

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Eliza Yard, Back of Ancoats

Planning noise report

London, Manchester, Edinburgh, Birmingham, Belfast Leeds

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A	12 Feb 24		Thomas Dent	James Atha
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Summary

Sandy Brown has been commissioned by John Sisk & Son Ltd to provide an assessment of noise in relation to the proposed new build Manchester Life development at Eliza Yard, at the corner of Jersey Street and Poland Street in Manchester.

Planning permission has been previously granted under application number 130354/FO/2021. This report presents updated planning noise assessments following minor updates to the scheme.

Unattended noise monitoring has been previously carried out around the site as follows:

- between 25 February and 4 March 2021
- between 25 August and 7 September 2021.

Attended noise measurements have also been previously carried out on 6 August 2020, 10 August 2020, 5 March 2021 and 9 September 2021.

Representative background sound levels measured during the survey were:

- Jersey Street (free-field): $L_{A90,15min}$ 42 dB during the day, L_{A90} 36 dB at night
- Poland Street (facade): $L_{A90,15min}$ 44 dB during the day, L_{A90} 39 dB at night.

Based on the requirements of the Local Authority 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 the following limits:

- NSPs to the east and south: $L_{Aeq,15min}$ 40 dB during the day, $L_{Aeq,15min}$ 34 dB at night
- NSPs to the north and west: $L_{Aeq,15min}$ 39 dB during the day, $L_{Aeq,15min}$ 34 dB at night.

The limits to NSPs to the east and south have been corrected relative to the measured free-field background sound levels facing Jersey Street by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1).

If plant items contain tonal or attention catching features, a penalty based on the type and impact of those features will be applied, and the limits will be more stringent than those set.

The average ambient noise levels measured during the survey were $L_{Aeq,16h}$ 53-55 dB during the day and $L_{Aeq,8h}$ 46-51 dB at night. Predicted external ambient noise levels to apartments vary from L_{Aeq} 47 to 59 dB during the day and night.

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

Assessment of noise ingress via open windows during summer overheating conditions has been carried out using the Acoustics, Ventilation and Overheating (AVO) Guide. This assessment indicates no significant adverse effects.

There will be no amplified sound or music within the commercial units.

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1 Introduction

Sandy Brown has been commissioned by John Sisk & Son Ltd to provide an assessment of noise in relation to the proposed new build Manchester Life development at Eliza Yard, at the corner of Jersey Street and Poland Street in Manchester.

Planning permission has been previously granted under application number 130354/FO/2021. This report presents updated planning noise assessments following minor updates to the scheme.

Environmental noise surveys have been previously 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 (MCC).

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 MCC guidelines.

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

2 Site description

2.1 The site and its surroundings

The site location in relation to its surroundings is shown in Figure 1, highlighted in red.

The Site is bounded by Poland Street to the west, Jersey Street to the south, the City Court Trading Estate to the north, and a surface car park to the east.

The Site can be accessed by pedestrians and vehicles via Jersey Street.



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

2.2 Adjacent premises

The nearby premises are mixed use of residential and commercial units. A summary of the nearby premises is set out below in reference to Figure 1:

- Residential premises on Jersey St, Rodney St and Mozart Close to the north east (highlighted in brown)
- Residential premises at Flint Glass Wharf to the south west (highlighted in aqua blue)
- Residential premises at Canal Point, Navigation Street, Burgess House, Avro House and 3 New Union St to the south (highlighted in navy blue)
- Trading estate at City Court to the north (highlighted in orange)
- Flint Glass Works, 62-64 Jersey St understood to be commercial to the south west (highlighted in green)
- Warehouse at 66 Jersey St to the south (highlighted in yellow)
- Commercial area including site offices and depot to the west (highlighted in pink)
- Factories on George Leigh St and Naval St to the north west (highlighted in purple).

In addition to the above existing receptors, there is another Manchester Life residential development, Jersey Wharf (133769/FO/2022), proposed to the south of the site, across Jersey Street.

Phoenix Iron Works (137346/FO/2023) is a proposed development to the west of the site, across Poland Street.

3 Development proposals

The proposal comprises an 8 storey building forming 126 residential apartments and ground floor commercial and amenity spaces.

3.1 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, December 2023 (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, clause 191 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 clause 193 states:

'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 Noise egress

4.3.1 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.

4.3.2 Local Authority criteria

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

'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.'

4.3.3 Planning condition 16 of 130354/FO/2021

Planning permission has been previously granted under application number 130354/FO/2021.

Planning condition 16 of 130354/FO/2021 states:

(a) Prior to the first occupation of the development, details of any externally mounted ancillary plant, equipment and servicing shall be submitted for approval in writing by the City Council, as Local Planning Authority. For the avoidance of doubt, externally mounted 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.

(b) Prior to the first occupation of the development, a verification report will be required to validate that the work undertaken conforms to the recommendations and requirements approved as part of part (a) of this planning condition. The verification report shall include post completion testing to confirm the noise criteria has been met. In instances of non-conformity, these shall be detailed along with mitigation measures required to ensure compliance with the noise criteria. A verification report and measures shall be agreed until such a time as the development complies with part (a) of this planning condition.

Any mitigation measures shall be implemented in accordance with a timescale to be agreed with the City Council, as Local Planning Authority. Any measures shall thereafter retained and maintained in situ.

4.4 Noise ingress

4.4.1 British Standard guidance

Guidance on acceptable internal noise levels in residential dwellings is given in BS 8233:2014 *Sound insulation and noise reduction for buildings*. The guidance limits are shown in Table 1.

These internal levels are based on annual average data and do not have to be achieved in all circumstances. It is normal to exclude occasional events, such as fireworks night or New Year's Eve.

Table 1 Internal noise criteria for sleeping/resting

Internal space	Indoor ambient noise level, L_{Aeq} (dB)	
	Day (07:00 – 23:00)	Night (23:00 – 07:00)
Living rooms	35	-
Dining room	40	-
Bedrooms	35	30 ^[1]

^[1] BS 8233 notes that individual noise events can cause sleep disturbance, and that a guideline value may be set depending on the character and number of events per night, although no specific limit is provided. For regular events, such as scheduled aircraft or passing trains, a guideline value may be set in terms of SEL or $L_{Amax,F}$. Sporadic noise events could require separate values.

The standard states that 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, the standard 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.'

4.4.2 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.'

4.4.3 Local Authority requirements

MCC provides guidance in relation to noise ingress to residential properties in the *Planning and Noise Technical Guidance* document dated October 2022. It states the following noise limits:

- 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} .

These criteria are in line with BS 8233:2014 and ProPG.

4.4.4 Planning condition 18 of 130354/FO/2021

Planning permission has been previously granted under application number 130354/FO/2021.

Planning condition 18 of 130354/FO/2021 states:

'Notwithstanding the Acoustic Report by Sandy Brown stamped as received by the City Council, as Local Planning Authority, on the 11 May 2021, prior to the first occupation of the development a scheme for acoustically insulating the proposed residential accommodation against noise from the local traffic network shall be submitted for approval in writing by the City Council, as Local Planning Authority. The approved noise insulation scheme shall be completed before the first occupation of the development.'

Noise survey data must include measurements taken during a rush-hour period and night time to determine the appropriate sound insulation measures necessary. The following noise criteria will be required to be achieved:

Bedrooms (night time - 23.00 - 07.00) 30 dB L_{Aeq} (individual noise events shall not 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}

(b) Prior to the first occupation of the development, a verification report will be required to validate that the work undertaken conforms to the recommendations and requirements approved as part of part (a) of this planning condition. The verification report shall include post completion testing to confirm the noise criteria has been met. In instances of non-conformity, these shall be detailed along with mitigation measures required to ensure compliance with the noise criteria. A verification report and measures shall be agreed until such a time as the development complies with part (a) of this planning condition.

Any mitigation measures shall be implemented in accordance with a timescale to be agreed with the City Council, as Local Planning Authority, and thereafter retained and maintained in situ.'

4.4.5 Approved Document O – Overheating

MCC Planning and Noise Technical Guidance includes discussion on Approved Document O 2021 Edition (to the Building Regulations 2010) in relation to ventilation and overheating.

Since construction started before 15 June 2023, ADO2021 is not directly applicable for this development.

Approved Document O 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).'*

4.4.6 Acoustics, ventilation and overheating

MCC Planning and Noise Technical Guidance includes discussion on the Association of Noise Consultants Acoustics Ventilation and Overheating, Residential Design Guide (AVO Guide) relation to ventilation and overheating. The AVO guide is also referenced within ADO2021.

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		
	Day (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.

