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Site Address : Lowry Park, Grimshaw Lane, Manchester, M40 2BA
For: A & H Construction
Client Address: Coombs Road, Halesowen, West Midlands, B62 8AE,
Report no: T 2324-203
Date of Report: 12/08/2023
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Scope of Work: Baseline Noise Survey to determine noise levels for
BREEAM Design Review.

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1.0 Introduction

1.1 REDFAN Solutions have been instructed by A & H Construction to assess the Environmental Noise Levels Lowry Park, Grimshaw Lane, Manchester, M40 2BA to aid in the Design Review for desired BREEAM acoustic credits.

1.2 This report outlines the likely impact of the noise environment to the working spaces and the plant equipment operation at the nearest noise sensitive receivers.

1.3 The construction of the warehouses at Lowry Park, Grimshaw Lane, Manchester, M40 2BA are being constructed on a large industrial area, the site is on the main A62 Oldham Road.

1.4 There will be 6 warehouse units with 2 of the units being separated into multiple areas. It will be constructed of trapezoidal cladding with a maximum 10° fall trapezoidal roof.

Appendix 1 shows the proposed site plan for the warehouse.

1.5 Internally the buildings are a mix of large full height loading and distribution area, plus a 2-storey office/ancillary area as well as smaller individual units.

1.6 Some of the buildings will have full mechanical ventilation with a mixed mode hybrid system in open plan/administrative areas, with the large hanger space fully ventilated. The occupants will be able to open windows as needed, but this is not necessary for the ventilation design.

1.7 A Baseline Noise Survey was undertaken at site, as well as short term surveys at 93 Ten Acres Lane. Results from this survey will be used when analysing the impact, the warehouse plant equipment has in the local area and to the nearest noise sensitive receptors.

1.8 This report contains a consideration of relevant planning policy and derivation of appropriate assessment criteria, an Environmental Noise Survey carried out in the vicinity of the site and an assessment of the plant equipment sources.

1.9 Consideration has been given to the noise impact of the proposals on the nearest residential property at 93 Ten Acres Lane.

2.0 Criteria

BS8233:2014

2.1 Local Authorities usually stipulate internal noise criteria for residential buildings use levels based on British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'.

2.2 BS 8233:2014 provides references and guideline values for desirable indoor ambient noise levels for dwellings as shown in Table 2.8 below.

BS 8233:2014 Desirable Internal Ambient Noise Levels for Dwellings

Table 4 Indoor ambient noise levels for dwellings

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

2.4 The table is noted to apply to external noise as it affects the internal acoustic environment from sources without a specific character.

2.5 The above internal ambient noise levels are therefore considered appropriate within this assessment.

2.6 BS 8233:2014 states 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 an upper guideline value of 55dB LAeq, which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances...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'.

Changes in noise level

2.7 The Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Noise Impact Assessment' provides guidance on the sensitivity of receptors to changes in noise levels. Changes in noise levels of less than 3dBA are not perceptible under normal conditions and changes of 10dB are equivalent to a doubling of loudness. This guidance has been accepted by Inspectors, at Inquiry, to encompass changes in noise levels in the index LAeq,T.

2.8 The following table summarises the response to changes in noise level (known as the Semantic Scale).

Table 2: Change in noise level – response and impact.

Change in noise level LAeqT dB	Response	Impact
<3	Imperceptible	None
3 - 5	Perceptible	Slight
6 - 10	Up to a doubling	Significant
11 – 15	More than a doubling	Substantial
> 15	-	Severe

2.9 BS 7445:2003 “Description and measurement of environmental noise”

Part 1 of BS 7445 establishes guidelines to quantities and procedures for environmental noise measurements. Guidance provided on instrumentation and calibration, measurement positions, meteorological effects, and information to be recorded.

- All equipment shall be calibrated and the configuration for calibration shall be in accordance with the manufacturer’s instructions.
- A comprehensive recalibration at certain time intervals may be prescribed by authorities responsible for the use of measurement results.
- A field check shall be made by the user at least before and after each series of measurements, preferably including an acoustic check of the microphone.
- “Outdoor measurements near buildings”: these measurements shall be carried out at places where the noise to which a receiver is exposed is of interest. If not otherwise specified, the preferred measurement positions are 1m to 2m from the façade and 1.2 to 1.5m above the ground.

