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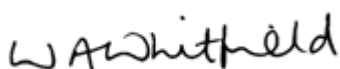
Environmental Noise Assessment

Prepared: 23rd September 2021

Report No	21528A-1
Client	Rowlinson Construction Ltd
Site	Happi Scheme Bowes Street Manchester

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1. Quality Management

Report Number	21528A - 1
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3. Executive Summary

- 3.1.1. An environmental noise assessment has been carried out for a proposed plant room at Happi Scheme, Bowes Street, Manchester ("Proposed Development").

3.2. Measurement, Assessment and Evaluation

- 3.2.1. The survey was carried out to BS7445-1:2003,¹ BS7445-2:1991² and BS4142:2014³ which are covered under our UKAS Accreditation.
- 3.2.2. The interpretation of the data and the specification of suitable mitigation or treatment are outside the scope of our UKAS accreditation but is covered in our 17025 Quality Management System and reporting procedure.

3.3. Scope

- 3.3.1. This report covers all aspects of the noise survey, including:
- the identification of acoustic design criteria;
 - the identification of specific sound sources;
 - an objective sound pressure level survey of the existing site;
 - assessment of the specific sound sources based on guidance contained in BS4142:2014.

3.4. Results Summary

- 3.4.1. A numerical BS4142 assessment shows that there is an indication that the specific sound will have a low impact on proposed new residential receivers and, generally, the lower the rating level is relative to the background sound level, the less likely it is that the specific sound source will have an adverse impact.
- 3.4.2. In this context the new specific sound sources are being introduced close to new residential receivers. The impact of the specific sound is likely to be significantly reduced compared to the situation where new sound sources are being introduced close to existing residential receivers.

¹ BS7445-1:2003 "Description and measurement of environmental noise – Part 1: Description of quantities and procedures"

² BS7445-2:1991 "Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use"

³ BS4142:2014 "Methods for rating and assessing industrial and commercial sound"

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5. Background

5.1. Noise Policy Statement for England

- 5.1.1. The Noise Policy Statement for England (NPSE), published in March 2010, states the long-term vision of Government noise policy is to *“promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development”*.
- 5.1.2. This long-term vision is supported by the following 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;
 - Where possible, contribute to the improvement of health and quality of life.
- 5.1.3. The intention is that the NPSE should apply to all types of noise apart from noise in the workplace (occupational noise).

5.2. National Planning Policy Framework

- 5.2.1. The National Planning Policy Framework (NPPF) was published on the 27th of March 2012 and was most recently updated on the 20th July 2021; it sets out the Government’s planning policies for England and how these are expected to be applied. The framework states that the planning system should contribute to and enhance the natural and local environment by:

“preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability”.

- 5.2.2. The NPPF requires that new developments be appropriate to their locations such that the effects of pollution on health have been taken into account. Planning policies and decisions should aim to:
1. avoid noise giving rise to significant adverse impacts on health and the quality of life;
 2. mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development; and,
 3. identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value.
- 5.2.3. Existing businesses near to proposed development 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.

5.3. National Planning Practice Guidance

- 5.3.1. The National Planning Practice Guidance (PPG) is a web-based resource, launched by the Department for Communities and Local Government (DCLG) which was published on the 29th November 2016 and is regularly updated to reflect the changes made to the NPPF and make it more accessible.⁴

⁴ <http://planningguidance.communities.gov.uk/>

- 5.3.2. There are a number of factors that determine whether a noise could be a concern to a receptor. These include: the absolute level of the noise and when it occurs, whether it is existing or new to the area, temporal characteristics, spectral content and the acoustic absorption in the area.

Perception	Examples of outcomes	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 (NOAEL)	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 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 (SOAEL)			
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 intrusive	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	Prevent

Table 1 – Noise exposure hierarchy

- 5.3.3. It is emphasised in the PPG that the planning process should be used to mitigate and minimise the impact of noise. This could include: engineering the noise sources to be quiet, minimising the impact of noise through layout, using conditions/obligations to restrict activities, mitigating the impact in places where noise is likely to be experienced (e.g. using facade sound insulation).

