

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Phoenix Ironworks, Ancoats, Manchester

Planning noise report

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds

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Version	Date	Comments	Author	Reviewer
A	3 Apr 23		Daniel Shaw	Mark Howarth
B	15 Jun 23	Clarifications on control of overheating	Daniel Shaw	Mark Howarth

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Summary

Sandy Brown has been commissioned by Manchester Life Development Company 3 Limited to provide acoustic advice in relation to the proposed development at Phoenix Ironworks, Ancoats, Manchester, M4 6JW.

Environmental noise surveys have been carried out to determine the existing sound levels in the area. The latest noise survey was carried out between 12:35 on 21 April 2022 and 14:50 on 25 April 2022.

Typical background noise levels were L_{A90} 47 dB during the daytime, and L_{A90} 40 dB during the night. Based on the requirements of Manchester City Council and on the results of the noise survey, all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed $L_{Aeq,15min}$ 40-42 dB during the daytime and $L_{Aeq,15min}$ 34-35 dB during the night.

Average ambient noise levels varied between L_{Aeq} 48-51 dB.

An initial assessment has been carried out to determine required acoustic performances for the facades and provide guidance on the ventilation strategy.

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1 Introduction

Sandy Brown has been commissioned by Manchester Life Development Company 3 Limited to provide acoustic advice in relation to the proposed development at Phoenix Ironworks, Ancoats, Manchester, M4 6JW.

An environmental noise survey has been carried out to establish:

- background sound levels around the site and by nearby noise sensitive premises
- ambient and maximum noise levels at the site.

The background sound levels measured during the survey are used as the basis for setting limits for noise emission from proposed building services plant. These limits are set in accordance with the requirements of Manchester City Council.

Ambient and maximum noise levels are used to assess building envelope sound insulation requirements to achieve appropriate internal noise levels for residences. These follow standards set in accordance with Manchester City Council guidelines.

This report provides details of the noise survey, including measurement results, and provides recommendations.

2 Site description

2.1 The site and its surrounding

The Site is bounded by Naval Street to the north, Poland Street to the east, Jersey Street to the south and Radium Street to the west.

The Site currently comprises hardstanding and warehouses. The site is located within the Ancoats Conservation Area, and the Howarth Metal Garages fronting Jersey Street and the wall bounding Jersey and Poland Street are of heritage interest.

The Site is surrounded by a mix of industrial and residential uses. Industrial units are located to the north along Naval Street. To the east of the Site is industrial units and surface car parking. To the south of the Site is Flint Glass Works and Wharf, warehouses converted to offices and residential respectively. To the west of the site is the Grade II* listed Beehive Mill which has been converted into co-working and residential development.



Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

The nearby premises are of mixed use including residential, commercial and light industrial units. Residential units are highlighted in green, commercial units in orange, and future residential units in blue in Figure 1.

A summary of the nearby premises are set out below:

1. 23 Radium Street commercial unit to the west adjacent to the site
2. 97 Jersey Street commercial unit to the south-west corner of the site
3. Eliza Yard and Jersey Wharf future residential buildings to the east
4. City Court trading estate to the north-east – proposed as a future residential site.
5. Flint Glass Works office space to the south
6. Beehive Mill and 4 Naval Street office spaces to the west
7. Flint Glass residential south of the office building
8. New Little Mill, Sawmill Court and NQ4 residential buildings to the south-west
9. 39 and 41 Bengal Street residential buildings to the north-west

3 Development proposals

3.1 Description of development

The development is to comprise a residential development (Use Class C3) of 256 apartments, with ground floor commercial space (Use Class E), within a building of varied height, ranging from 5 storeys to 10 storeys, cycle provision, hard and soft landscaping, access and servicing and other associated works.

3.2 Potential noise sources

The potential noise sources associated with the scheme can be broadly divided into two categories:

- Building services plant
- Internal activity in commercial units.

The potential impact of these sources has been assessed and mitigation measures have been proposed to minimise impact on existing noise sensitive premises around the development.

4 Assessment criteria

4.1 NPPF and NPSE

The National Planning Policy Framework, July 2021 (NPPF) sets out the UK government's planning policies for England. It supersedes previous guidance notes such as PPG24. No specific noise criteria are set out in the NPPF, or in the Noise Policy Statement for England (NPSE) to which it refers.

The NPPF states:

'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

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

and

'Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship,

pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'

The NPSE states that its aims are as follows:

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

- *Avoid significant adverse impacts 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.'*

As such, neither document sets out specific acoustic criteria for new residential developments, but they require consideration of the effect of existing noise on the new development and the effect of noise from the development on the surroundings.

4.2 ProPG

ProPG *Planning & Noise (Professional Practice Guidance on Planning & Noise), New Residential Development, 2017* provides guidance to the management of noise within the planning system in England. It is restricted to consideration of new residential developments that will be exposed predominantly to airborne noise from transport sources.

The two stages of the approach are given below

- Stage 1 – Initial noise risk assessment of the proposed development site
- Stage 2 – Systematic consideration of four key elements
 - Element 1 – Demonstrating a "Good Acoustic Design Process"
 - Element 2 – Observing internal "Noise Level Guidelines"
 - Element 3 – Undertaking an "External Amenity Area Noise Assessment"
 - Element 4 – Consideration of "Other Relevant Issues".

Following this approach, there are four possible recommendations, the choice of recommendation is as follows:

- Grant without conditions
- Grant with conditions
- Avoid
- Prevent.

Guidance provided in ProPG has been used to assess the proposed development site and recommend mitigation measures to reduce noise levels.

4.3 Manchester Residential Quality Guidance

Item 4 of the Key Actions in the Manchester Residential Quality Guidance relates to Acoustic Privacy and states:

“Homes are places of retreat. Residents should be able to ‘shut out’ the external world and enjoy sleep without suffering from either external noise generated by traffic or the public realm; or from neighbouring homes, common spaces or other functions in the building.

Acoustic separation, when measured at the line of inside face of the external and party walls should achieve Building Regulations requirements plus 5dB.”

The control of external noise from traffic and the public realm is covered by planning conditions so the main implication of the guidance is to provide internal sound insulation values between apartments 5 dB better than those in ADE2003.

4.4 Noise egress

4.4.1 Standard guidance

BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* (BS 4142) provides a method for assessing noise from items such as building services plant against the existing background sound levels at the nearest noise sensitive premises.

BS 4142 suggests that if the noise level is 10 dB or more higher than the existing background sound level, it is likely to be an indication of a significant adverse impact. If the level is 5 dB above the existing background sound level, it is likely to be an indication of an adverse impact. If the level does not exceed the background sound level, it is an indication of having a low impact.

If the noise contains ‘attention catching features’ such as tones, bangs etc, a penalty, based on the type and impact of those features, is applied.

4.4.2 Local Authority criteria

Manchester City Council (MCC) provides guidance in relation to plant noise emissions in *Planning and Noise Technical Guidance* document dated October 2022. It states the following in relation to plant noise egress:

‘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 5 dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.’

4.5 Noise ingress

4.5.1 Manchester City Council Guidance and BS8233

Guidance on acceptable internal noise levels in residential dwellings is given in Manchester City Council's Planning and Noise Technical Guidance. This also references BS 8233:2014 *Sound insulation and noise reduction for buildings*.

Manchester City Council's guidance includes 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 10 times)
- Living Rooms (daytime - 07.00 - 23.00) 35 dB L_{Aeq}
- Gardens and terraces (daytime) 55 dB L_{Aeq} .

These internal levels are based on BS8233 criteria which uses annual average data. It is normal to exclude occasional events, such as fireworks night or New Year's Eve.

Where development is considered necessary or desirable, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

For external amenity areas, such as gardens and patios, BS8233 states:

'it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.' ProPG

Internal noise ingress criteria in ProPG are the same as in BS 8233:2014 but additional guidance is provided. In relation to regular individual noise events the following additional guidance is provided:

'In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events.'

4.5.2 Approved Document O – Overheating

Approved Document O 2021 Edition (to the Building Regulations 2010) states the following in relation to noise ingress during overheating periods:

‘In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (23:00-07:00 hours).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- a. $L_{Aeq,T}$ 40 dB average over 8 hours (between 23:00-07:00)
- b. L_{AFmax} 55 dB more than 10 times a night (between 23:00-07:00).’

The above applies to residential dwellings, institutional residential accommodation, and other types of residential accommodation, such as student accommodation.

4.5.3 Acoustics, ventilation and overheating

Guidance on external noise levels from transport noise sources and the assessment of risk in an overheating condition is given in the Association of Noise Consultants *Acoustics Ventilation and Overheating, Residential Design Guide* (AVO Guide). The guidance for night-time internal noise levels during an overheating condition set out in AVO Guide is superseded by the requirements set out in ADO2021 and therefore I provided for information only.

A Level 1 assessment comprises assessing the external free-field noise levels to guideline thresholds. External noise levels and the associated risk categories for a Level 1 assessment are adapted and summarised in Table 1, though consideration also has to be given the duration and frequency of any overheating periods.

Table 1 Guidance for Level 1 assessment of noise from transport sources relating to overheating condition

Risk category for Level 1 assessment	External free-field noise level	
	Daytime (07:00 – 23:00)	Night (23:00 – 07:00)
Negligible	$L_{Aeq} \leq 52$ dB	$L_{Aeq} \leq 47$ dB
Low	$L_{Aeq} > 52$ dB and $L_{Aeq} \leq 57$ dB	$L_{Aeq} > 47$ dB and $L_{Aeq} \leq 52$ dB
Medium	$L_{Aeq} > 57$ dB and $L_{Aeq} \leq 62$ dB	$L_{Aeq} > 52$ dB and $L_{Aeq} \leq 55$ dB
High	$L_{Aeq} > 62$ dB	$L_{Aeq} > 55$ dB

If a Level 1 assessment finds that the development falls into a ‘Medium’ or ‘High’ risk category a Level 2 assessment should be carried out, assessing the expected internal noise levels for an overheating condition and the associated risk of adverse effect. The Level 2 assessment would consider the following:

- Duration of period where additional ventilative cooling is required (to be assessed by others, typically part of a CIBSE TM59 assessment)
- How wide the external windows would need to be open to control overheating (to be assessed by others, typically part of a CIBSE TM59 assessment).

