HOWELL ACOUSTICS
SPECIALIST ACOUSTIC CONSULTANCY

Mr. A Khan.

NOISE ASSESSMENT

Queens Road Manchester

HA223-R01-P01
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CONTENTS

1. INTRODUCTION 1

2. SITE DESCRIPTION 2

3. NOISE SURVEY 3

3.1. METHODOLOGY 3

3.2. EQUIPMENT 3

3.3. WEATHER CONDITIONS 4

3.4. RESULTS 4

4. NOISE ASSESSMENT CRITERIA 6

4.1. BS 4142:2014+A1:2019 6

5. ASSESSMENT 8

5.1. FIXED PLANT NOISE 8

5.2. DELIVERIES 8

6. CONCLUSION 9

APPENDICES

APPENDIX A

TECHNICAL TERMINOLOGY

APPENDIX B

REPORT LIMITATIONS

1. INTRODUCTION

Howell Acoustics has been appointed by Seed Architects on behalf of their client, Mr. Abdul Khan to undertake an assessment of the noise impact of a proposed warehouse ("The Site") on its surrounding.

The site at Queens Road, Manchester M8 0RX is a brownfield site, just off the A6010 and is mainly surrounded by residential areas and some commercial premises. The proposal is for the development of a 'trade counter' style warehouse.

Due to the permanency of the proposed unit and its proximity to the adjacent noise sensitive residential areas, an assessment is required to ensure that operational use will not result in an adverse impact upon the amenity of the nearby noise sensitive adjacencies.

The following scope of work has been undertaken:

- Determine the nearest noise sensitive receptors
- Establish baseline environmental noise levels;
- Consider the impact of any proposed fixed plant; and
- Consider the impact of deliveries.

This report presents the results of an environmental noise survey, an evaluation of the noise risk in respect of exposure for the existing residential units surrounding the proposed development and summarises the potential measures that may be required to enable a good acoustic design

The noise impact assessment is in accordance to British Standard 4142:2014+A1:2019

For details of the acoustic terminology used throughout this report, please refer to Appendix A.

2. SITE DESCRIPTION

The site is located at Queens Road, Manchester M8 0RX, at approximate National Grid Reference (NGR):335 A6010. Reference should be made to Figure 1 for a map of the site location. The site lies within the jurisdiction of Manchester City Council ("MC Council").

Figure 1: Site Location Plan Indicating Building Location and Noise Sensitive Areas.

The proposed site is for the development of a 'trade counter' style retail warehouse and lies along the north side of Queens Road. The proposed site location is surrounded by residential type properties to its north, south and east and west and has a commercial premises to it's east. The site also has a tram line to its west.

From an overview of satellite imagery, nearby noise sensitive sites with the potential to be affected by the proposed development site include:

- Residential units surrounding the site location (10 metres due north, 50 metres due south).
- Commercial premises and residential units, approx. 18 metres to the east of the site location.

The areas shaded in green highlight the areas mentioned above.

3. NOISE SURVEY

3.1. METHODOLOGY

An unattended environmental noise survey of the current prevailing background noise levels was undertaken at one location on the site on Thursday 2 March 2023.

Figure 2: Noise Survey Measurement Locations

To establish the prevailing daytime levels across the site, measurements of consecutive 15-minute L_{Aeq}, L_{A90} and L_{AFmax} sound pressure levels were taken at a height of 3.3 m above local ground level in free-field conditions at the measurement position shown in green in Figure 2. The assessment location is dominated by general traffic noise on the A6010.

As mentioned in BS 4142:2014+A1:2019, the background sound level was measured at a time (6:10 am to 8 pm), which is approximately representative of the duration when the plant is intended to be operational.

3.2. EQUIPMENT

Noise levels were monitored using Class 1 integrating/averaging Sound Level Meters (SLMs), with the position A measurement equipment housed in environmental protection apparatus. The SLM was field calibrated before and after the survey using a Class 1 calibrator, with no significant drift in calibration levels recorded (> ± 0.5dB).

Full details of the noise measurement equipment used in the survey are provided in Table1 .

