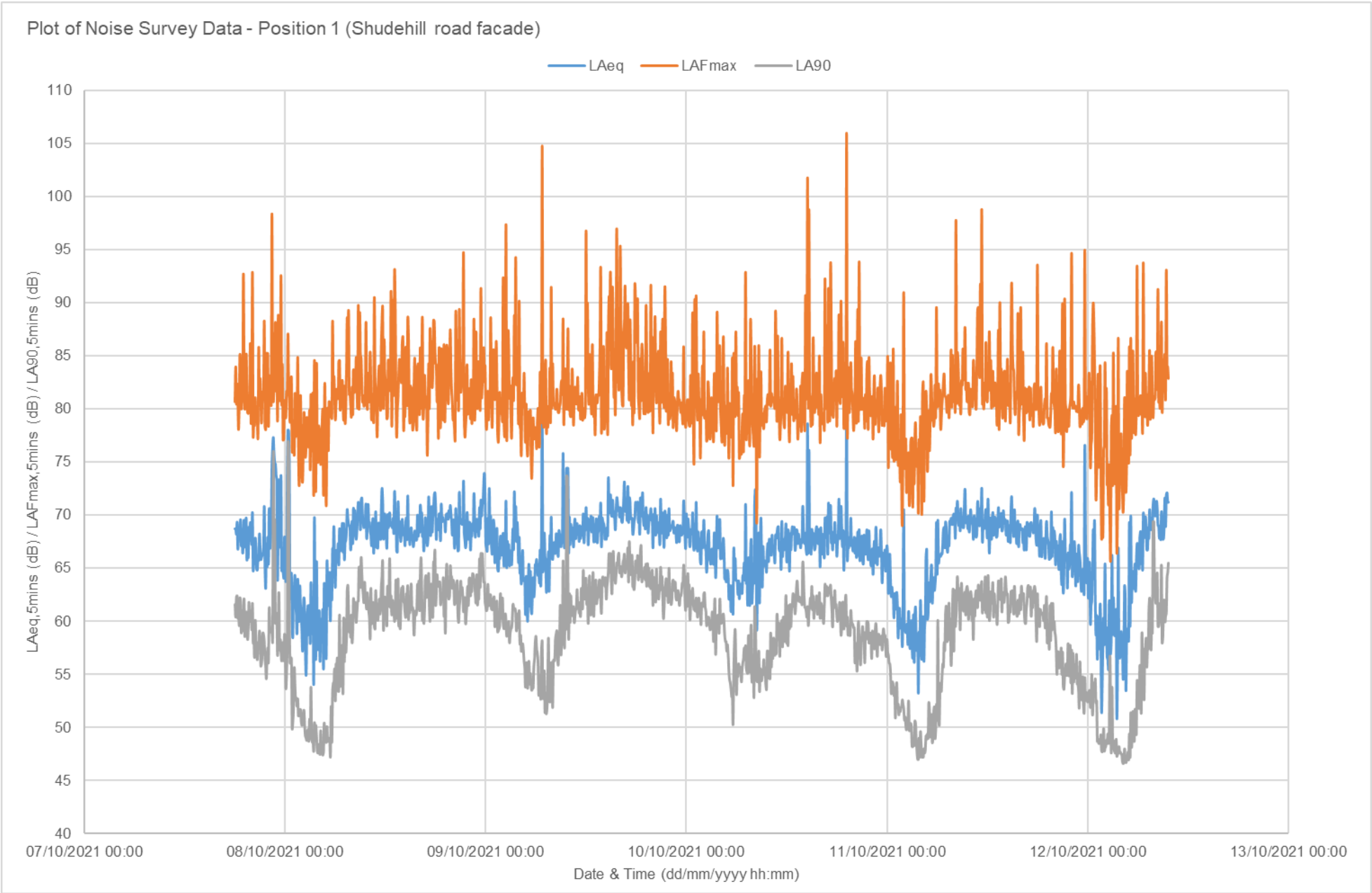
Weighted Sound Reduction Index, R_w

This is a weighted single figure descriptor of the sound insulation performance of a partition measured under laboratory conditions. The sound reduction index in each of the one-third octave bands from 100Hz to 3150Hz is compared with a standard set of curves. The value of R_w for a given partition is obtained from the standard curve which when compared with the measured SRI values produces an adverse deviation as close to -32dB as possible. Only the SRI values which fall below a particular standard curve are considered in the sum. Positive deviations from the standard curve are not taken into account.

