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Paradise Mews, Manchester

Noise Impact Assessment

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Client: Victor (M1) Limited

Date: 28/10/2021

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REVISION HISTORY

Revision	Date	Revision Details	Author	Checked
R01	28/10/2021	Original Issue	DocuSigned by: Matt Jones 45C749F61A3B42E... Matt Jones MEng AMIOA	DocuSigned by: Susan Witterick 3E69257DCFC14C6... Susan Witterick BSc MIOA

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1 INTRODUCTION

1.1 dBx Acoustics Ltd has been appointed by Victor (M1) Limited to provide a noise survey and noise impact assessment for the proposed mews houses at Paradise Wharf, Manchester, M1 2JN.

1.2 The proposal is for 4 mews houses to be built on the existing car park at Paradise Wharf.

1.3 The intent of this report is to present the results of a noise survey undertaken at and around the site, to detail the subsequent noise impact assessment, and to provide outline guidance on appropriate acoustic requirements for façade and glazing build-ups to control noise intrusion in line with the recommendations given in BS8233:2014 *Guidance on sound insulation and noise reduction for buildings.*

1.4 The report also sets noise emission limits for any proposed externally mounted building services plant, in order to preserve the amenity of the surrounding properties.

1.5 A glossary of acoustic terminology is provided in Appendix A in order to assist the reader.

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2 ACOUSTIC DESIGN CRITERIA

Local Authority Criteria

2.1 This site falls under the jurisdiction of Manchester City Council (MCC).

2.2 Manchester City Council detail their requirements for Noise Impact Assessments in their document 'Planning & Noise Technical Guidance' (December 2015). In terms of residential developments, their internal noise level limits are as detailed below.

- Bedrooms (night time 23:00-07:00) 30 $dBL_{Aeq,8hr}$ (individual noise events should not normally exceed 45 $dBL_{Af,Max}$ more than 15 times)
- Living Rooms (daytime – 07:00-23:00) 35 $dBL_{Aeq,16hr}$
- Gardens and terraces (daytime) 55 $dBL_{Aeq,16hr}$

2.3 In addition, any new items of building services plant should have a Rating Level of 5 dB below the typical background noise level at the nearest noise sensitive receptor.

2.4 These limits are based on guidance in NPSE, BS 8233:2014, WHO Guidelines for Community Noise 1999 and BS 4142:2014, as described below.

The National Planning Policy Framework (NPPF)

2.5 The NPPF was introduced in 2012, and updated in 2018, 2019 and 2021. The NPPF is the over-arching planning policy document that applies to all new developments in England. The guidance and assessment criteria given (or referred to) in this document can therefore be applied to all other standards in terms of assessing the suitability of granting Planning Permission with respect to noise impact.

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

- *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

2.7 With specific reference to noise impact, the NPPF document refers to the Noise Policy Statement for England (NPSE).

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Noise Policy Statement for England (NPSE)

2.8 NPPF affirms that National Policy Statements form part of the overall framework of national planning policy, and should be a material consideration in decisions on planning applications. The Noise Policy Statement for England came into force in 2010 and states:

This Noise Policy Statement for England (NPSE) should apply to all forms of noise including environmental noise, neighbour noise and neighbourhood noise. The NPSE does not apply to noise in the workplace (occupational noise).

Noise Policy Vision

Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

Noise Policy Aims

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.*

2.9 The NPPF noise aims widely reflect those in NPSE. The NPSE does however include some context within the explanatory note to assessing noise impact and uses established concepts from toxicology currently being applied to noise impacts, these include:

- ***NOEL*** *– No Observed Effect Level.* This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- ***SOAEL*** *– Significant Observed Adverse Effect Level.* This is the level above which significant adverse effects on health and quality of life occur.
- ***LOAEL*** *– Lowest Observed Adverse Effect Level.* This is the level above which adverse effects on health and quality of life can be detected.

2.10 However, it is clear that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times.

2.11 The table on the following page is extracted from the Government's Planning Practice Guidance on noise[1]. It summarises the noise exposure hierarchy, based on the likely average response.