The guidance for suitable internal noise levels in order that noise ingress can be suitably controlled for an overheating condition are provided in AVO Guide. These are adapted and summarised in Table 2, though are not supposed to be taken as limits, rather guidelines to be assessed while also considering the adverse effect of any overheating (duration and severity).

The lowest observed affect level (LOAEL) and the significant observed affect level (SOAEL) for increased noise levels associated with controlling overheating are specific to each project as these depend on the magnitude of the increased internal noise levels and the duration for which they occur.

Table 2 Guidance for Level 2 assessment of noise from transport sources relating to overheating condition

Effect level	Internal noise level from transport sources		
	Daytime (07:00 – 23:00)	Night (23:00 – 07:00)	
LOAEL (noise can be heard, but does not cause any change in behaviour)	$L_{Aeq} \leq 35$ dB	$L_{Aeq} \leq 30$ dB	L_{AFmax} 45 dB not normally exceeded
SOAEL upper limit for longer overheating durations	$L_{Aeq} > 35$ dB and $L_{Aeq} \leq 40$ dB	$L_{Aeq} > 30$ dB and $L_{Aeq} \leq 35$ dB	-
SOAEL upper limit for shorter overheating durations	$L_{Aeq} > 40$ dB and $L_{Aeq} \leq 50$ dB	$L_{Aeq} > 35$ dB and $L_{Aeq} \leq 42$ dB	-
Exceeds SOAEL (noise causes a material change in behaviour)	$L_{Aeq} > 50$ dB	$L_{Aeq} > 42$ dB	L_{AFmax} 65 dB normally exceeded

The AVO Guide illustrates that there is a link between adverse effects, increasing internal ambient noise levels and the duration of exposure to noise for an overheating condition. These are indicated in Figure 2.

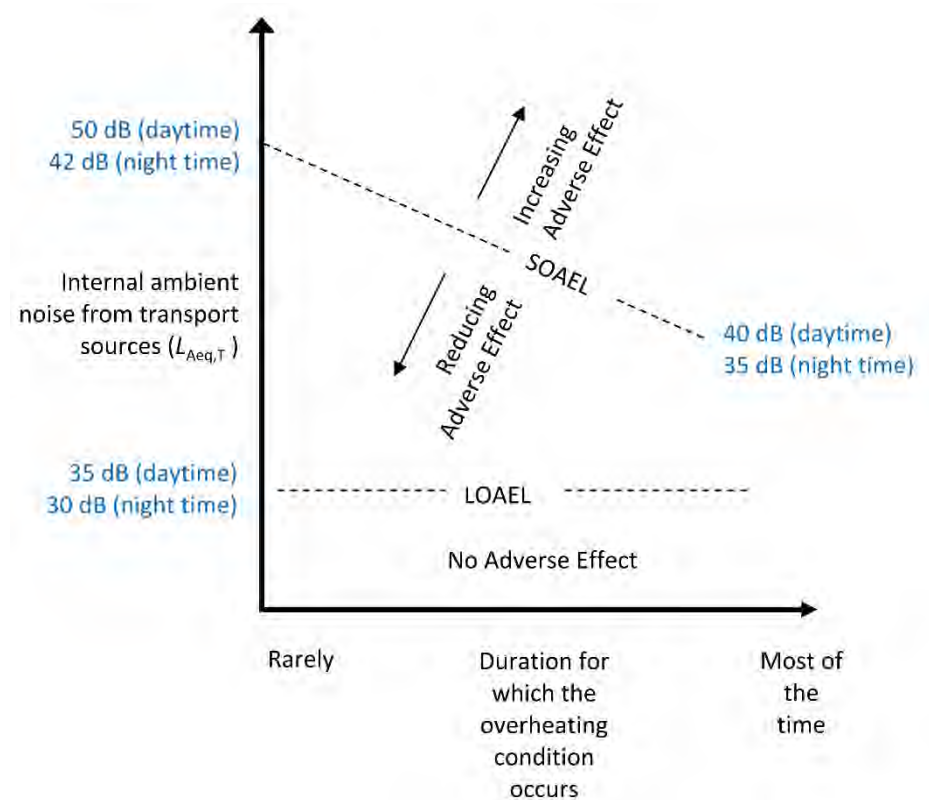


Figure 2 Internal ambient noise levels and increasing adverse effects for an overheating condition

When internal noise levels are above Significant Observed Adverse Effect Level (SOAEL), it is likely that there will be a high potential for an adverse outcome. These adverse outcomes will include:

- Material change in behaviour and/or attitude, eg 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 and difficulty in getting back to sleep
- Quality of life diminished.

As illustrated, the potential for adverse risk increases with the duration of exposure to noise, ie, a shorter exposure will result in a lower risk of adverse outcomes.

5 Noise survey method

The survey included unattended and attended noise measurements.

5.1 Unattended measurements

5.1.1 Latest survey

Unattended noise monitoring was undertaken at the site over 5 days.

Details of the equipment used and the noise indices measured are provided in Appendix A.

The unattended measurements were taken over 5 minute periods between 12:35 on 21 April 2022 and 14:50 on 25 April 2022. The equipment was installed by Christian Clark and collected by Daniel Shaw.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter 'L'. This location was chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises. This measurement was carried out under free field conditions, using a tripod with the microphone placed 1.4 m from the ground and 5 m away from reflective surfaces.

5.1.2 Previous surveys

Unattended measurements were also carried out between 25 August and 7 September 2021 at 2 locations at the site. These are indicated in Figure 1 as Position A (Jersey Street) and Position B (Poland Street).

At position A (Jersey Street) the microphone was mounted on a tripod approximately 1.2 m above the ground level and at least 3 m from any other reflective surface. At position the microphone was mounted 1 m from the facade out of a first-floor window. Measurements were carried out in 15 minute periods. Photographs of the locations are provided in Figure 3 and Figure 4.

Details of the equipment used and the noise indices measured are provided in Appendix A.

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Figure 3 Photograph of measurement position A (Jersey Street)



Figure 4 Photograph of measurement position B (Poland Street)

5.2 Attended measurements

Attended sample measurements were taken by Daniel Shaw at 2 locations around the site. These are indicated in Figure 1 as positions 1 to 2. The measurements were carried out on 25 April 2022, over 5 minute periods.

At each position, measurements were carried out with the microphone mounted on a tripod approximately 1.2 m above the ground level, and 1 m from the building facades.

Details of the equipment used and the noise indices measured are provided in Appendix A.

Dominant noise sources occurring during the measurements were noted. Figure 5 and Figure 6 show the attended survey locations.



Figure 5 Position 1 – Radium Street opposite Beehive Mill car park



Figure 6 Position 2 – Corner of Jersey Street and Radium Street

5.3 Weather conditions

Weather conditions during the survey are described in Appendix A.

6 Noise survey results

6.1 Observations

The dominant noise sources observed at the site during the survey were from road traffic on Radium Street, Naval Street and Jersey Street, and distant construction works.

Less significant noise sources included occasional noise from pedestrians, distant road traffic on Oldham Road, and distant plant noise from surrounding commercial units.

6.2 Noise measurement results

6.2.1 Unattended measurement results – Latest survey

A graph showing the results of the unattended measurements is provided in Appendix B.

Day and night-time ambient noise levels measured during the unattended survey are presented in Table 3.

The maximum L_{Amax} measured for the duration of the survey was 81 dB in the daytime period and 72 dB in the night-time. The night time maximum noise level not normally exceeded was L_{Amax} 65 dB.

Table 3 Ambient noise levels measured during the unattended survey

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Thursday 21 April 2022	-	48
Friday 22 April 2022	53	48
Saturday 23 April 2022	51	48
Sunday 24 April 2022	50	47
Average	51	48

Statistical analysis of the background levels measured during the unattended survey is presented in Figure 7 and Figure 8.

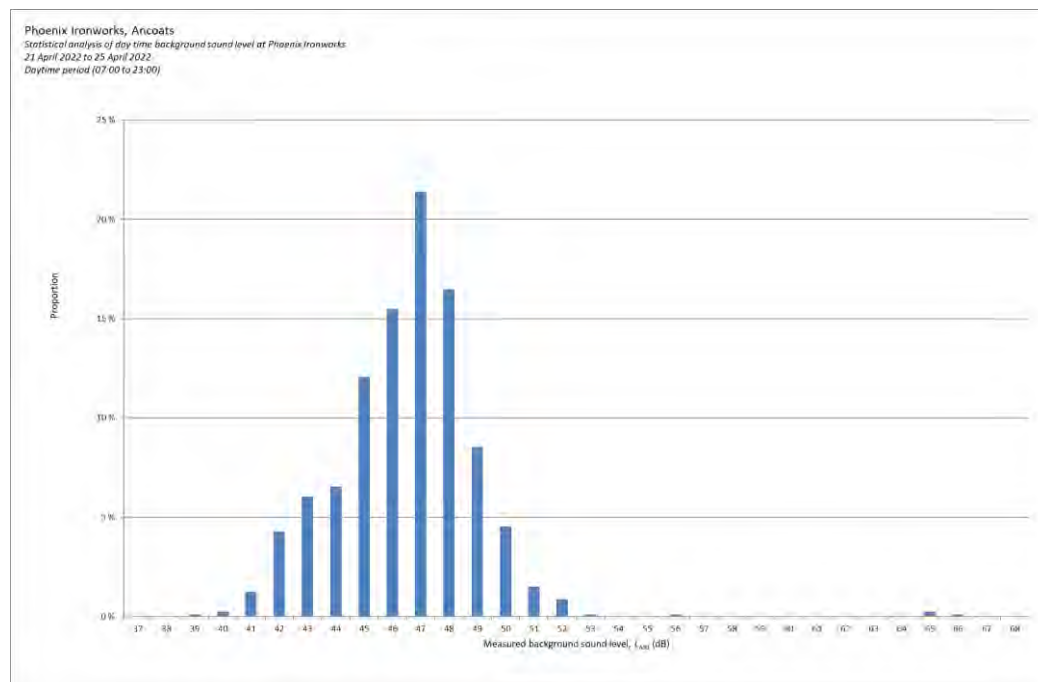


Figure 7 Histogram showing background noise levels during the daytime (07:00 - 23:00)