Position	Equipment Item	Make / Model	Serial Number
1	Sound Level Meter	Norsonic 118	31512
	Pre-amplifier	Norsonic 1201	15457
	Microphone	GRAS 40AF	51464
	Calibrator	Norsonic 1255	125525651

Table 1 Noise Measuring Equipment

3.3. WEATHER CONDITIONS

Weather conditions during the survey were observed to be dry, partly cloudy, and slightly windy. Temperatures were recorded at the site location to range between 3 and 9°C with wind speeds ranging between 3 and 6 mph from a North-easterly direction during the survey.

Weather conditions were suitable for the measurement of environmental noise.

3.4. RESULTS

Figure 3 shows the results of all the measurements periods indicating the background sound level. According to the data an L_{A90} of 60 dB is representative of the most commonly occurring sound pressure level value which is exceeded 90% of the time.

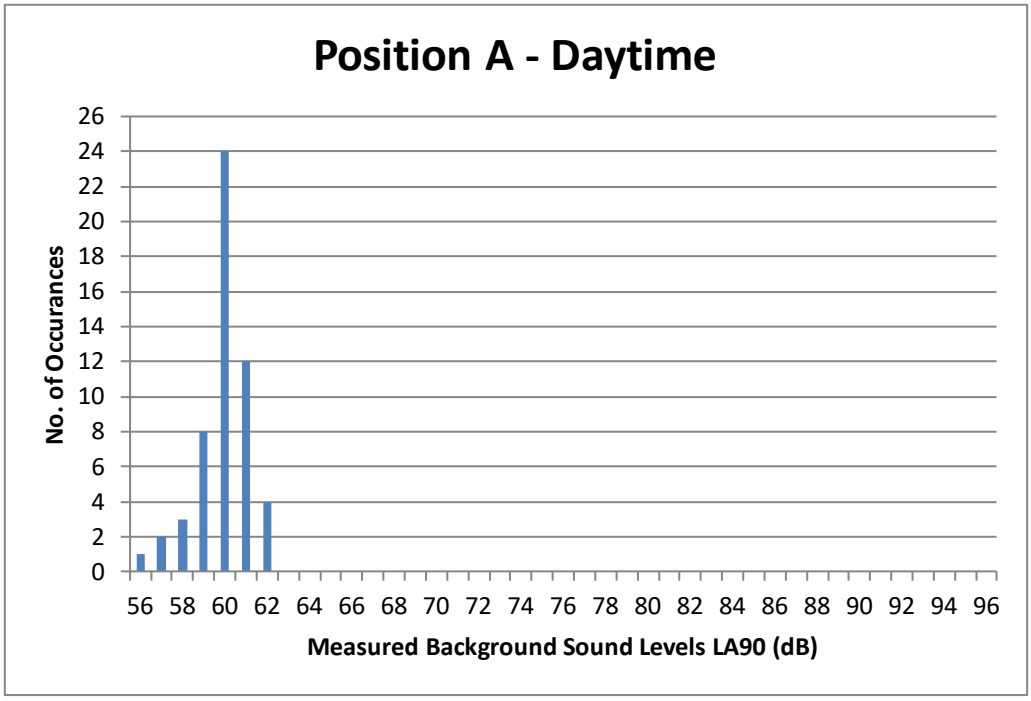

Figure 3 Background Noise Level

A summary of the background sound survey measurements is provided below in Table 2. The data gathered during the measurement time has been analysed to determine the indices L_{Aeq} (15 mins), L_{A90} , L_{AFmax}.

Period (T)	Ambient Noise Level ($L_{Aeq,T}$)	Typical Background Noise Level ($L_{A90,T}$)	Maximum Noise Level (L_{AFmax})
Day (06:22-19:22)	68 dB	60 dB	102 dB