6. Introduction

6.1.1. An environmental noise assessment has been carried out for a proposed plant room at Happi Scheme, Bowes Street, Manchester.

6.2. Proposed Development

6.2.1. An image showing the proposed location and layout of the Proposed Development is given in Figure 1.



Figure 1 - Plan showing the layout of the Proposed Development

6.3. Specific Sound Sources

6.3.1. Details for the equipment to be located in the plant room have been provided by the client. Full details are attached to Appendix C. Table 2 sets out the sound power levels used.

Plant Item	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	dB(A)
Sound power level @ octave band mid frequency (Hz)							
Ideal Evomax 40kW Boiler (Boiler (x4))	58.1	52.6	47.2	47.0	42.8	39	52.5
Grundfos MAGNA3 25-80 (Shunt pump)	52.1	46.6	41.2	41.0	36.8	33.0	46.5
Grundfos TPE2 40-200 N-A-F-A-BQQE-GAC (System pump)	78.1	72.6	67.2	67.0	62.8	59.0	72.5
Flamco Pro PUm 231 Twin Pump WallMount 1-3bar (Press Set)	59.7	61.7	61.7	64.7	61.7	57.7	68.3
SAV XRG1 6 (CHP)	68.1	62.6	57.2	57.0	52.8	49.0	62.5

Table 2 – Manufacturer's quoted sound power levels for plant

- 6.3.2. Spectra taken from Engineering Noise Control Theory and Practice, Table 11.11 and Table 11.15 and adjusted to meet manufacture's dB(A) level/manufacturer's duty ratings
- 6.3.3. It should be noted that in the manufacturer's data, no distances were given along with the sound pressure levels for the Grundfos sources. In these cases, it has been assumed that the sound pressure levels are based on a distance of 1m from the source.
- 6.3.4. The Flamco pump manufacturer's information gives a noise rating level of <75dB(A). It is difficult to know what this is referring to and it is not known whether this value is sound power or sound pressure, and if it is sound pressure, the distance at which the measurements were made. As a result, for the purposes of this assessment, the formula for predicting a sound power for a pump from Engineering Noise Control Theory and Practice⁵ has been used.

⁵ Engineering Noise Control Theory and Practice – David A. Bies and Colin H. Hansen – Page 443 Table 11.10 and Page 444 Table 11.11

7. Assessment Criteria

7.1. BS4142:2014

- 7.1.1. BS4142 provides methods for rating and assessing **specific sound sources** of an industrial and/or commercial nature, which includes: industrial and manufacturing processes, fixed services plant, sound generated by the loading/unloading of goods and sound from mobile plant/vehicles associated with industrial/commercial premises (e.g. fork-lift trucks). The **assessment location** is outside a residential receptor.
- 7.1.2. The standard is specifically precluded from being used to assess the likely impact inside a building or from the assessment of various sound sources for which other (more relevant) guidance exists, including: music/entertainment noise, noise from people and construction noise.
- 7.1.3. The foundation of the assessment is to establish the following quantities, either by measurement or prediction:
- **Ambient sound:** The overall sound at the assessment location
 - **Residual sound:** The ambient sound without the specific sound source operating
 - **Specific sound:** The ambient sound with the specific sound source operating, corrected for residual sound
 - **Background sound:** Residual sound present for 90% of the time
- 7.1.4. How these quantities relate to the sound that would be measured during a survey has been illustrated in Figure 2.

