Post Completion Noise Testing and Verification Report

Site: Benmore Road, Manchester
Reference: 51-608-R1-1
Date: March 25

e3p

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R1-2					

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EXECUTIVE SUMMARY

Site Address	Benmore Road, Manchester M9 6EQ
National Grid Reference	E 386653, N 403523.
Background	Post completion acoustic testing is required in order to discharge the planning conditions in relation to the residential development at the above address, specifically Conditions 12b and 21a.
Surveys Completed	E3P have undertaken unattended measurements inside worst-case living rooms and bedrooms of selected plots during a typical weekday period. As mechanical ventilation was installed with no trickle vents, windows were not required to be opened for this and, as such, a 24-hour survey was conducted with windows closed. No mitigation measures were required for this site and, as such, verification of any mitigation measures was not required.
Assessments Completed	Measured internal noise levels have been corrected to allow for unfurnished rooms and then compared to BS 8233 and WHO guidelines for internal habitable rooms. The surveys determined compliance with the applicable criteria in both rooms of Plots 7 and 13. Additionally, measurement of an ASHP unit was measured at Plot 7 and Plot 10 and was measured to be at 47 dB at 1 m which is lower than assessed (50 dB at 1 m).
Remedial Mitigation Measures	Due to the outcome of the survey and verification, no remedial measures are required.

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1. INTRODUCTION

1.1. BACKGROUND

E3P were commissioned by Casey Group to undertake Post Completion Noise Testing for the development at Benmore Road in Manchester, to be referred to hereafter as 'the Site'.

Following submission of the Nosie Impact Assessment (50-477-R1-1) by E3P, planning permission was granted with the following conditions applied:

> *12 ab) Prior to first occupation of the residential units, a verification report shall be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that the internal noise criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the internal noise criteria.*
>
> *Reason- To secure a reduction in noise from traffic or other sources in order to protect future residents from noise disturbance, pursuant to policies SP1 and DM1 of the Core Strategy for the City of Manchester.*
>
> *21 a) Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location. Prior to commencement of the use hereby approved the scheme shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site. The scheme shall be implemented in full before the use commences or as otherwise agreed in writing by the City Council as local planning authority.*
>
> *b) Prior to the operation of the scheme a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic report. The report shall also undertake post completion testing to confirm that the noise criteria have been met.*

Parts a of 12 and 21 were addressed in the submitted NIA along with a subsequent Technical Note (50-477-TN3-1) in relation to the Air Source Heat Pumps (condition 21).