Table 2 Background Noise Level Summary

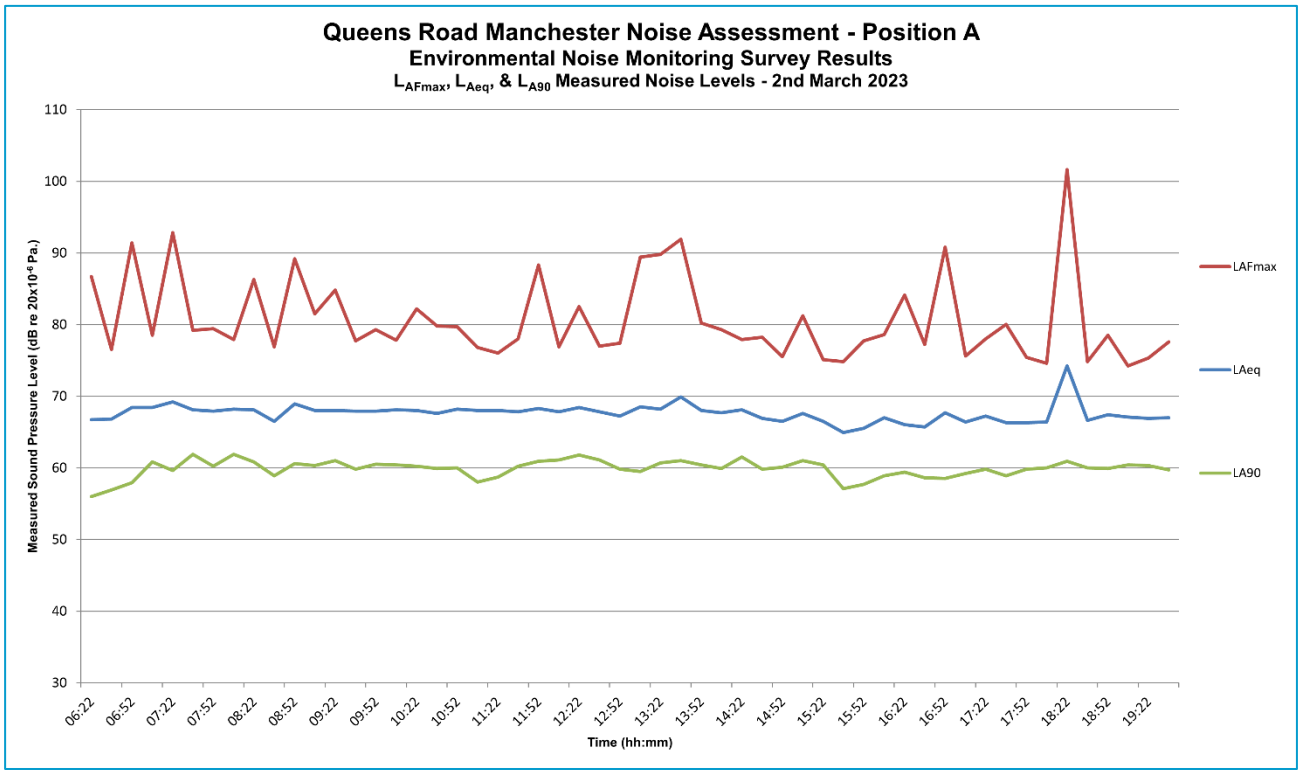

Figure 4 Statistical Data Indicating Background Sound Level Time History

4. NOISE ASSESSMENT CRITERIA

4.1. BS 4142:2014+A1:2019

The assessment methodology contained within BS 4142:2014+A1:2019 evaluates the specific sound level of each industrial or commercial sound source, corrects for distinguishable features to derive the rating level and compares this with the background sound level.

The Background Sound Level ($L_{A90,T}$) is in fact a range of levels, not one absolute value. Whilst stating that the measurements of background sound should be normally not less than 15 minutes, the focus is on obtaining a level for use in assessment that is representative of typical conditions at the noise-sensitive receivers.

The Specific sound ($L_{Aeq,T}$) is obtained over a reference period of 1 hour (daytime) and 15 mins (at night). Ideally, measurements would be taken of the ambient sound and residual sound at the assessment location, with these measurements used to accurately calculate the specific sound (ambient – residual = specific).

The Rating Level is obtained by measuring or predicting the 'Specific Sound Level' from the source, in terms of the $L_{Aeq,T}$ parameter, correcting for the influence from any 'Residual Sound' and, if necessary, applying a correction factor to account for the acoustic features present in the noise in question, such as distinguishable, discrete, continuous note (a whine, hiss, screech or hum etc.) or distinct impulses (bangs, clatters or thumps etc.).

These correction factors can be approached in three ways:

- subjective method;
- objective method for tonality;
- reference method.