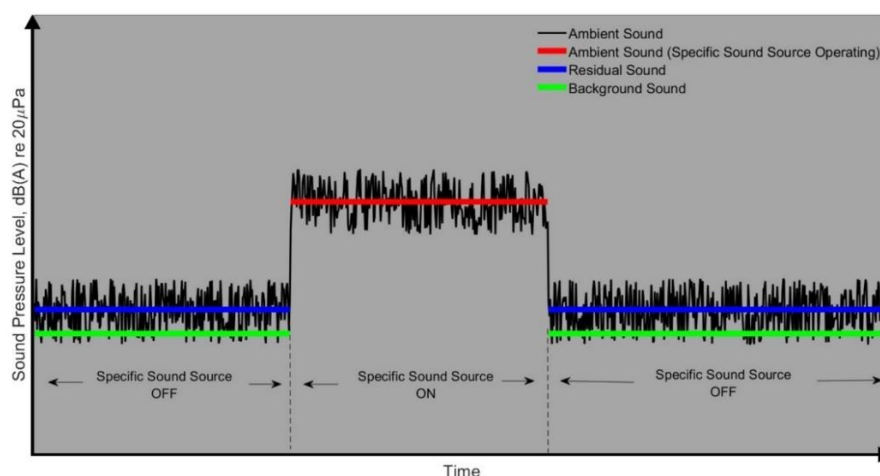


Figure 2 –
Diagrammatic
illustration of the
definitions of ambient,
residual, specific and
background sound

- 7.1.5. Once the specific sound level has been determined, this must be corrected for the presence of acoustic features that are audible at the assessment location to determine the **rating level**:

$$\text{Rating Level} = \text{Specific Sound Level} + \text{Character Corrections}$$

- 7.1.6. Normally it is possible to carry out a subjective assessment of characteristics, based on the following correction guidelines:
- Tonality: +2dB for a 'just perceptible' tone, +4dB for 'clearly perceptible', and rising to +6dB for 'highly perceptible' tones.
 - Impulsivity (rapidity of change and overall change in level): +3 dB for 'just perceptible' impulsivity, +6dB for 'clearly perceptible', rising to +9 dB for 'highly perceptible' impulsivity.
 - Intermittency: if the on/off-time of the specific sound is readily distinctive at the noise-sensitive receivers, +3dB.

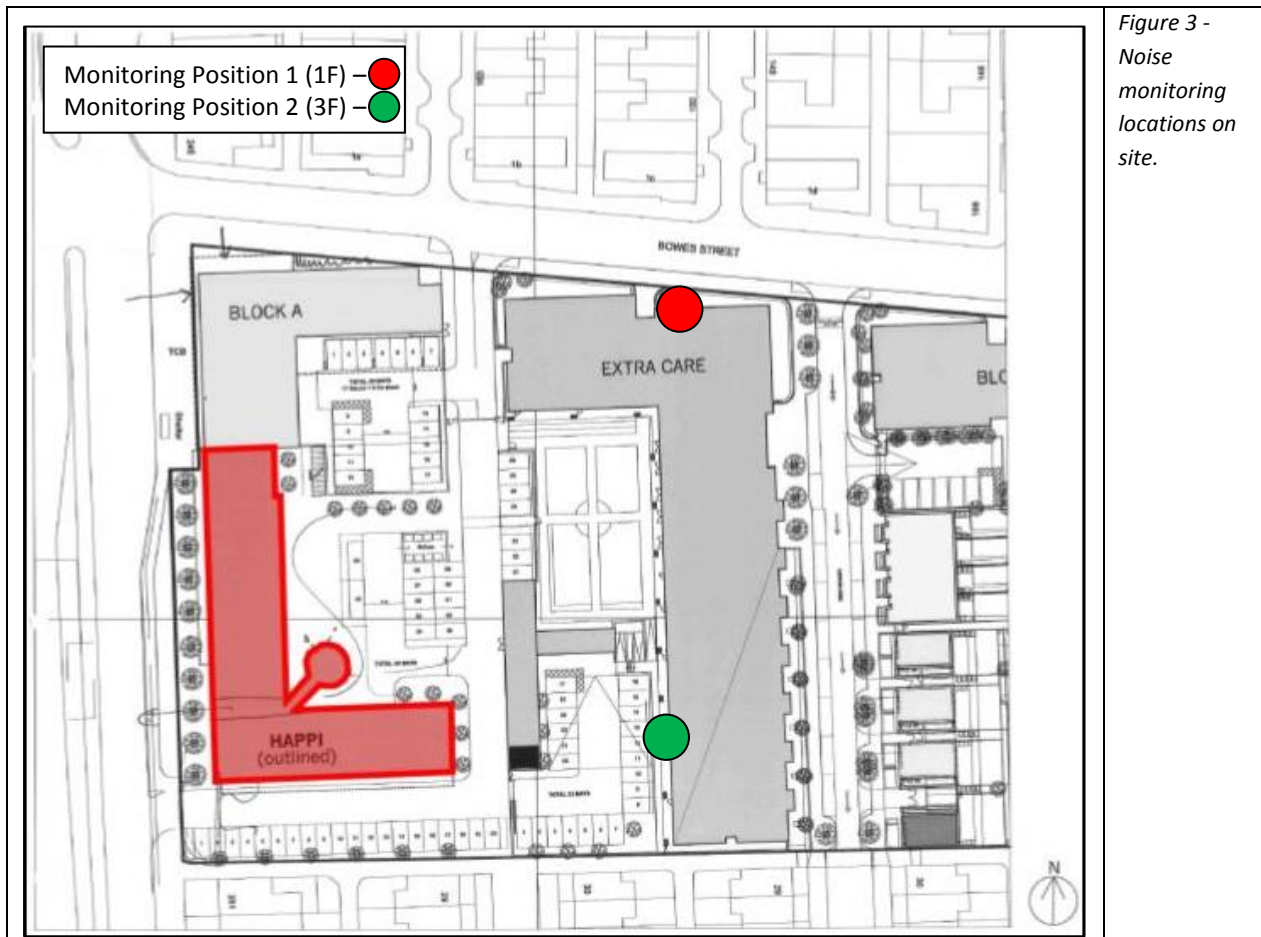
- 7.1.7. It should be noted that, where one feature is clearly perceived as dominant, it may be appropriate to apply a single correction. Where multiple features are likely to affect perception and response, each should be added arithmetically.
- 7.1.8. An estimate of the magnitude of the impact is evaluated by subtracting the measured background sound level at the assessment location from the rating level