1.2. REPORT OBJECTIVES

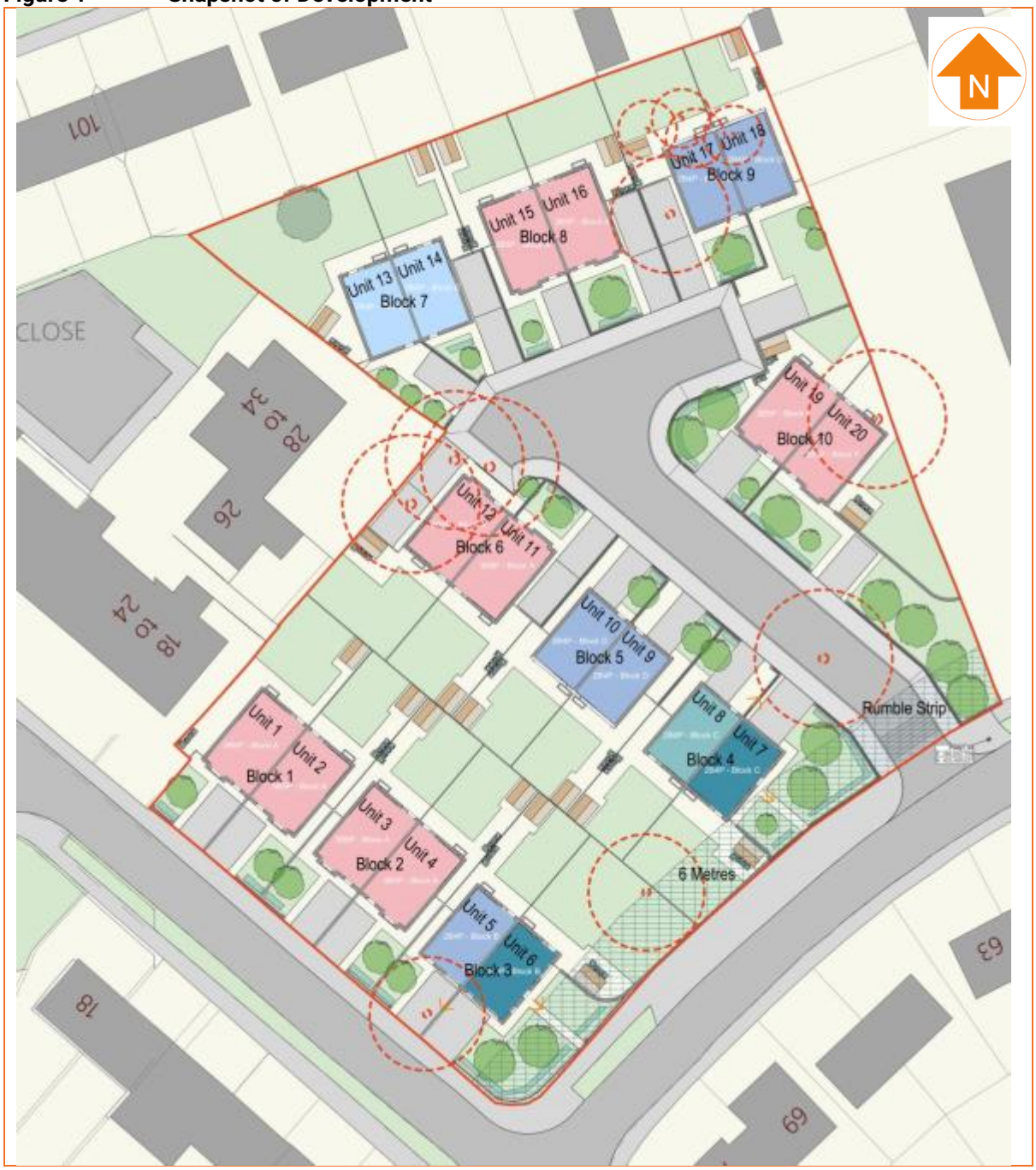
The objectives of this report are as follows.

- Establish and measure the existing sound levels within affected rooms during typical weekday periods.
- Assess internal noise levels in accordance with criteria given in BS 8233.
- Measure and assess the noise from the installed ASHPs in accordance with BS 4142.
- Verify any mitigation measures, where required.

1.3. DEVELOPMENT

A snapshot of the development layout is indicated in Figure 1 which is zoomed in to Plots 9 and 10.

Figure 1 Snapshot of Development



2. ASSESSMENT METHODOLOGY

2.1. BRITISH STANDARD BS 8233:2014+A1:2019 – GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

The scope of this standard is the provision of recommendations for the control of noise in and around buildings including residential dwellings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.

The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table 1.

Table 1 BS 8233:2014 Recommended Internal Noise Levels

Criterion	Typical situation	Design criterion, $L_{Aeq,t}$ (dB)
Suitable resting and sleeping conditions	Living Room	35
	Bedroom	30

3. SURVEY RESULTS

Plot 7 was chosen for its proximity to Benmore Road and Plot 13 for its proximity to White Moss Road, both considered the primary sources of noise across the site.

It was noted the vents were installed to all habitable room windows and these were open for the duration of the tests.

The rooms were unfurnished and so a correction to the measured values may be required.

3.1. PLOT 7 – BENMORE ROAD

3.1.1. LIVING ROOM – INTERNAL SOUND MEASUREMENT

E3P has conducted an internal sound survey within the living room with all windows and doors closed. The survey was conducted during the following periods:

- 10:00 Tuesday 18th March to 10:00 Wednesday 19th March 2025.