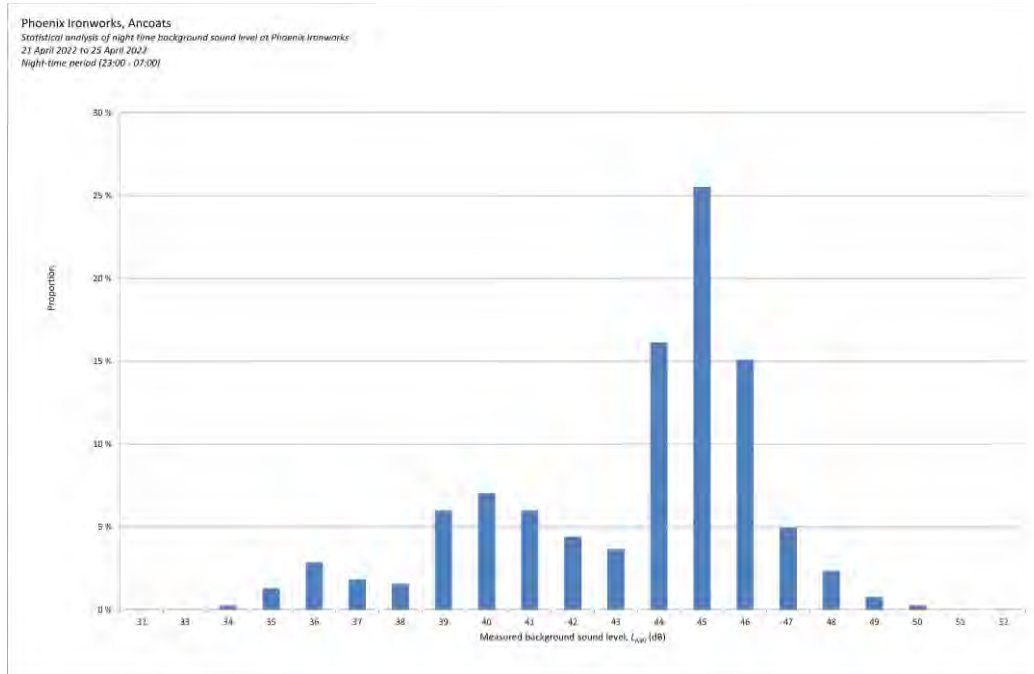


Figure 8 Histogram showing background noise levels during the night-time (23:00 - 07:00)

Based on the above statistical analysis, the typical background noise levels are L_{A90} 47 dB during the day, and L_{A90} 40 dB during the night-time.

6.2.2 Unattended measurement results – previous survey

A graph showing the results of the unattended measurements is provided in Appendix B.

Day and night-time ambient noise levels measured during the unattended survey are presented in Table 4

Table 4 Ambient noise levels measured during the unattended survey at position A (Jersey St)

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Friday 3 September 2021	-	45
Saturday 4 September 2021	52	45
Sunday 5 September 2021	50	47
Monday 6 September 2021	54	45
Average	53	46

Table 5 Ambient noise levels measured during the unattended survey at position B (Poland St)

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Wednesday 25 August 2021	-	45
Thursday 26 August 2021	56	47
Friday 27 August 2021	54	45
Saturday 28 August 2021	50	46
Sunday 29 August 2021	53	47
Monday 30 August 2021	52	47
Average	53	46

Analysis of night-time maximum noise levels indicates that the night-time maximum noise level not normally exceeded 15 times a night is L_{AFmax} 70 dB for both positions, both during and after Covid-19 restrictions.

In line with BS 4142:2014+A1:2019, representative background sound levels have been determined using statistical analysis of the continuous measurements.

Daytime and night time statistical analysis of representative values for the site are given below.

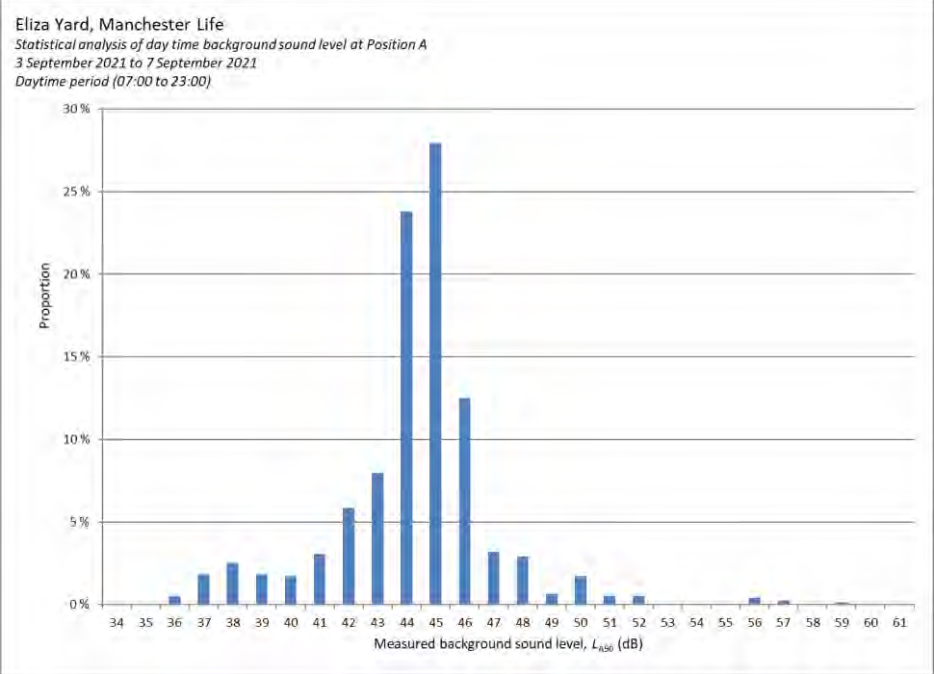


Figure 9 Histogram of daytime background noise levels at position A (Jersey St) in the free field

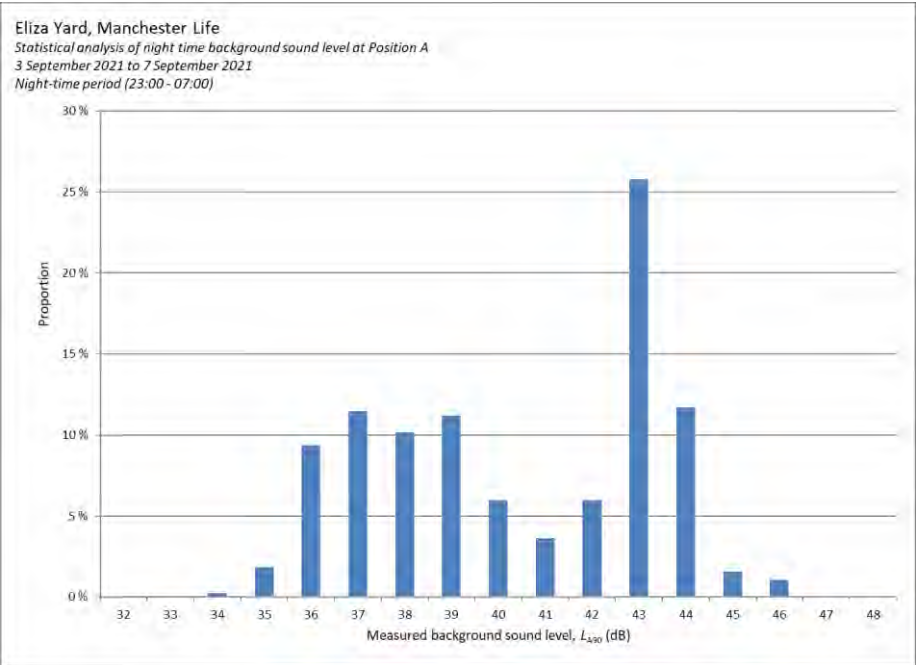


Figure 10 Histogram of night-time background noise levels at position A (Jersey St) in the free field

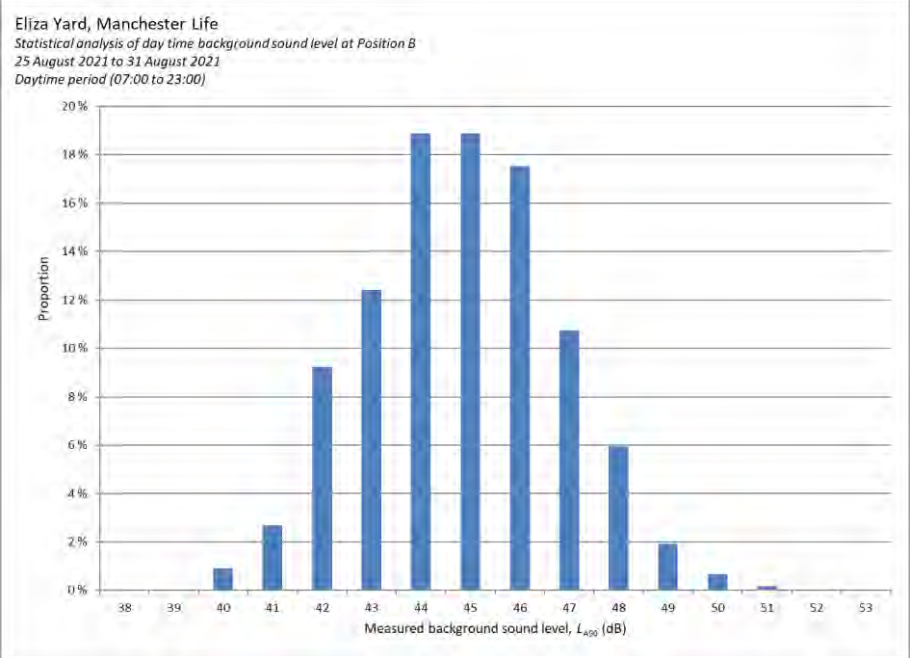


Figure 11 Histogram of daytime background noise levels at position B (Poland St) at the facade

