
NISA STORE, BRETBY ROAD
NOISE IMPACT ASSESSMENT REPORT
51 BRETBY ROAD, SWADLINCOTE DE11 0LL

Client: Nisa Store, Bretby Road

Report Ref: P4375-R1-V2

Issue Date: 13th December 2021

Document Status: Version 2



This page has been left blank intentionally

DATE ISSUED: 13th DECEMBER 2021

REPORT REFERENCE P4375-R1-V2

NOISE IMPACT ASSESSMENT REPORT

51 BRETBY ROAD, SWADLINCOTE DE11 0LL

REPORT VERSION CONTROL:

Document Reference	Date	Prepared by	Checked by	Authorised by
P4375-R1-DRAFT	23/12/2020	M. MAY, BSc (Hons), AMIOA	M. J. Malone, BSc (Hons), AMIOA	N. J. Malone, MIOA
P4375-R1-V1	15/02/2021			
P4375-R1-V2	13/11/2021			

This report has been prepared by NoiseAir Limited with all reasonable skill, care and diligence, within the terms of the contract with the client. The report is confidential to the Client and NoiseAir Limited accept no responsibility of whatever nature to third parties to whom this report may be made known.

No part of this document may be reproduced without the prior written approval of NoiseAir Limited.

This page has been left blank intentionally

CONTENTS

1	INTRODUCTION	7
2	ASSESSMENT METHODOLOGY AND SCOPE OF WORKS	9
3	ACOUSTIC SURVEY	20
4	NOISE IMPACT ASSESSMENT	25
5	CONCLUSIONS	39

APPENDICES

APPENDIX A - REPORT LIMITATIONS

APPENDIX B – METER READINGS

APPENDIX D - GLOSSARY

This page has been left blank intentionally

1 INTRODUCTION

- 1.1.1 By instruction from Savawatt Controls Limited ('the client'), NoiseAir was commissioned to undertake a noise impact assessment (NIA) with respect to existing external plant equipment at the site location; 51 Bretby Road, Swadlincote DE11 0LL.
- 1.1.2 This NIA report has been requested to accompany a retrospective planning application for externally located plant equipment, specifically J&E Hall condenser units which are currently installed at the rear (north-west) facing building façade.
- 1.1.3 It has been advised by the client the NIA is required due to noise complaints that have been received with respect to the existing condenser units.
- 1.1.4 The client identified that one of the condenser units appeared to be functioning incorrectly resulting in higher levels of noise breakout than would be typical under correct operational circumstances from that condenser.
- 1.1.5 Subsequently, the malfunctioning condenser has been replaced (prior to the acoustic survey) and all condensers are reported by the client to be operating within manufacturers specifications.
- 1.1.6 Additionally, it has advised that several residential dwellings located immediately adjacent, as a well as those located directly above the Nisa Local Convenience Store are under the ownership of the client and as such have remit for further noise mitigation measures (such as enhancements to the existing composite glazing/ventilation options) should it be required.
- 1.1.7 Cumulative noise level readings of the exiting condenser units during typical operation were obtained at the site and have been assessed in relation to existing background sound levels at noise sensitive receptors.
- 1.1.8 This noise report assesses the results of a noise survey carried out in accordance with relevant guidance and includes recommendations and mitigation as appropriate.

1.2 Site Description

- 1.2.1 At the time of writing the ground floor at the site operates as a Nisa Local Convenience Store.
- 1.2.2 The NIA is to consider noise emissions from the previously installed condenser equipment at the site upon nearby noise sensitive receptors in respect to a retrospective panning

- application. The previously installed condenser equipment required for assessment is understood to be J&E Hall condenser units Model: JEHS – 0400 – L- 3.
- 1.2.3 The external plant equipment requiring assessment is located at the north-west building façade to the rear of the Nisa Local Convenience Store.
- 1.2.4 Noise sensitive receptors (NSR's) in relation to the externally located plant equipment are identified as residential dwellings within the immediate locality of the site.
- 1.2.5 **Figure 1** shows an aerial photograph of the proposed site with respect to the local area and its context.

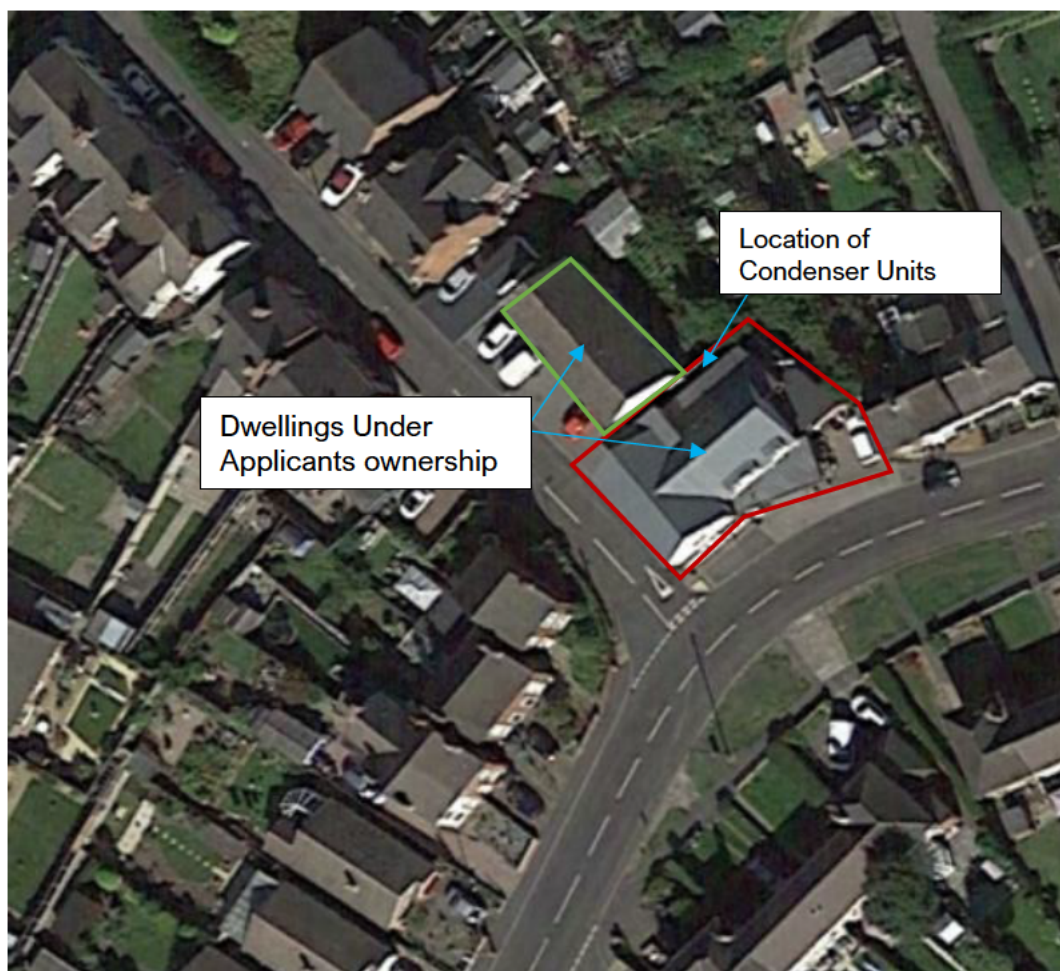


Figure 1: Site aerial photograph.

 Site Location

2 ASSESSMENT METHODOLOGY AND SCOPE OF WORKS

2.1 Planning Guidance and Noise

2.1.1 This acoustic report has been prepared to support a retrospective planning application and therefore it is considered that reference should be made to the appropriate planning guidance documentation, specifically:

- National Planning Policy Framework (NPPF), 2019;
- Noise Policy Statement for England (NPSE), 2010;
- Planning Practice Guidance – Noise, 2019;

2.1.2 A summary of the relevant planning documentation and its relevance with respect to noise is provided below.

National Planning Policy Framework [NPPF 2019]

2.1.3 The NPPF was published in March 2012 with the most recent version updated in February 2019. The NPPF sets out the Governments planning policies for England and how these are expected to be applied across a number of areas.

2.1.4 With respect to noise specifically, Section 15, Paragraph 170 of the NPPF 2019 states:

‘Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;’*

2.1.5 The NPPF 2019 continues to state in Paragraph 180:

‘Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and;*

Noise Policy Statement for England [NPSE 2010]

2.1.6 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*”.

2.1.7 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.

2.1.8 The NPSE also introduces the below categories with respect to ‘adverse impacts’.

‘NOEL – No Observed Effect Level

- *This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*

LOAEL – Lowest Observed Adverse Effect Level

- *This is the level above which adverse effects on health and quality of life can be detected.*

SOAEL – Significant Observed Adverse Effect Level

- *This is the level above which significant adverse effects on health and quality of life occur’.*

2.1.9 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided. The second aim refers to the situation where the impact lies somewhere between LOAEL and SOAEL, and it requires that all reasonable steps are taken to mitigate

and minimise the adverse effects of noise. However, the requirement to mitigate and minimise the adverse effects of noise does not mean that such adverse effects cannot occur.

Planning Practice Guidance - Noise [PPG 2019]

- 2.1.10 The National Planning Practice Guidance (PPG) is a web-based resource, launched by the Department for Communities and Local Government (DCLG) in March 2014 to support the NPPF¹.
- 2.1.11 The PPG advises on how planning can manage potential noise impacts in new development. The guidance is regularly reviewed and updated and noise is listed as a specific category, the noise category was most recently updated on 22nd July 2019.
- 2.1.12 The PPG provides further detail about how the effect levels can be recognised. Above the NOEL noise becomes noticeable, however it has no adverse effect as it does not cause any change in behaviour or attitude. Once noise crosses the LOAEL threshold it begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise.
- 2.1.13 Increasing noise exposure further might cause the SOAEL threshold to be crossed. If the exposure is above this level the planning process should be used to avoid the effect occurring by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused.
- 2.1.14 At the highest extreme the situation should be prevented from occurring regardless of the benefits which might arise.
- 2.1.15 **Table 1** summarises the noise exposure hierarchy outlined within the PPG.