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Table 1: Noise Exposure Hierarchy

Perception	Examples of outcomes	Increasing effect level	Action
Not noticeable	No effect	No observed effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life	No observed adverse effect	No specific measures required
		Lowest observed adverse effect level (LOAEL)	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude. E.g. turning up the volume of the television; speaking more loudly; where there is no alternative ventilation, having to close windows are some of the time because of the noise. Potential for some reportedly disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
		Significant observed adverse effect level (SOAEL)	
Noticeable and disruptive	The noise causes material change in behaviour and/or attitude e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep the windows closed most of the time because of the noise. Potential for sleep disturbance result in difficulty in getting to sleep. Premature awakening and difficulty getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed adverse effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise leading to psychological stress or psychological effects e.g. regular sleep deprivation/awakening; loss of appetite; significant, medically definable harm e.g. auditoria and non-auditory	Unacceptable adverse effect	Prevent

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BS 8233:2014: 'Guidance on sound insulation and noise reduction for buildings'

Internal Noise Level Limits

2.12 BS 8233 gives guidance for noise levels within residential properties. It discusses appropriate criteria for reasonable rest and sleep conditions and provides noise levels which are considered to provide appropriate conditions in accordance with WHO guidelines. The guidance on limits from the standard is reproduced in Table 2, below;

Table 2: Internal Ambient Noise Limits (BS8233)

Activity	Location	07:00 – 23:00 hrs	23:00 – 07:00 hrs
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

2.13 It should be noted that these levels represent the average noise level over the 16-hour day or 8-hour night period. This potentially means that higher noise levels may be experienced internally over a shorter period of time (e.g. individual passing trams or vehicles). These equivalent noise levels over a period of time are the best representation of the average noise level and are generally the main focus when it comes to evaluating noise exposure.

2.14 Under the updates to BS 8233 in 2014, for both day and night-time cases, a relaxation of up to 5 dB is considered to provide "reasonable internal conditions" where development is considered necessary or desirable.

2.15 To assess the maximum noise levels, the World Health Organisation (WHO) document "*Guidelines for Community Noise: 1999"* recommends that maximum noise levels ($dBL_{Amax,F}$) do not exceed 45 $dBL_{Amax,F}$ more than 10-15 times a night.

Outdoor Noise Level Limits

2.16 BS 8233: 2014 and the World Health Organisation (WHO) document "Guidelines for Community Noise: 1999" presents guidance for external noise levels within outdoor amenity areas of residential properties to be within 55 $dBL_{Aeq,16h}$.

2.17 It is, however, noted that compliance with these levels may not always be practical, and that the benefits of a development in other areas may take precedence overachieving external amenity noise levels.

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BS 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound'

2.18 BS 4142:2014 sets out a procedure for assessing noise impact whereby a Noise Rating is determined and compared with the existing local Background Sound Level.

2.19 Manchester City Council requires that any new items of building services plant should have a Rating Level of 5 dB below the typical background noise level at the nearest noise sensitive receptor.

2.20 The Rating Level ($dBL_{Ar,Tr}$) is evaluated from the Specific Noise Level by including several, cumulative corrections to account for factors such as distinguishable tone, impulse, intermittency or other readily distinguishable sound characteristics.

2.21 The assessment of the impact depends upon the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level. An initial estimate of the impact of the specific sound is made by subtracting the Background Sound Level from the Rating Level, while considering the following points:

a) Typically, the greater this difference, the greater the magnitude of the impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