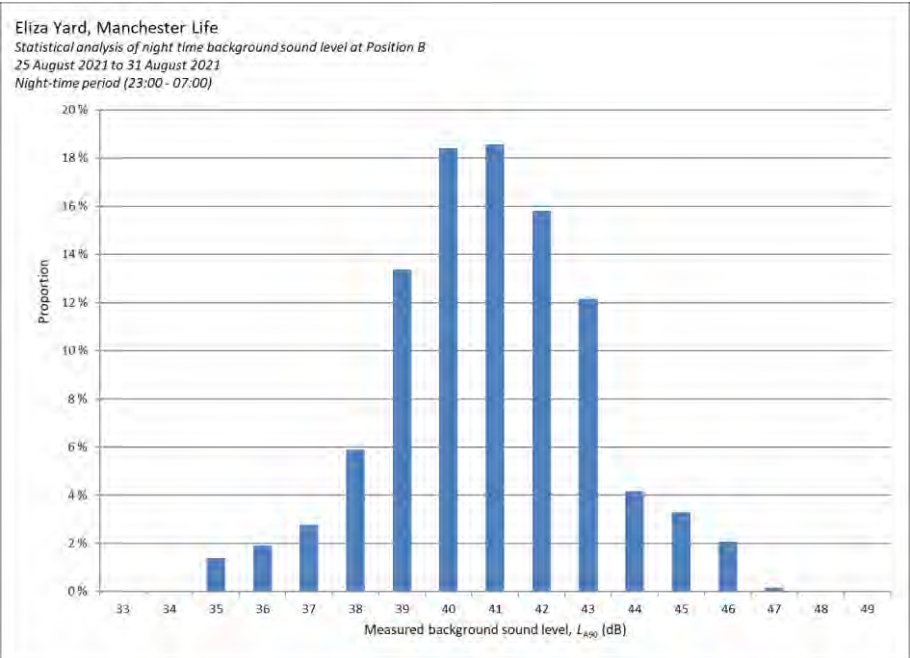


Figure 12 Histogram of night-time background noise levels at position B (Poland St) at the facade

Based on the above levels, the representative background noise levels measured during all surveys are as follows:

- Jersey Street (free field)
 - L_{A90} 42 dB daytime (L_{A90} 45 dB equivalent facade level)
 - L_{A90} 36 dB night-time (L_{A90} 39 dB equivalent facade level)
- Poland Street (facade)
 - L_{A90} 44 dB daytime
 - L_{A90} 39 dB night-time

6.2.3 Attended measurement results

Noise levels and key sources recorded during the attended measurements are summarised in Table 6. These were carried out 1 m from the building facades.

Table 6 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
1	13:00	62	78	52	Ambient and maximum noise levels dominated by occasional traffic on Radium Street, with a high percentage of heavy works and delivery vehicles.
	13:10	64	80	53	
	13:15	60	74	52	
	13:20	64	84	51	
	13:25	62	81	49	Traffic on Naval Street and Jersey Street was audible, but much less dominant.
	13:30	59	77	49	
	13:35	61	79	49	Distant construction works contributed to the background noise intermittently prior to 13:45
	13:40	61	76	49	
	13:45	60	79	49	Traffic noise from Oldham Road was minor.
	13:50	62	79	49	
2	13:55	60	77	50	Keg delivery to adjacent warehouse 13:20
					Dogs barking 13:28
	14:05	65	75	52	Frequent vehicle movement on Jersey and Radium Streets was
	14:10	65	78	50	

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
	14:15	62	76	50	dominant.
	14:20	62	74	49	Pedestrian chatter from outside takeaway.
	14:25	64	78	53	School break time audible
	14:30	67	88	54	during lull in traffic 14:15

7 Operational noise egress

7.1 Limits

Based on the above criteria and the measurement results, the cumulative noise level from the operation of all new plant should not exceed the limits set out in Table 7.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels.

Table 7 Plant noise limits at 1 m from the nearest noise sensitive premises

Location	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)	
	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Proposed residential accommodation on Eliza Yard	40	34
Residential premises at Flint Glass Wharf, New Little Mill	40	34
Residential premises at NQ4 building, Naval Street and Loom Street	42	35
Flint Glass Works, 62-64 Jersey St, Beehive Mill	40	-

The limits set out above do not include any attention catching features. Penalty corrections for attention catching features may be significant and will need to be considered in line with BS4142 as the building services design progresses.

7.1 Emergency plant limits

Relaxations of 10 dB over the limits above may be considered for emergency plant items operating for a short period, as accepted on other projects in Manchester. It is proposed that this be adopted for the emergency generator, subject to agreement with Manchester City Council.

7.2 Assessment

All building services plant will be designed to achieve the noise limits set out above, including any corrections for attention catching features. At this stage, no information is available in relation to the proposed plant. This will need to be assessed as the design progresses.

7.3 Operational noise

7.3.1 *Commercial spaces*

It is recommended that deliveries and collections to the commercial units be limited to be daytime only to minimise the risk of noise disturbance.

The commercial units are expected to be for a variety of uses, including workspaces and retail, with the potential for restaurant or cafe uses. As such operational noise egress due to background music or patrons within the units is likely to be sufficiently controlled to minimise disturbance to surrounding noise sensitive receptors and apartments above.

The proposed sound insulation performance of the floor between the commercial spaces and the apartments above is $D_{nT,w}+C_{tr}$ 53 dB, which is to be achieved with a 250 mm solid concrete slab. If a tenant wishes to generate high operational noise levels, they would be required to carry out sound insulating works to avoid disturbance to other occupants of the building. Measures would typically include installation of sound insulating ceilings and formation of external lobbied doors. These mitigation measures would need to be confirmed with Manchester City Council.

7.3.2 *Residential amenity*

The residential amenity area may wish to utilise amplified sound. This needs to be controlled to ensure the following:

- Noise breakout due to this is controlled to meet with the requirements of Manchester City Council.
- Noise transfer to adjacent internal areas of the development does not cause disturbance.

7.3.3 Breakout criteria

Manchester City Council require amplified sound egress to be 10 dB below the typical background noise level in octave bands outside the nearby noise sensitive premises. These limits are provided below based on the noise survey data:

Table 8 Maximum amplified sound egress limits

Period	Maximum sound pressure level at 1m from noise sensitive premises (dB)						
	Octave-band centre frequency (Hz)						
	63	125	250	500	1k	2k	4k
Daytime (07:00-23:00)	37	33	30	28	26	16	6
Night (23:00-07:00)	35	30	26	24	21	12	3

Amplified sound breakout outside the nearest apartment windows within the development shall be no higher than 5 dB above these limits, capped at 52 dB at 63Hz and 46 dB at 125 Hz.

7.3.4 Transfer criteria

Amplified sound transfer from the residential amenity space or commercial areas to adjacent apartments shall be controlled to meet NR 15 ($L_{eq,5mins}$).

7.3.5 Guidance on maximum internal amplified sound levels

Maximum internal amplified sound limits will need to be set in the residential amenity space and commercial units using electronic limiters to ensure that the amplified sound egress limits are not exceeded. These should be set following pre-completion testing to establish the sound insulation provided.

Based on the proposed minimum standards of sound insulation for the floor and facades, and the proposed breakout/transfer criteria, guidance on maximum amplified sound limits in these areas.

Table 9 Guidance on maximum amplified sound limits in residential amenity area and commercial units

Period	Guidance on maximum internal sound pressure levels $L_{eq,5mins}$ (dB)						
	Octave-band centre frequency (Hz)						
	63	125	250	500	1k	2k	4k
Daytime (07:00-23:00)	70	75	69	73	79	82	74
Night-time (23:00-07:00)	70	75	67	68	79	82	74

7.3.6 Loading bay noise egress

Loading bay noise egress will be controlled through the management of hours of operation and through the selection of quietly operating doors, to reduce noise when opening and closing.

8 Facade sound insulation – noise ingress

This section describes an assessment of facade sound insulation to control noise ingress. The required facade specification largely depends on the external noise levels and the internal noise criteria.

The following assessment is based on achieving the internal noise levels recommended in BS 8233 and by MCC, which are set out in Section 4.4.

8.1 External noise levels

A computer model of the site and its surrounding has been built using CadnaA software by Datakustik, with the purposes of calculating the external noise levels at the different facades of the proposed development based on the results of the environmental noise surveys.

The 3D acoustic model has been built using the architectural layouts and elevations dated 8 February 2023.

The software carries out calculation using a ray tracing technique. This takes into account the effects to topography, reflections, screening and distance attenuation for noise sources to predict noise levels in three dimensions. Calculations are carried out in accordance with ISO 9613 *Attenuation of sound during propagation outdoors*.

Eliza Yard and Jersey Wharf are proposed developments further down Jersey Street and have been included in the model.

Images of the computer model are provided in Figure 13 and Figure 15.