¹ <https://www.gov.uk/guidance/noise--2>

Table 1: National Planning Practice Guidance noise exposure hierarchy			
Perception	Examples of Outcomes	Increasing 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	No specific measures required
Lowest Observed 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 non-awakening 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 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	Prevent

2.2 Methodology and Scope of Works

2.3 Assessment Criteria

-
- 2.3.1 The potential noise impact upon nearby residential receptors and the general principles regarding the associated acoustic report were initially discussed between NoiseAir and the Environmental Protection Department of the Local Authority.
- 2.3.2 As the NIA is to consider the potential effect of noise breakout from commercial equipment at the site upon nearby noise sensitive receptors (NSRs), it is reasoned that an NIA in accordance with BS4142:2014 would typically be the most appropriate assessment methodology.
- 2.3.3 As the applicant owns several residential properties within proximity of the site, the Local Authority (LA) have consented that an assessment against the design criteria quoted in BS8233:2014 would be acceptable for properties under the applicant's ownership, given the possibility to introduce noise control measures at both the source and receptor locations. It was put forward to NoiseAir that a full BS4142 assessment should be undertaken at the nearest noise sensitive properties not under the applicant's ownership.
- 2.3.4 Additionally, it has been reasoned that properties being assessed to BS8233 criteria should demonstrate consideration of character correction where the noise source is determined to have specific features which would normally attract a penalty when considered as part of a BS4142 assessment.
- 2.3.5 As such, it was further agreed with the LA that those properties under the applicant's ownership shall be assessed to -5 dB below the internal noise criteria (as specified for habitable rooms within BS8233) to accommodate specific characteristics of the noise source. Resulting internal noise levels will be calculated based on 15 dB attenuation across a partially open window. A BS4142 assessment will be carried out for the nearest noise sensitive receptors not under the applicant's ownership and best practice mitigation measures will be included within the report.
- 2.3.6 In order to achieve noise levels which are considered to be in alignment with the planning approaches and policies discussed in Section 2.1 it is considered that all efforts are made to ensure that existing residents are unlikely to be exposed to noise levels which might breach the LOEL criteria.
- 2.3.7 It should be noted however that planning guidance does not preclude development where the LOEL is likely to be breached in certain circumstances as long as reasonable efforts are made to mitigate and reduce such an effect.
- 2.3.8 A summary of the standards forming the basis of this assessment is provided below.
-

Pro-PG – Planning & Noise [Pro-PG 2018]

- 2.3.9 Pro-PG Planning and Noise provides professional practice guidance in relation to new residential development exposed to noise from transport sources. It provides practitioners with a recommended approach to the management of noise within the planning system in England.
- 2.3.10 The guidance reflects the Government’s overarching National Planning Policy Framework, the Noise Policy Statement for England, and Planning Practice Guidance (including PPG-Noise) and draws on other authoritative sources of guidance. It provides advice for Local Planning Authorities and developers, and their professional advisers, on achieving good acoustic design in and around new residential developments.
- 2.3.11 Pro-PG adopts a two-stage approach to assessment:
- **Stage 1** – an initial noise risk assessment of the proposed development site; and,
 - **Stage 2** – a systematic consideration of four key elements.
- 2.3.12 The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:
- **Element 1** – demonstrating a “Good Acoustic Design Process”;
 - **Element 2** – observing internal “Noise Level Guidelines”;
 - **Element 3** – undertaking an “External Amenity Area Noise Assessment”; and,
 - **Element 4** – consideration of other relevant issues.
- 2.3.13 Internal noise level guidelines are set out in Figure 2 of Pro-PG which have been reproduced in **Table 2**.

Table 2: Summary of internal noise guidelines.			
Activity	Location	0700 – 2300 hours	2300 – 0700 hours
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} 45 dB L _{AMax}

- 2.3.14 There are multiple notes outlined within Pro-PG with respect to **Table 2** which should be considered in full however the main points for consideration are outlined below:

- The table provides recommended internal $L_{Aeq,T}$ target levels for overall noise in the design of a building. These are the sum total of structure-borne noise and airborne noise sources.
- The internal $L_{Aeq,T}$ target levels shown in the table are based on the existing guidelines issued by the World Health Organisation (WHO) and assume normal diurnal fluctuation in external noise.
- The internal $L_{Aeq,T}$ target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.
- Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events.
- Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded.
- Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

2.3.15 The guidelines presented in **Table 2** reflect and extend current practice contained in BS8233:2014.

2.3.16 In terms of external amenity noise assessment, Pro-PG again draws upon guidelines set presented by the WHO and also presented in BS8233:2014.

2.3.17 BS8233:2014 states that "the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$ ". The standard continues... "These guideline values may not be achievable in all circumstances where development might be desirable. In

such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited.”

***BS4142:2014 – Methods for Rating and Assessing Industrial and Commercial Sound
[BS414:2014]***

- 2.3.18 BS4142:2014 provides methods for rating and assessing sound of an industrial / commercial nature, which includes sound from 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).
- 2.3.19 BS4142 uses various descriptors to assess the likelihood of adverse impact relating to proposed / existing industrial / commercial activities on existing or proposed noise-sensitive receivers.
- 2.3.20 The magnitude of impact is assessed by subtracting the measured background sound level at a location representative of the nearest noise-sensitive receiver, from the ‘rating level’ (the specific sound source to be introduced into the locality, corrected for acoustically distinguishing characteristics which may make it more subjectively prominent).
- 2.3.21 Typically, the greater the difference between the background and rating level, the greater the magnitude of impact, although BS 4142 suggests that this is should be considered in the context-of the site and surrounding being assessed.
- 2.3.22 As a guideline, BS4142 suggests 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.*
 - *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.*
- 2.3.23 BS4142:2014 requires qualified engineering consultants and technical planning professionals (e.g. Environmental Health Officers) to use a combination of quantitative assessment techniques and rational qualitative judgments to come to a reasoned conclusion.

Definitions;

2.3.24 BS 4142 uses several specific terms to define the various levels used in assessments, as follows:

- **Specific sound** – the commercial / industrial noise source under consideration.
- **Residual sound** – the sound level at the noise-sensitive receivers in the absence of the specific sound.
- **Ambient sound** – the sound level at the noise-sensitive receivers in the presence of the specific sound (i.e. ambient = residual + specific).
- **Background level** - the sound pressure level which is exceeded by the residual sound for 90% of the measurement period.
- **Rating level** – the specific sound, corrected for acoustically distinguishing characteristics.

Background level;

2.3.25 BS4142 suggests that the background level ($L_{A90,T}$) should be considered as a range of levels and not an absolute value. Background sound measurements should be normally not less than 15 minutes, the suggestion is on obtaining a level for use in assessment that is representative of typical conditions at the noise-sensitive receivers.

2.3.26 An example methodology by which this typical value may be obtained is given in BS4142. The example suggests that where monitoring of $L_{A90,15mins}$ is undertaken during periods which represent when the specific noise will be operational. After obtaining a sequence of representative results, the mode average value is considered representative of the 'typical' background level and may be adopted for the assessment.

Specific sound;

2.3.27 BS4142 requires that the specific sound ($L_{Aeq,T}$) is obtained over a reference period of 1 hour (daytime) and 15 mins (at night). Ideally, where possible measurements should 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).

2.3.28 Where the source (specific sound) is not yet operational, it is permissible to measure the specific sound elsewhere (or to use known manufacturers' or library data) and then model the impact of this against the known background level.

Rating level;

- 2.3.29 Once the specific sound level has been determined, this should be corrected in terms of the need to consider the subjective prominence of the impact of the sound at noise-sensitive receptors.
- 2.3.30 BS 4142 states that this is normally possible to carry out a subjective assessment of characteristics, based on the following correction guidelines:
- **Tonality:** +2 dB for a 'just perceptible' tone, +4 dB for 'clearly perceptible', +6 dB for 'highly perceptible' tones.
 - **Impulsivity:** +3 dB for 'just perceptible' impulsivity, +6 dB 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, +3 dB.
 - **Other sound characteristics:** up to +3 dB may be added for sound characteristics which are considered adverse to the receptor being clearly / highly perceptible. It should be noted that a correction for other sound characteristics is rare.
- 2.3.31 It should be noted that where one feature is clearly perceived as dominant, it may be applicable to correct for that feature only. Where multiple features are likely to affect perception and response, each should be added arithmetically.

2.4 Noise Survey

- 2.4.1 NoiseAir has carried out attended, specific noise level measurements at the site location of the existing plant equipment. Additionally, unattended noise monitoring has also been undertaken to establish the existing background sound levels dB L_{A90} representative of nearby noise sensitive receptors (identified as nearby residential dwellings).
- 2.4.2 It is noted that the noise monitoring undertaken as part of this NIA was undertaken during the global Covid-19 pandemic where traffic flows, and therefore general residual noise levels, are likely to be at a lower level than considered typical. Given that the acoustic noise monitoring undertaken as part of this assessment was to establish background sound levels for the area it is considered that measured levels would likely be lower than considered typical and therefore are unlikely to negatively affect the outcome of the assessment with respect to the potential for adverse impact on nearby residents.
- 2.4.3 It is therefore considered that the outlined approach is in accordance with the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA) Joint Guidance on the Impact

of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments document issued on 16th April 2020.

2.4.4 The primary noise sources assessed as part of the NIA are:

- J&E Hall Condenser Units

2.4.5 The above noise sources have been assessed in relation to the below identified receptors:

- Existing nearby residential dwellings.