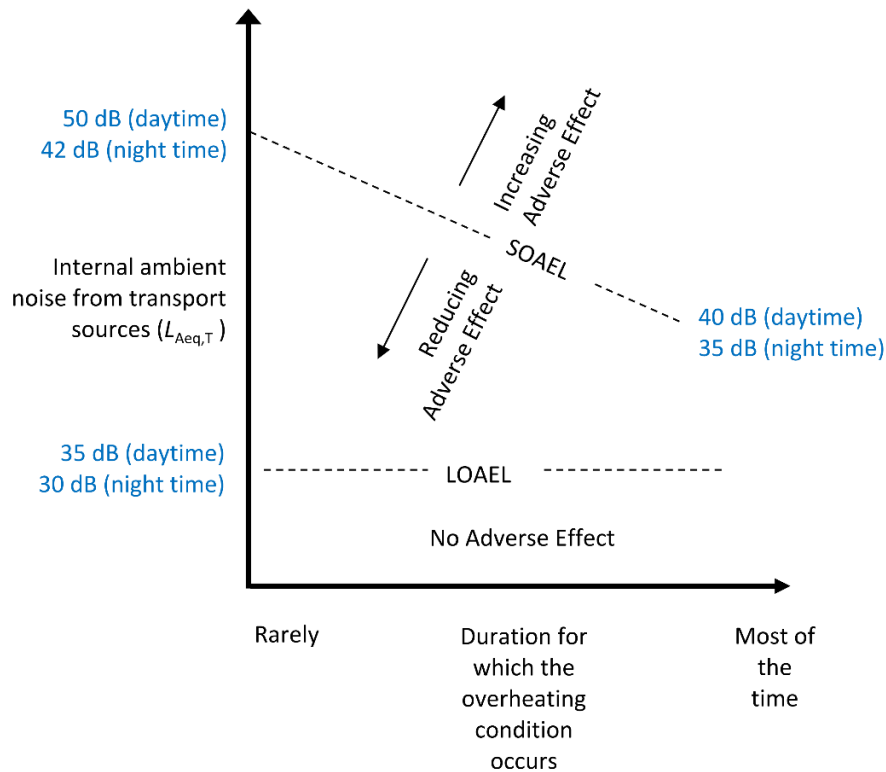


Figure 2 Internal ambient noise levels and increasing adverse effects for an overheating condition

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 Survey method

The survey included unattended and attended noise measurements.

5.1 Attended measurements

Attended sample measurements were taken by Christian Clark on 9 September 2021 at position 1, and by Jessica Wright on 6 August 2020 and Jessica Wright and Daniel Shaw on 10 August 2020 at all 4 positions around the site. These are indicated in Figure 1 as positions 1 to 4.

At each position 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 for positions 1-3 and at facade level at position 4. Details of the equipment used and the noise indices measured are provided in Appendix A.

Dominant noise sources occurring during the measurements were noted.

Photographs of the measurement positions are set out in Figure 3 to Figure 6 below.



Figure 3 Photograph of Positions 1



Figure 4 Photograph of Positions 2



Figure 5 Photograph of Position 3



Figure 6 Photographs of Positions 4

5.2 Unattended measurements

Unattended measurements were carried out during the following periods:

- between 25 February and 5 March 2021
- between 25 August and 7 September 2021.

Measurements were carried out at 2 locations around 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 7 and Figure 8.

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

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Figure 7 Photograph of measurement position A (Jersey Street)



Figure 8 Photograph of measurement position B (Poland Street)

5.1 Weather conditions

Weather conditions during the surveys are described in Appendix A.

6 Measurement results

6.1 Observations

The dominant noise sources observed at the site during the survey were from occasional road traffic noise and constant plant noise from the commercial unit site to the north (reference 4 in Figure 1).

Less significant noise sources included construction noise and distant plant noise from other locations.

6.2 Noise measurement results

6.2.1 Unattended measurement results

Graphs showing the results of the unattended measurements are provided in Appendix B.

Day and night ambient noise levels measured during the unattended surveys are presented in Table 3 to Table 6. All measurements presented below are raw values and do not include any corrections to estimate changes due to Covid-19 restrictions.

Table 3 Ambient noise levels measured during the unattended survey at position A (Jersey St) – during Covid pandemic-restrictions

Date	Day (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Thursday 25 February 2021	-	49
Friday 26 February 2021	55	52
Saturday 27 February 2021	53	48
Sunday 28 February 2021	55	51
Monday 1 March 2021	54	51
Tuesday 2 March 2021	56	50
Wednesday 3 March 2021	54	48
Thursday 4 March 2021	53	48
Average	55 ^[1]	50 ^[1]

^[1] Calculated from un-rounded values

Table 4 Ambient noise levels measured during the unattended survey at position A (Jersey St) – after lifting of Covid pandemic restrictions

Date	Day (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)– during Covid pandemic restrictions

Date	Day (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Thursday 25 February 2021	-	52
Friday 26 February 2021	54	52
Saturday 27 February 2021	52	49
Sunday 28 February 2021	49	50
Monday 1 March 2021	54	49
Tuesday 2 March 2021	54	50
Wednesday 3 March 2021	53	53
Average	53	51

Table 6 Ambient noise levels measured during the unattended survey at position B (Poland St) – after lifting of Covid pandemic restrictions

Date	Day (07:00 – 23:00)	Night (23:00 – 07:00)
	$L_{Aeq,16h}$ (dB)	$L_{Aeq,8h}$ (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 survey data indicates that the night 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.

Day and night statistical analysis of representative values for the site are given in Figure 9 to Figure 14.

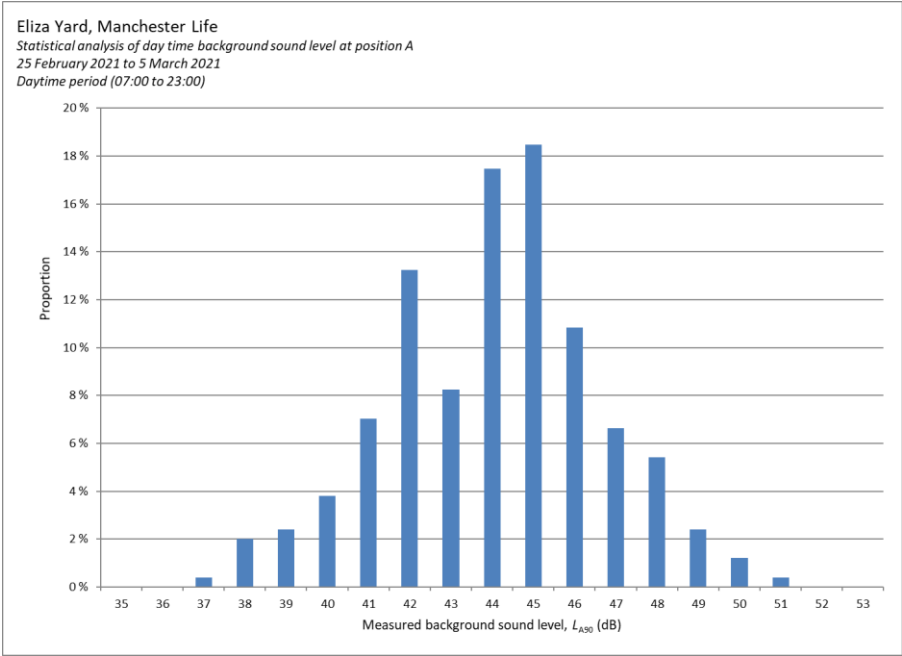


Figure 9 Histogram of day background noise levels at position A (Jersey St) in the free field – during Covid pandemic restrictions

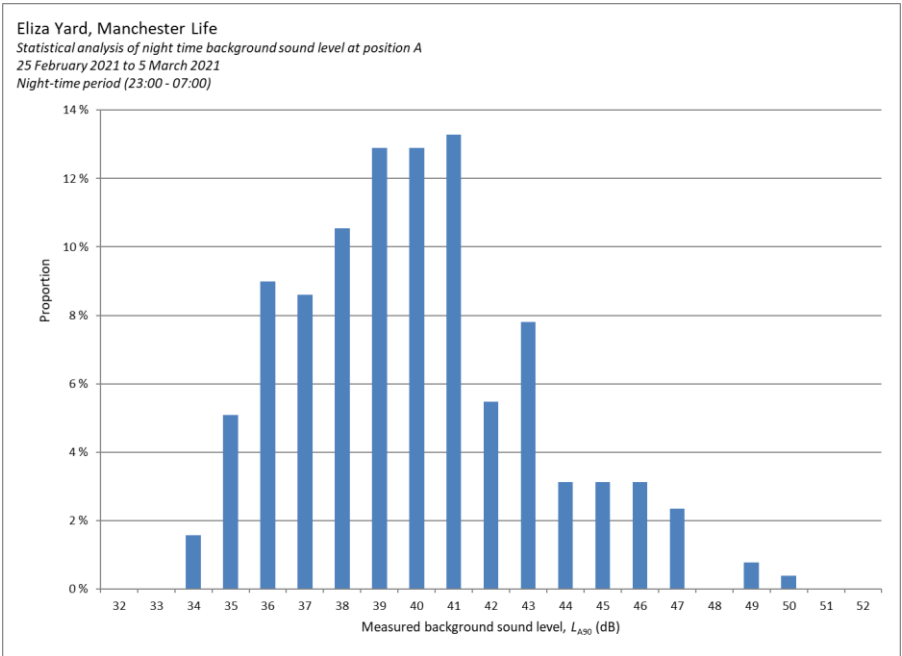


Figure 10 Histogram of night background noise levels at position A (Jersey St) in the free field – during Covid pandemic restrictions