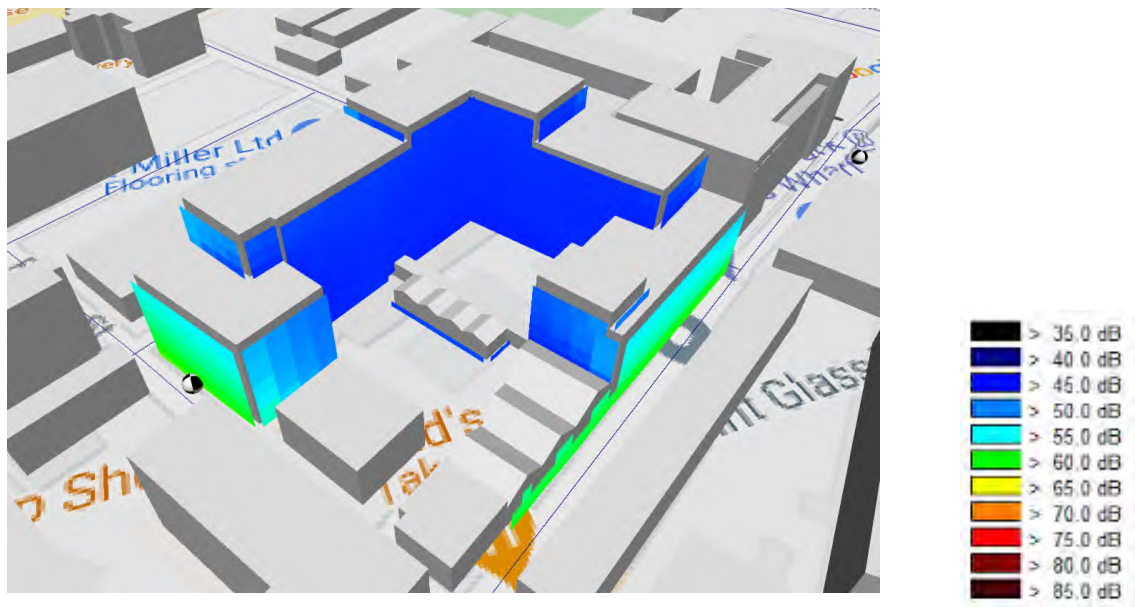


Figure 13 Screenshot of 3D environmental noise model – Predicted facade noise levels, daytime, L_{Aeq} (dB)

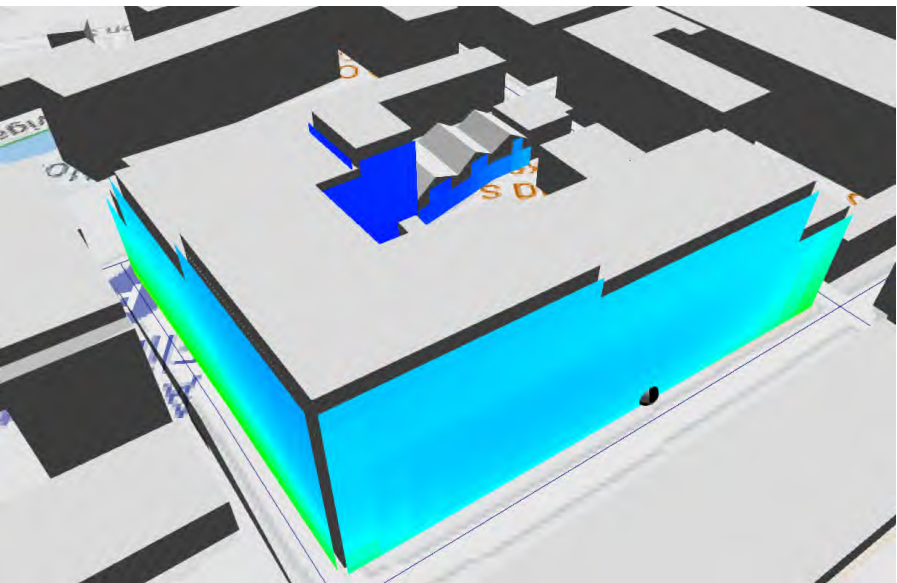


Figure 14 Screenshot of 3D environmental noise model – Predicted facade noise levels, daytime, L_{Aeq} (dB)

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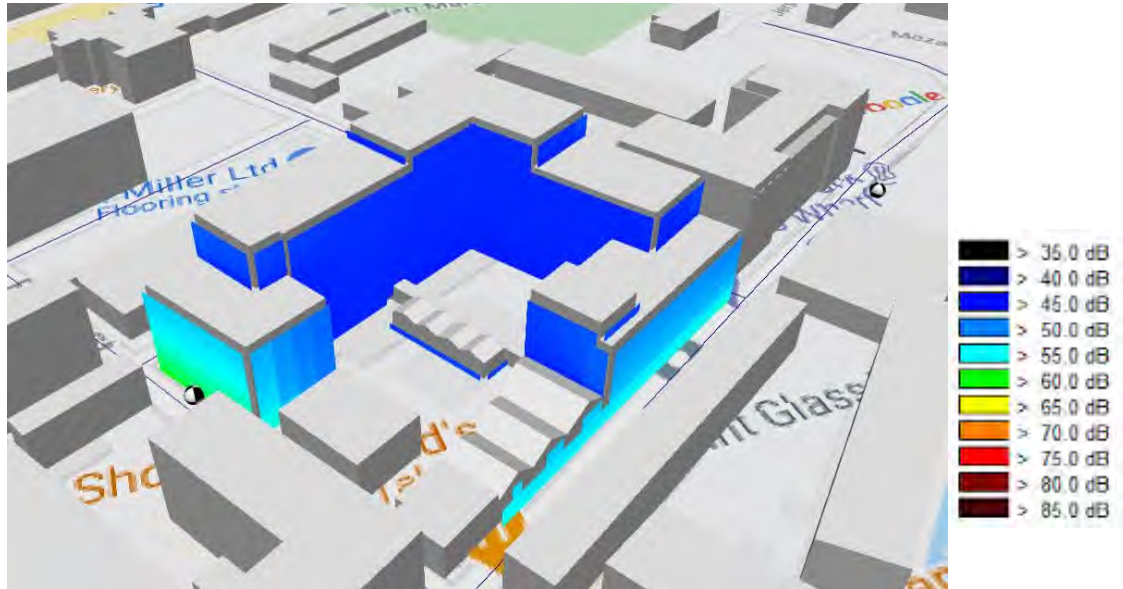


Figure 15 Screenshot of 3D environmental noise model – Predicted facade noise levels, night-time, L_{Aeq} (dB)

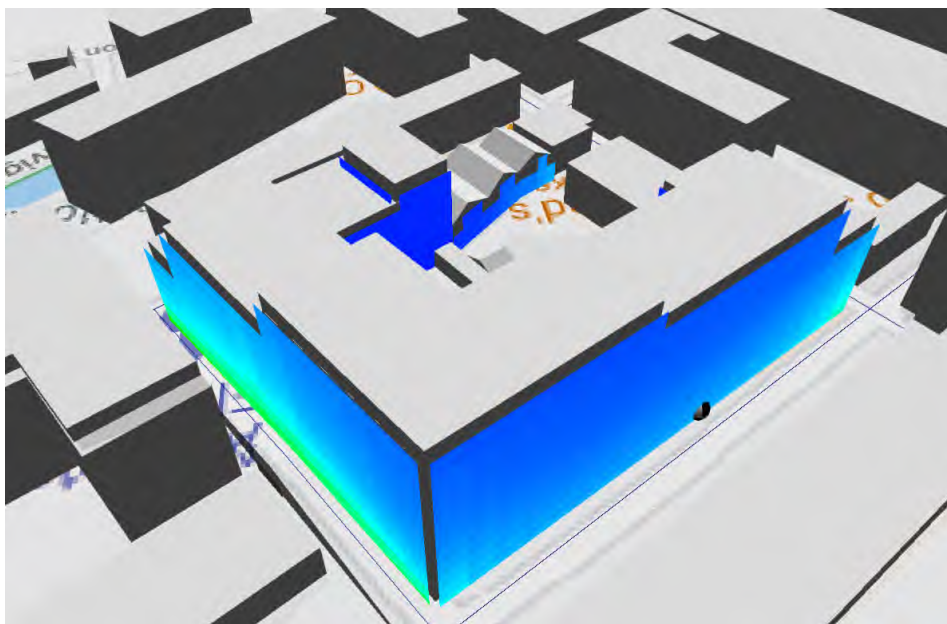


Figure 16 Screenshot of 3D environmental noise model – Predicted facade noise levels, night-time, L_{Aeq} (dB)

Façade zone markups are provided in Appendix C.

The council's proposed changes to the traffic flow have not been accounted for in the noise modelling given they are still under review and would not necessarily result in a simple change to noise levels across the site.

Table 10 Minimum overall facade noise levels

Facade zone	Facade noise level, L_{Aeq} (dB)
A 	59-60
B 	57-58
C 	53-56
D 	51-52
E 	≤50

Typical maximum facade noise levels not normally exceeded are L_{AFmax} 69 dB at Level 1 on Poland, Jersey and Radium Streets, decreasing by 1-2 dB per level, as shown in Table 11 below. The maxima are less than 15 dB greater than the average noise levels, and so the average noise levels drive the facade specification.

Table 11 Summary of variation in typical maximum noise levels with height

Floor level	Predicted night-time maximum, L_{Amax} (dB)
1	69
2	67
3	65
4	62
5	61
6	60
7	58
8	58
9	58

8.2 Facade sound insulation

Minimum overall facade sound insulation requirements for the facades, under the background ventilation condition are given in Table 12. These have been determined to achieve the internal noise criteria for bedrooms and living areas using the predicted external noise levels at the facades. The facade specification has been determined to ensure that $L_{AFmax 15 min}$ criteria is exceeded on no more than 10 occasions based on the worst affected night during the survey.

Due to the increased facade area and volume of the living rooms, the requirements are increased by 1 dB to ensure the internal levels are met. Bedroom requirements are driven by the night-time average levels.

Table 12 Minimum overall facade sound insulation requirements

Facade zone	Facade noise level, L_{Aeq} (dB)	Overall minimum sound insulation performance R'_w+C_{tr} (dB)	
		Living rooms	Bedrooms
A 	59-60	26	-
B 	57-58	24	28
C 	53-56	22	26
D 	51-52	19	22
E 	≤50	16	20

8.2.1 Guidance on facade construction, glazing and ventilation strategy

The solid facades should ideally provide a performance at least 10 dB greater than that of the windows. Based on the overall requirements, this would be R_w+C_{tr} 37-38 dB to be suitable for all façades, capable of being reduced on quieter facades.

This performance is expected to be achieved by the proposed facade constructions, currently brick and metal rainscreen cladding with internal linings. Proposals will need to be reviewed as the design develops.