The following noise measurement position was chosen for the Noise Survey:

- Noise Measurement Position 1 (NMP1): Located in the centre of the living room at a height of 1.5 m above floor level. Noise sources were noted to be distant traffic and on-site construction works, intermittently, which is removed post analysis where possible.

A summary of the hourly measured sound pressure levels inside the living room are presented in Table 2.

Table 2 Plot 7 - Living Room – Unfurnished

Measurement start time	Measured ambient noise level, $L_{Aeq,T}$ (dB)	Measured maximum noise level, $L_{Amax,fast}$ (dB)
18/03/2025 10:00	34.8	54.5
18/03/2025 11:00	34.5	56.5
18/03/2025 12:00	30.3	52.8
18/03/2025 13:00	35.0	65.7
18/03/2025 14:00	37.0	66.0
18/03/2025 15:00	25.3	45.1
18/03/2025 16:00	25.4	37.5
18/03/2025 17:00	26.0	36.1
18/03/2025 18:00	25.9	41.1
18/03/2025 19:00	26.0	41.3
18/03/2025 20:00	24.7	33.0
18/03/2025 21:00	21.6	29.2
18/03/2025 22:00	21.9	34.0
18/03/2025 23:00	20.7	31.5
19/03/2025 00:00	20.2	28.3
19/03/2025 01:00	19.6	28.4
19/03/2025 02:00	19.1	22.5
19/03/2025 03:00	19.5	34.1
19/03/2025 04:00	20.8	33.8

Measurement start time	Measured ambient noise level, $L_{Aeq,T}$ (dB)	Measured maximum noise level, $L_{Amax,fast}$ (dB)
19/03/2025 05:00	25.6	36.0
19/03/2025 06:00	28.7	36.1
19/03/2025 07:00	28.1	45.5
19/03/2025 08:00	33.4	43.7
19/03/2025 09:00	35.2	61.7

The resultant 16-hour noise level is noted to be 32 dB applicable to the unfurnished room. If corrections for furnishings were applied, the internal noise levels would be lower.

This falls below the 35 dB internal criterion by 3 dB. As such, the installed glazing and façade insulation are acceptable.

3.1.2. BEDROOM – INTERNAL SOUND MEASUREMENT

E3P has conducted an internal sound survey within the bedroom with all windows and doors closed. The survey was conducted during the following periods:

- 11:00 Tuesday 18th March to 10:00 Wednesday 19th March 2025.

The following noise measurement position was chosen for the Noise Survey:

- Noise Measurement Position 2 (NMP2): Located in the centre of the bedroom at a height of 1.5 m above floor level. Noise sources were noted to be distant traffic and on-site construction works, intermittently, which is removed post analysis where possible.

A summary of the hourly measured sound pressure levels inside the bedroom room are presented in Table 3.

Table 3 Plot 7 - Bedroom – Unfurnished

Measurement start time	Measured ambient noise level, $L_{Aeq,T}$ (dB)	Measured maximum noise level, $L_{Amax,fast}$ (dB)
18/03/2025 11:00	34.0	60.7
18/03/2025 12:00	27.4	44.2
18/03/2025 13:00	29.5	54.4
18/03/2025 14:00	28.6	54.1
18/03/2025 15:00	24.6	38.4
18/03/2025 16:00	24.9	39.5
18/03/2025 17:00	24.9	38.6
18/03/2025 18:00	24.9	40.5
18/03/2025 19:00	24.9	41.6
18/03/2025 20:00	23.4	37.3
18/03/2025 21:00	21.8	40.6
18/03/2025 22:00	20.8	36.4
18/03/2025 23:00	20.6	40.3
19/03/2025 00:00	20.2	32.8
19/03/2025 01:00	19.8	30.5
19/03/2025 02:00	19.2	27.9

Measurement start time	Measured ambient noise level, $L_{Aeq,T}$ (dB)	Measured maximum noise level, $L_{Amax,fast}$ (dB)
19/03/2025 03:00	20.1	40.7
19/03/2025 04:00	20.4	37.9
19/03/2025 05:00	23.3	29.6
19/03/2025 06:00	26.7	46.0
19/03/2025 07:00	25.8	43.0
19/03/2025 08:00	50.2*	78.8*
19/03/2025 09:00	33.1	62.6

*removed due to on-site works.