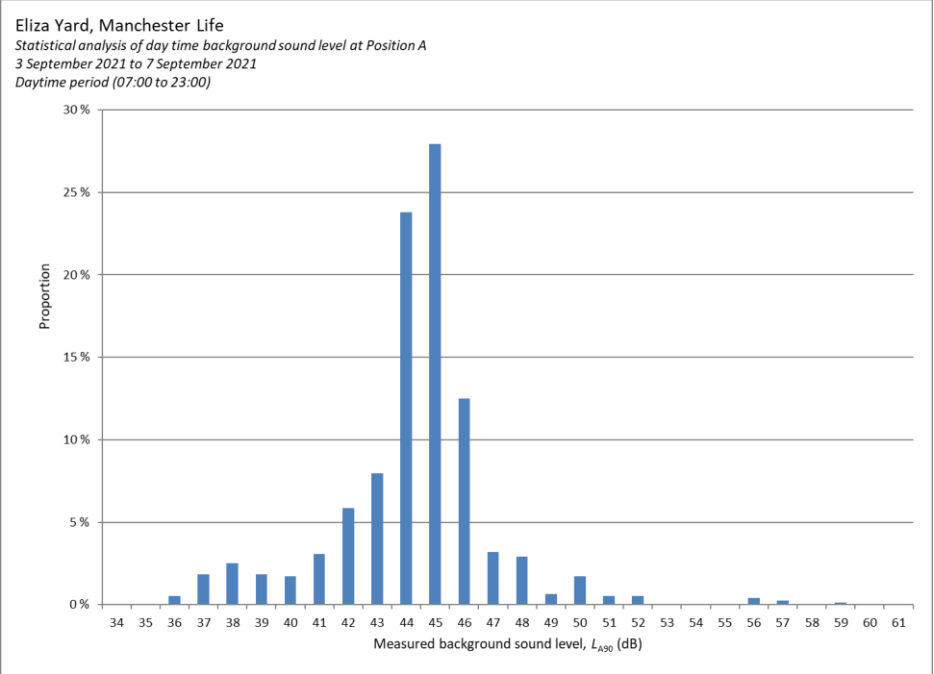


Figure 11 Histogram of day background noise levels at position A (Jersey St) in the free field – after lifting of Covid pandemic restrictions

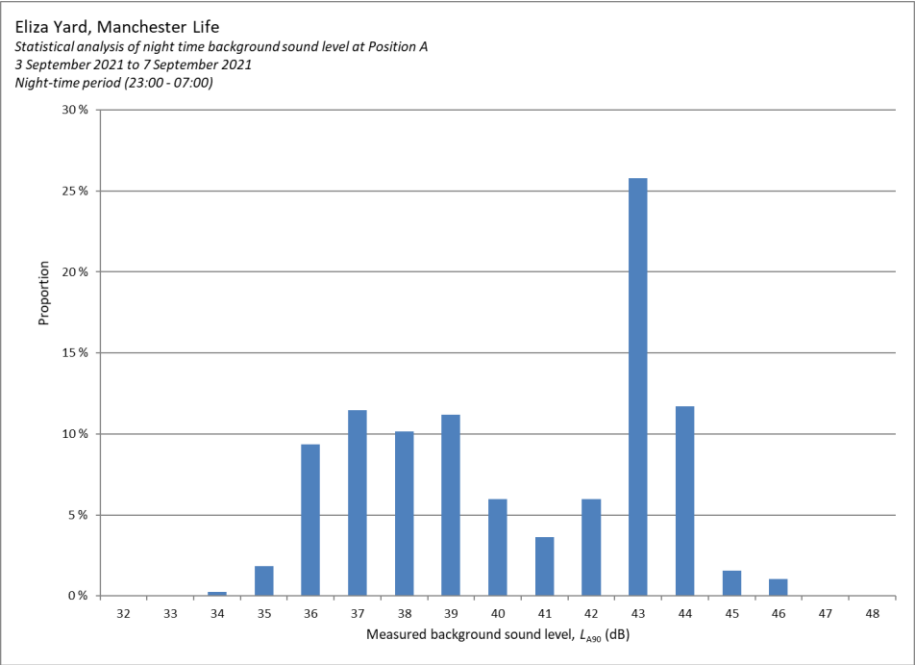


Figure 12 Histogram of night background noise levels at position A (Jersey St) in the free field – after lifting of Covid pandemic restrictions

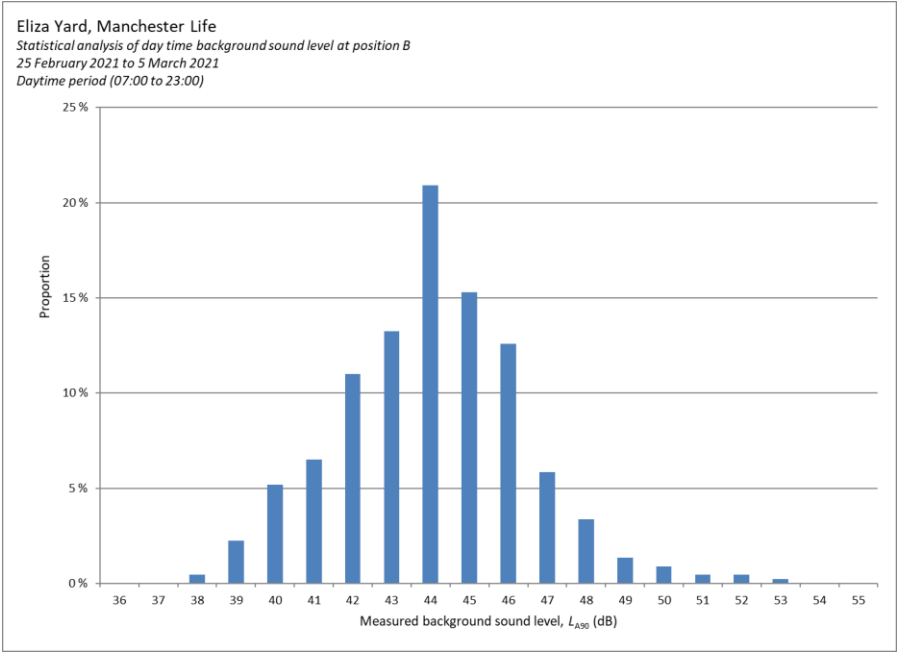


Figure 13 Histogram of day background noise levels at position B (Poland St) at the facade – during Covid pandemic restrictions

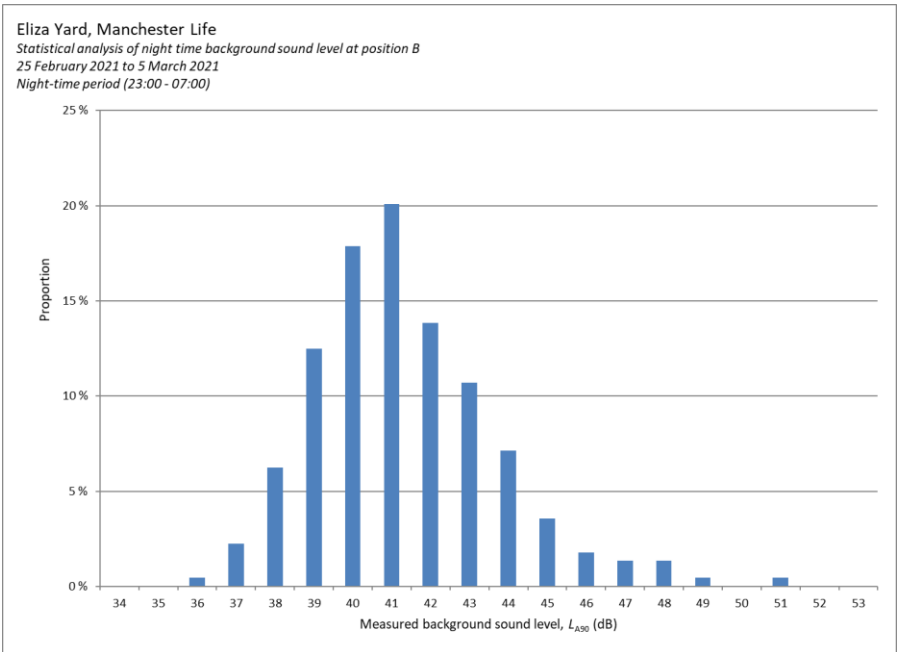


Figure 14 Histogram of night background noise levels at position B (Poland St) at the facade – during Covid pandemic restrictions