3 ACOUSTIC SURVEY

3.1 Acoustic Survey Details

- 3.1.1 NoiseAir has undertaken unattended noise monitoring at one location (ML1) at the subject site across the dates 05/11/2020 – 08/11/2020.
- 3.1.2 The measurement location (ML1) was selected to be representative of the existing noise climate at nearby noise sensitive receptors, without influence from the external plant equipment to be assessed within the NIA.
- 3.1.3 Attended source specific noise measurements were obtained at one measuring location (ML2) at the subject site on 05/11/2020.
- 3.1.4 Measurements obtained at measuring location ML2 represent cumulative noise emissions of all equipment running under typical operation at the site.
- 3.1.5 Monitoring locations adopted for assessment are detailed within **Figure 2** and **Table 3** below.

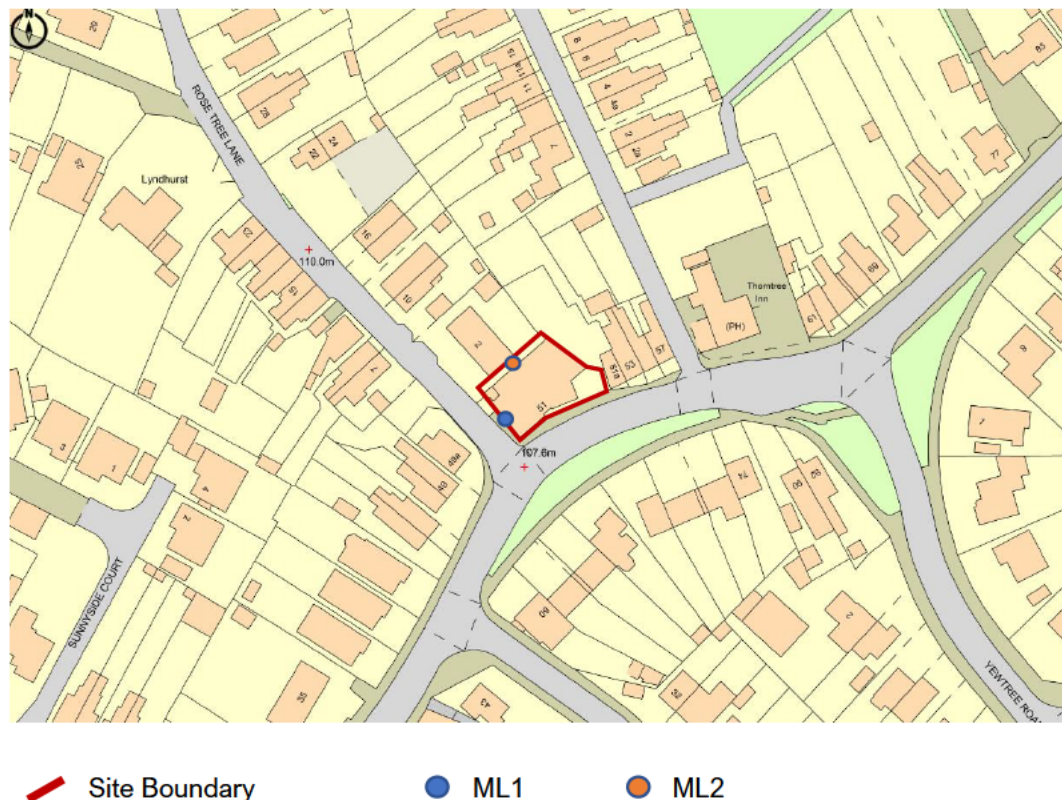


Figure 2: Site layout plan and noise monitoring location.

Table 3: Summary of Noise Monitoring Locations

Monitor Location Number	Location Description	Time Period Monitored		Attended or Unattended Monitoring
		Start	End / Duration	
ML1	At first-floor level, via an openable window located at the south-west building façade of the site.	14:30 05/11/20	09:45 08/11/20	Unattended
ML2	At ground-floor level 3 m from the external plant equipment located at the north-west building façade.	14:13 05/11/20	14:28 05/11/20	Attended

- 3.1.6 ML1 was positioned to be representative of levels at the approximate location of the nearest noise sensitive receivers.
- 3.1.7 The microphone at ML1 was positioned out of a first-floor openable window at an approximate height of 4.5 m from the ground, 1 m from the façade.
- 3.1.8 The microphone at ML2 was tripod mounted at an approximate height of 1.5 m from the ground and at a distance of 3 m from the external plant equipment.
- 3.1.9 All measurements were made using Class 1, integrating sound level meters (SLM's).
- 3.1.10 The acoustic equipment was calibrated to comply with Section 4.2 of BS7445-1:2003² before and after the noise monitoring periods.
- 3.1.11 Details of the SLM's and associated field calibration can be found in **Table 4** below.

Table 4: Summary of SLM's used for survey and associated field calibration

SLM (Serial Number)	Preamp (Serial Number)	Microphone (Serial Number)	Calibrator (Serial Number)	Start Calibration	End Calibration	Drift
NOR140 (1405016)	NOR1209 (14242)	NOR1225 (118503)	B&K4231 (2431761)	-26.4 dB	-26.3 dB	0.1 dB
NOR140 (1406528)	NOR1209 (15455)	NOR1225 (168289)	B&K4231 (2431761)	-25.9 dB	-25.9 dB	0.0 dB

- 3.1.12 The weather conditions were noted to be as outlined in **Table 5** during the site visits at the start and end of the background monitoring period.

² BS7445-2003 "Description and measurement of environmental noise – Part 1: Guide to quantities and procedures.

Table 5: Summary of weather conditions noted at the start and end of the monitoring duration.

	5 th November 2020	8 th November 2020
Roads (Wet / Dry)	Dry	Dry
Temperature (°C)	11	10
Wind speed (ms ⁻¹)	< 0.5	< 0.5
Cloud Cover (Approx. %)	100	100
Humidity (%)	82	79

- 3.1.13 The weather conditions remained approximately consistent over the duration of the noise survey with typical temperature fluctuations over night and daytime hours.
- 3.1.14 A-weighted³ L_{eq}⁴ and L₉₀⁵ noise levels were measured to comply with the requirements of BS4142:2014. The measured noise levels are set out in full in Appendix B.
- 3.1.15 Attending the proposed installation site at the start and end of the survey monitoring period provided opportunity for observations and detailed notes to be made of the significant noise sources which contribute to the existing noise floor.

ML1:

Road Traffic Noise: Road traffic noise from Bretby Road. Regular vehicles included: Motor cars, motorcycles, Heavy goods Vehicles (HGVs) and Light Goods Vehicles (LCVs). Secondary sources of noise included cars parking to use the convenience store, vehicles (predominantly motor cars) travelling along Rose Tree Lane and resident parking cars along Rose Tree Lane.

³ An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions.

⁴ Equivalent continuous noise level; the steady sound pressure which contains an equivalent quantity of sound energy as the time-varying sound pressure levels.

⁵ The noise level which is exceeded for 90% of the measurement period.

3.2 Measured Sound Levels

- 3.2.1 A summary of the specific sound levels measured for the condenser units at the site are presented in **Table 6**. Details of 1/3 octave frequency data are presented within **Appendix B**.

Table 6: Measured Noise Level			
Measurement Reference	Duration mm:ss	Approximate Distance from Source, m	Measured Noise Level
			dB L _{Aeq,T}
Condenser Units – Cumulative Noise Level	15:00	3 m	56.7

3.3 Background Sound Levels

- 3.3.1 Data is shown in **Figure 3** detailing a level vs. time graph of the recorded L_{Amax}, L_{Aeq,T} and L_{A90} sound level over 15-minute time periods for ML1 at the proposed installation site.

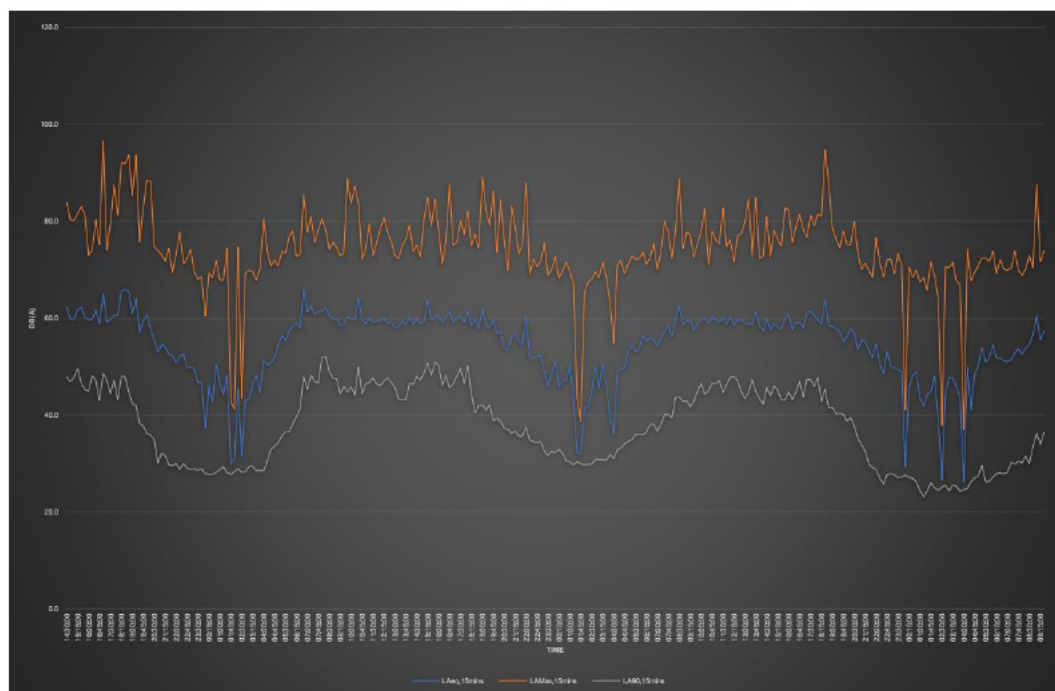


Figure 3: Level vs. time graph showing L_{Amax}, L_{Aeq,T} and L_{A90} sound levels – ML1.