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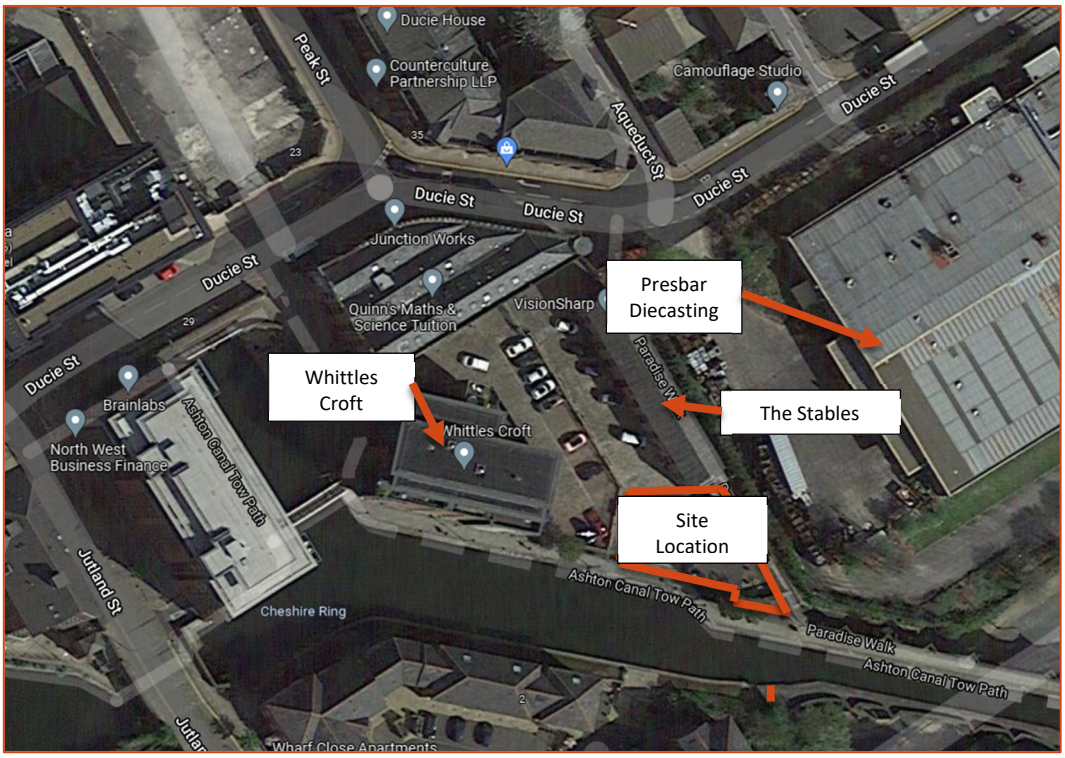
3 SITE DESCRIPTION

3.1 The site lies on Paradise Wharf, Manchester and is bounded by Paradies Walk to the east and the Ashton Canal to the south. Ducie Street is approximately 50m to the north. Figure 1, below shows the site.

Figure 1: Site and Surrounding Area (Site Boundary Approximate, Information Only)



3.2 To the east lies the Presbar Diecastings site, a former warehouse and factory, which is no longer in use.

3.3 Surrounding the proposed location of the mews houses are offices and other residential units located in The Stables in Whittles Croft.

3.4 The dominant noise source across the site is road traffic from Ducie Street to the north and the surrounding road network. Across the site, background noise is caused by distant road traffic and industrial sources. Maximum noise events measured were due to vehicle movements in the Paradise Wharf car park, and pedestrian shouting on the Ashton Canal Towpath and Paradise Walk.

3.5 Figures 2, below, shows the proposed site layout.

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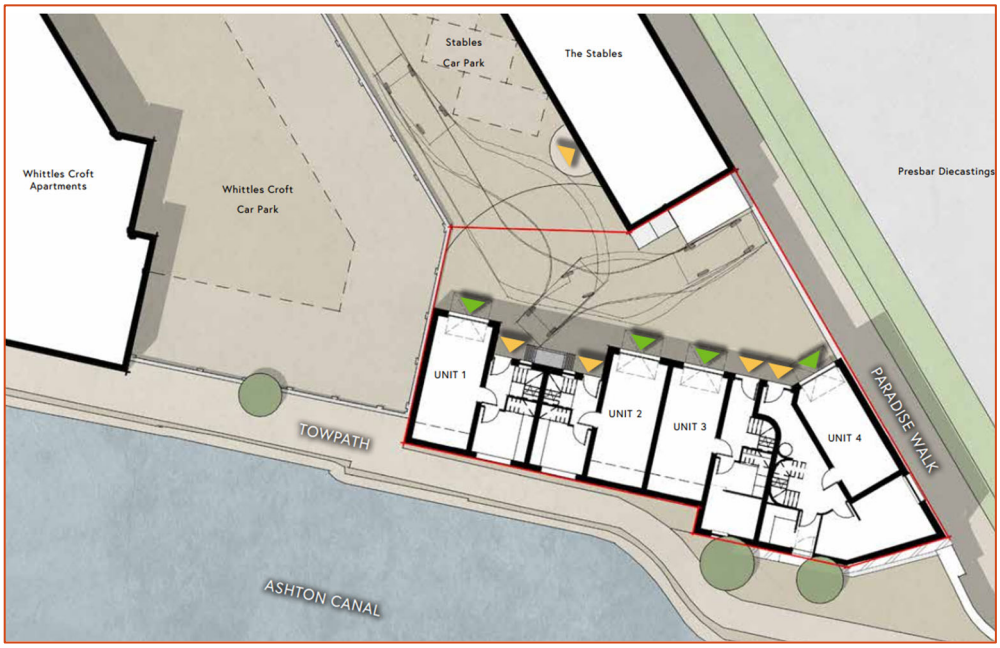
Figure 2: Proposed Site Layout