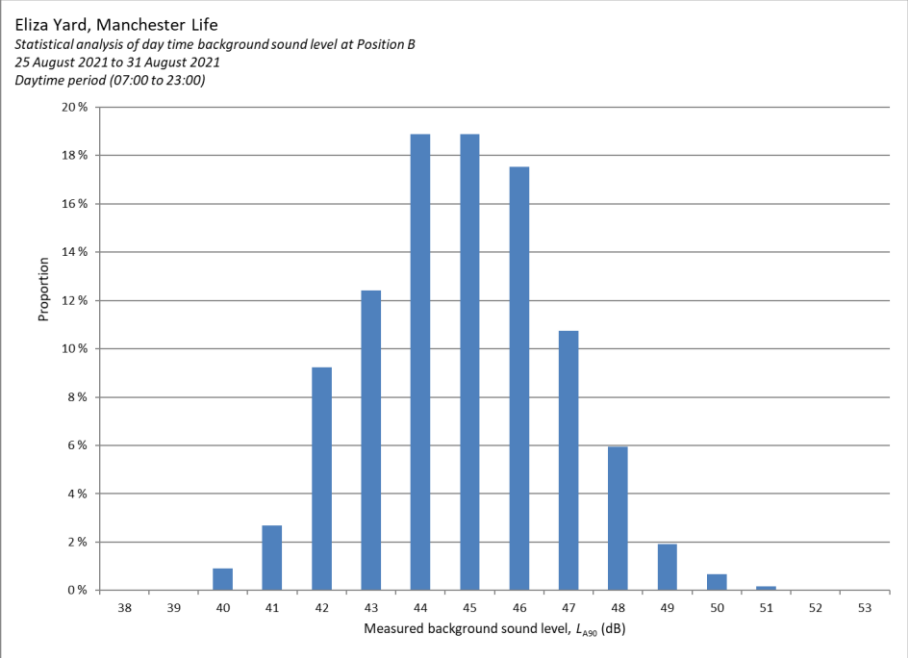


Figure 15 Histogram of day background noise levels at position B (Poland St) at the facade – after lifting of Covid pandemic restrictions

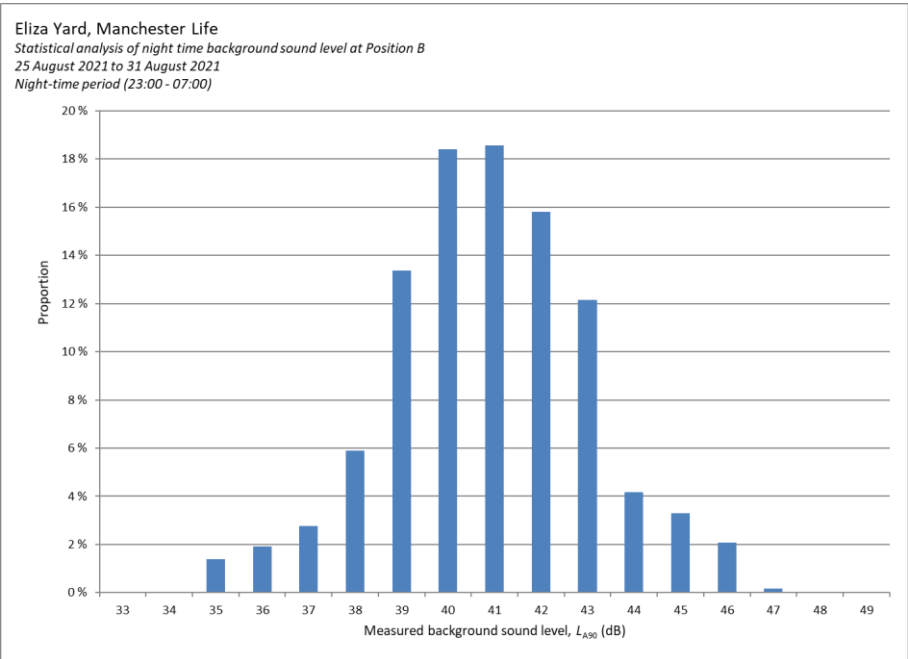


Figure 16 Histogram of night background noise levels at position B (Poland St) at the facade – after lifting of Covid pandemic restrictions

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 day (L_{A90} 45 dB equivalent facade level)
 - L_{A90} 36 dB night (L_{A90} 39 dB equivalent facade level)
- Poland Street (facade)
 - L_{A90} 44 dB day
 - L_{A90} 39 dB night.

6.3 Attended measurement results

6.3.1 Attended measurement results – 9 September 2021

Noise levels and key sources recorded during the attended measurements are summarised in Table 9.

Table 7 Noise levels and key noise sources from attended measurements 9 September

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,15min}$	$L_{AFmax,15min}$	$L_{A90,15min}$	
1	12:05	48	60	46	Constant noise from plant from site to the north dominates. Occasional road traffic noise. Aircraft
1	12:10	52	65	47	Constant noise from plant from site to the north dominates. Occasional road traffic noise. Aircraft, pedestrian conversation
1	12:15	52	72	47	Constant noise from plant from site to the north dominates. Occasional road traffic noise. Aircraft
1	12:20	50	51	49	Constant noise from plant from site to the north dominates. Occasional road traffic noise.

6.3.2 Day attended measurement results – August 2020

Noise levels and key sources recorded during the attended measurements are summarised in Table 8.

Table 8 Day noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,15min}$	$L_{AFmax,15min}$	$L_{A90,15min}$	
1	16:15	52	76	48	Constant noise from plant from site to the north dominates. Some road traffic noise. Distant construction. Max likely caused by car speeding.
1	17:35	50	63	48	Constant noise from plant from site to the north dominates. Occasional road traffic noise.
2	16:15	52	73	49	Constant noise from plant from site to the north dominates. Occasional road traffic noise. Distant construction.
2	17:35	51	64	49	Constant noise from plant from site to the north dominates. Occasional road traffic noise.
3	16:30	54	70	48	Constant noise from plant from site to the north, less dominant than position 2. General construction noise, infrequent banging. Car passbys dominate when they occur.
3	17:55	54	72	48	Constant noise from plant from site to the north, less dominant than position 2. Car passbys dominate when they occur.
4	16:35	55	75	47	Occasional road traffic noise. Distant construction noise from site to the north west. Distant siren. Max likely caused by a car accelerating up the road. Very distant plant noise.
4	17:55	55	72	46	Occasional road traffic noise. Distant plant noise.

6.3.3 Night attended measurement results – August 2020

Noise levels and key sources recorded during the attended measurements are summarised in Table 9.

Table 9 Night noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,15min}$	$L_{AFmax,15min}$	$L_{A90,15min}$	
1	23:15	47	59	46	Constant noise from plant from site to the north.
1	01:10	50	75	46	Constant noise from plant from site to the north, very occasional road traffic noise from Poland Street. Max caused by car pass by.
2	23:20	49	56	49	Constant noise from plant from site to the north.
2	01:10	51	70	47	Constant noise from plant from site to the north, very occasional road traffic noise from Poland Street. Max caused by car pass by.
3	23:35	46	60	45	Constant fan noise from site to the north dominating, very occasional distant traffic noise. Max likely caused by car pass by.
3	01:30	46	53	45	Constant fan noise from site to the north dominating.
4	23:55	46	66	41	Distant plant noise from Jersey Street, very distant road traffic noise from Oldham road. Max likely caused by car pass by on Jersey Street.
4	01:50	46	72	40	Distant plant noise from Jersey Street, very distant road traffic noise from Oldham road. Max likely caused by car pass by on Jersey Street.

7 Control of noise egress

7.1 Basic 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 10.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. These have been corrected relative to the measured free-field background noise levels by the addition of 3 dB where necessary. In this case these limits would apply at locations set out in Section 2.

Table 10 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)	
	Day (07:00-23:00)	Night (23:00-07:00)
NSPs to the east and south	40	34
NSPs to the north and west	39	34

^[1] The limits set out in Table 10 do not include any attention catching features. Penalty corrections for attention catching features may be significant and will need to be considered as the building services design progresses. This is discussed in Appendix C.

7.2 Emergency plant limits

Relaxations of 15 dB over the limits given in Table 10 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 rooftop emergency generator, subject to agreement with Manchester City Council.

7.3 Plant noise assessment

All building services plant will be designed to achieve the noise limits set out above, including any corrections for attention catching features.

7.4 Plant noise verification

In line with Planning Condition 16 of 130354/FO/2021 (see Section 4.3.3), post completion testing shall be carried out to confirm the plant noise limits have been met.

7.5 Commercial unit activity noise

There will be no amplified sound or music within the commercial units.

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

Loading/parking 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.

7.6 Residential amenity

None of the residential amenity areas shall utilise amplified sound.

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 criteria from Manchester City Council, which are set out in Section 4.4.

8.1 3D noise modelling

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 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 predicts noise levels in three dimensions. Calculations are carried out in accordance with ISO 9613 *Attenuation of sound during propagation outdoors*.

Pheonix Ironworks and Jersey Street proposed developments to the west and south have been included in the model.

An image of the computer model is provided in Figure 17.



Figure 17 3D environmental noise model

The 3D model has been calibrated based on the environmental noise surveys carried out at the site.

