BUROHAPPOLD ENGINEERING

Mayfield Temporary Use

Noise Statement

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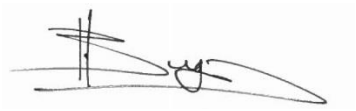
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Glossary

Term	Definition
Decibel (dB)	The decibel scale is used to measure, among other things, the level of sound in the form of Sound Pressure Level (SPL). The measurement is a logarithmic scale based on the ratio of two pressures (the pressure caused by a sound field compared to the minimum audible pressure level), which closely follows the way loudness is perceived by the human ear. The decibel, one tenth of a Bel, is used for convenience, keeping the numbers more manageable.
A-Weighting	The A-Weighting scale is a frequency weighting curve applied to measurements in order to mimic the sensitivity of the human ear at different frequencies. A capital A is suffixed to units to show that the A-Weighting curve has been applied, e.g. dB(A). There are also B, C, D, and E scales for use for higher level signals, although these are rarely used except in very loud instances like measuring ground crew exposure to aircraft noise. Linear measurements, with no weighting applied, can be shown either with a suffixed L or with no weighting suffix at all.
Statistical Noise Levels	Noise levels that vary greatly over time are usually expressed using statistical values of the level exceeded for a stated percentage of the time. These are denoted Lx, showing the level that is exceeded x% of the time. LA90 is considered to be the (A-Weighted) background noise level with unusually loud events being excluded. LA10 is usually used for the measurement of traffic noise.
Frequency	Frequency is the rate of repetition of a sound wave, measured in cycles per second. The higher the frequency of an audio signal, the subjectively higher the pitch to the listener. Human hearing covers a frequency range of approximately 20Hz to 20kHz. For measurement purposes the audio spectrum is normally divided into Octave Bands, where the mid-frequency of one band is double the frequency of the mid-point of the band below. These bands are then sometimes subdivided into 1/3 Octave Bands or smaller Narrow Bands when more detailed analysis is necessary.
$L_{Aeq,T}$	Equivalent continuous sound pressure level (dB, A-weighted) over a period of time, T.

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1 Noise Statement

1.1 Introduction

BuroHappold have prepared this noise statement to accompany an application for Full Planning Permission for the construction of a temporary four-storey event space and office and related landscaping associated with the Mayfield regeneration masterplan.

The location of the proposed development is within the Mayfield regeneration area, adjacent to Manchester Piccadilly train station. The application site is to the east of Baring Street and the north of the River Medlock. The site is accessed directly from Baring Street.

The proposed event space and office is to be a scaffold and timber structure including containers at ground and first floor, to create a temporary mixed use development that will be the first phase of the wider Mayfield regeneration. The intention of the proposed temporary use is to raise the profile of Mayfield as a regeneration area and is intended to kick-start the regeneration process.

The proposed development is of a high quality and unique design to set a precedent for future development and use of the wider Site. The proposed development has been designed specifically to integrate with and provide a gateway to the regeneration area when it comes forward.

The development includes the erection of a four storey building with event and exhibition space (sui generis) at ground and first floor to include market, food and drink, theatre, film, music events and associated ancillary activities, and marketing and commercial floorspace at first and second floor (sui generis), and related access and landscaping.

The figure below shows the approximate location for the proposed development. As can be seen from the figure, there are nearby existing student residences to the immediate west of the site, and these are considered to be the nearest noise-sensitive receptors (*NSRs)*.



Figure 1-1 - Site and nearest noise-sensitive receivers

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Given that the scheme includes performance/events space, public areas in which patrons can convene, and the potential possibility of mechanical services plant (e.g. to ventilate the shipping containers, or to provide kitchen extract from the food and beverage provision) there is the possibility that the development will generate a certain level of noise impact. At this early stage in the proposals, the purpose of this acoustic statement is to suggest noise limits for agreement with the Local Authority.

Since the first issue of this noise statement, a baseline survey has been carried out on site.

1.2 Potential Noise Sources

Based on the information received to date, it is anticipated that the primary sources of noise likely to be associated with the proposed development are:

- Entertainment noise (outdoor stage area)
- Entertainment noise (events space)
- Servicing, deliveries and refuse (ground floor)
- Patron noise (all areas)
- Services plant noise (all areas)

Reference should be made to the plans accompanying the planning application for the full site layout and proposed uses.