The glazing is expected to be the main factor determining the sound insulation performance, though all performance requirements are expected to be achieved by default by 6 mm glass / 12 mm air gap / 6 mm glass standard thermal double glazing based on the proposed glazed areas to typical rooms.

Air supply and extract will be ducted through the facade for each apartment. This avoids use of facade trickle ventilators and optimises the sound insulation provided by the facade.

Each apartment is to have independent mechanical ventilation with heat recovery unit (MVHR) by supply and extract heat recovery equipment in accordance with Approved Document F, Table 5.16.

Noise break-in via the ductwork will also need to be controlled. This will be achieved by the use of sound insulating ceilings and duct attenuators.

8.3 Overheating

Approved Document O 2021 relates to overheating and sets out requirements for internal noise levels in bedrooms during the night, and therefore takes precedence over *Acoustics*

Ventilation and Overheating, Residential Design Guide (AVO guide). For living rooms during the day, the AVO guide will be used to inform the advice provided.

As discussed above, general ventilation is proposed to be provided by MVHR units to each apartment. When required, it is proposed that overheating be alleviated by use of opening tilted windows to provide additional ventilation. The windows can be adjusted so that they are slightly open to provide trickle ventilation or fully open to provide maximum ventilation.

8.3.1 Approved Document O assessment

The ANC *Guide to demonstrating compliance with noise requirements of Approved Document O* suggests the noise attenuation from free field noise levels provided by an open window would be approximately 4 dB in high-risk areas with an openable free area greater than 13%, and approximately 9 dB elsewhere.

This site is not understood to be in a high-risk area, as such, 12 dB from facade values has been used to assess noise ingress (ie 9 dB from free field values corrected by 3 dB). ADO suggests that windows are likely to be closed during sleeping hours if noise within bedrooms exceeds L_{Aeq} 40 dB average over 8 hours, or L_{AFmax} 55 dB more than 10 times a night.

Table 13 Predicted night-time internal noise levels assessed under ADO

Facade zone	Predicted worst-case night-time internal noise level, L_{Aeq} (dB)
A 	48
B 	46
C 	44
D 	40
E 	38

The ADO assessment indicates that openable windows to control overheating during the night would only be acceptable for average noise levels in facade zones D and E.

Internal night-time maximum noise levels on all roads except Naval Street are expected to be L_{Amax} 57 dB at Level 1, decreasing by 1-2 dB per level. Maximum internal noise levels are expected to be in line with ADO criteria from Level 2 and above, and for all courtyard apartments. As such, for overheating to be suitably controlled using openable windows, they would need to be both:

- in facade zone E and
- either
 - higher than level 2, or
 - facing the inner courtyard.

Enhanced MVHR units are proposed as a method of controlling overheating to bedrooms especially.

8.3.2 AVO assessment

Appendix C of the AVO guide provides the following alternative information for the attenuation from open windows based on a field study in Switzerland:

They measured (free-field) outside-to-inside level differences of $10.0 \pm 2.9\text{dB}$ for open windows and $15.8 \text{ Open} \pm 2.7\text{dB}$ for tilted windows. A value of 13dB is consistent with a situation between 'open' and 'tilted'.

Calculated internal noise levels shown in Table 14 are based on a free-field outside to inside level difference insulation of 13 dB. A variation of ± 3 dB has been considered to allow for adjustment of window openings – ie a worst-case reduction from free field levels of 10 dB.

Table 14 Predicted daytime internal noise levels with openable windows assessed under AVO

Facade zone	Predicted daytime internal noise level with open window, L_{Aeq} (dB)
A 	47
B 	45
C 	43
D 	39
E 	37

Table 3-3 of the AVO guide provides examples of outcomes for internal ambient noise levels. This is shown below. The predicted levels with windows open are all lower than the daytime upper limits of $L_{Aeq,16hrs}$ 50 dB, though only the quietest areas of facade zone E would be below the lower threshold of L_{Aeq} 35 dB.

It should be noted that the noise levels on Poland Street are due in a large part to noise from plant associated with the industrial units, which is not within the explicit scope of the AVO guidance, though is still considered for Approved Document O.

The AVO guidance states “At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time”. An overheating assessment has been carried out to assess the duration of time that open windows will be required. This has determined that the overheating condition is expected to occur at the following rates for the assessed living rooms:

- Jersey Street 75-77%
- Radium Street 75-85%
- Poland Street 70%

- Naval Street 68%

Enhanced MVHRs are proposed to reduce the duration of time that open windows are required. The graphs for the standard condition are provided in Appendix D.

9 Conclusion

A noise survey has been carried out to support the proposed development of Phoenix Ironworks, Ancoats, Manchester. Key noise sources at the site were noted as traffic and pedestrians on Jersey Street, Radium Street and Naval Street. Less significant noise sources included occasional distant construction works and traffic on Oldham Road.

Measured average ambient noise levels were L_{Aeq} 51 dB during the day and L_{Aeq} 48 dB during the night. The typical background sound levels measured during the survey were L_{A90} 47 dB during the daytime and L_{A90} 40 dB at night.

The data collected has been used to determine appropriate plant noise egress limits and sound insulation requirements for the building envelope.

Appendix A

Survey details

Equipment

The unattended and attended noise measurements were both taken using Rion NL-52 sound level meters.

Calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	NL-52/00932326	Rion	16 Mar 23	TCRT21/1182
Microphone	UC-59/05549	Rion	16 Mar 23	TCRT21/1182
Pre-amp	NH-25/32354	Rion	16 Mar 23	TCRT21/1182
Calibrator	NC-74/34125432	Rion	16 Mar 23	TCRT21/1181
Sound level meter	NL-52/01143564	Rion	15 Dec 22	TCRT20/1738
Microphone	UC-59/10153	Rion	15 Dec 22	TCRT20/1738
Pre-amp	NH-25/43581	Rion	15 Dec 22	TCRT20/1738
Calibrator	NC-74/34257023	Rion	14 Dec 22	TCRT20/1736

Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meters used in this survey are available upon request.

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey. No significant calibration deviation occurred.

Noise indices

Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures*.

Weather conditions

During the attended noise measurements, the weather was generally clear, dry and no rain occurred. Wind speeds were measured at each position and were within suitable parameters for the measurement of environmental noise (i.e. generally under 5 ms^{-1}).

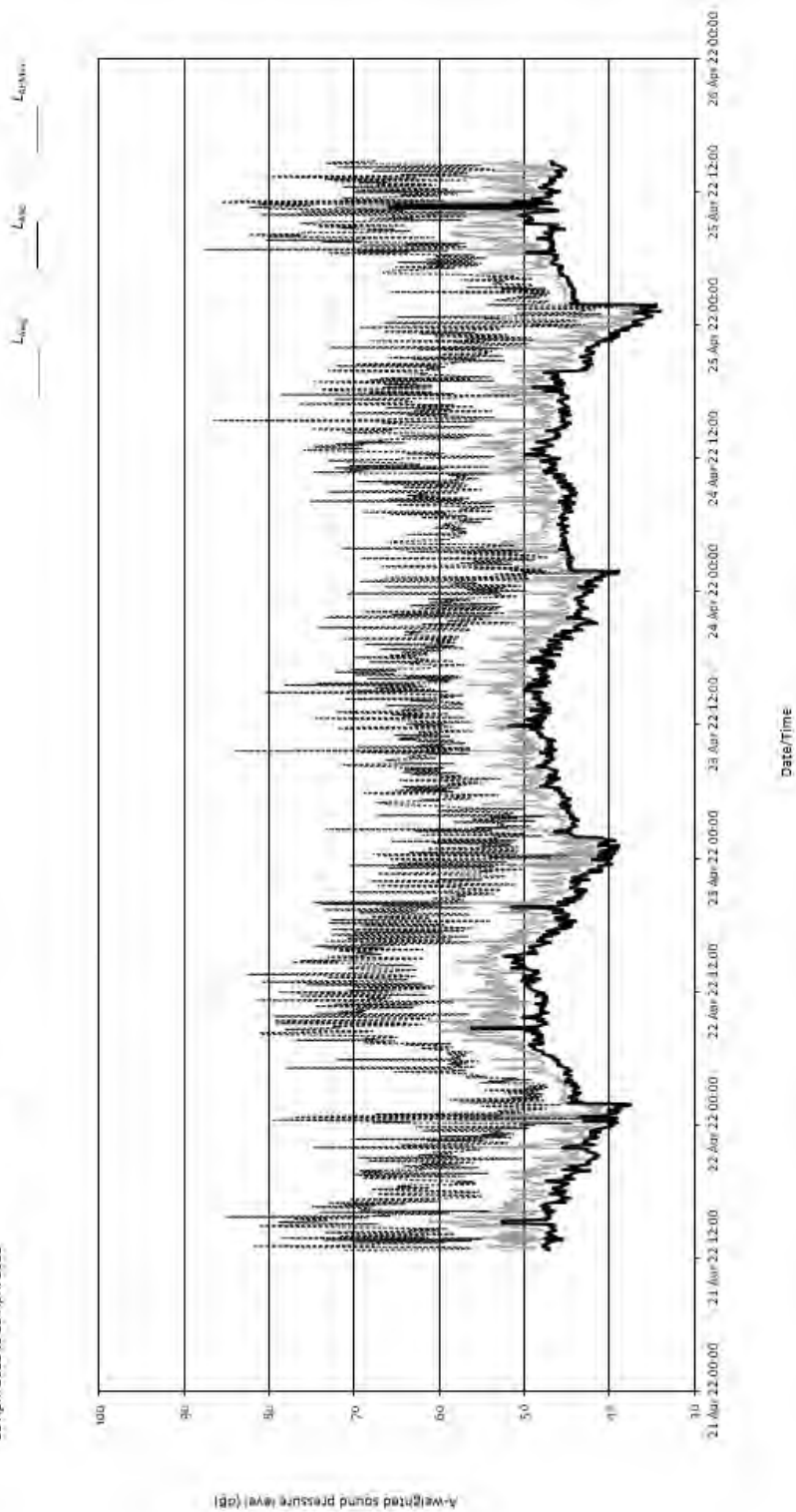
During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 4°C at night and 17°C during the day, and the wind speed was less than 5 m/s .