The environmental noise model does not currently include noise from plant associated with the development, though this would be designed such that the noise levels are not significantly increased. Nor does it include any increased likelihood of single events such as late-night taxis or traffic associated with the development of the area. These levels do not account for any attenuation which may be applied to the plant in the adjacent industrial units.

8.2 External noise levels

The predicted external facade noise levels are presented in Table 11.

Maximum noise levels from passing cars on Jersey Street and Poland Street measured during the night were in the range L_{AFmax} 53 to 86 dB, with the not normally exceeded value being L_{AFmax} 70 dB.

Table 11 Predicted external facade noise levels (including existing plant noise to the rear of the site)

Location	Predicted facade noise levels, L_{Aeq} (dB)	
	Day (07:00-23:00)	Night (23:00-07:00)
Residential facades facing Jersey Street	48-58	47-51
Residential facades facing Poland Street	52-59	48-53
Residential facades to the rear	52-60	52-60
Residential facades elsewhere	46-57	46-50
Non-residential facades	57-61	51-60

8.2.1 Predicted external facade noise levels for AVO assessment (excluding plant noise)

For the purposes of AVO assessment, the following external facade noise levels are predicted when excluding plant noise (transport noise sources only):

- Residential facades facing Poland Street:
 - L_{Aeq} 52-58 dB during the day
 - L_{Aeq} 48-51 dB at night.
- Residential facades to the rear:
 - L_{Aeq} 47-54 dB during the day
 - L_{Aeq} 46-48 dB at night.

Screenshots detailing predicted facade noise levels facing Jersey Street and Poland Street (for AVO assessment) are provided in Appendix D.

8.3 Facade sound insulation

All apartments include MVHR units to provide background ventilation in line with the requirements of Approved Document F. As such, there is no reliance upon opening windows or facade ventilators (trickle vents etc) to provide background ventilation.

On the assumption that the glazing/windows to apartments would comprise of standard thermal double glazing as a minimum (e.g. 6/16/6), this would typically be capable of providing a sound insulation performance of at least $R'_w + C_{tr}$ 28 dB.

This is expected to be capable of controlling environmental noise ingress to meet with the requirements of MCC across the majority of the development. A higher glazing specification of R'_w+C_{tr} 33 dB is required to the ground floor north facing bedroom.

An example glazing configuration to achieve R'_w+C_{tr} 33 dB (for the ground floor north facing bedroom) comprises:

- 6.8 mm acoustic laminate glass/16 mm cavity/6 mm glass

9 Acoustics, Ventilation and Overheating (AVO)

General background 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.

The noise attenuation provided will depend on the degree of opening. Appendix C of the AVO guide provides the following information based on a field study in Switzerland:

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

Calculated internal noise levels shown in Table 12 are based on the free-field sound pressure levels outside to inside level difference insulation of 13 dB. A potential variation of ± 3 dB should be considered to allow for adjustment of window openings.

The overheating analysis is to be carried out by the building services engineer, Ameen, in accordance with CIBSE TM59:2017 *Design methodology for the assessment of overheating risk in homes* methodology.

The AVO guide provides a graphical format for assessing the significance of adverse effects (SOAEL). This plots the predicted internal ambient noise level during overheating conditions against the duration for which the overheating condition occurs.

Scaling of the x-axis is not specified in the AVO guide and is therefore open to interpretation. As overheating in England is largely an issue associated with summer months, the x-axis has been scaled based on the percentage time that windows would be opened to control internal temperatures over 22 °C during the period between May and September. This period aligns with the period used for the thermal assessments in TM52:2013 *The Limits of Thermal Comfort: Avoiding overheating in European Buildings*.

There are 153 days from May to September. In line with the acoustic requirements, day is considered to be 16 hours from 07:00 to 23:00; night is 8 hours from 23:00 to 07:00. The day X-axis therefore extends to 100 % equalling a maximum of $153 \times 16 \text{ hrs} = 2448 \text{ hrs}$. The night X-axis extends to 100% equalling a maximum of $153 \times 8 \text{ hrs} = 1224 \text{ hrs}$. The number of hours windows could be open to control overheating will be calculated (from the thermal

assessment) by the building services consultant, Ameon. These will be plotted on the x-axis of the AVO graph template at the end of this memo as a percentage of hours open. So, for example, a bedroom with a point at 45% equates to windows being open for a total of 551 hrs (45% of 1224 hrs) between May and September for control of overheating.

The predicted internal levels with windows open for the proposed development are summarised below.

Table 12 Predicted internal levels based on partially open window providing 13 dB of attenuation to free-field external levels

Location	$L_{Aeq,16hrs}$ (dB) day (0700-2300)	$L_{Aeq,8hrs}$ (dB) night (2300-0700)
Residential facades to Jersey St	32-42	31-35
Residential facades to Poland St	36-42	32-35
Residential facades to the rear	31-38	30-32
Residential facades to the east	30-41	30-34

If dual aspect windows are required to open to a single room within an apartment to control over-heating, the overall internal noise level could increase compared to the values presented above.

The assessed noise levels do not include plant from the adjacent industrial areas, since the AVO guide is only applicable for noise from transport sources. Including plant noise would result in 1 dB increase to the highest predicted noise levels during the day and 7 dB increase at night. There is 1 bedroom facing north (towards the existing plant), at ground floor which could potentially be affected by the 7 dB increase at night. It is recommended that the windows to this bedroom facing north are fixed/sealed shut to avoid risk of adverse effects.

Graphs based on the predicted internal noise levels have been provided by Ameon, as presented in Appendix E. Ameon have confirmed they have fully modelled the building, including each individual apartment, to understand the entire overheating potential of the proposed building. This has been undertaken in line with TM59 (Design methodology for the assessment of overheating risk in homes), TM52 The limits of thermal comfort: avoiding overheating in European buildings) and other associated industry guidance for the production of overheating models. This has allowed for the AVO data to be produced for each apartment. This has then allowed this data range for all apartments to be plotted onto the AVO graph as Appendix E. All individual bedroom and living spaces sit within the data range indicated. These graphs plot the range of predicted internal noise levels across the development against the range of percentage hours that windows could be open to control overheating. The graphs demonstrate that internal noise levels based on the data range for all apartments, during the overheating condition with openable windows, are not predicted to result in significant adverse effect to any apartment within the development.

The graphs show that within the living space within the daytime the SOAEL level is not exceeded with the window open 79% of the hours based on the maximum L_{Aeq} 42 dB predicted noise level as detailed elsewhere within this report. Additionally, the graph showing the nighttime values in the bedroom is not exceeded at 64% of the hours with the windows open with a maximum noise level of L_{Aeq} 35 dB.

For reference, the maximum opening hours figure of 79% for living rooms during the daytime from the Ameen assessment is reached on apartments 119 & 121 facing Jersey Street. These apartments are at Level 7. The predicted internal noise level to these apartments is L_{Aeq} 37 dB (below the SOAEL). Additionally, the average percentage open figure was noted to be 64% during the daytime for the living spaces which provides a further degree of comfort from the SOAEL figure.

10 Conclusion

Planning permission has been previously granted under application number 130354/FO/2021. Updated planning noise assessments have been carried out following minor updates to the scheme.

Based on the requirements of the Local Authority 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 the following limits:

- NSPs to the east and south: $L_{Aeq,15min}$ 40 dB during the day, $L_{Aeq,15min}$ 34 dB at night
- NSPs to the north and west: $L_{Aeq,15min}$ 39 dB during the day, $L_{Aeq,15min}$ 34 dB at night.

The limits to NSPs to the east and south have been corrected relative to the measured free-field background sound levels facing Jersey Street by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1).

If plant items contain tonal or attention catching features, a penalty based on the type and impact of those features will be applied, and the limits will be more stringent than those set.

An initial assessment has been carried out to determine required acoustic performances for the facades and provide guidance on the ventilation strategy. Standard thermal double glazing is expected to be capable of controlling environmental noise ingress to meet with the requirements of MCC across the majority of the development. A higher glazing specification of $R'_w + C_{tr}$ 33 dB is required to the ground floor north facing bedroom.

Assessment of noise ingress via open windows during summer overheating conditions has been carried out using the Acoustics, Ventilation and Overheating (AVO) Guide. This assessment indicates no significant adverse effects.

There will be no amplified sound or music within the commercial units.

Appendix A

Survey details

Equipment

The attended and unattended noise measurements were 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 ^[1]	Calibration certification number
Sound level meter	NL-52/00932326	Rion	13 Mar 21	TCRT19/1179
Microphone	UC-59/05549	Rion	13 Mar 21	TCRT19/1179
Pre-amp	NH-25/32354	Rion	13 Mar 21	TCRT19/1179
Calibrator	NC-74/34125432	Rion	13 Mar 21	TCRT19/1178
Sound level meter	NL-52/01143564	Rion	15 Dec 22	TCRT18/1993
Microphone	UC-59/10153	Rion	15 Dec 22	TCRT18/1993
Pre-amp	NH-25/43581	Rion	15 Dec 22	TCRT18/1993
Calibrator	NC-74/34257023	Rion	15 Dec 22	TCRT18/1991

^[1] All equipment was in calibration at the time of the survey works.