1.3 External Noise Survey Results

Environmental noise surveys were carried out on the 13th of February 2017 to assess the suitability of the site for the proposed uses and to identify any potential impacts of the development on adjacent sensitive receptors (NSR1 & NSR2).

The results of the environmental noise survey will be used for :

- Defining the current minimum noise levels for assessing the likelihood of disturbances due to the new development at the nearest noise sensitive receptors.

1.3.1 Survey methodology

Figure 1-2 presents the site and the location of the short term noise survey (position 1).

Surveys began the 13th of February 2017 at approximately 21:00 at position 1. Measurements were made for 15 minute periods until approximately 00:00.

The time period chosen for the surveys was intended to reflect the quietest period of a typical weekday/weeknight during which the temporary site will be operational. The hours of operation are understood to be 08:00 – 00:00. On this basis, the quietest hours of this period are anticipated to be between 22:00 and 00:00, and the survey therefore included these times.

Basing the assessment (and any limits for noise) on levels measured during this period is considerd to provide the most robust method of working. Adherence to limits based on these levels should see that the impact outside of this quietest period is somewhat lower.

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Figure 1-2 Location of the site (red), NSRs (blue) and location of the noise survey measuments

1.3.2 Noise instrumentation

The sound level meters were prooogrammed to log various noise parameters, including $L_{Aeq,T}$, $L_{AF,max}$ and $L_{A90,T}$ at the measurement location.

Table 1-1 presents the noise instrumentation used during the survey.

Instrumentation	Serial Number
B&K 4231 Calibrator	2438725
B&K 2250 sound level meter (used for short term measurements)	3008216
B&K 4189 microphone	2983647

Table 1-1 Noise survey instrumentation

The meters were calibrated before and after use with the calibrator. No significant drift was witnessed (≤±0.5dB). Calibration certificates for all equipment are available upon request.

1.3.3 Weather

During the survey, the temperature was approximately 7˚C with wind speed no greater than 5ms^{-1}.

1.3.4 Noise survey results

A summary of the results of the surveys is shown in Table 1-2. The values are as follows :

- **$L_{Aeq,15mins}$** – the average A-weighted sound pressure level within a 15 minute period

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- Typically thought of as the average ambient noise level at a particular time, and likely to be due to a combination of various noise sources, near and far

- **$L_{AF,max}$** – the maximum instantaneous A-weighted sound pressure level measured during a 15 minute period
  - Typically corresponding to a short-duration event with a very high SPL, for example motorbike passing by, car horn etc.

- **$L_{A90,15mins}$** – the A-weighted sound pressure level exceeded for 90% of the measurement period
  - i.e. a level which would be perceived as a constant, background noise level. Typically largely unaffected by local traffic pass-by or by transient events. More usually attributable to constantly-running building services plant or distant road traffic. What you would hear when there is no local traffic present (or other readily-identifiable noise source)

The 'typical' values reported in the following table are averages of each descriptor during the relevant measurement period.

The $L_{Aeq,T}$ has been averaged logarithmically. The $L_{AF,max}$ values shown are the highest measured on site. The $L_{A90,T}$ values are median integers.

Short term noise measurements (13/02/2017) (dB)					
Period	**Start time**	**End time**	**$L_{Aeq,T}$**	**$L_{AF,max}$**	**$L_{A90,T}$**
Location 1 (see figure 2)					
Night	13/02/2017 21:11	13/02/2017 21:26	59	68	56
	13/02/2017 21:32	13/02/2017 21:47	63	84	55
	13/02/2017 22:07	13/02/2017 22:22	62	77	58
	13/02/2017 22:26	13/02/2017 22:41	59	76	55
	13/02/2017 22:46	13/02/2017 23:01	58	75	55
	13/02/2017 23:11	13/02/2017 23:26	58	71	54
	13/02/2017 23:30	13/02/2017 23:45	62	78	56
	13/02/2017 23:46	14/02/2017 00:01	60	77	55
Typical			**60**	**84**	**56**

Table 1-2 Short term noise survey results – Night-time

1.3.5 Discussion

The levels measured during the short term measurements indicate that the site is exposed to moderate levels of environmental noise. The main sources of noise in the vicinity are road traffic on Fairfield Street, the railway to the north of the site, and the taxi rank on Baring street.

1.4 Suggested Noise Limits

In order to adequately protect residential amenity in nearby residential blocks, limits will be required in terms of noise impact. Various documentation and best-practice techniques exist which relate to the various noise sources listed above, and these are considered in the sub-sections below.