2.10 BS 4142: 2014+A1:2019 “Method for rating and assessing industrial and commercial sound”

This British Standard describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

- sound from industrial and manufacturing processes; equipment; commercial premises;
- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

The significance of sound impact is to be determined according to the following summary process:

- Determine the background sound levels, in terms of the index LA90, at the receptor locations of interest.
- Determine the specific sound level of the source being assessed, in terms of its LAeqT level (T = 1 hour for day or 15 minutes for night), at the receptor location of interest.

- Apply a rating level acoustic feature correction if the source sound has tonal, impulsive, intermittent, or other characteristics which attract attention. between the two, the higher the likelihood of adverse impact.
- A difference (rating – background) of around +10 dB is an indication of significant adverse impact, depending on the context; a difference of +5 dB is an indication of an adverse impact, depending on the context. 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 upon context.

2.11 BS 4142 introduced the concept of ‘context’ to the process of identifying noise impact. Section 11 of BS 4142: 2014+A1:2019 explains “The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs” (our emphasis). An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context” (our emphasis).

There are many context points to consider when undertaking an assessment of sound impact including:

- The absolute level of sound;
- The character and level of the specific sound in the context of the existing noise climate; for example, is the sound to occur in a location already characterised by similar activities as those proposed?
- The sensitivity of the receptors;
- The time and duration that the specific sound is to occur;
- The conclusions of assessments undertaken using alternative assessment methods, for example, WHO guidelines noise values or change in noise level;

2.12 It is therefore entirely possible that whilst the numerical outcome of a BS BS 4142: 2014+A1:2019 assessment is indicative of adverse or significant adverse impact, when the proposal is considered in context the significance of the impact is reduced to an acceptable level.

2.13 WHO Guidelines for Community Noise

2.13.1 The WHO Guidelines (1999) recommends indoor night-time guidelines in order to avoid sleep disturbance, the document states these to be 30 dB (LAeq) and 45 dB (LAfmax) for continuous and individual noise events respectively.

2.13.2 The document states that the number of noise events should also be considered and that individual noise events should not exceed 45 dB (LAfmax) more than 10 – 15 times per night.

2.14 The NPPG introduces the concept of a noise exposure hierarchy based on likely average response. The guidance contained in the NPPG is summarised in the table below:

Table 1: Noise Exposure Hierarchy - Perception Examples

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Noticeable and intrusive	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
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			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep 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			
Noticeable and disruptive	The noise causes a 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 windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in 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 effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Adverse Effect Prevent

2.15 The unattended survey was undertaken on 04/08/2023 between 16:00 and 08:00 on 08/08/23. The monitoring equipment was placed at the boundary of the site towards what will be considered the loudest noise sources. Measurements taken were (L_{Aeq}), (L_{A90}), (L_{cfMax}) and (L_{cfMax})

3.0 Site Description and Observations

3.1 The warehouse construction area will be hereafter referred to as 'the site'. Is a development of 6 warehouses situated on a large industrial area to the northeast of Manchester close to the M60.

3.2 The noise survey was unmanned. Therefore, a subjective assessment of background and ambient

noise sources could not be undertaken for the whole monitoring duration. While onsite the dominant noise source was traffic. Secondary noise was from other businesses on the industrial area.

3.3 investigation of the surrounding area identified properties at 93 Ten Acres as the most likely receptor, comparing to site drawings, Ten Acres will be the closest and have the most direct view of the external plant equipment. Properties on Bower Street have the potential to be closer by a short distance however there is no direct view of plant equipment, these properties will be shielded by the new warehouses themselves as well as the existing units on the industrial estate that is between Bower Street and the new development.

3.4 Red Lines outline site and yellow dot shows position tested.



Short term survey position (green dot indicates position of survey)



4.0 Environmental Noise Survey

4.1 The unmanned environmental noise survey was undertaken on 04/08/2023 between 16:00 and 08:00 on 08/08/23.

4.2 Ambient (L_{Aeq}), (L_{A90}), (L_{cfMax}) and (L_{cfMin}) level measurements were taken for a continuous 1-hour period in 5- and 15-minute increments.

4.3 The recordings were taken in 5 minute and 15-minute intervals to prevent any other single noises that would be seen as not representational from affecting the measurements. Prior knowledge of any out of the ordinary potential noise was limited and could have had an impact on the test.

4.4 The sound level meter was positioned as for an outdoor free field measurement. 1m to 2m from the façade and 1.2m to 1.5m above the ground, the sound level meter was positioned 3.5m from the nearest reflective surfaces and 1.2m above the ground. The positions were chosen as to best represent the nearest noise sensitive receptors.