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.
- $L_{ASmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a slow 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 and dry, and no rain occurred. Wind speeds were less than 5 m/s.

During the unattended noise measurements, weather reports for the area indicated that:

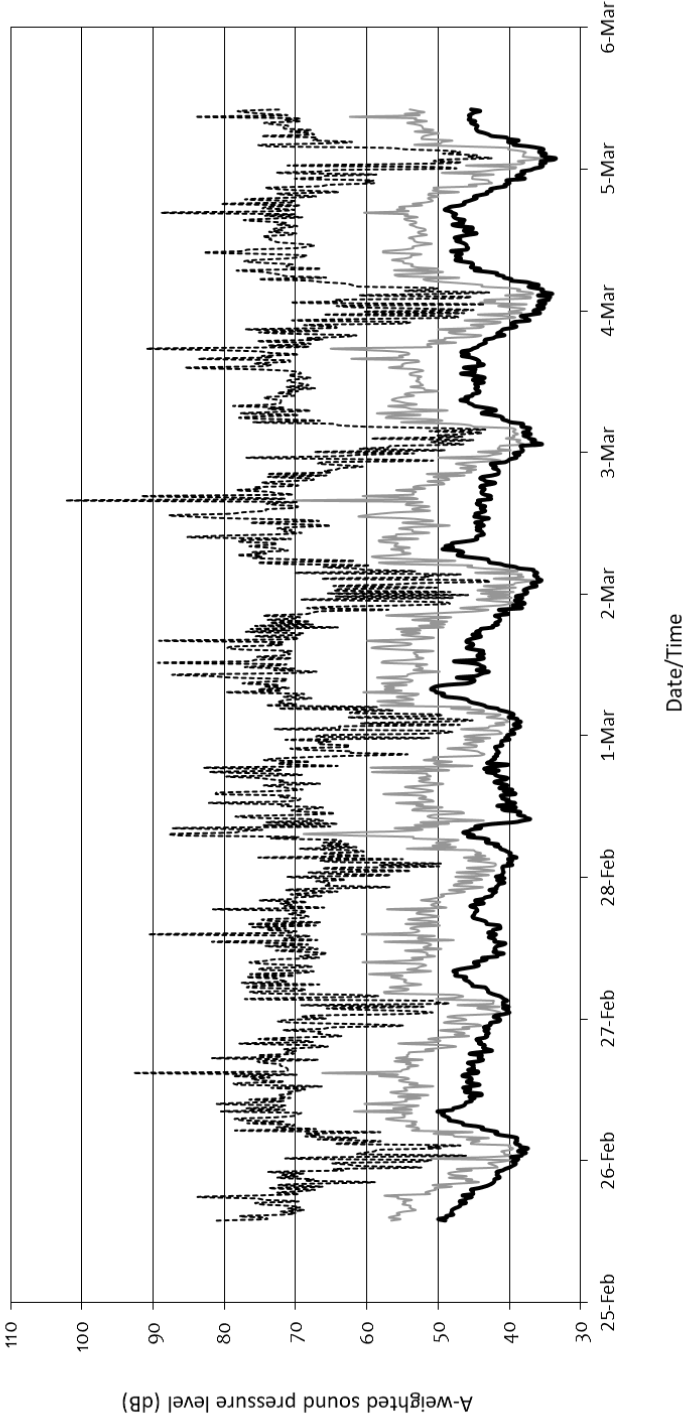
- For the surveys in February and March 2021, temperatures varied between -3°C at night and 12°C during the day, and the wind speed was less than 4 m/s.
- For the surveys between 25 August and 7 September 2021, temperatures varied between -9°C at night and 21°C during the day, and the wind speed was less than 4 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

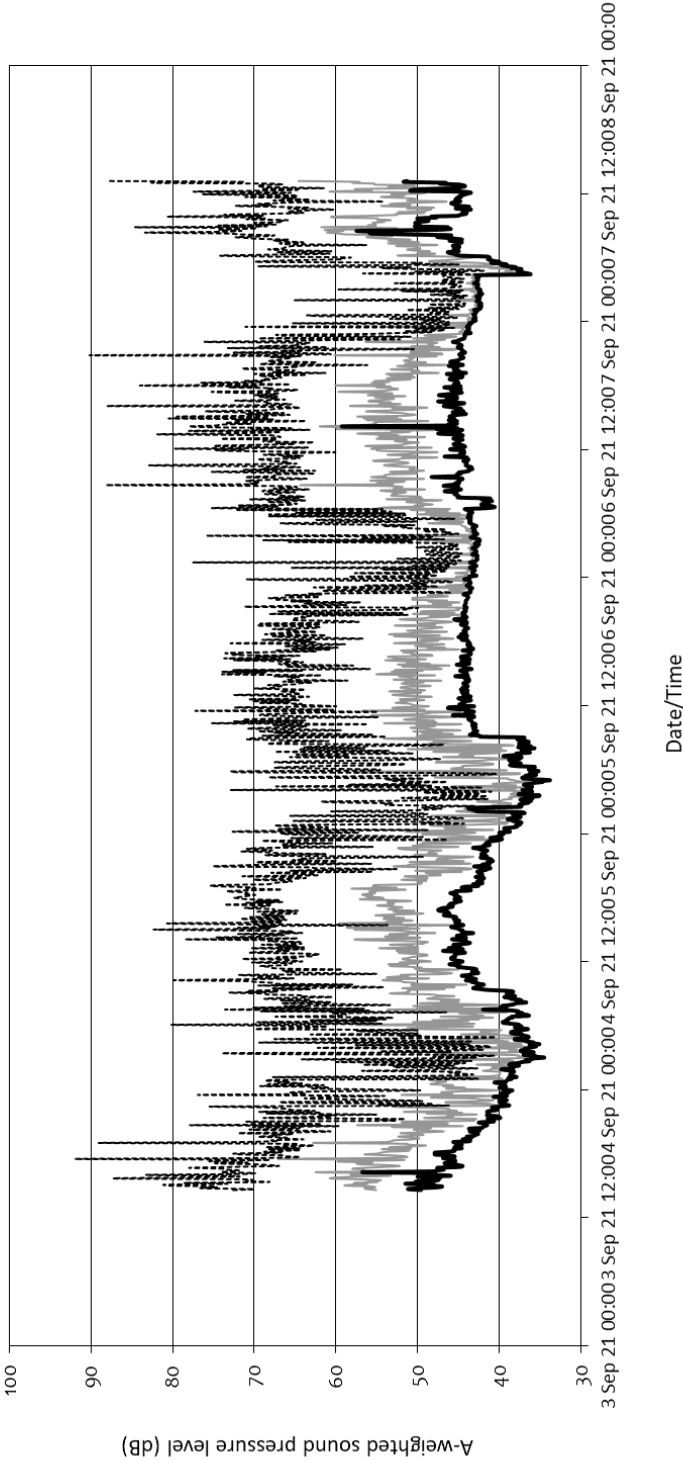
Appendix B

Measurement results from unattended measurement positions

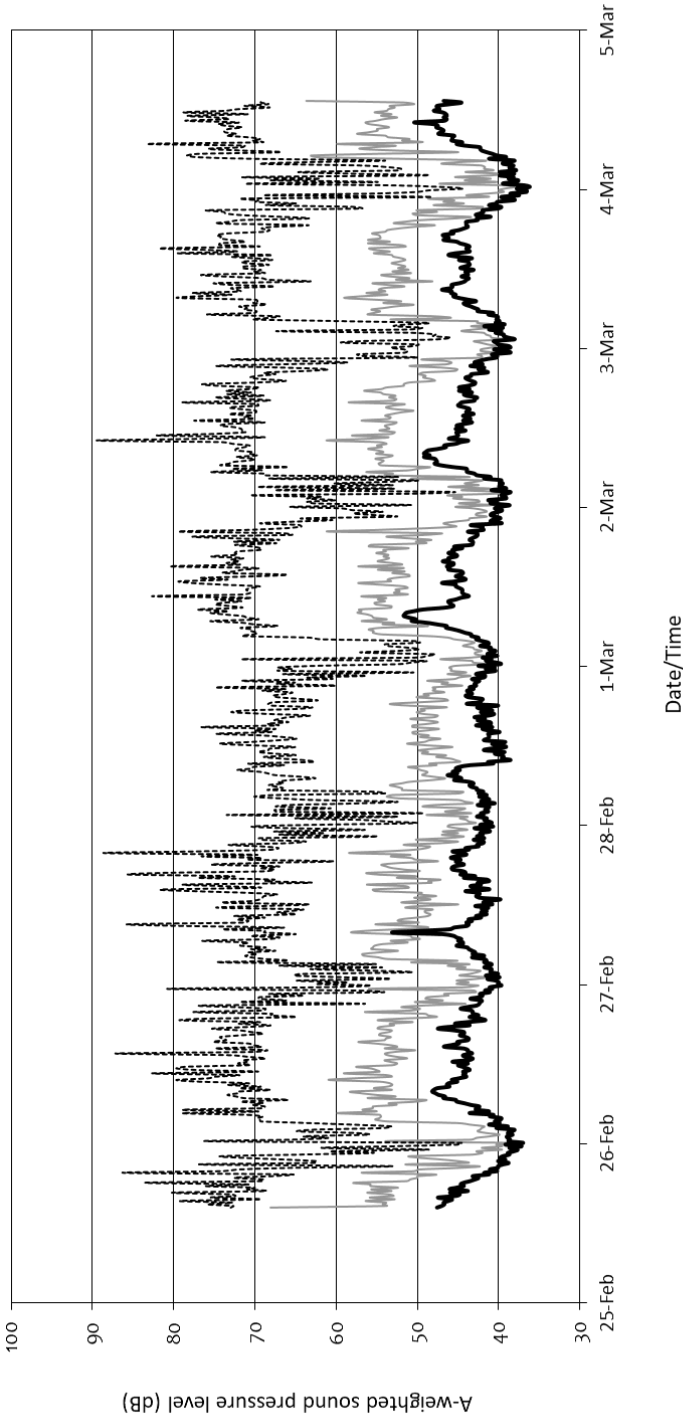
Eliza Yard, Manchester Life
Results of noise logging survey at position A (Jersey Street)
25 February 2021 to 5 March 2021