1.4.1 Local policy

The planning & noise technical guidance from Manchester City Council references the World Health Organisation guidelines and British Standard 8233 which are described below. In the context of government policy, Manchester City Council requires that developments aim for :

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- *1. A noise level between the No Observed Effect Level (this is the level of noise exposure below which no effect at all on health or quality of life can be detected) and the Lowest Observed Adverse Effect Level (this is the level of noise exposure above which adverse effects on health and quality of life can be detected)*
- If point 1 cannot be achieved then :
- 2. If the assessment results in a level between the Lowest Observed Adverse Effect Level and the Significant Observed Adverse Effect Level (this is the level of noise exposure above which significant adverse effects on health and quality of life occur), mitigation will be necessary to reduce the level and thus conditions will be attached.
- If points 1 & 2 cannot be achieved then :
- If the assessment results in a Significant Observed Adverse Effect Level after mitigation, the application will be recommended for refusal.

The levels referred to in the policy guidance listed above (i.e. No Observed Effect Level, or NOEL, Lowest Observed Adverse Effect Level, or LOAEL etc.) refer to the National Planning Policy Framework document. Instead of setting definitive limits or quantitative target values, the document places the onus on professionals (such as engineering consultants and environmental health officers) to assess the context of proposals and make judgements accordingly. The following sections are aimed at starting these discussions, to be later augmented by noise survey data to be collected in the future.

1.4.2 Entertainment and patron noise

The World Health Organisation "Guidelines for Community Noise" gives guideline values at which 'moderate' or 'serious' annoyance is typically experienced in 'outdoor living areas' during the daytime and evening as 50 and 55 dB LAeq,16hrs respectively.

British Standard 8233 (Guidance on Sound Insulation and Reduction For Buildings) expands on these noise limits, suggesting that:

'For traditional external areas that are used for amenity space, such as gardens and patios, 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…a compromise between elevated noise levels and other factors…might be warranted.'

Although the student residences do not appear to have external amenity areas such as gardens, the upper limits referred to in BS 8233 and the WHO Guidelines are considered to have merit as a starting point for agreement. On this basis it is considered that the cumulative noise impact from the proposed development may be adequately tolerated by local residents if it is approximately 55 dB(A) LAeq,16hrs at the most exposed external façade of the NSRs.

1.4.2.1 Suggested limits vs existing levels

The noise survey results, in Table 1-2, show that the typical background noise ($L_{A90,T}$) measured at the nearest sensitive receptors during the quietest part of a typical day is $L_{A90,T}$ 56 dB(A).

Therefore, assuming the suggested limit of $L_{Aeq,T}$ 55 dB(A) is adhered to, the subsequent noise impact due to the temporary development would be lower than the existing levels of background noise.

Whilst the noise impact from the development may still potentially be audible at times, British Standard 4142 states that:

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- The lower the rating level relative to the background level, the less likely it is that the specific sound will have an adverse impact
- Where the rating level does not exceed the background level, this is an indication that the specific sound will have a low impact, depending on context

It should be noted that BS 4142 refers to a 'Rating level' in which the noise source is corrected for tonality, intermittency and other acoustically distinguishable characteristics. Entertainment noise is likely to include some of these features, which would potentially increase the possibility of adverse impact.

However, in terms of providing context, it is considered likely that the proximity of the student residences to the proposed site may mean that many of the residents are in fact patrons of the site themselves, potentially reducing the possiblilty of annoyance. It is also noted that the assessment considers the quietest part of the day/night when the development would be operational, and that the impact at most times would be lower than assessed (due to an increase in background noise levels).

1.4.2.2 Suggested limits at source

From examination of the site plan, the 'gable end' of the nearest student block (NSR1) does not have operable residential windows, meaning that the closest part of the nearest NSR would be approximately 55m from the centre of the site, incurring an attenuation due to distance of 35 dB (assuming point sources of noise).

This therefore suggests the cumulative noise limit in the centre of the site may be acceptable to local residents if it is no greater than $L_{Aeq,16hrs}$ 90 dB(A). This is likely to permit most unamplified sources of entertainment and patron noise but is likely to require some consideration of any amplified noise at later stages in the process. Any isolated events that breach this level, will need to be agreed with MCC in advance.

For further information on events, including operating times, reference should be made to the Events Strategy submitted with the planning application. As the temporary noise policy will depend on the number and nature of the events proposed – this should be developed as scheduling progresses. The temporary noise policy should comply with the Noise Council code of practice on environmental noise at concerts.