The resultant 16-hour noise level is noted to be 28 dB and the 8 hour night-time noise level is 22 dB. The 10th highest maximum noise level during the night-time period was also measured and noted to be 35 dB. All applicable to the unfurnished room. With the correction applied to allow for furnishings, such as carpet, furniture, curtains, etc, the resultant noise levels would be lower.

These fall below the 35 dB, 30 dB and 45 dB internal criterion respectively. As such, the installed glazing and façade insulation are acceptable.

3.2. PLOT 13 – WHITE MOSS ROAD

3.2.1. LIVING ROOM – INTERNAL SOUND MEASUREMENT

E3P has conducted an internal sound survey within the living room with all windows and doors closed. The survey was conducted during the following periods:

- 11:00 Tuesday 18th March to 11:00 Wednesday 19th March 2025.

The following noise measurement position was chosen for the Noise Survey:

- Noise Measurement Position 3 (NMP3): Located in the centre of the living room at a height of 1.5 m above floor level. Noise sources were noted to be distant traffic and on-site construction works, intermittently, which is removed post analysis where possible.

A summary of the hourly measured sound pressure levels inside the living room are presented in Table 4.

Table 4 Plot 13 - Living Room – Unfurnished

Measurement start time	Measured ambient noise level, $L_{Aeq,T}$ (dB)	Measured maximum noise level, $L_{Amax,fast}$ (dB)
18/03/2025 11:00	48.9*	69.8
18/03/2025 12:00	40.9*	63.9
18/03/2025 13:00	32.8	61.7
18/03/2025 14:00	47.8*	77.6
18/03/2025 15:00	52.8*	77.8
18/03/2025 16:00	28.0	68.7
18/03/2025 17:00	21.8	43.9
18/03/2025 18:00	21.9	38.6
18/03/2025 19:00	21.8	38.4

Measurement start time	Measured ambient noise level, $L_{Aeq,T}$ (dB)	Measured maximum noise level, $L_{Amax,fast}$ (dB)
18/03/2025 20:00	21.6	41.6
18/03/2025 21:00	23.2	37.1
18/03/2025 22:00	22.9	30.0
18/03/2025 23:00	22.0	44.8
19/03/2025 00:00	22.1	36.5
19/03/2025 01:00	22.1	39.8
19/03/2025 02:00	21.5	32.2
19/03/2025 03:00	21.9	34.6
19/03/2025 04:00	21.5	23.7
19/03/2025 05:00	22.2	39.2
19/03/2025 06:00	23.4	31.5
19/03/2025 07:00	24.6	27.7
19/03/2025 08:00	26.8	54.0
19/03/2025 09:00	41.2*	48.0
19/03/2025 10:00	39.2	48.8

*Construction work interference

The resultant 16-hour noise level is noted to be 35 dB applicable to the unfurnished room. If corrections for furnishings were applied, the internal noise levels would be lower.

This achieves the 35 dB internal criterion but it is noted that construction works were taken place nearby on site and have influenced this value. As such, the installed glazing and façade insulation are acceptable.

3.3. BEDROOM – INTERNAL SOUND MEASUREMENT

E3P has conducted an internal sound survey within the bedroom with all windows and doors closed. The survey was conducted during the following periods:

- 12:00 Tuesday 18th March to 10:00 Wednesday 19th March 2025.

The following noise measurement position was chosen for the Noise Survey:

- Noise Measurement Position 4 (NMP4): Located in the centre of the bedroom at a height of 1.5 m above floor level. Noise sources were noted to be distant traffic and on-site construction works, intermittently, which is removed post analysis where possible.

A summary of the hourly measured sound pressure levels inside the bedroom room are presented in Table 5.