These weather conditions are considered suitable for obtaining representative measurements.

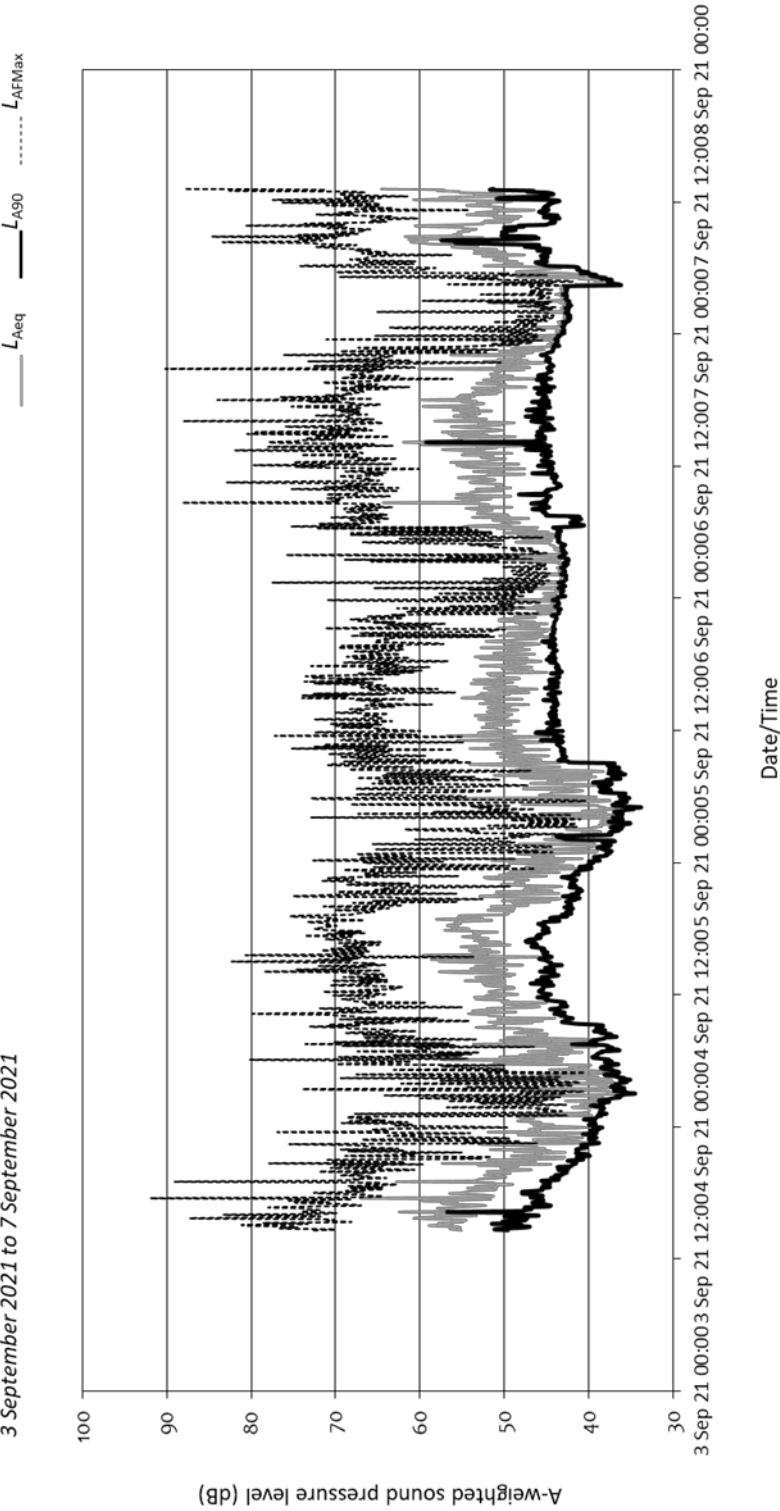
Appendix B

Results of unattended measurements

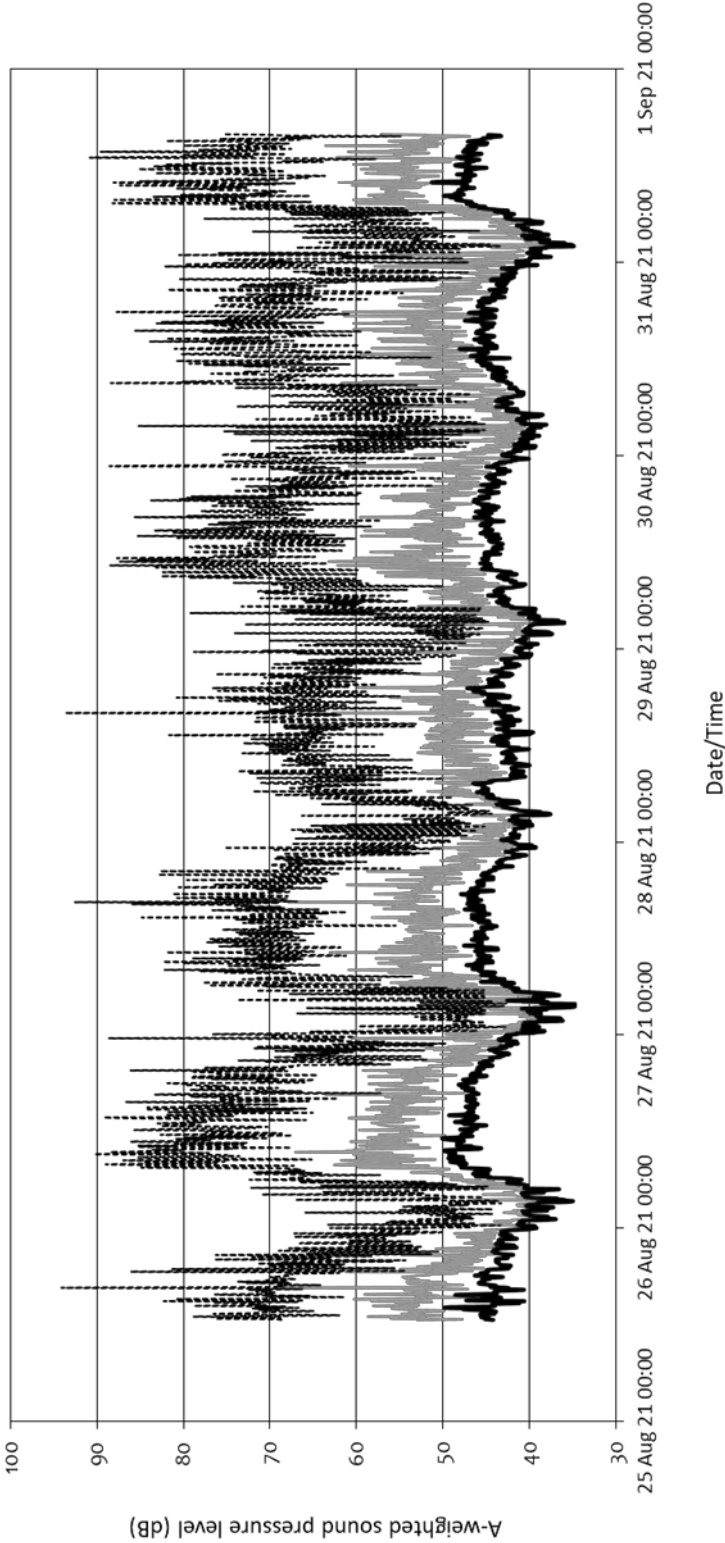
Phoenix Ironworks, Ancoats
Results of noise logging survey at Phoenix Ironworks
21 April 2022 to 25 April 2022



Eliza Yard, Manchester Life
Results of noise logging survey at Position A (Jersey Street)
3 September 2021 to 7 September 2021



Eliza Yard, Manchester Life
Results of noise logging survey at Position B (Poland Street)
25 August 2021 to 31 August 2021



Appendix C

Facade noise level markups



South Elevation_ Jersey Street
SCALE: 1:200



North Elevation_ Naval Street
SCALE: 1 : 200



East Elevation_ Poland Street
SCALE: 1 : 200



West Elevation _ Radium Street
SCALE: 1 : 200

Title	Predicted external facade noise level mark-ups (Daytime)
Project	Phoenix Ironworks (Plot A), Manchester Life
Project no.	22132
Version	C
Marked-up by	Daniel Shaw
Reviewed by	James Atha
Date	20 March 2023

Mark-up key

A - L_{Aeq} 59- 60 dB

B - L_{Aeq} 57-58 dB

C - L_{Aeq} 53-56 dB

D - L_{Aeq} 51-52 dB

E - L_{Aeq} ≤50 dB

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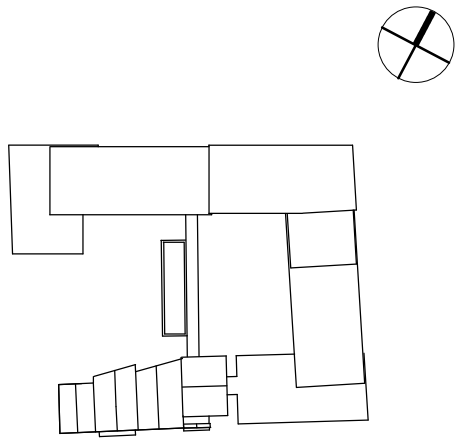
Consultants in Acoustics, Noise & Vibration

P5	25/01/22	elevations	JU	MP
P4	12/09/22	Updated to show existing buildings	RB	MP
P3	09/09/22	Issued for stage 2 design freeze	RB	MP
P2	26/08/22	Issued for Market Testing	ER	MP
P1	15/08/22	Issued for Information		