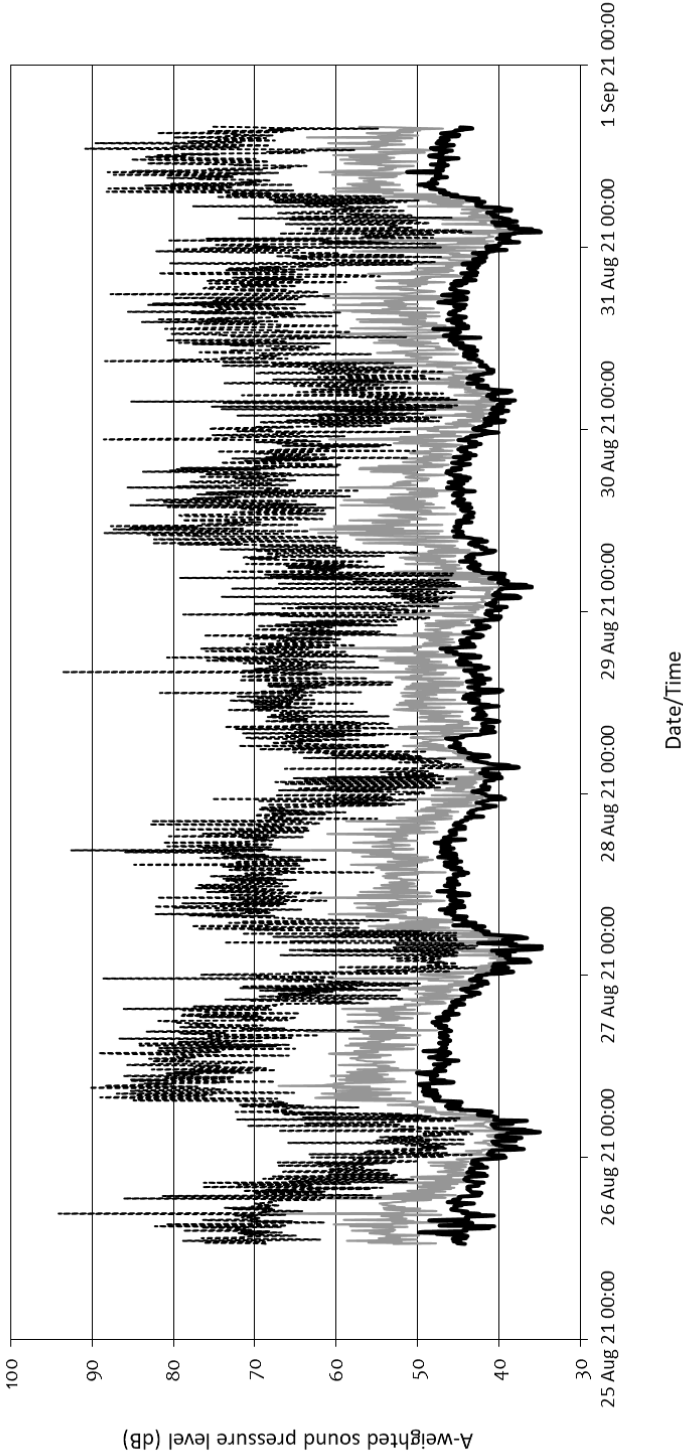
Eliza Yard, Manchester Life
Results of noise logging survey at Position A (Jersey Street)
3 September 2021 to 7 September 2021



Eliza Yard, Manchester Life
Results of noise logging survey at position B (Poland Street)
25 February 2021 to 5 March 2021



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



Appendix C

BS 4142 corrections for attention catching features

The following applies where plant noise is assessed in accordance with BS 4142:2014+A1:2019.

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), penalty corrections should be applied based on the type and impact of the features.

If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor:

- 0 dB where the tone is not perceptible
- 2 dB where the tone is just perceptible
- 4 dB where the tone is clearly perceptible
- 6 dB where the tone is highly perceptible.

Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor:

- 0 dB where the impulse is not perceptible
- 3 dB where the impulse is just perceptible
- 6 dB where the impulse is clearly perceptible
- 9 dB where the impulse is highly perceptible.

For noise which is equally both impulsive and tonal, then both features can be accounted for by linearly summing the corrections for both characteristics.

If the plant has other distinctive characteristics, such as intermittency, then a 3 dB correction can be made.

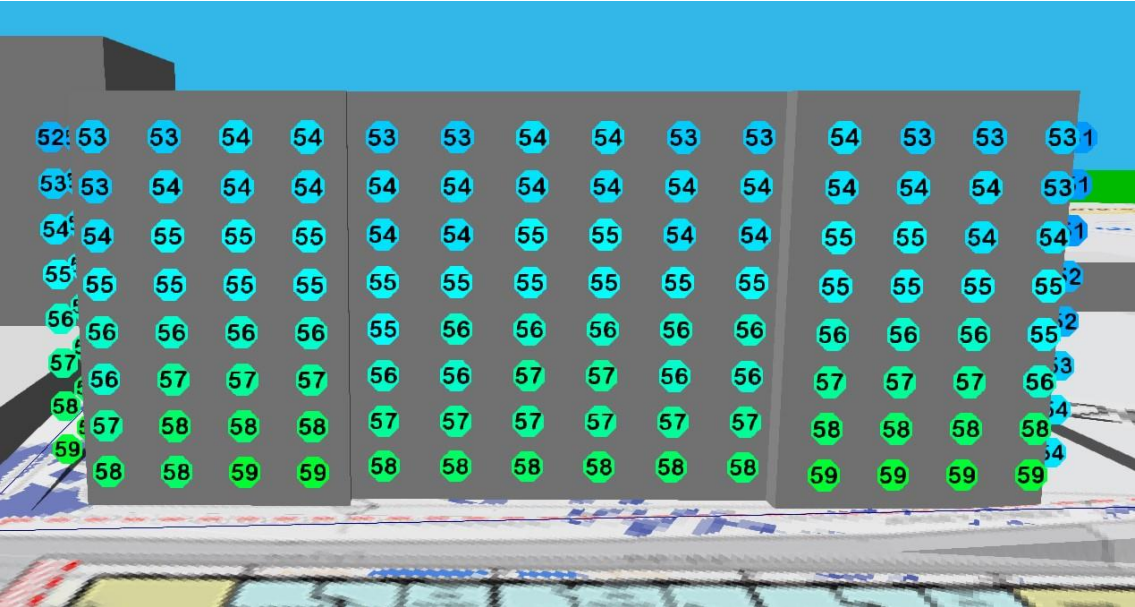
If a subjective assessment of tonality is not appropriate, an objective assessment can be made by analysis of time-averaged, third-octave band sound pressure levels. A noise source is deemed to be tonal if the level in a third-octave band exceeds the level in adjacent third-octave bands by the level differences given below:

- 15 dB in the low frequency third-octave bands (25 Hz to 125 Hz)
- 8 dB in the mid frequency third-octave bands (160 Hz to 400 Hz)
- 5 dB in the high frequency third-octave bands (500 Hz to 10000 Hz).