- 3.3.2 Measured daytime and night-time noise levels recorded at ML1 are presented in **Table 7**. Results are presented in full within **Appendix B**.

Table 7: Measured Daytime and Night-time noise level					
Monitoring Location	Time	Measured Noise Level			
		dB L _{Aeq,1hour}	dB L _{A90,1hour}	dB L _{Aeq, 15min}	dB L _{A90,15min}
ML1	07:00-23:00	51.4 – 64.8	27.3 – 50.2	-	-
	23:00-07:00	-	-	26.2 – 65.9	23.2 – 47.9

3.3.3 It is reasoned that the condenser equipment will operate on a 24-hour basis. As such, it is considered that background sound levels recorded during the night-time hours (07:00-23:00) are appropriate for assessment.

3.3.4 A histogram showing the distribution of existing L_{A90,15min} sound levels for the night-time sound levels measured at ML1 are presented within **Figure 4** below.

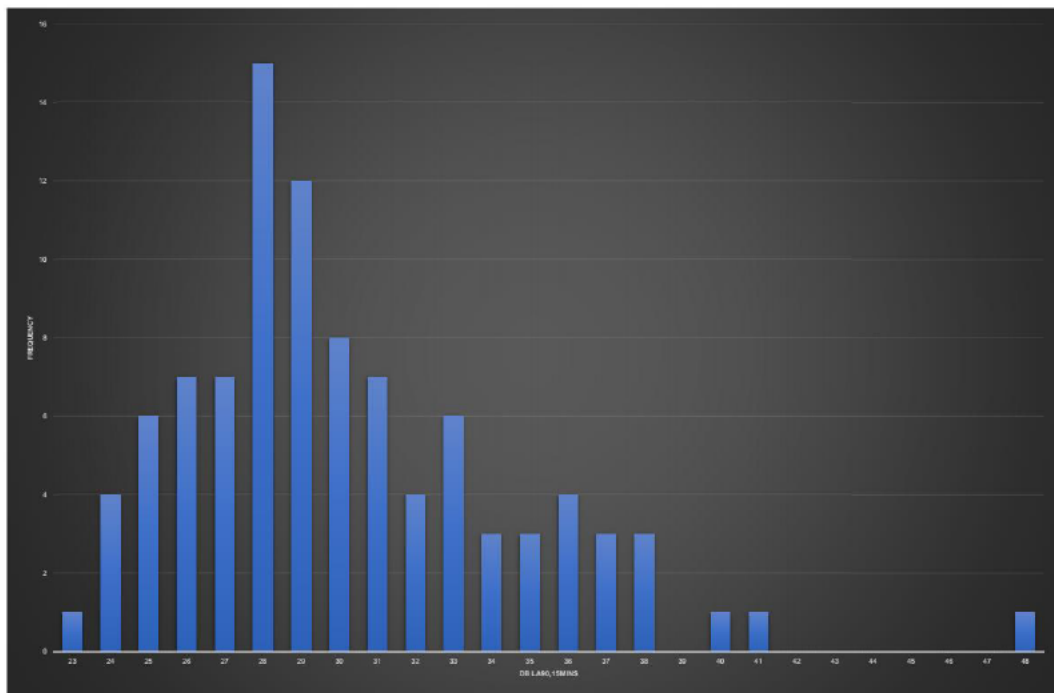


Figure 4: Histogram showing frequency distribution of L_{A90,15min} noise readings at ML1 – Daytime (23:00-07:00 hours).

3.3.5 At location ML1, a background L_{A90} sound level of 28 dB has been adopted for BS4142 assessment being the most frequent value recorded over the full monitoring duration.

4 NOISE IMPACT ASSESSMENT

4.1 3D Sound Model

- 4.1.1 A 3D sound model has been constructed in SoundPLAN™ to calculate the predicted sound pressure levels at selected potential receptor facades. The model uses the calculation method from ISO 9613-2:1996⁶ to account for the distance between the source and receiver and any screening or reflections provided by the surrounding buildings. The model is based on the proposals forwarded to NoiseAir at the time of writing and measurement data presented within **Section 4.1.1** and **Appendix B**.
- 4.1.2 For assessment purposes, the noise source has been modelled as an area source and has been calibrated to a relative sound power level of 71.5 dB(A).
- 4.1.3 The sound power level represents the cumulative sound pressure level obtained on site of 56.7 dB $L_{Aeq,15min}$.
- 4.1.4 Measurements can be viewed in detail within **Appendix B**.
- 4.1.5 A noise contour plot illustrating the propagation of sound from source to receptor with and without mitigation is presented within **Figure 5** and **Figure 6**.
- 4.1.6 **Figure 7** details receiver positions assigned at NSR locations.

⁶ ISO9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation"

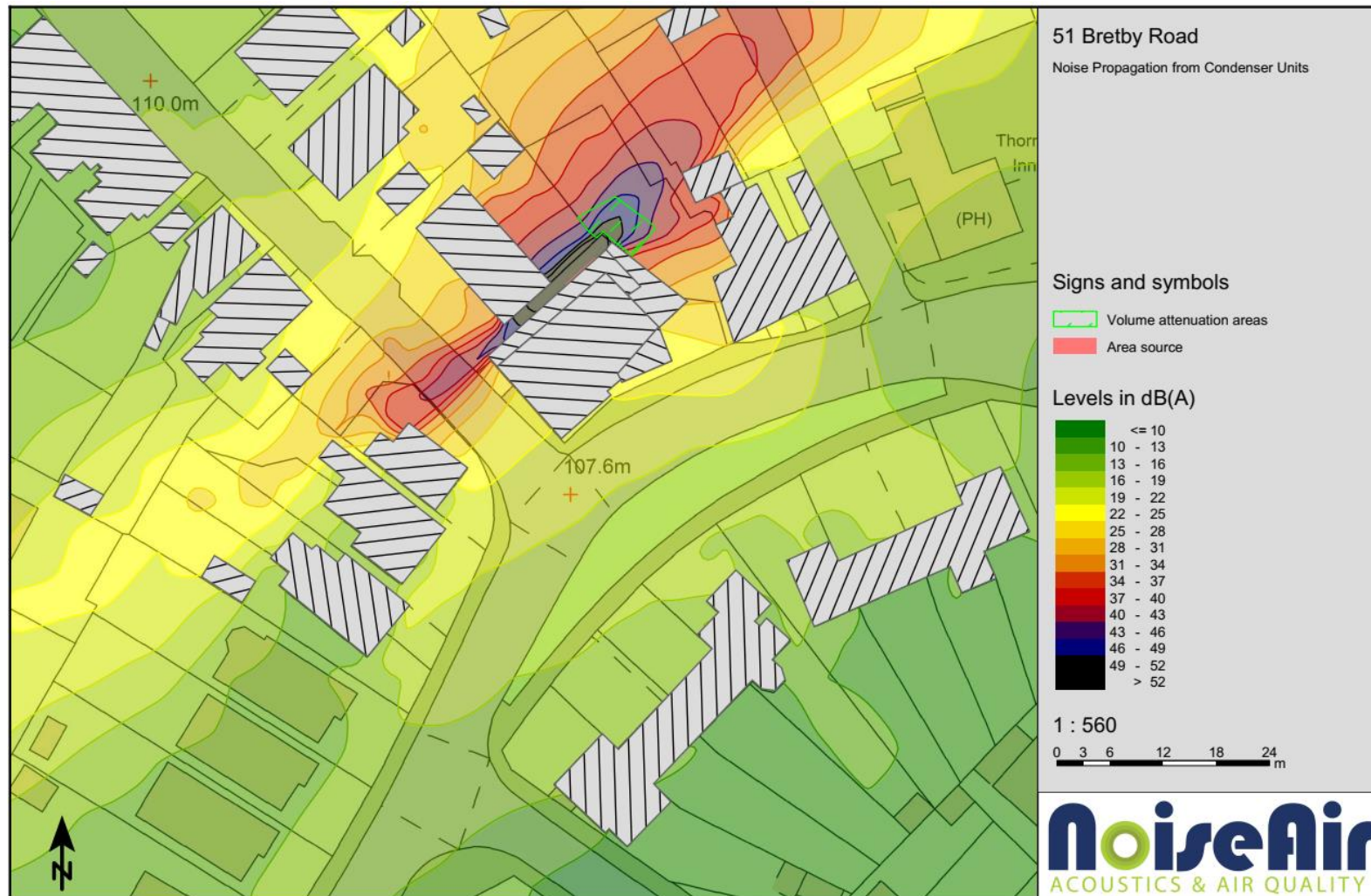


Figure 5: Noise contour of the predicted propagation of sound from condenser units at the site – No Mitigation