4.5 Equipment used for the survey.

Item	Make/Model	Serial no	Calibration Cert no
Calibrator	Norsonic 1255	125525488	U39343
Sound Level Meter	Norsonic 140	11404818	U39909
Microphone	Norsonic 1225	149539	39908

Item	Make/Model	Serial no	Calibration Cert no
Calibrator	Norsonic 1255	125525488	U35819
Sound Level Meter	Norsonic 145	14529308	U35821/U35822

4.6 The Noise Survey and measurements were conducted, BS4142:2014 Methods for rating and assessing industrial and commercial sound. BS 4142:2014 gives a method for rating sound from

industrial and commercial sources and BS 7445:2003 establishes guidelines to quantities and procedures for environmental noise measurements.

4.7 Weather conditions throughout the survey were classed as mainly dry but breezy, some rain on 05/08/2023, a temperature high of between 11-18 °C and a gentle wind blew throughout the test with the wind having no set direction (<5m/s). with 20% -40% cloud cover.

4.8 The noise monitoring equipment used was calibrated before and after the noise survey period. No significant drift was recorded. Equipment calibration certificates can be provided upon request.

4.9 The shortened survey at 93 Ten Acres recorded x3, 3-hour periods of time, from 07:00 – 10:00, 14:00 – 17:00 and 23:00 – 02:00 on the 04/08/2023 to the 05/06/2023.

5.0 Uncertainty

5.1 All measurements onsite were taken with a sound level meter manufacturer's margin of uncertainty at typically +/- 1.1dB. It is due to the tolerances associated with Class 1 sound level meters and calibrator equipment used to measure background noise.

6.0 Results

6.1 The test was carried out under free field conditions and therefore no adjustments are required for façade reverberation sound.

6.2 The table below gives the Baseline Noise Survey readings taken at site.

Time Period	Sound pressure level dB (L_{Aeq})	Background level (L_{A90})	(L_{Amax})
Daytime (07:00-19:00hrs)	55dB	49dB	90dB
Nighttime (23:00-07:00hrs)	50dB	46dB	78dB

6.3 The table below gives the short-term survey results taken at 93 Ten Acres.

Time Period 1hr	Sound pressure level dB (L_{Aeq})1hr	Background level (L_{A90})1hr
Daytime (07:00-19:00hrs)	52dB	47dB
Nighttime (23:00-07:00hrs)	49dB	44dB

6.4 The average ambient (L_{Aeq}) and background (L_{A90}) noise levels at the measurement position during the survey has been based on an analysis of the monitored data.

6.5 Given that all the plant equipment has the potential to be used 24hrs a day the night-time measurement of 44dB will be used when comparing sound pressure levels produced by the use and equipment on site.

7.0 Conclusion

7.1 Units 1,2,3 & 6 are the only units having external plant equipment fitted. There will be 1 item of plant equipment at each unit.

7.2 Table of units and Sound Pressure

Unit Number	Air conditioning unit	Sound Pressure (dBA)	Sound Pressure (low Power/nighttime) (dBA)
1	PURY-P250 NW-A2	61	45
2	PURY-P200 NW-A2	59	44
3	PURY-P200 NW-A2	59	44
6	PURY-P450 NW-A2	66	53

7.3 Positions of Air-conditioning Units.



7.4 The calculation to determine the specific noise level at the nearest noise sensitive receiver.

$$L_2 = L_1 - 20 \times \log \left(\frac{r_2}{r_1} \right)$$

7.5

r_1 = the distance the recording was taken from the noise source

r_2 = the distance to the nearest noise sensitive receptor

L_1 = the sound pressure recorded

L_2 = the sound level that carries to the noise sensitive receptor

7.6 Distances from Plant equipment to NNSR

Position	NSR	Distance from Plant Equipment
Unit 1	93 Ten Acres	270m
Unit 2	93 Ten Acres	190m
Unit 3	93 Ten Acres	130m
Unit 6	93 Ten Acres	150m

7.7 Daytime Sound Pressure levels

93 Ten Acres

$$\text{Unit 1} \quad L_2 = 61\text{dB} - 20 \times \log\left(\frac{270}{1}\right) = 12\text{dB}$$

$$\text{Unit 2} \quad L_2 = 59\text{dB} - 20 \times \log\left(\frac{190}{1}\right) = 13\text{dB}$$

$$\text{Unit 3} \quad L_2 = 59\text{dB} - 20 \times \log\left(\frac{130}{1}\right) = 17\text{dB}$$

$$\text{Unit 6} \quad L_2 = 66\text{dB} - 20 \times \log\left(\frac{150}{1}\right) = 22\text{dB}$$