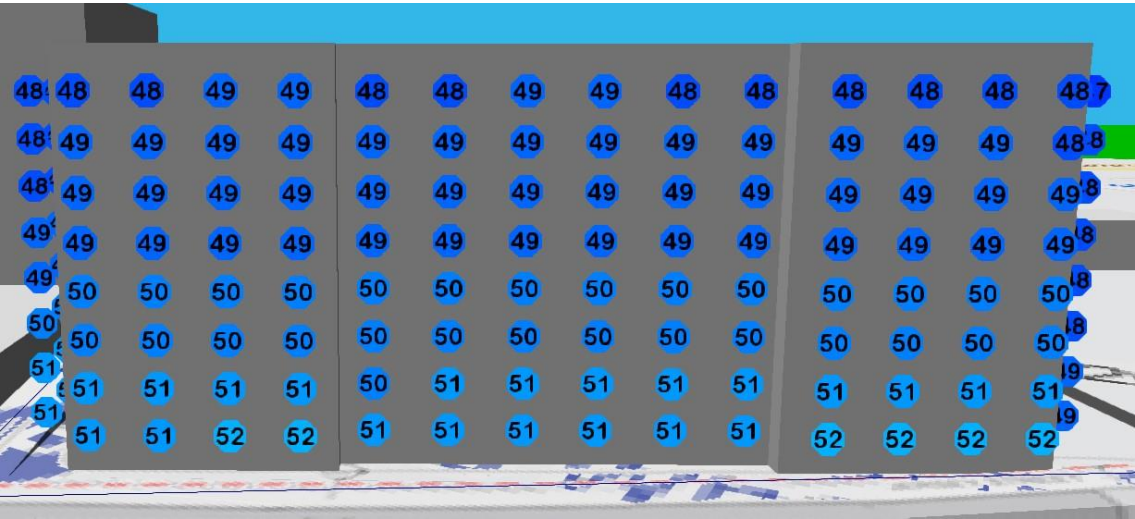
If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.

Appendix D

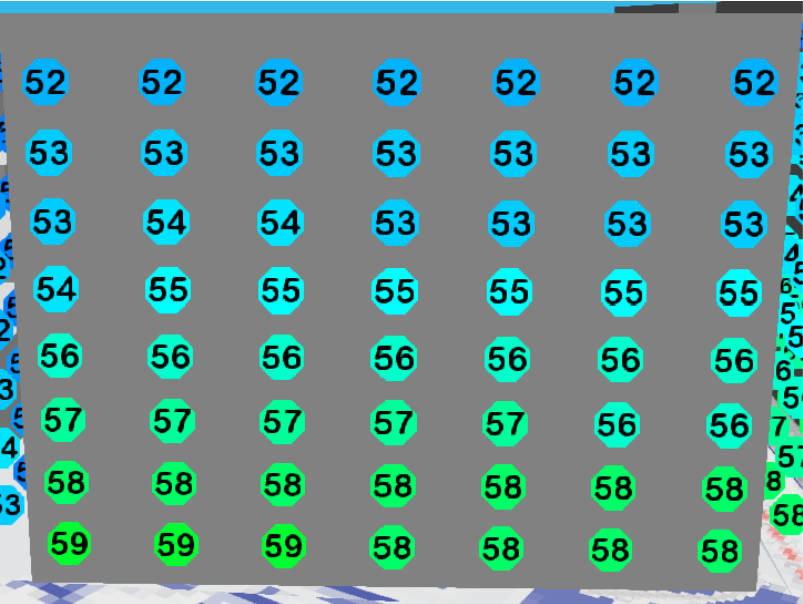
Predicted facade noise levels for AVO assessment



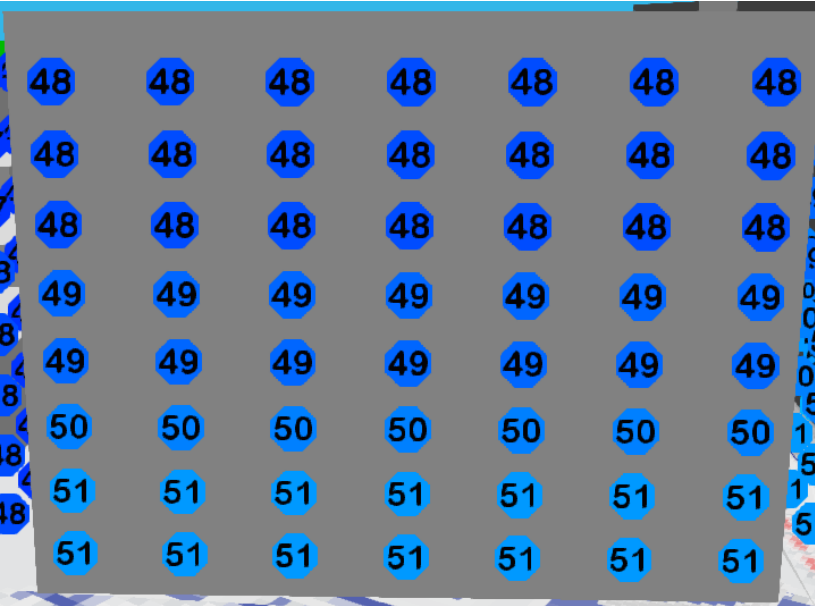
Predicted facade noise levels facing Jersey Street during the day (plant noise excluded)



Predicted facade noise levels facing Jersey Street during the night (plant noise excluded)



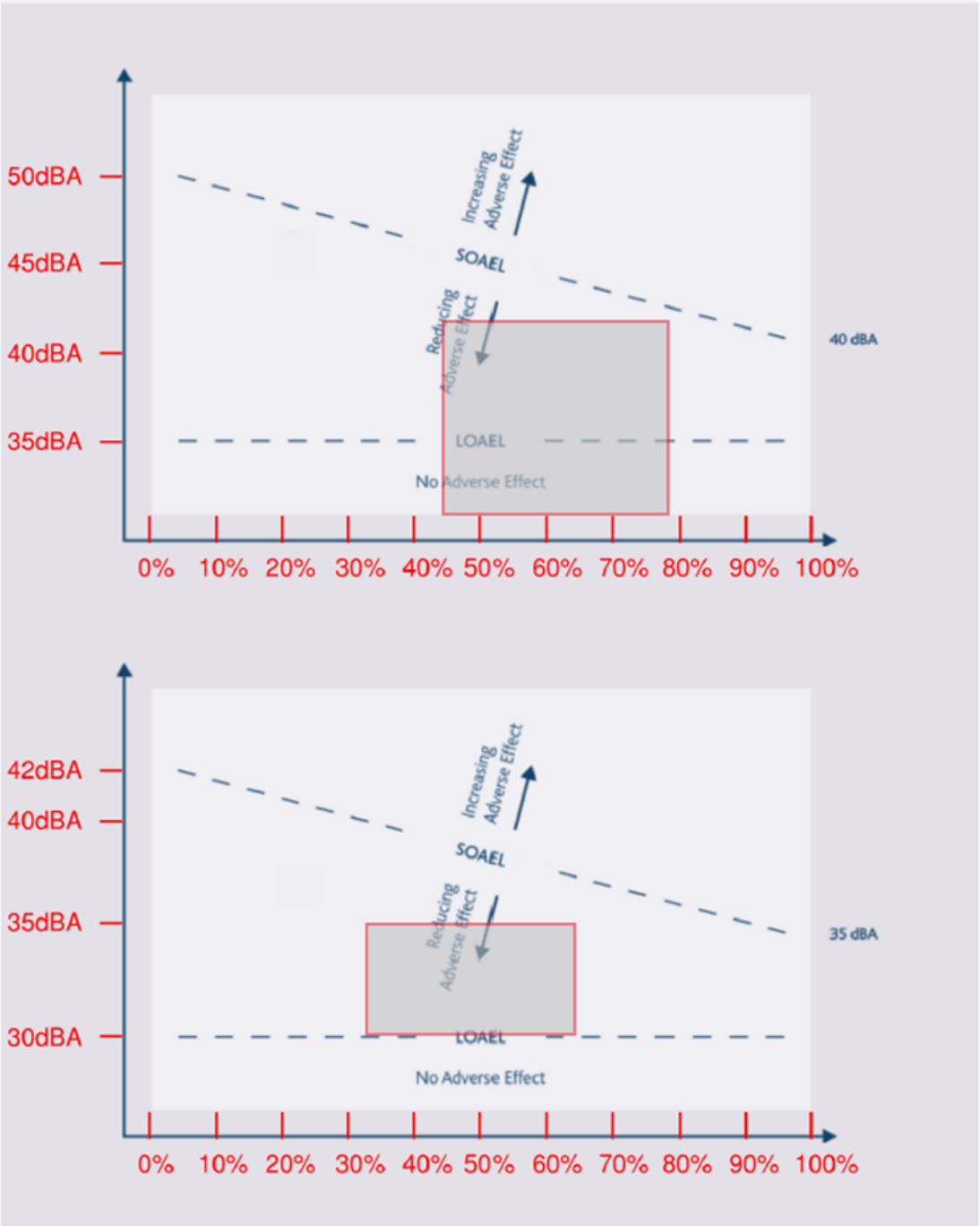
Predicted facade noise levels facing Poland Street during the day (plant noise excluded)



Predicted facade noise levels facing Poland Street during the night (plant noise excluded)

Appendix E

AVO graphs from Ameon



AVO graphs from Ameen indicating range of predicted internal noise levels across the development (on the Y axis) against the range of percentage hours that windows could be open to control overheating (on the X axis). Upper graph shows living rooms during the day (07:00-23:00), lower graph shows bedrooms during the night (23:00-07:00)