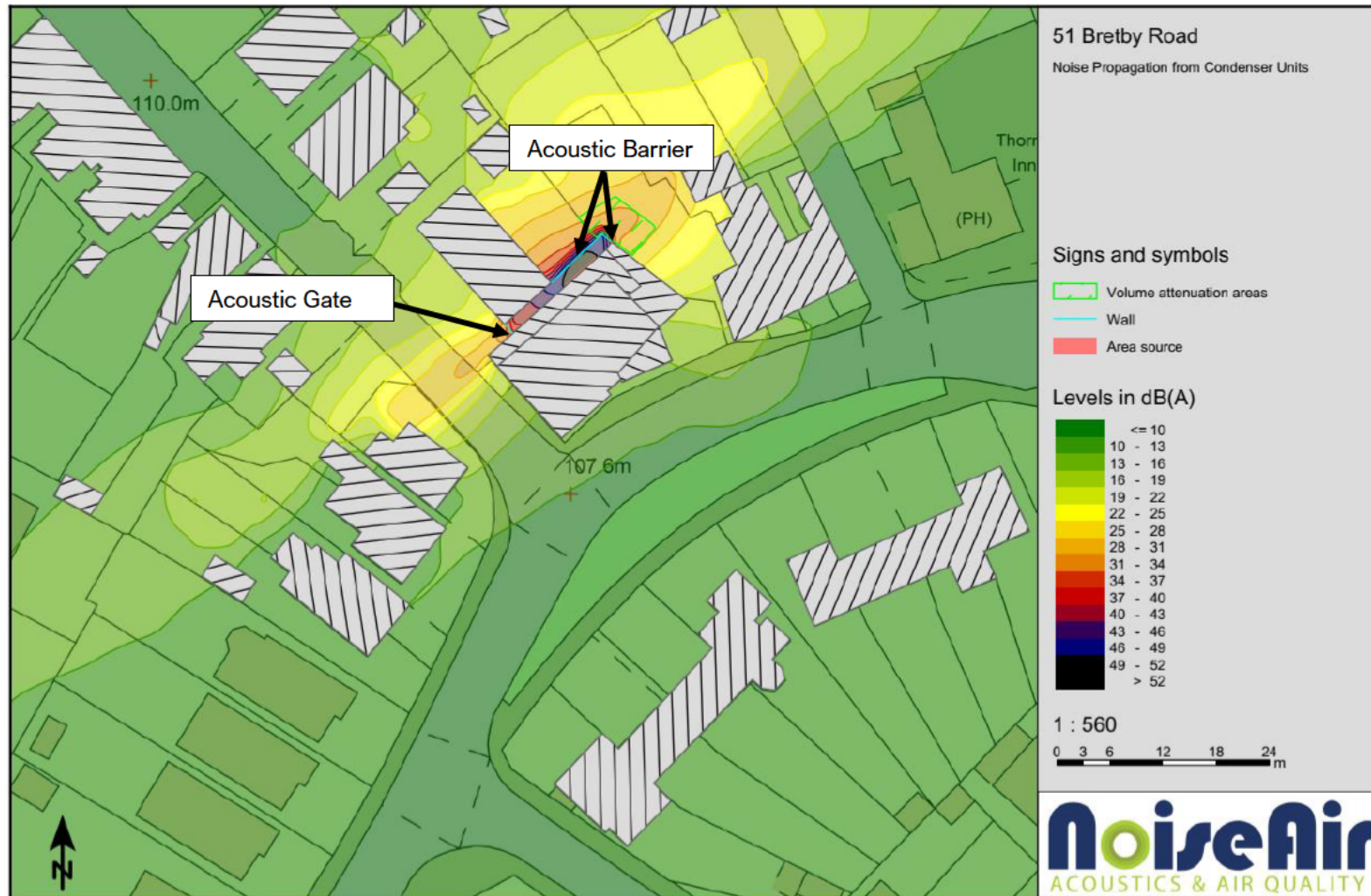


Figure 6: Noise contour of the predicted propagation of sound from condenser units at the site – With Mitigation



Figure 7: Illustration of the 3D sound model receptor locations.

4.1.7 **Table 8** below details the calculated worst-case noise levels at receptor locations without mitigation.

Table 8: Predicted Noise Levels at receptor locations – No Mitigation.	
Rec#	dB L _{Aeq}
1	46.3
2	39.5
3	35.9
4	33.6
5	30.0
6	27.2
7	26.1
8	30.7
9	21.5
10	20.4
11	32.2
12	17.1
13	30.9
14	18.7
15	36.0
16	17.9
17	45.9
18	42.6
19	40.0
20	25.1
21	22.8
22	13.9
23	14.8
24	14.6

4.2 Assessment of external plant equipment

4.2.1 Based on the measured sound levels presented in **Section 3.2** and the calculated results of a 3D sound model presented within **Section 4.1.7**, a detailed assessment has been undertaken with respect to NSR locations.

Background Sound Level

4.2.2 Existing background sound levels have been measured and are presented within Section 3.3.3 of this report.

4.2.3 A background L_{A90} sound level of 28 dB (during night-time hours) has been adopted for BS4142 assessment within this report.

Character Corrections

4.2.4 As discussed in Section 2, the character of the specific sound should be taken into account within the assessment outcome.

- **Tonality** – It is considered that noise generated from condenser equipment may produce modest tones which may become just perceptible at receptor locations in some atmospheric circumstances. As such a + 2 dB character correction for tonality has been applied for the BS4142 assessment as a conservative means of assessment.
- **Impulsivity** – It is considered unlikely that condenser equipment will exhibit impulsive characteristics therefore no character correction has been applied for impulsivity; and,
- **Intermittency** – It is understood that condenser equipment will function on a demand basis and will likely have the potential to exhibit intermittency characteristics. As such, a +3 dB character correction has been applied to the BS4142 assessment for intermittency.

Noise Impact Assessment

4.2.5 The NIA based on the cumulative effect of noise levels from external plant equipment against criteria reasoned within **Section 2.2**, while unmitigated is presented in **Table 9**.

Table 9: NIA - Unmitigated

Rec #	Assessment Standard	Background Sound Level, dB	Specific Sound Level, dB	Sound Attenuation Via a Partially Open Window, dB	Character Correction, dB	Criteria, dB	Calculate Internal Noise Level, dB	Rating Level, dB	Excess Rating over Background Sound Level/Criteria, db
1	BS8233	-	46	-15	-	25	31	-	+6
2		-	40	-15	-	25	25	-	0
3		-	36	-15	-	25	21	-	-4
4		-	34	-15	-	25	19	-	-6
5		-	30	-15	-	25	15	-	-10
6		-	27	-15	-	25	12	-	-13
7		-	26	-15	-	25	11	-	-14
8		-	31	-15	-	25	16	-	-9
9	BS4142	28	22	-	+5	-	-	27	-1
10		28	20	-	+5	-	-	25	-3
11		28	32	-	+5	-	-	37	+9
12		28	17	-	+5	-	-	22	-6
13		28	31	-	+5	-	-	36	+8

Table 9: NIA - Unmitigated

Rec #	Assessment Standard	Background Sound Level, dB	Specific Sound Level, dB	Sound Attenuation Via a Partially Open Window, dB	Character Correction, dB	Criteria, dB	Calculate Internal Noise Level, dB	Rating Level, dB	Excess Rating over Background Sound Level/Criteria, db
14		28	19	-	+5	-	-	24	-4
15		28	36	-	+5	-	-	41	+13
16		28	18	-	+5	-	-	23	-5
17	BS8233	-	46	-15	-	25	31	-	+6
18		-	43	-15	-	25	28	-	+3
19		-	40	-15	-	25	25	-	0
20		-	25	-15	-	25	10	-	-15
21		-	23	-15	-	25	8	-	-17
22	BS4142	28	14	-	+5	-	-	19	-9
23		28	15	-	+5	-	-	20	-8
24		28	15	-	+5	-	-	20	-8

Assessment Outcome (Context)

- 4.2.6 The BS4142 assessment calculates an excess rating over background sound level of up to +13 dB at the worst affected NSR (receptor 15) and demonstrates that a rating level of *'significantly adverse effect'* is likely at this location. Results also indicates a rating level of *'adverse effect is likely'* at the façade of receptor 11 and receptor 13 without any further mitigation measures.
- 4.2.7 The BS8233 assessment for properties under the applicant's ownership indicates an excess of the internal noise criteria of +6 dB at the worst affected NSRs (receptor 1 and receptor 17). This demonstrates that adverse internal noise levels may be considered likely without any further noise mitigation measures.
- 4.2.8 We would therefore recommend that a conservative approach to mitigation is adopted to ensure that an adverse impact is not experienced at the façade of nearby noise sensitive receptors.

5 RECOMMENDATIONS

- 5.1.1 It is recommended that mitigation in the form of installing a 2.4 m acoustic gate to the access and a 2.4 m acoustic barrier along the boundary of the alleyway containing the condensers units is implemented at the site as demonstrated graphically within **Figure 6**.
- 5.1.2 The acoustic gate and acoustic barrier should be designed to achieve a minimum surface density of 10 kg/m² and should be imperforate in structure. It is recommended that absorption is incorporated to the surface (directed at the noise source) to minimise reflected sound from source.
- 5.1.3 Additionally, it is also recommended that a louvered enclosure is installed around the existing condenser units.
- 5.1.4 The louvered enclosure should be closed at the top and be capable of achieving a minimum attenuation of 15 dB at mid band frequencies. The enclosure should be adequately designed to allow the necessary ventilation requirements to the units housed within, whilst not compromising acoustic performance below.
- 5.1.5 It is recommended that plant equipment should be installed incorporating a suitable antivibration mounting system in-order to avoid re-radiated noise through the building structure.
- 5.1.6 **Table 10** presents the calculated worst-case receptor noise levels, based on a revised 3D sound model which incorporates the mitigation recommendations detailed above.