Assessment Level = Rating Level – Background Sound Level

- 7.1.9. Typically, the greater the difference between the background and rating level, the greater the magnitude of impact, although BS 4142 emphasises that this is highly context-specific. As an initial estimate, BS4142 states that:
- A difference (between the background and rating level) of around +10 dB or more is likely to be indicative of significant adverse impact, depending on context
 - A difference (between the background and rating level) of around +5 dB or more is likely to be indicative of adverse impact, depending on context
 - 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
- 7.1.10. Where the initial estimate of the impact needs to be modified due to the context, other factor should be considered, including: absolute sound levels, the character and level of the residual sound and the sensitivity of the receiver, which includes the effect of building façade sound insulation.

8. Survey

8.1.1. Fixed position monitoring took place at three positions to determine the representative background sound levels. The monitoring equipment was located 1.5m from the ground and at least 3m from the next nearest reflecting surface. The monitoring position is shown in Figure 3. The measurements were carried out over a weekend period to avoid construction noise through the week. In any event these are likely to be the worst case (lowest) background sound pressure levels during the week.



8.1.2. The measurement instrumentation used during the survey is detailed in the appendix. The acoustic equipment was calibrated to comply with Section 4.2 of BS7445-1:2003⁶ before and after the surveys. The calibration details are also detailed in the appendix.

8.2. Meteorology

8.2.1. During the survey the weather information was noted. This is summarised in Table 3.

	18 th July 2020	19 th July 2020
Roads (Wet/Dry)	Dry	Dry
Wind Speed (ms ⁻¹)/Direction	4 / SSW	3 / N

Table 3 - Meteorological data noted during the survey

⁶ BS7445-1:2003 "Description and measurement of environmental noise – Part 1: Guide to quantities and procedures"

8.3. Measurement and Timescale

8.3.1. Unattended monitoring was carried out between 18th July 2020 and 19th July 2020. The measurements that have been made are summarised in Table 4.