Table 5 Plot 13 - Bedroom – Unfurnished

Measurement start time	Measured ambient noise level, $L_{Aeq,T}$ (dB)	Measured maximum noise level, $L_{Amax,fast}$ (dB)
18/03/2025 12:00	24.3	48.3
18/03/2025 13:00	27.1	46.9
18/03/2025 14:00	27.9	55.5
18/03/2025 15:00	25.1	56.6

Measurement start time	Measured ambient noise level, $L_{Aeq,T}$ (dB)	Measured maximum noise level, $L_{Amax,fast}$ (dB)
18/03/2025 16:00	23.6	38.1
18/03/2025 17:00	24.2	37.8
18/03/2025 18:00	23.8	38.5
18/03/2025 19:00	23.7	43.1
18/03/2025 20:00	24.3	36.7
18/03/2025 21:00	22.8	39.3
18/03/2025 22:00	22.1	31.8
18/03/2025 23:00	22.4	40.8
19/03/2025 00:00	22.2	28.3
19/03/2025 01:00	21.9	42.8
19/03/2025 02:00	22.1	28.2
19/03/2025 03:00	22.2	27.5
19/03/2025 04:00	22.9	31.6
19/03/2025 05:00	26.1	40.9
19/03/2025 06:00	27.7	35.7
19/03/2025 07:00	24.6	42.2
19/03/2025 08:00	27.2	50.7
19/03/2025 09:00	26.4	46.2

The resultant 16-hour noise level is noted to be 25 dB and the 8 hour night-time noise level is 24 dB. The 10th highest maximum noise level during the night-time period was also measured and noted to be 35 dB. All applicable to the unfurnished room. With the correction applied to allow for furnishings, such as carpet, furniture, curtains, etc, the resultant noise levels would be lower.

These fall below the 35 dB, 30 dB and 45 dB internal criterion respectively. As such, the installed glazing and façade insulation are acceptable.

3.4. PLOTS 7 AND 10 – ASHP SOURCE

E3P has conducted an attended measurement of an ASHP running, specifically at plots 7 and 10. The survey was conducted during the following periods:

- 10:00-10:45 Friday 21st March 2025.

The ASHP ran intermittently for approximately 5 m at a time. The low level noise at more than a metre away meant this intermittent operation was barely perceptible. The following noise measurement positions were chosen for the Noise Survey:

- Noise Measurement Position 5 (NMP5): Located 1 m from the ASHP in façade conditions but representative of the garden area and model output at Plot 7. The microphone was located at a height of 1.5 m above floor level.

- Noise Measurement Position 6 (NMP6): Located 1 m from the ASHP in free-field conditions but representative of the garden area and model output at Plot 10. The microphone was located at a height of 1.5 m above floor level.

A summary of the hourly measured sound pressure levels inside the living room are presented in Table 6.

Table 6 ASHP Source

Measurement start time	Distance to source (m)	Measured ambient noise level, $L_{Aeq,T}$ (dB)	Commentary
10:00	1 m at Plot 7	49.0	ASHP on
10:05		44.4	ASHP off
10:10		44.3	
10:15		44.4	
10:20		45.2	
10:30	1 m at Plot 10	47.6	ASHP on
10:35		44.6	ASHP off

The assessment used a sound power level of 58 dBA. This translates to an expected measured value of 50 dBA at 1 m.

When the above values are corrected for the residual sound level, the specific noise level is noted to be 47 dB, 3 dB below the modelled value.

Weather conditions during the survey were calm and dry and conducive to the measurement of environmental noise.

The equipment outlined in Table 7 was used for the noise survey.

Table 7 Noise Measurement Equipment and Calibration Dates

Measurement position	Equipment description	Manufacturer/ Type	Serial Nr	Calibration due date
NMP2	Sound Level Meter	Fusion	12039	28th July 2025
	Pre-amplifier	Pre22	1805124	
	Microphone	40CE	330832	
	Calibrator	Cal31	87281	19th January 2025
NMP1, NMP5 and NMP6	Sound Level Meter	Fusion	14226	7th December 2025
	Pre-amplifier	Pre22	2135072	
	Microphone	40CD	470570	
	Calibrator	CR 515	99204	8th August 2025
NMP3	Sound Level Meter	CR:171A	G303884	19th September 2025
	Pre-amplifier	MV:200F	12731F	
	Microphone	MK:224	215899D	
	Calibrator	CR:515	99403	
NMP4	Sound Level Meter	SV 971A	154342	2nd August 2026
	Microphone	Svantek 7152	93784	

The sound level meters were field calibrated before and after measurements with no significant drift witnessed.