The subjective method to calculate the Rating Level incorporates the following corrections (particularly appropriate for new noise sources that cannot be measured in-situ):

- Up to +6 dB due to tonality, subjectively this might be +2 for a tone that is just perceptible, +4 where it is clearly perceptible and +6 where it is highly perceptible.
- Up to+9 dB for impulsivity, subjectively this might be +3 for impulsivity that is just perceptible, +6 where it is clearly perceptible and +9 where it is highly perceptible; and
- Up to +3 dB for other acoustic features that are neither tonal nor impulsive, though readily distinctive at the receptor.

Where the subjective method is not sufficient to assessing the audibility of tones, the objective method for tonality should be used. This involves analysing the one-third octave bands (25Hz to 10kHz) of the specific sound and applying a correction of +6dB where a tone is prominent.

Where the subjective method is not sufficient for assessing the prominence of impulsive sounds, the reference method should be used. This involves analysing the onset rate of an impulsive sound and the amount of increase in level. A correction of between 0.0 and 9.0 dB is applied to the specific sound level.

Where the one-third octave method is not sufficient for identifying tones, the reference method for assessing the audibility of tones should be used. This analysis produces a sliding scale correction from 0.0 to 6.0dB.

An initial estimate of the impact of the specific noise is calculated by subtracting the measured background sound level from the rating level. According to BS 4142:2014+A1:2019, the following advice applies:

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

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.

5. ASSESSMENT

5.1. FIXED PLANT NOISE

According to the data collected, the typical background sound level at the assessment location is $L_{A90,15m}$ 60 dB.

Based on the above, the noise associated with operation of the plant is advised to have a noise rating level of $L_{Ar,Tr}$ 60 dB to ensure that the plant operation has low impact on surrounding noise sensitive areas in accordance with BS 4142:2014+A1:2019.

The cumulative sound level from all proposed plant developments must be designed to achieve this set limit to achieve a low impact. Future equipment installations can be located freely around the site provided it achieves the set noise limit at the nearest adjacent noise sensitive dwellings. This limit is considered feasible given the potential small plant in conjunction with a relatively high limit.

5.2. DELIVERIES

Deliveries are likely to occur from 6am. Based on the survey data and site experience, typical noise levels are high and road traffic noise is busy. The addition of a few deliveries as proposed is unlikely to have any adverse effect on nearby residential receptors. The nearest noise sensitive dwellings would benefit from the delivery location being situated on the opposite site of the building i.e towards the front of the site.

6. CONCLUSION

Howell Acoustics has been appointed by Seed Architects on behalf of their client, Mr. Abdul Khan to undertake an assessment of the noise impact of a proposed warehouse ("The Site") on its surrounding.

The Background Sound Level Assessment identified the typical background sound level and used this to set a sound rating level of 60dB to ensure that the plant operation has low impact on surrounding noise sensitive areas.

The noise impact from deliveries have been considered and it is concluded that no adverse effects are likely.

Fixed plant must be procured and located such that the recommended sound rating level is achieved, cumulatively at the nearby residential receptors.

This report is subject to the limitations as set out in Appendix B.

Appendix A

TECHNICAL TERMINOLOGY

Descriptor	Description
Free-Field Level	A measured sound pressure level that is independent of any contributions due to reflections from nearby surfaces and is therefore representative of the direct path only.
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level	The sound level is the sound pressure relative to a standard reference pressure of 20µPa ($20x10^{-6}$ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{AFmax,T}$	A noise level index defined as the maximum noise level during the period T. LMax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L90 can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{Aeq,Tr}$	Specific noise level. The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.
$L_{Ar,Tr}$	Rating noise level. The specific noise level plus any adjustments for characteristic features of the noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.

Appendix B

REPORT LIMITATIONS

This report has been prepared for the titled project or named part thereof and should not be used in whole or part and relied upon for any other project without the written authorisation of Howell Acoustics Limited. Howell Acoustics Limited accept no responsibility or liability for the consequences of this document if it is used for a purpose other than that for which it was commissioned. Persons wishing to use or rely upon this report for other purposes must seek written authority to do so from the owner of this report and/ or Howell Acoustics Limited and agree to indemnify Howell Acoustics Limited for any and all loss or damage resulting therefrom. Howell Acoustics Limited accepts no responsibility or liability for this document to any other party other than the person by whom it was commissioned.

The findings and opinions expressed are relevant to the dates of the site works and design drawings/specifications and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations Howell Acoustics Limited reserve the right to review the information, reassess any new potential concerns and modify our opinions accordingly.

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