Monitoring position	Date	Type	Quantity
1	18/07/2020 – 19/07/2020	Unattended	L _{A90,15min}
2	18/07/2020 – 19/07/2020	Unattended	L _{A90,15min}

Table 4 – Measurements made at the site of the Proposed Development

8.3.2. Sound pressure measurements were subsequently averaged into hourly, daytime and night-time periods. The acoustic measurements and their interpretation have been in accordance with BS 7445: Parts 1, and 2⁷. All sound pressure levels are in dB (re 20µPa).

Background Sound Levels

8.3.3. The background sound levels at monitoring position 2 have been used to determine the representative background sound levels for the purposes of this assessment. Figure 4 shows the results of the data analysis in terms of the frequency of occurrence of each data value during the daytime and the night-time.

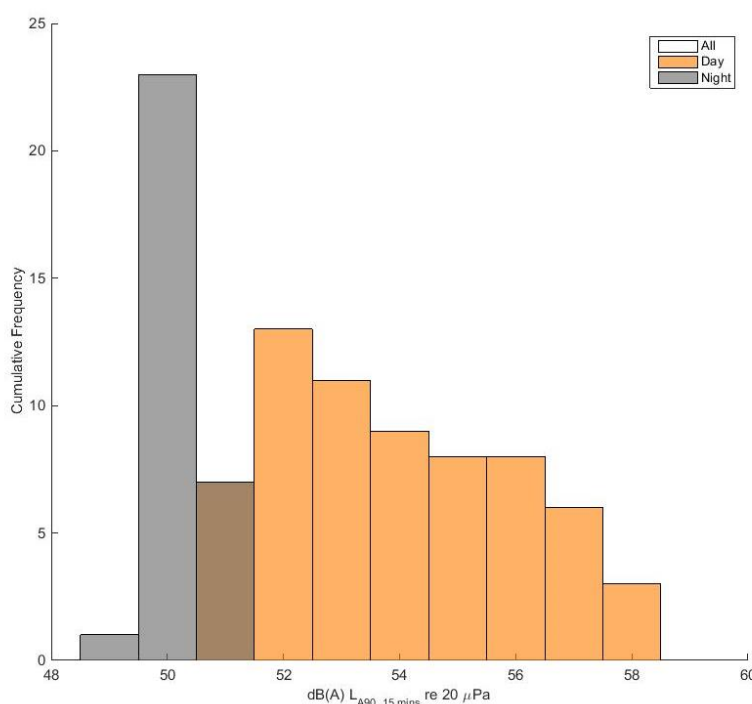


Figure 4 – Distribution of background sound levels at Position 2 during the daytime (07:00-23:00) and night-time (23:00-07:00)

8.3.4. Figure 4 shows that at position 2 the background sound levels ranged between 51dB L_{A90,15min} and 58dB L_{A90,15min} during the daytime period and between 49dB L_{A90,15min} and 51dB L_{A90,15min} during the night-time period.

8.3.5. The typical background sound level has been taken to be 52dB L_{A90,15min} during the daytime and 50dB L_{A90,15min} for the night-time at position 2.

⁷ BS7445-2:1991 "Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use"

9. 3D Noise Model

- 9.1.1. A 3D noise model has been constructed using SoundPLAN™ in order to predict the propagation of sound across the site of the Proposed Development. The calculation procedure has been used from ISO9613-2:1996⁸ to predict the propagation of sound from source to receiver, taking into account distance, screening, and atmospheric and ground conditions.
- 9.1.2. The plant room has been included as an 'Industrial Building' object. The specific items of plant have been represented by point sources inside the plant room object. The louvres have been assigned a sound reduction of 3dB for each octave band to represent louvres with 50% open area.
- 9.1.3. The results of the model have been illustrated in noise contour map in Figure 5. The single figure values are given at the worst affected floor level and the contours are set at a height of 11m above the ground.