Table 10: Predicted Noise Levels at receptor locations – No Mitigation.	
Rec#	dB L _{Aeq}
1	33.4
2	28.4
3	25.3
4	23.2
5	20.1
6	17.2
7	15.7
8	16.0
9	11.4
10	10.3
11	16.9
12	7.1
13	20.9
14	8.7
15	23.0
16	7.9
17	36.0
18	33.3
19	30.3
20	15.1
21	12.8
22	3.9
23	4.8
24	4.6

5.2 Revised Noise Impact Assessment

5.2.1 The revised NIA based on the mitigation recommendations reasoned within this report is presented below within **Table 11**

Table 11: NIA - Mitigated

Rec #	Assessment Standard	Background Sound Level, dB	Specific Sound Level, dB	Sound Attenuation Via a Partially Open Window, dB	Character Correction, dB	Criteria, dB	Calculate Internal Noise Level, dB	Rating Level, dB	Excess Rating over Background Sound Level/Criteria, db
1	BS8233	-	33	-15	-	25	18	-	-7
2		-	28	-15	-	25	13	-	> -10
3		-	25	-15	-	25	10	-	> -10
4		-	23	-15	-	25	8	-	> -10
5		-	20	-15	-	25	5	-	> -10
6		-	17	-15	-	25	2	-	> -10
7		-	16	-15	-	25	1	-	> -10
8		-	16	-15	-	25	1	-	> -10
9	BS4142	28	11	-	+5	-	-	16	> -10
10		28	10	-	+5	-	-	15	> -10
11		28	17	-	+5	-	-	22	-6
12		28	7	-	+5	-	-	12	> -10
13		28	21	-	+5	-	-	26	-2

Table 11: NIA - Mitigated

Rec #	Assessment Standard	Background Sound Level, dB	Specific Sound Level, dB	Sound Attenuation Via a Partially Open Window, dB	Character Correction, dB	Criteria, dB	Calculate Internal Noise Level, dB	Rating Level, dB	Excess Rating over Background Sound Level/Criteria, db
14		28	9	-	+5	-	-	14	> -10
15		28	23	-	+5	-	-	28	0
16		28	8	-	+5	-	-	13	> -10
17	BS8233	-	36	-15	-	25	21	-	-4
18		-	33	-15	-	25	18	-	-7
19		-	30	-15	-	25	15	-	-10
20		-	15	-15	-	25	0	-	> -10
21		-	13	-15	-	25	-2	-	> -10
22	BS4142	28	4	-	+5	-	-	9	> -10
23		28	5	-	+5	-	-	10	> -10
24		28	5	-	+5	-	-	10	> -10

5.3 Revised Outcome

- 5.3.1 The outcome of the revised BS4142 assessment calculates an excess rating over background sound level of up to 0 dB at the worst affected NSR (receptor 15) and demonstrates that a rating level of low impact is likely at all receptor locations within BS4142 assessment, based on the mitigation recommendations in **Section 4.3**.
- 5.3.2 The results of the revised BS8233 assessment for properties under the applicant's ownership indicates noise levels of 4 dB below the internal noise criteria at the worst affected NSR location (receptor 17).
- 5.3.3 Results indicate that by implementing the mitigation as recommended, adverse effect can be avoided.

5.4 Uncertainty

- 5.4.1 Uncertainty of measurements can have a significant effect on the outcome and findings of an assessment and therefore such constraints are documented and discussed below.
- 5.4.2 The SLM's used were Norsonic Class 1 SLM's, it is generally recognised that Class 1 SLM's offer an uncertainty of ± 1.0 dB. The instrumentation used for the survey has been calibrated by UKAS approved laboratories
- 5.4.3 The environmental sound levels measured (which include busier and quieter periods) are considered typical for a built-up area where road traffic noise is the dominating source.
- 5.4.4 Wind speeds during the survey visits were typically less than 5 ms⁻¹ and the effect of wind generated noise is not considered to have a significant impact on this assessment.
- 5.4.5 The specific noise level and therefore rated noise levels have been calculated using a 3D sound model based on noise levels obtained on-site.
- 5.4.6 It is therefore considered that in this instance the uncertainty of the calculations may have minimal influence on the outcome of the assessment.

6 CONCLUSIONS

- 6.1.1 NoiseAir has carried out a noise impact assessment with respect to previously installed external plant equipment at the site; 51 Bretby Road, Swadlincote DE11 0LL.
- 6.1.2 The external plant equipment requiring assessment has been identified as J&E Hall condenser units installed at ground level to the north-west building façade.
- 6.1.3 The client identified that one of the condenser units appeared to be functioning incorrectly resulting in higher levels of noise breakout than would be typical under correct operational circumstances from that condenser.
- 6.1.4 Subsequently, the malfunctioning condenser has been replaced (prior to the acoustic survey) and all condensers are reported by the client to be operating within manufacturers specifications.
- 6.1.5 Prior to conducting the noise impact assessment, the noise impact upon nearby residential receptors and the general principles regarding the associated acoustic report were discussed between NoiseAir and the Environmental Protection Department of the Local Authority.
- 6.1.6 Subsequently, as the applicant owns several residential properties within proximity of the site, the LA have consented that an assessment against the design criteria quoted in BS8233:2014 would be acceptable for properties under the applicant's ownership, given the possibility to introduce noise control measures at both the source and receptor locations. It was put forward to NoiseAir that a full BS4142:2014 assessment should be undertaken at the nearest noise sensitive properties not in the applicant's ownership.
- 6.1.7 The outcome of the noise impact assessment indicates that a rating level of '*adverse and significantly adverse effect is likely*' at the façade of some nearby receptors when assessed against BS4142 and left unmitigated. Additionally, adverse internal noise levels may be considered likely without any further noise mitigation measures for some properties when assessed to BS8233 criteria.
- 6.1.8 As such, it is recommended that mitigation in the form of installing a 2.4 m acoustic gate to the access and a 2.4 m acoustic barrier along the boundary of the alleyway containing the condensers units is implemented at the site as demonstrated graphically within **Figure 6**.
- 6.1.9 The acoustic gate and Acoustic barrier should be designed to achieve a minimum surface density of 10 kg/m² and should be imperforate. It is recommended that absorption is

incorporated to the surface (directed at the noise source) to minimise reflected sound from source.

- 6.1.10 It is recommended that a louvered enclosure is installed around the existing condenser units. The louvered enclosure should be closed at the top and be capable of achieving a minimum attenuation of 15 dB at mid band frequencies. The enclosure should adequately designed to allow the necessary ventilation requirements to the units housed within, whilst not compromising acoustic performance below.
- 6.1.11 It is recommended that plant equipment should be installed incorporating a suitable antivibration mounting system in-order to avoid re-radiated noise through the building

This page has been left blank intentionally

APPENDIX A - REPORT LIMITATIONS

This Report is presented to Nisa Store, Bretby Road and may not be used or relied on by any other person or by the client in relation to any other matters not covered specifically by the scope of this report.

Notwithstanding anything to the contrary contained in the report, NoiseAir Limited is obliged to exercise reasonable skill, care and diligence in the performance of the services required by Nisa Store, Bretby Road and NoiseAir shall not be liable except to the extent that it has failed to exercise reasonable skill, care and diligence, and this report shall be read and construed accordingly.

This report has been prepared by NoiseAir Limited. No individual is personally liable in connection with the preparation of this report. By receiving this report and acting on it, the client or any other person accepts that no individual is personally liable whether in contract, tort, for breach of statutory duty or otherwise.

The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from who it has been requested and that such information is accurate. Information obtained by NoiseAir Limited has not been independently verified by NoiseAir Limited unless otherwise stated in the report and should be treated accordingly.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

Where / if estimates and projects are made within this report, are made based on reasonable assumptions as of the date of this report, such statements however by their very nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. NoiseAir Limited specifically does not guarantee or warrant any estimates or projects contained in this report.

DISCLAIMER- This report was prepared by NoiseAir Limited. The material in it contains NoiseAir Limited best judgment in light of the information available at the time of preparation of this report. Any use which a third party makes of this report, or any reliance on, or decisions based on it are the responsibility of such third parties. NoiseAir Limited accept no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

APPENDIX B – METER READINGS

This page has been left blank intentionally

ML1

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
05/11/2020	14:30:00	00:15:00	62.1	83.8	47.8
05/11/2020	14:45:00	00:15:00	59.8	80.3	46.9
05/11/2020	15:00:00	00:15:00	59.7	80.1	47.7
05/11/2020	15:15:00	00:15:00	61.7	81.6	49.5
05/11/2020	15:30:00	00:15:00	62.2	83.0	46.5
05/11/2020	15:45:00	00:15:00	60.2	81.2	45.2
05/11/2020	16:00:00	00:15:00	59.6	72.9	44.9
05/11/2020	16:15:00	00:15:00	59.8	74.0	48.1
05/11/2020	16:30:00	00:15:00	61.6	80.3	47.1
05/11/2020	16:45:00	00:15:00	58.9	75.2	43.0
05/11/2020	17:00:00	00:15:00	65.1	96.6	48.6
05/11/2020	17:15:00	00:15:00	59.2	74.1	47.1
05/11/2020	17:30:00	00:15:00	59.7	79.5	44.4
05/11/2020	17:45:00	00:15:00	60.5	87.5	47.2
05/11/2020	18:00:00	00:15:00	60.6	81.2	43.2
05/11/2020	18:15:00	00:15:00	65.7	92.2	48.0
05/11/2020	18:30:00	00:15:00	65.8	91.8	47.9
05/11/2020	18:45:00	00:15:00	65.5	93.6	44.8
05/11/2020	19:00:00	00:15:00	61.0	85.3	42.3
05/11/2020	19:15:00	00:15:00	63.9	93.6	41.9
05/11/2020	19:30:00	00:15:00	57.1	75.7	38.2
05/11/2020	19:45:00	00:15:00	59.5	82.7	37.7
05/11/2020	20:00:00	00:15:00	60.6	88.4	36.2
05/11/2020	20:15:00	00:15:00	57.8	88.2	35.9
05/11/2020	20:30:00	00:15:00	55.4	74.8	34.9
05/11/2020	20:45:00	00:15:00	53.0	73.9	30.1
05/11/2020	21:00:00	00:15:00	54.5	73.1	32.1
05/11/2020	21:15:00	00:15:00	54.1	71.7	31.7
05/11/2020	21:30:00	00:15:00	52.5	74.3	29.7
05/11/2020	21:45:00	00:15:00	52.3	69.4	29.5
05/11/2020	22:00:00	00:15:00	50.7	73.1	30.0
05/11/2020	22:15:00	00:15:00	52.1	77.7	28.8
05/11/2020	22:30:00	00:15:00	52.6	71.2	30.0
05/11/2020	22:45:00	00:15:00	49.8	72.2	29.0
05/11/2020	23:00:00	00:15:00	49.9	74.2	28.7
05/11/2020	23:15:00	00:15:00	49.5	69.5	28.8
05/11/2020	23:30:00	00:15:00	46.7	68.0	28.6
05/11/2020	23:45:00	00:15:00	46.7	68.5	28.9
06/11/2020	00:00:00	00:15:00	37.4	60.4	27.9
06/11/2020	00:15:00	00:15:00	45.9	69.3	27.8
06/11/2020	00:30:00	00:15:00	42.6	68.3	27.8
06/11/2020	00:45:00	00:15:00	50.3	71.8	28.1
06/11/2020	01:00:00	00:15:00	46.8	67.8	28.8
06/11/2020	01:15:00	00:15:00	44.1	67.8	29.3
06/11/2020	01:30:00	00:15:00	48.2	74.4	28.1
06/11/2020	01:45:00	00:15:00	30.0	42.7	27.8