7.7 Nighttime Sound Pressure levels

93 Ten Acres

$$\text{Unit 1} \quad L_2 = 45\text{dB} - 20 \times \log\left(\frac{270}{1}\right) = -4\text{dB}$$

$$\text{Unit 2} \quad L_2 = 44\text{dB} - 20 \times \log\left(\frac{190}{1}\right) = -2\text{dB}$$

$$\text{Unit 3} \quad L_2 = 44\text{dB} - 20 \times \log\left(\frac{130}{1}\right) = 2\text{dB}$$

$$\text{Unit 6} \quad L_2 = 53\text{dB} - 20 \times \log\left(\frac{150}{1}\right) = 9\text{dB}$$

7.8 The calculated sound pressure is more than 5dB lower than both daytime and nighttime measured background noise.

Appendices

1. proposed site plan for the warehouse



2. These are the main noise indices in use in the UK.

- **dB(A):** The human ear does not hear all frequencies with the same intensity. It is most sensitive to sounds in the 500Hz-8kHz range. Above and below this range the ear becomes progressively less sensitive. To compensate for this, sound level meters incorporate electronic filtering to correspond with the varying sensitivity of the ear. This filtering is called A-weighting and Sound Pressure Levels obtained with this weighting are referred to as A-weighted and signified as dB(A).
- **LA90:** The sound level (in dBA) exceeded for 90% of the time. This unit gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the “background noise level” of an area.
- **LAeq,T:** The equivalent continuous sound pressure level over a period of time, T; (in dBA) This unit may be described as “the notional steady noise level that would provide, over a period, the same energy as the varying noise in question”. In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as road traffic, aircraft and trains.

- LA1: The sound pressure level (in dBA) exceeded for 1% of the time. This unit can give an indication of a regular maximum noise level from such activities as dance music.
- LAe: The sound exposure level, (previously denoted SEL) is the noise level of an event, such as a train or aircraft event, normally expressed in a 1 second time period.
- LAmin: The minimum sound pressure level (in dBA) measured over the time period.
- LAmax: The maximum level of sound (in dBA), i.e. the peak level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.
- LArT : sound rating level, the a-weighted, leq sound level of an industrial noise during a specified time period, adjusted for tonal character and impulsiveness

4. Measurements at site

Date	LAeq	LAF,Perc6
16:00	59	52
17:00	55	50
18:00	53	49
19:00	53	48
20:00	53	47
21:00	51	47
22:00	50	47
23:00	51	47
00:00	52	47
01:00	51	47
02:00	48	46
03:00	51	47
04:00	49	46
05:00	51	46
06:00	56	49
07:00	55	50
08:00	55	50
09:00	56	51
10:00	54	49
11:00	54	49
12:00	53	49
13:00	55	49
14:00	54	48
15:00	53	49
16:00	54	49
17:00	55	51
18:00	56	51
19:00	54	50

20:00	54	50
21:00	54	49
22:00	52	49
23:00	53	49
00:00	53	49
01:00	51	48
02:00	51	47
03:00	49	47
04:00	49	47
05:00	50	48
06:00	52	48
07:00	52	48
08:00	51	47
09:00	51	46
10:00	53	47
11:00	53	49
12:00	53	50
13:00	53	50
14:00	66	48
15:00	52	48
16:00	52	48
17:00	52	48
18:00	53	48
19:00	54	48
20:00	52	47
21:00	52	46
22:00	50	46
23:00	49	46
00:00	50	46
01:00	49	46

02:00	49	46
03:00	50	45
04:00	48	46
05:00	52	46
06:00	55	49
07:00	60	53
08:00	58	52
09:00	60	53
10:00	57	49
11:00	61	53
12:00	60	54
13:00	55	50
14:00	59	54
15:00	62	55
16:00	58	52
17:00	57	52

18:00	55	48
19:00	53	47
20:00	51	46
21:00	51	47
22:00	52	47
23:00	50	46
00:00	53	46
01:00	49	46
02:00	48	46
03:00	49	46
04:00	49	46
05:00	51	46
06:00	57	48
07:00	64	56
08:00	65	56
09:00	59	52

Short Term Survey 93 Ten Acres

Date	LAeq	LAF,Perc6
08:00	55	50
09:00	53	48
10:00	50	47
15:00	51	46
16:00	50	45
17:00	48	45
23:15	48	44
23:30	49	44
23:45	50	45
00:00	50	46
00:15	49	45
00:30	52	44
00:45	48	45
01:00	49	46
01:15	48	45
01:30	50	46
01:45	49	42
02:00	49	42