⁸ ISO9613-2:1996 "Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation"

10. BS4142 Assessment

10.1. Rating Level

- 10.1.1. The commercial sound sources were operating at the time of the attended survey. The sources have been assessed based on the character of the sound at the boundary with the proposed residential development. The adjustments to the specific sound levels for acoustic features have been discussed in the following sections.

Tonality

- 10.1.2. It is likely that the items of plant will generate tonal sound. However, as they are located in the plant room and given the location of the nearest sensitive receivers it is not expected that this will be perceptible at the receivers. For a worst-case assessment, a +2dB correction has been applied.

Impulsivity

- 10.1.3. It is not expected that the proposed items of plant will generate impulsive sound. Therefore, no impulsivity correction has been applied.

Intermittency

- 10.1.4. It is not expected that the plant will turn on and off multiple times in the reference period (1-hour day, 15 minutes night). Therefore, no correction for intermittency has been applied.

10.2. Assessment

- 10.2.1. The BS4142 assessment is detailed in Table 5.

	Level, dB	
	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Background sound level, dB $L_{A90,15min}$	52	50
Specific sound level, dB(A)	40	40
Acoustic feature corrections		
Tonality	+2	+2
Impulsivity	0	0
Intermittency	0	0
Other	0	0
Rating level		
Specific sound level + corrections	42	42
Assessment Level		
Rating level – Background sound level	-10	-8
<i>“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”</i>		

Table 5 - The assessment procedure from BS4142

10.3. Context

- 10.3.1. In this situation, the new specific sound sources are being introduced close to new residential receivers. The impact of the specific sound is likely to be significantly reduced compared to the situation where new sound sources are being introduced close to existing residential receivers.

11. Conclusions

- 11.1.1. An environmental noise assessment has been carried out at the site of a proposed residential development at Happi Scheme, Bowes Street, Manchester to determine the impact of a proposed plant room on nearby residential receivers.
- 11.1.2. A numerical BS4142 assessment shows that there is an indication that the specific sound will have a low impact on proposed new residential receivers and, generally, the lower the rating level is relative to the background sound level, the less likely it is that the specific sound source will have an adverse impact.
- 11.1.3. In this context the new specific sound sources are being introduced close to new residential receivers. The impact of the specific sound is likely to be significantly reduced compared to the situation where new sound sources are being introduced close to existing residential receivers.
- 11.1.4. We strongly recommend that this report be passed to the local planning authority for approval prior to any works being carried out.

12. Appendix

APPENDIX A: Summary Information

Required ISO Test Report Information (cross referenced where required)			
		Measurements carried out to:	Analysed to:
A	Standards	BS 7445-1: 2003 BS 7445-2: 1991 BS4142:2014	BS 8233:2014 BS4142:2014
B	Organisation performed the measurements	noise.co.uk Ltd, The Haybarn, Newnham Grounds, Kings Newnham Lane, Bretford, Coventry, CV23 0JU.	
C	Name of Client	Rowlinson Construction Ltd	
D	Full site address	Happi Scheme Bowes Street Manchester	
E	Date of surveys	Survey Date: 18 th July 2020 – 19 th July 2020	
F	Description & identification of Proposed Development	It is proposed to develop the site for residential use.	
G	Brief Description of details of Procedure & equipment	See Section 5 of this report.	

APPENDIX B: Technical Appendix

12.1.1. Measurements were made using the following equipment:

Monitoring Position	Sound Level Meter (Serial Number)	Calibrator (Serial Number)
1	Norsonic 140 (1405560)	Norsonic 1251 (33824)
2	Norsonic 140 (1405559)	Norsonic 1251 (33823)

12.1.2. The equipment has traceable calibration. The sound level meter was calibrated immediately prior to and immediately after the measurements were carried out.

Sound Level Meter	Before	After
Norsonic 140 (1405560)	114.0 dB	114.0 dB
Norsonic 140 (1405559)	114.0 dB	114.0 dB

12.1.3. There was no adverse deviation.

APPENDIX C: Full size SoundPLAN image map