Start Date	Start Time	Duration	L _{Aeq}	L _{AF} Max	L _{A90}
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
06/11/2020	02:00:00	00:15:00	30.9	41.2	28.3
06/11/2020	02:15:00	00:15:00	45.4	74.6	28.9
06/11/2020	02:30:00	00:15:00	31.5	43.4	28.1
06/11/2020	02:45:00	00:15:00	43.0	69.2	28.3
06/11/2020	03:00:00	00:15:00	43.3	69.8	29.3
06/11/2020	03:15:00	00:15:00	46.2	69.6	29.4
06/11/2020	03:30:00	00:15:00	48.2	67.9	28.5
06/11/2020	03:45:00	00:15:00	44.5	70.2	28.5
06/11/2020	04:00:00	00:15:00	51.2	80.4	28.5
06/11/2020	04:15:00	00:15:00	50.3	73.8	30.5
06/11/2020	04:30:00	00:15:00	50.8	70.7	32.9
06/11/2020	04:45:00	00:15:00	51.8	71.9	33.5
06/11/2020	05:00:00	00:15:00	54.3	70.8	34.3
06/11/2020	05:15:00	00:15:00	56.5	73.7	35.7
06/11/2020	05:30:00	00:15:00	55.3	73.4	36.5
06/11/2020	05:45:00	00:15:00	57.3	76.7	36.5
06/11/2020	06:00:00	00:15:00	58.3	78.0	38.2
06/11/2020	06:15:00	00:15:00	59.1	72.7	39.6
06/11/2020	06:30:00	00:15:00	57.9	73.1	41.3
06/11/2020	06:45:00	00:15:00	65.9	85.5	47.9
06/11/2020	07:00:00	00:15:00	61.2	77.7	45.3
06/11/2020	07:15:00	00:15:00	62.5	80.9	48.2
06/11/2020	07:30:00	00:15:00	60.6	75.6	46.9
06/11/2020	07:45:00	00:15:00	61.4	78.3	46.6
06/11/2020	08:00:00	00:15:00	61.4	80.4	52.0
06/11/2020	08:15:00	00:15:00	62.1	78.4	52.1
06/11/2020	08:30:00	00:15:00	60.6	74.1	49.0
06/11/2020	08:45:00	00:15:00	59.8	75.7	47.6
06/11/2020	09:00:00	00:15:00	59.8	74.6	47.5
06/11/2020	09:15:00	00:15:00	58.4	72.8	44.3
06/11/2020	09:30:00	00:15:00	58.7	73.4	45.9
06/11/2020	09:45:00	00:15:00	60.3	88.7	44.7
06/11/2020	10:00:00	00:15:00	59.9	83.7	45.8
06/11/2020	10:15:00	00:15:00	59.7	87.2	44.1
06/11/2020	10:30:00	00:15:00	64.1	83.7	49.9
06/11/2020	10:45:00	00:15:00	59.7	72.1	44.3
06/11/2020	11:00:00	00:15:00	58.8	74.4	46.5
06/11/2020	11:15:00	00:15:00	60.0	79.4	46.7
06/11/2020	11:30:00	00:15:00	59.1	72.8	47.7
06/11/2020	11:45:00	00:15:00	59.3	75.5	46.4
06/11/2020	12:00:00	00:15:00	59.5	78.4	46.1
06/11/2020	12:15:00	00:15:00	59.9	80.7	47.0
06/11/2020	12:30:00	00:15:00	58.9	77.7	47.7
06/11/2020	12:45:00	00:15:00	59.3	75.8	46.7
06/11/2020	13:00:00	00:15:00	58.0	73.0	45.7
06/11/2020	13:15:00	00:15:00	58.2	72.2	43.3
06/11/2020	13:30:00	00:15:00	59.3	74.9	43.2
06/11/2020	13:45:00	00:15:00	58.7	76.3	43.1

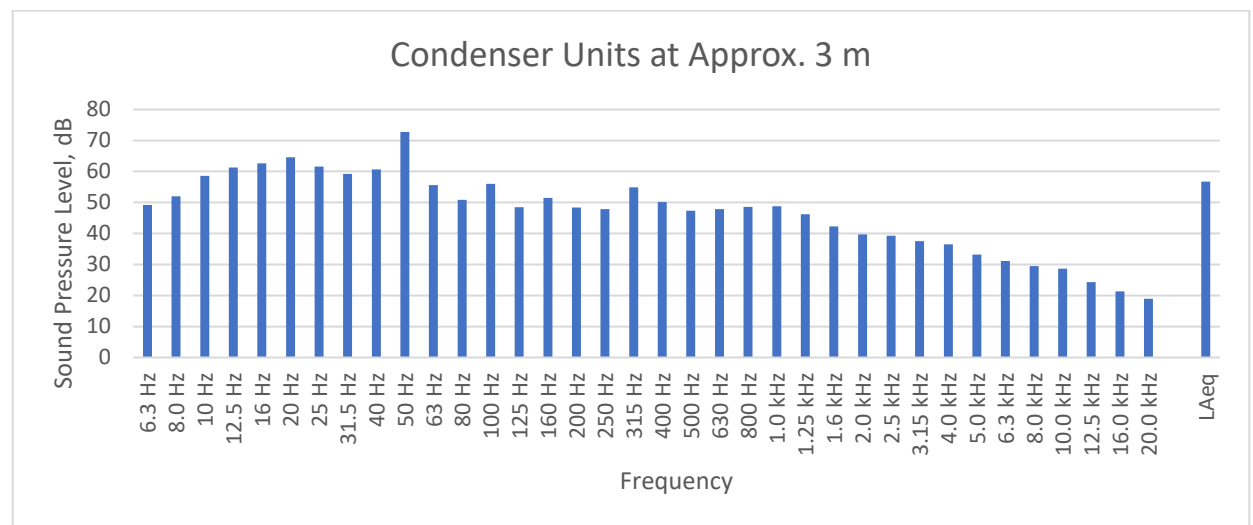
Start Date	Start Time	Duration	L _{Aeq}	L _{AF} Max	L _{A90}
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
06/11/2020	14:00:00	00:15:00	60.3	79.2	46.5
06/11/2020	14:15:00	00:15:00	58.6	73.8	46.2
06/11/2020	14:30:00	00:15:00	59.8	75.0	47.9
06/11/2020	14:45:00	00:15:00	58.8	72.6	47.2
06/11/2020	15:00:00	00:15:00	59.3	80.4	48.7
06/11/2020	15:15:00	00:15:00	63.6	84.8	50.7
06/11/2020	15:30:00	00:15:00	59.6	79.0	48.2
06/11/2020	15:45:00	00:15:00	60.2	84.5	50.9
06/11/2020	16:00:00	00:15:00	60.6	78.1	50.2
06/11/2020	16:15:00	00:15:00	58.9	71.1	46.1
06/11/2020	16:30:00	00:15:00	60.2	75.9	48.1
06/11/2020	16:45:00	00:15:00	61.3	87.6	45.6
06/11/2020	17:00:00	00:15:00	59.1	75.0	46.3
06/11/2020	17:15:00	00:15:00	60.1	75.7	48.1
06/11/2020	17:30:00	00:15:00	60.5	80.1	49.7
06/11/2020	17:45:00	00:15:00	59.1	77.2	46.5
06/11/2020	18:00:00	00:15:00	61.4	82.0	50.1
06/11/2020	18:15:00	00:15:00	58.5	74.9	44.3
06/11/2020	18:30:00	00:15:00	59.7	77.2	40.5
06/11/2020	18:45:00	00:15:00	57.9	74.5	41.9
06/11/2020	19:00:00	00:15:00	62.0	89.1	42.0
06/11/2020	19:15:00	00:15:00	58.4	82.2	41.0
06/11/2020	19:30:00	00:15:00	58.0	79.1	42.1
06/11/2020	19:45:00	00:15:00	59.6	86.2	38.9
06/11/2020	20:00:00	00:15:00	56.8	73.5	39.3
06/11/2020	20:15:00	00:15:00	57.1	84.4	38.7
06/11/2020	20:30:00	00:15:00	53.8	76.2	37.3
06/11/2020	20:45:00	00:15:00	53.4	69.8	37.1
06/11/2020	21:00:00	00:15:00	56.2	83.2	36.2
06/11/2020	21:15:00	00:15:00	56.6	78.8	36.6
06/11/2020	21:30:00	00:15:00	55.4	73.2	35.7
06/11/2020	21:45:00	00:15:00	54.4	75.2	35.6
06/11/2020	22:00:00	00:15:00	60.4	87.8	37.4
06/11/2020	22:15:00	00:15:00	52.2	69.0	34.8
06/11/2020	22:30:00	00:15:00	51.6	72.1	34.5
06/11/2020	22:45:00	00:15:00	52.0	70.6	34.3
06/11/2020	23:00:00	00:15:00	52.3	71.8	34.5
06/11/2020	23:15:00	00:15:00	49.1	75.4	32.6
06/11/2020	23:30:00	00:15:00	45.8	68.8	31.6
06/11/2020	23:45:00	00:15:00	48.5	70.0	32.5
07/11/2020	00:00:00	00:15:00	51.1	72.6	32.2
07/11/2020	00:15:00	00:15:00	45.7	68.2	32.9
07/11/2020	00:30:00	00:15:00	47.1	69.8	32.1
07/11/2020	00:45:00	00:15:00	47.2	71.5	30.5
07/11/2020	01:00:00	00:15:00	50.1	69.6	30.3
07/11/2020	01:15:00	00:15:00	43.2	67.1	29.7
07/11/2020	01:30:00	00:15:00	32.3	43.6	30.4
07/11/2020	01:45:00	00:15:00	31.8	38.6	29.9