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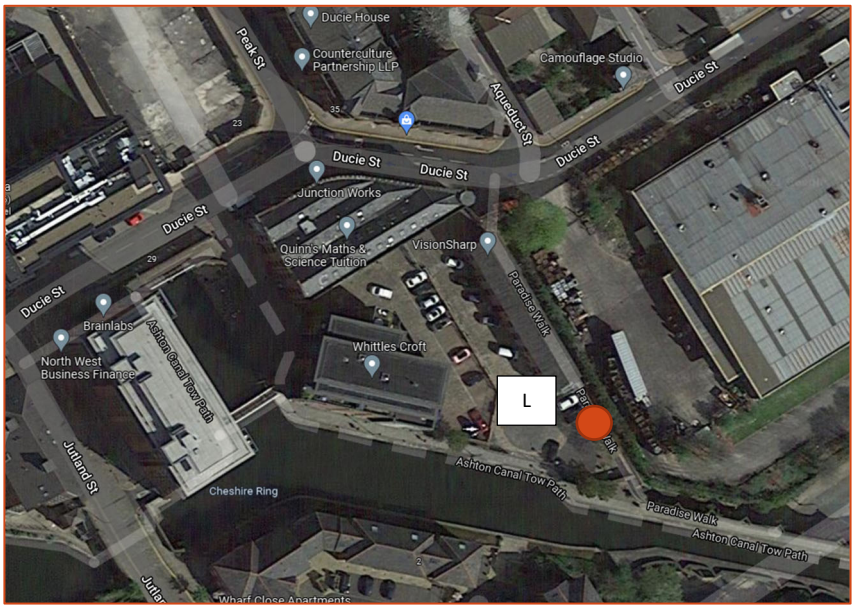
4 NOISE SURVEY

4.1 An unattended noise survey was carried out at the site between Wednesday 6th October 2021 and Monday 11th October 2021.

4.2 The unattended measurement location is shown as L on Figure 3. This measurement location can be taken as representative of the noise levels across the site.

Figure 3: Measurement Locations



4.3 All measurements were undertaken in accordance with BS 7445-1:2003 *Description and Measurement of Environmental Noise*.

Equipment Used

4.4 The equipment used in the environmental noise survey is detailed below.

Table 3: Equipment Used

Measurement Type	Equipment	Manufacturer / Model	Serial Number
Unattended Measurements	Sound Level Meter	Norsonic / NOR140	1405619
	Microphone	Norsonic / MOR 1225	168247
	Calibrator	Norsonic / NOR 1251	33827

4.5 The sound level meter was calibrated before and after the measurements with no significant drift recorded. An accredited laboratory calibrated the equipment not more than two years prior to the measurements being made, with the exception of the calibrator, which had been calibrated not more than one year prior to the survey.

4.6 The measurements were taken in the free field.

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Weather Conditions

4.7 Weather conditions throughout the survey were generally cool with a light breeze and scattered clouds. There were scattered showers throughout the weekend, however these did not lead to standing water on the roads.

4.8 Wind speeds remained below 5m/s throughout the noise survey period.

4.9 The noise survey data has been examined with reference to the weather data, and it has been determined that no data appears to have been affected by weather conditions.