4. DISCUSSION

It has been shown that the required internal criteria are achieved in all rooms of Plots 7 and 13, both of which face the primary noise sources around the site.

Furthermore, the NIA determined that no mitigation measures were required, as such, verification of these measures were not required.

With regards to the ASHPs, the noise output was found to be lower than was originally assessed. The assessment found compliance with the 5 dB below the background sound level with these units in place. As such, the testing has verified this to be the case with a betterment of expected noise levels from the ASHPs.

Accordingly, this report has provided sufficient information in order to discharge Conditions 12b and 21b.

END OF REPORT

APPENDIX I
LIMITATIONS

GENERAL

1. This report and any associated works (together comprising the "Services") were compiled and carried out by E3P for the client (as present in Section 1) under the E3P “Terms of Business” or with those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

2. Unless explicitly agreed otherwise, in writing, this report has been prepared under E3P Standard Terms and Business as included within our proposal to the Client.

3. Project-specific appointment documents may be agreed upon at our discretion and a charge may be levied for both the time to review and finalise appointment documents and also for associated changes to the appointment terms. E3P reserves the right to amend the fee should any changes to the appointment terms create an increased risk to E3P.

4. The report needs to be considered in light of the proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

NOISE AND VIBRATION IMPACT ASSESSMENTS

5. Where a noise or vibration survey is required to inform an assessment, E3P will endeavour to ensure that all noise and vibration measurements taken are robust, representative and reliable in order to inform an accurate assessment.

6. Where mitigation measures are specified in this report, it should be noted that these measures are relative to a specific sound or vibration source, both in terms of the measured sound pressure and vibration level and the character of the sound source. Where either the sound pressure level or the character of the sound varies following completion of the sound survey, E3P cannot be held responsible for any subsequent variations in the proposed mitigation performance.

7. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walkover inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. E3P cannot be held responsible for any disclosures that are provided post-production of our report and will not automatically update our report.

8. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, E3P reserves the right to review such information and, if warranted, to modify the opinions accordingly.

9. E3P does not warrant work/data undertaken/provided by others.

APPENDIX II
GLOSSARY

NOISE

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source. The most widely used weighting mechanism that best corresponds to the response of the human ear is the “A”-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or LAeq, LA90 etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective but, as a general guide, a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table 8 Typical Sound Pressure Levels

SOUND PRESSURE LEVEL	LOCATION/EXAMPLE
0	Threshold of hearing
20-30	Quiet bedroom at night
30-40	Living room during the day
40-50	Typical office
50-60	Inside a car
60-70	Typical high street
70-90	Inside a factory
100-110	Burglar alarm at 1 m away
110-130	Jet aircraft on take off
140	Threshold of pain

ACOUSTIC TERMINOLOGY

Table 9 Terminology

DESCRIPTOR	EXPLANATION
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2E-05 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. "A" weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
LAeq, T	LAeq is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
LAmax	LAmax is the maximum A-weighted sound pressure level recorded over the period stated. LAmax is sometimes used in assessing environmental noise where occasional loud noises occur, 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.
L10 and L90	If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L10 is the level exceeded for 10% of the time and as such can be regarded as the "average maximum level". Similarly, L90 is the "average minimum level" and is often used to describe the background noise. It is common practice to use the L10 index to describe traffic noise.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and away from buildings.
Fast	A time weighting used in the root-mean-square section of a sound level meter with a 125-millisecond time constant.
Slow	A time weighting used in the root-mean-square section of a sound level meter with a 1000-millisecond time constant.
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2E-05 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. "A" weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.