1.4.3 Servicing, deliveries and refuse

It is considered that the existing student residences in the vicinity of the site will already have regular deliveries, refuse collection and service operations associated with their usages. In principle, it is considered that additional (similar or identical) noise sources will be adequately tolerated provided that they occur during daytime hours (for example 08:00-20:00) only.

1.4.4 Services plant noise

Services plant could be adequately assessed in accordance with British Standard 4142, which provides a method of comparing industrial/commercial noise impact against existing background noise levels. The likely level of perceived impact varies with context, however the standard does state that "Where the rating level does not exceed the background level, this is an indication that the specific sound will have a low impact".

On this basis, it is suggested that a suitable level of noise impact from plant may be to target a value lower than the existing level of background noise, when assessed at the nearest NSRs.

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1.4.4.1 Services plant noise limits

As described in Section 1.3, measurements of the background noise level were conducted at the nearest noise sensitive receptors located in the vicinity of the development.

The plant noise limits will be set out as at leat 5 dB below the existing $L_{A90,15mn}$, which is a common limitation accepted, and will serve to see that the noise impact from plant on existing receptors is minimal.

Therefore, the acceptable moise levels from plant associated with the development at the nearest noise sensitive receptors are shown in Table 1-3 :

NSR Location	Period	Plant Noise Limits	
		Existing measured background noise levels	Limit of plant noise from the development at the nearest noise sensitive receptors
		$L_{A90,T}$ dB typical value	$L_{Aeq,T}$ dB (1h)
Student residential	NSR – Night	56	51

Table 1-3 Existing noise levels at the NSRs, resulting from the measurements & limiting levels for plant noise impact

1.4.4.2 Discussion & levels at source

As can be seen in Table 1-3, plant must be limited to $L_{Aeq,T}$ 51 dB(A), when measured at the residential locations, during all times in which the development is operational.

It should be noted that these are cumulative limits for all plant items operating simultaneously. However, these are not considered to be stringent limits due to the high background noise in the vicinity of the nearest noise sensitive receptors.

As decribed above, the closest part of the nearest NSR would be approximately 55m from the centre of the site, incurring an attenuation due to distance of 35 dB (assuming point sources of noise).

Therefore, it can be assumed that the cumulative noise impact from plant items should have a limitation of $L_{Aeq,T}$ of 86 dB(A) when measured at source, assuming this location to be in the centre of the site. This is not considered an onerous limit for the type of plant expected at the site, and would permit (for example) 10 items each with a sound pressure level of $L_{Aeq,T}$ 75 dB(A) at source (i.e. 1m from the item in question).

It should be noted that plant locations are not known at present. Should any items be proposed in closer proximity to the NSRs than suggested above, the limits would need to be reduced accordingly.

1.5 Conclusions and National / Local Policy Adherence

As discussed in sections above, local policy requires that an assessment is carried out in accordance with the NPPF, which does not provide a quantitative framework for assessing external noise impact. Instead, the onus is on planning and engineering professionals to agree on criteria which represent a level of noise impact which does not adversely impact on quality of life for existing residents.

MCC policy suggests that the aim should be to provide a level of impact between the NOEL (no observable effect level) and the LOAEL (lowest observed adverse effect level).

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1.5.1 Entertainment and patron noise

Adherence with the proposed limits should see a noise impact 1 dB lower than the existing background noise levels, which could (at the quietest period of the day/night) see an increase in the background level of approximately 2 dB. Given that the threshold of perceptibility for most humans is 3 dB, this level of impact is considered to be marginally less than the LOAEL, and therefore in line with the MCC suggestion.

1.5.2 Deliveries and refuse

Adherence with the proposed method of mitigation is expected to see that (whilst individual deliveries or activities may be perceptible) these would not be perceived as problematic over and above the existing, similar activities for the residential blocks themselves. Delvieries and refuse pick-ups would therefore be considered the LOAEL, with the impact for the vast majority of the time (when no activity is taking place) being the NOEL.

1.5.3 Plant noise

Adherence with the proposed limits should see a noise impact 5 dB lower than the existing background noise levels, which could (at the quietest period of the day/night) see an increase in the background level of less than 1 dB. Given that the threshold of perceptibility for most humans is 3 dB, this level of impact is considered to be less than the LOAEL (and close to the NOEL), and therefore in line with the MCC suggestion.

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