4.10 The microphone was protected with a windshield for the duration of the survey.

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5 MEASUREMENT RESULTS

Unattended Measurements

5.1 A summary of the day and night-time noise levels measured at the long term noise monitoring location is shown in Table 4, below.

5.2 Measurements were taken in 15-minute periods between approximately 14:00 on Wednesday 6th October 2021 to 09:00 on Monday 11th October 2021.

5.3 The measurement time history is presented graphically in Appendix B.

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Table 4: Unattended Noise Measurements

Day / Date	Period	Ambient Sound Level ($dBL_{Aeq,T}$[1])	Rush Hour Ambient Noise Level ($dBL_{Aeq,1h}$[2])	Typical Background Sound Level ($dBL_{A90,T}$[3])	Highest maximum Noise Level ($dBL_{Af,max}$)	Typical Maximum Sound Level ($dBL_{Af,max}$[4])
Wednesday 6th October	Daytime* (14:00-23:00)	55	N/A	45	94	73
	Night Time (23:00-07:00)	48	N/A	39	73	67
Thursday 7th October	Daytime (14:00-23:00)	54	53	49	82	75
	Night Time (23:00-07:00)	49	N/A	40	78	65
Friday 8th October	Daytime (14:00-23:00)	60	55	48	101	79
	Night Time (23:00-07:00)	51	N/A	41	81	73
Saturday 9th October	Daytime (14:00-23:00)	52	51	45	81	73
	Night Time (23:00-07:00)	49	N/A	40	89	73
Sunday 10th October	Daytime (14:00-23:00)	54	54	46	90	74
	Night Time (23:00-07:00)	49	N/A	37	82	68
Monday 11th October	Daytime* (14:00-23:00)	55	54	52	79	68

*partial period measured

[1] Logarithmic average over the day/night survey period.

[2] Logarithmic average over the 1 hour period from 08:00 – 09:00

[3] Modal Background Noise Level over the given period

[4] $L_{AF,\,max}$ levels selected based on 10-15 occurrences over the given period

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Assessment Noise Levels

5.4 The noise levels measured by the logger can be taken as representative for the whole site.

5.5 In order to make the assessment a 'worst-case', the loudest daytime ambient, night-time ambient and typical night-time maximum noise levels will be taken forward into the assessment.

5.6 In addition, the quietest typical background noise levels will be taken forward.

5.7 These noise levels are reproduced in Table 5, below

Table 5: Noise Levels Used in the Assessment

Daytime Ambient Noise Level ($dBL_{Aeq,16hr}$)	Night-time Ambient Noise Level ($dBL_{Aeq,8hr}$)	Typical Night-time Maximum Noise Level ($dBL_{Af,max}$)	Typical Daytime Background Noise Level ($dBL_{A90,16hr}$)	Typical Night-time Background Noise Level ($dBL_{A90,8hr}$)
60	51	73	45	37

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6 NOISE IMPACT ASSESSMENT

6.1 The internal ambient noise criteria which have been adopted for the proposed development using BS8233:2014 and WHO guidelines are outlined in Table 6, below.

Table 6: Internal Ambient Noise Criteria

Activity	Location	07:00 – 23:00 hrs	23:00 – 07:00 hrs
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

6.2 Based on a reduction in external noise levels to internal noise levels of 15 dB for a partially opened window (based on WHO guidance), allowable external noise levels are therefore 50 $dBL_{Aeq,T}$ outside living rooms and bedrooms in the day, and 45 $dBL_{Aeq,T}$ and 60 $dBL_{Amax,F}$ outside bedrooms at night.

6.3 It can be seen that the noise levels in Table 5 exceed the external noise level limits for ventilation via a partially opened window shown in 6.2, above.

6.4 Therefore, background ventilation must be provided by an alternative means, such as a trickle ventilator. It should be noted that the windows may still be openable for purge ventilation purposes.

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Façade and Ventilation Strategy

6.5 Based on the noise levels shown in Table 5, calculations have been undertaken to determine the minimum glazing and ventilator sound insulation performances required to achieve the internal ambient and maximum noise levels shown in BS8233. A summary of the calculations is shown in Table 7, below.