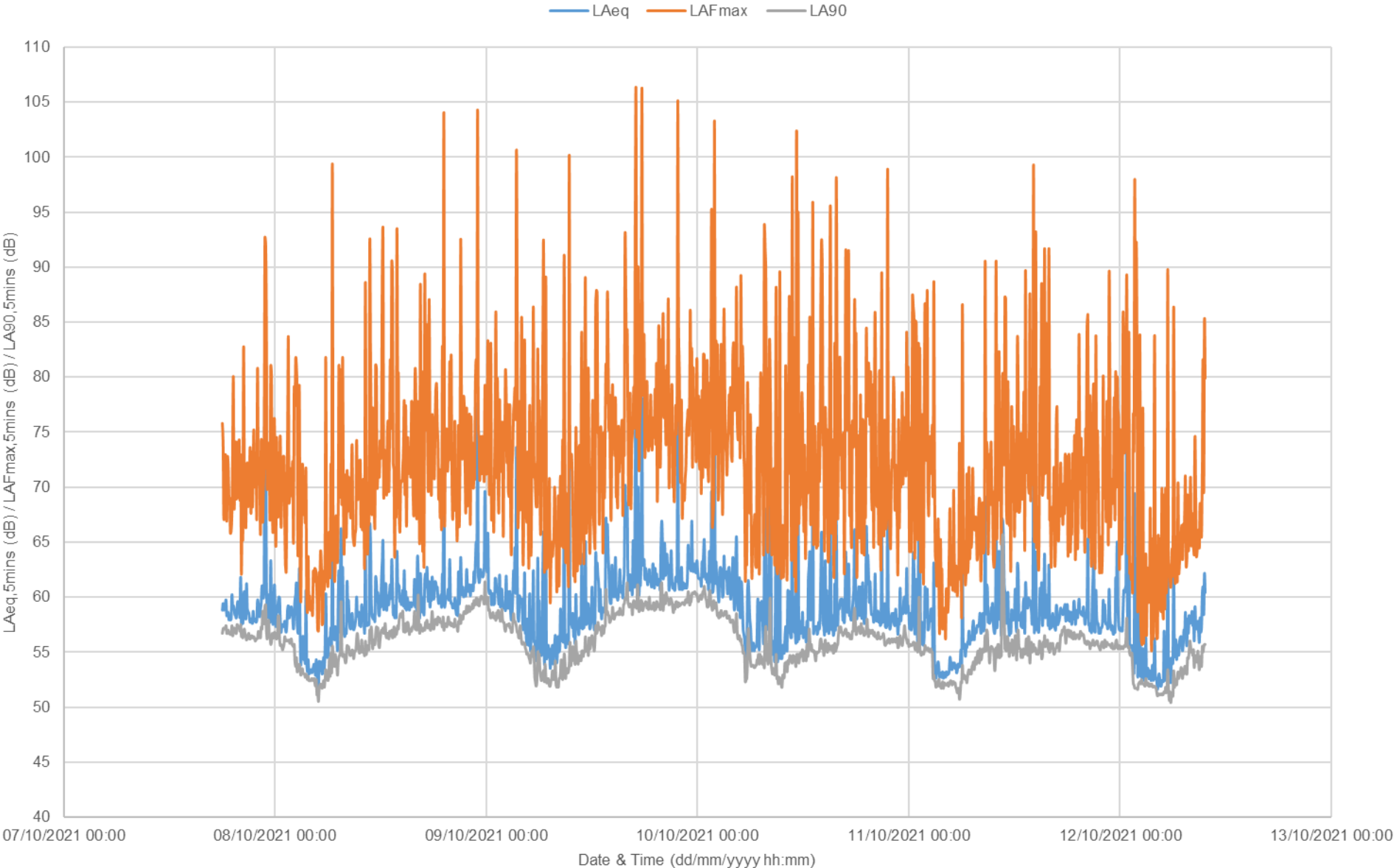
Z-Weighting

Z-weighting or "zero weighting" is where no frequency weighting has been applied to the measured values.

Appendix II – Noise Survey Data Plots



Plot of Noise Survey Data - Position 2 (Well St facade)



Plot of Noise Survey Data - Position 3 ('The Washhouse' facade)