REV	DATE	DESCRIPTION	DRN	CHK

☐ METAL FACADE

KEY PLAN



PROJECT

Phoenix Ironworks
Jersey Street,
Ancots

CLIENT

MLDC3 Ltd.
Unit 5,
Royal Mill,
17 Redhill Street,
M4 5BA



ARCHITECT

CALLISONRTKL™
CallisonRTKL Ltd.
Suite 12A
Manchester One
Portland Street
Manchester
M1 3LF

SHEET IDENTIFICATION

TITLE
WEST & EAST ELEVATIONS

STATUS

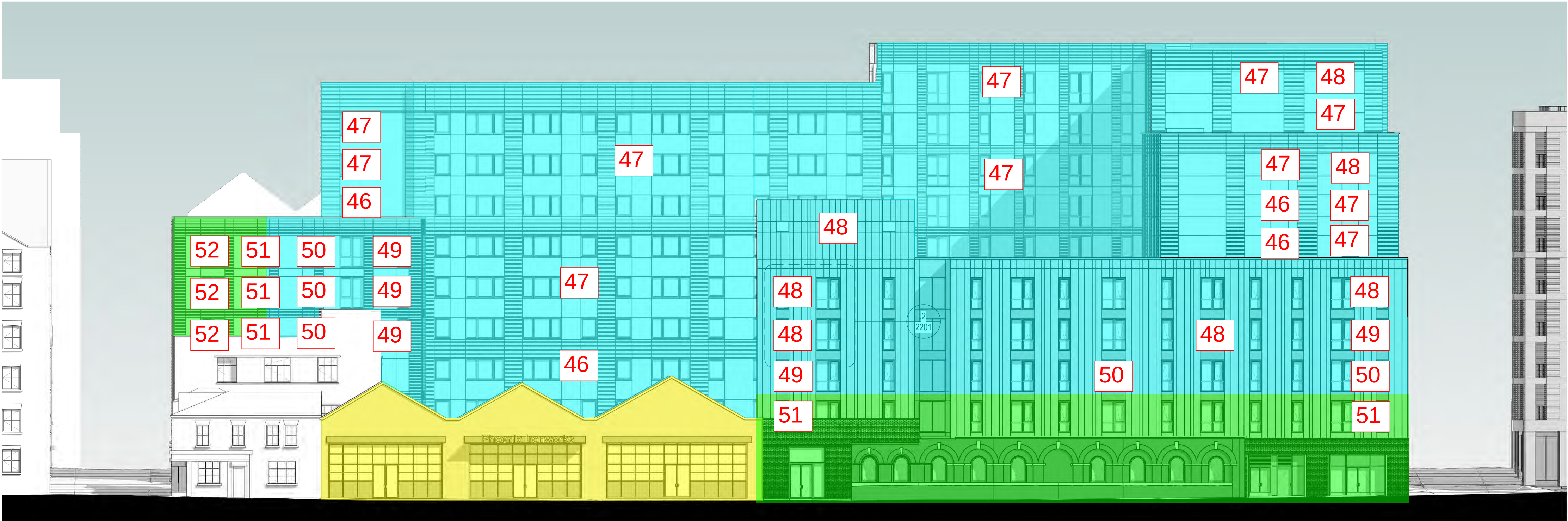
STAGE 3

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SUITABILITY CODE	DATE DRAWN: 11/04/22
REVISION	DRAWN BY: CRTKL
P6	CHECKED BY: MP

PROJECT ORGN ZONE LEVEL TYPE ROLE NUMBER
PIW - CRL - ZZ - ZZ - DR - AR - 2002

Title	Predicted external facade noise level mark-ups (Night-time)
Project	Phoenix Ironworks (Plot A), Manchester Life
Project no.	22132
Version	C
Marked-up by	Daniel Shaw
Reviewed by	James Atha
Date	20 March 2023
Mark-up key A - L_{Aeq} 59- 60 dB B - L_{Aeq} 57-58 dB C - L_{Aeq} 53-56 dB D - L_{Aeq} 51-52 dB E - L_{Aeq} ≤50 dB	
SANDY BROWN Consultants in Acoustics, Noise & Vibration	

P4	12/09/22	Issued for design freeze	RB	MP
P3	09/09/22	Issued for stage 2 design freeze	RB	MP
P2	26/08/22	Issued for Market Testing	ER	MP
P1	15/08/22	Issued for Information		
REV	DATE	DESCRIPTION	DRN	CHK
KEY PLAN				
PROJECT				
Phoenix Ironworks				
Jersey Street, Ancoats				
CLIENT				
MLDC3 Ltd. Unit 5, Royal Mill, 17 Redhill Street, M4 5BA				
ARCHITECT				
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CallisonRTKL Ltd. Suite 12A Manchester One Portland Street Manchester M1 3LF				
SHEET IDENTIFICATION				
TITLE				
NORTH & SOUTH ELEVATIONS				
STATUS				
STAGE 3				
PROJECT NUMBER				
058-210006				
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As indicated				
DATE DRAWN:				
11/04/22				
DRAWN BY:				
CRTKL				
CHECKED BY:				
MP				
PROJECT ORIGIN				
PIW - CRL - ZZ - ZZ - DR - AR - 2001				



South Elevation_ Jersey Street
SCALE: 1:200



North Elevation_ Naval Street
SCALE: 1:200



East Elevation_ Poland Street
SCALE: 1 : 200



West Elevation _ Radium Street
SCALE: 1 : 200

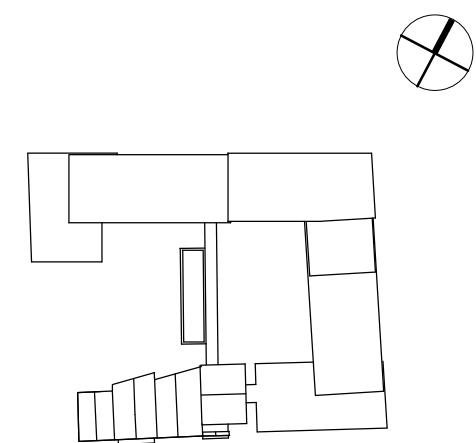
Title	Predicted external facade noise level mark-ups (Night-time)
Project	Phoenix Ironworks (Plot A), Manchester Life
Project no.	22132
Version	C
Marked-up by	Daniel Shaw
Reviewed by	James Atha
Date	20 March 2023
Mark-up key A - L_{Aeq} 59-60 dB B - L_{Aeq} 57-58 dB C - L_{Aeq} 53-56 dB D - L_{Aeq} 51-52 dB E - L_{Aeq} ≤50 dB	
SANDY BROWN <i>Consultants in Acoustics, Noise & Vibration</i>	

P6	29/01/22	elevations	JU	MP
P4	12/09/22	Updated to show existing buildings	RB	MP
P3	09/09/22	Issued for stage 2 design freeze	RB	MP
P2	26/08/22	Issued for Market Testing	ER	MP
P1	15/08/22	Issued for Information		

REV	DATE	DESCRIPTION	DRN	CHK

☐ METAL FACADE

KEY PLAN



PROJECT

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SHEET IDENTIFICATION

TITLE
WEST & EAST ELEVATIONS

STATUS

STAGE 3

PROJECT NUMBER
058-210006

SCALE @ A1: **As indicated**

DATE DRAWN: **11/04/22**

SUITABILITY CODE

DRAWN BY: **CRTKL**

REVISION **P6** CHECKED BY: **MP**

PROJECT ORIGIN ZONE LEVEL TYPE ROLE NUMBER
PIW - CRL - ZZ - ZZ - DR - AR - 2002

Appendix D

TM-59 Assessment from Buro Happold



Room Legend

- 1B2P
- 2B4P
- 3B6P

Radium Street
3B6P A

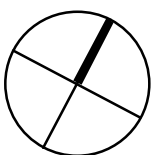
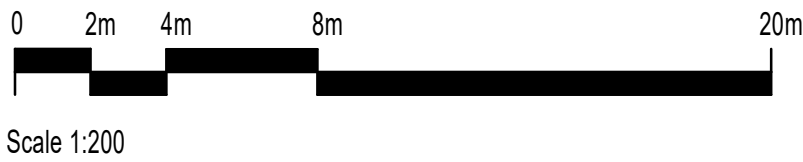
Naval Street
2B4P H

Poland Street
1B2P B
(Levels 1-7)

Jersey Street
2B4P C

Day Time - AVO
Compliance Review
29/03/23
Based on Sandy Brown
design note issued
28/03/23

GA - Level 03
SCALE: 1 : 200



GENERAL NOTES

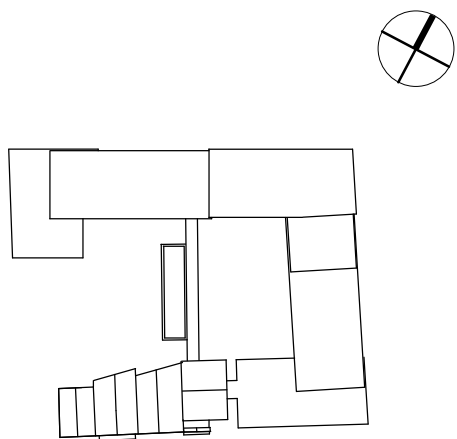
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REV	DATE	DESCRIPTION	DRN	CHK
P7	23/02/23	Stage 3 Revision	JO	MP
P6	08/02/23	Frozen Stage 3	JO	MP
P5	23/09/22	Issued for Stage 2	JO	MP
P4	09/09/22	Issued for stage 2 design freeze	RB	MP
P3	26/08/22	Issued for Market Testing	ER	MP
P2	15/08/22	Issued for Information		
P1	18/07/22	First Issue		

KEY PLAN



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Level 03 GA

STATUS

STAGE 3

PROJECT NUMBER 058-210006	SCALE @ A1: 1 : 200
SUITABILITY CODE S3	DATE DRAWN: 06/04/22
REVISION P7	DRAWN BY: JO
	CHECKED BY: MP

PROJECT ORIGIN ZONE LEVEL TYPE ROLE NUMBER
PIW - CRL - ZZ - 03 - DR - AR - 1203