Table 7: Minimum Glazing and Ventilator Performances

Minimum glazing sound insulation performance (dBR_w ($+C_{tr}$))	Example Glazing construction	Minimum ventilator sound insulation performance ($dBD_{nT,w}$ ($+C_{tr}$))
38 (32)	10mm/TC/6mm Standard Thermal Glazing	36 (35)

6.6 The glazing configuration shown in Table 7 is a suggestion only, and alternative configurations may be acoustically suitable.

6.7 Windows can be openable, however, must be well sealed when closed. The frames should not downgrade the sound insulation performance of the glazing.

6.8 The glazed doors that form a part of the development should also have the same sound insulation performance as shown in Table 7, above. The doors should also be well sealed when shut and the frames should not downgrade the performance of the glazing.

6.9 The surrounding external wall and roof constructions should have a sound insulation performance of at least 10 dB greater than the sound insulation performance outlined in Table 7 in order to control noise ingress.

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7 EXTERNAL AMENITY

7.1 Manchester City Council prefers that external noise levels within outdoor amenity areas of residential properties should be no greater than 55 $dBL_{Aeq,16h}$.

7.2 The floorplans sent to dBx Acoustics shown that there will be rooftop terraces as part of this development. These are shown in drawings *20005_0315 - PROPOSED SITE PLAN - LEVEL 04* dated 27th August 2021.

7.3 Table 4 shows that the daytime ambient noise levels at the site are generally in the 50-60 $dBL_{Aeq,16hr}$ range.

7.4 The site is located in Manchester City Centre, and the noise levels experienced at the proposed development will be comparable to those in the surrounding area.

7.5 Mitigation such as noise barriers or replanning will be ineffective on this site.

7.6 BS8233 states that '*locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate.'*

7.7 The external amenity area noise levels are therefore considered appropriate for this development.

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8 BUILDING SERVICES NOISE EMISSIONS

8.1 MCC requires that any new pieces of building services plant have a Rating Level of at least 5 dB below the typical background noise level at the nearest noise sensitive receptor.

8.2 The nearest noise sensitive properties to the development are the neighbouring residences and offices in Whittles Croft and The Stables.

8.3 The typical background noise measured during the noise survey can therefore be taken as representative of the noise levels at these two properties.

8.4 Consequently, suitable limits to which the cumulative plant noise level should adhere are set in Table 8, below.

Table 8: External Building Services Rating noise levels

Noise Sensitive Receptors	External Building Services Plant Noise Limit ($L_{Ar,Tr}$) dB	
	Daytime Period (07:00 – 23:00)	Night-time Period (23:00 – 07:00)
Whittles Croft/The Stables	40	32

8.5 The limits set in Table 8, above, assume that the building services could operate 24/7.

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9 CONCLUSION

9.1 This report details the noise survey and noise impact assessment carried out for Paradise Mews, Paradise Wharf, Manchester, M1 2JN.

9.2 Four mews houses are proposed to be built on the existing car park at Paradise Wharf.

9.3 An unattended noise survey has been carried out to establish the prevailing noise climate across the site and at the nearest noise sensitive receptors.

9.4 Noise levels at the facades of the proposed development have been assessed.

9.5 It is determined that natural ventilation by means of openable windows **will not be** appropriate for this site and an alternative means of ventilation e.g. via trickle vents is suggested.

9.6 Minimum sound insulation requirements for glazing, doors and ventilators have been provided.

9.7 Windows may be openable at the residents' discretion for purge ventilation purposes.

9.8 Rating noise levels at the nearest noise sensitive receptors for emissions from any building services plant have been set.

9.9 On this basis, noise should not be a limiting factor in any planning application

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APPENDIX A – GLOSSARY OF ACOUSTIC TERMINOLOGY

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (L_p) the reference quantity is $2x10^{-5}$ N/m^2. The sound pressure level existing when microphone measured pressure is $2x10^{-5}$ N/m^2 is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (L_p) or Sound Power Level (L_w).
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
A weighting	Arithmetic corrections applied to values of L_p according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of L_p actually measured.
$L_{n,T}$	L_p which was exceeded for n% of time, T.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during time, T.
$L_{Amax,T}$	The instantaneous maximum A weighted sound pressure level which occurred during time, T.

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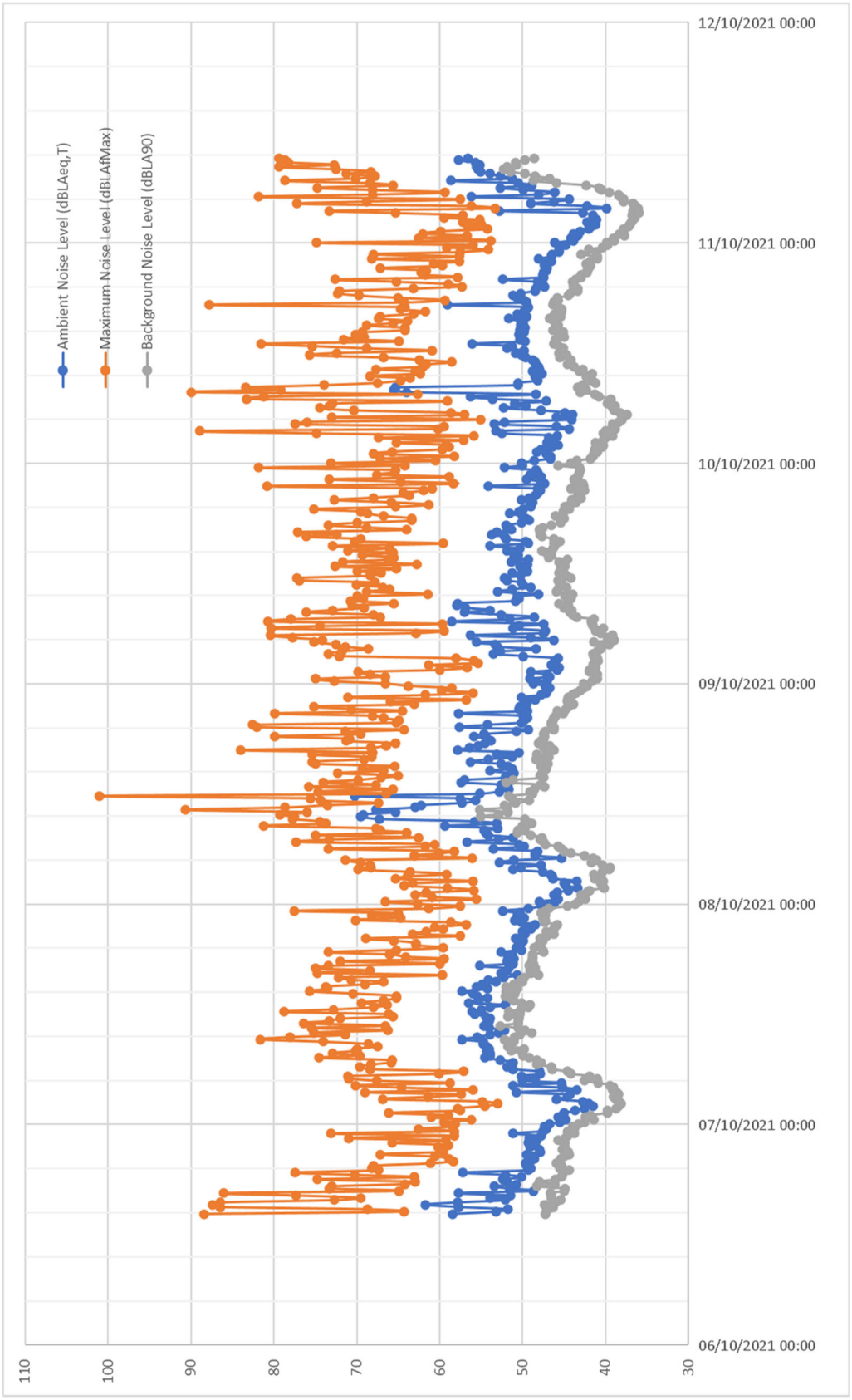
APPENDIX B – UNATTENDED NOISE MEASUREMENTS