Start Date	Start Time	Duration	L _{Aeq}	L _{AF} Max	L _{A90}
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
07/11/2020	02:00:00	00:15:00	41.5	65.2	29.7
07/11/2020	02:15:00	00:15:00	41.6	67.5	29.8
07/11/2020	02:30:00	00:15:00	44.9	68.0	29.8
07/11/2020	02:45:00	00:15:00	49.9	69.5	30.8
07/11/2020	03:00:00	00:15:00	45.3	68.3	30.8
07/11/2020	03:15:00	00:15:00	50.7	71.5	30.7
07/11/2020	03:30:00	00:15:00	46.4	68.5	30.7
07/11/2020	03:45:00	00:15:00	39.8	63.1	31.8
07/11/2020	04:00:00	00:15:00	35.9	54.8	31.0
07/11/2020	04:15:00	00:15:00	49.3	70.9	32.8
07/11/2020	04:30:00	00:15:00	49.4	72.0	33.2
07/11/2020	04:45:00	00:15:00	49.8	69.2	34.0
07/11/2020	05:00:00	00:15:00	53.3	71.1	34.5
07/11/2020	05:15:00	00:15:00	54.3	72.8	34.9
07/11/2020	05:30:00	00:15:00	53.0	72.1	36.0
07/11/2020	05:45:00	00:15:00	53.5	72.2	36.0
07/11/2020	06:00:00	00:15:00	56.3	73.6	35.9
07/11/2020	06:15:00	00:15:00	55.3	71.1	36.5
07/11/2020	06:30:00	00:15:00	55.9	72.5	38.0
07/11/2020	06:45:00	00:15:00	55.5	75.3	38.1
07/11/2020	07:00:00	00:15:00	54.2	70.0	36.6
07/11/2020	07:15:00	00:15:00	56.2	74.0	38.1
07/11/2020	07:30:00	00:15:00	57.2	79.9	40.1
07/11/2020	07:45:00	00:15:00	58.5	77.6	40.1
07/11/2020	08:00:00	00:15:00	56.1	72.2	39.4
07/11/2020	08:15:00	00:15:00	59.9	78.2	43.6
07/11/2020	08:30:00	00:15:00	62.6	88.7	43.7
07/11/2020	08:45:00	00:15:00	58.7	74.3	42.8
07/11/2020	09:00:00	00:15:00	59.4	77.7	42.9
07/11/2020	09:15:00	00:15:00	59.5	77.2	41.7
07/11/2020	09:30:00	00:15:00	57.5	72.6	42.8
07/11/2020	09:45:00	00:15:00	58.7	75.3	44.9
07/11/2020	10:00:00	00:15:00	59.7	77.9	46.5
07/11/2020	10:15:00	00:15:00	60.0	82.5	44.3
07/11/2020	10:30:00	00:15:00	58.8	71.0	45.0
07/11/2020	10:45:00	00:15:00	60.2	77.9	46.6
07/11/2020	11:00:00	00:15:00	59.7	76.1	46.5
07/11/2020	11:15:00	00:15:00	59.1	75.4	47.1
07/11/2020	11:30:00	00:15:00	60.1	82.7	44.6
07/11/2020	11:45:00	00:15:00	58.8	74.7	46.3
07/11/2020	12:00:00	00:15:00	60.3	76.2	47.8
07/11/2020	12:15:00	00:15:00	58.5	71.6	47.9
07/11/2020	12:30:00	00:15:00	59.7	77.0	47.0
07/11/2020	12:45:00	00:15:00	59.7	77.3	44.8
07/11/2020	13:00:00	00:15:00	58.9	79.8	43.4
07/11/2020	13:15:00	00:15:00	58.9	84.6	44.6
07/11/2020	13:30:00	00:15:00	58.7	73.0	47.3
07/11/2020	13:45:00	00:15:00	61.2	84.8	44.8

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
07/11/2020	14:00:00	00:15:00	58.4	72.2	43.3
07/11/2020	14:15:00	00:15:00	57.3	72.8	42.3
07/11/2020	14:30:00	00:15:00	59.9	80.9	45.7
07/11/2020	14:45:00	00:15:00	57.7	72.7	43.9
07/11/2020	15:00:00	00:15:00	58.8	78.0	46.0
07/11/2020	15:15:00	00:15:00	58.2	76.3	45.1
07/11/2020	15:30:00	00:15:00	57.7	74.8	43.2
07/11/2020	15:45:00	00:15:00	60.0	82.7	43.1
07/11/2020	16:00:00	00:15:00	60.8	82.3	44.8
07/11/2020	16:15:00	00:15:00	57.7	75.6	43.2
07/11/2020	16:30:00	00:15:00	59.0	78.8	44.7
07/11/2020	16:45:00	00:15:00	59.1	81.4	47.0
07/11/2020	17:00:00	00:15:00	58.1	78.3	43.7
07/11/2020	17:15:00	00:15:00	61.1	76.6	47.3
07/11/2020	17:30:00	00:15:00	61.4	81.3	47.3
07/11/2020	17:45:00	00:15:00	60.5	79.1	45.9
07/11/2020	18:00:00	00:15:00	59.6	81.4	47.7
07/11/2020	18:15:00	00:15:00	58.8	81.0	42.8
07/11/2020	18:30:00	00:15:00	63.7	94.7	45.3
07/11/2020	18:45:00	00:15:00	58.4	88.0	41.4
07/11/2020	19:00:00	00:15:00	58.3	78.6	41.6
07/11/2020	19:15:00	00:15:00	57.7	76.3	40.2
07/11/2020	19:30:00	00:15:00	57.2	74.4	40.3
07/11/2020	19:45:00	00:15:00	55.1	77.9	40.1
07/11/2020	20:00:00	00:15:00	56.2	75.2	38.7
07/11/2020	20:15:00	00:15:00	57.7	75.0	39.4
07/11/2020	20:30:00	00:15:00	57.0	79.9	37.7
07/11/2020	20:45:00	00:15:00	53.5	73.1	35.1
07/11/2020	21:00:00	00:15:00	55.5	70.0	33.8
07/11/2020	21:15:00	00:15:00	55.0	71.3	32.5
07/11/2020	21:30:00	00:15:00	53.4	69.8	29.8
07/11/2020	21:45:00	00:15:00	51.8	68.4	29.1
07/11/2020	22:00:00	00:15:00	54.6	76.6	28.8
07/11/2020	22:15:00	00:15:00	50.5	71.5	26.9
07/11/2020	22:30:00	00:15:00	48.6	68.5	25.8
07/11/2020	22:45:00	00:15:00	53.2	72.0	27.8
07/11/2020	23:00:00	00:15:00	50.0	72.2	27.9
07/11/2020	23:15:00	00:15:00	49.8	69.1	27.7
07/11/2020	23:30:00	00:15:00	49.2	73.3	27.0
07/11/2020	23:45:00	00:15:00	49.0	70.7	27.2
08/11/2020	00:00:00	00:15:00	29.2	41.1	27.6
08/11/2020	00:15:00	00:15:00	45.6	70.6	27.1
08/11/2020	00:30:00	00:15:00	48.0	68.4	26.9
08/11/2020	00:45:00	00:15:00	48.9	69.8	26.2
08/11/2020	01:00:00	00:15:00	43.5	67.4	24.4
08/11/2020	01:15:00	00:15:00	41.8	68.3	23.2
08/11/2020	01:30:00	00:15:00	44.3	65.7	24.3
08/11/2020	01:45:00	00:15:00	44.8	71.6	26.0

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
08/11/2020	02:00:00	00:15:00	47.9	68.7	24.9
08/11/2020	02:15:00	00:15:00	39.0	64.0	24.5
08/11/2020	02:30:00	00:15:00	26.6	37.9	25.1
08/11/2020	02:45:00	00:15:00	44.4	70.6	25.5
08/11/2020	03:00:00	00:15:00	47.8	70.4	24.3
08/11/2020	03:15:00	00:15:00	47.5	71.5	25.5
08/11/2020	03:30:00	00:15:00	45.8	67.7	25.3
08/11/2020	03:45:00	00:15:00	43.4	66.9	24.2
08/11/2020	04:00:00	00:15:00	26.2	37.0	24.6
08/11/2020	04:15:00	00:15:00	50.0	74.2	24.8
08/11/2020	04:30:00	00:15:00	40.9	67.7	26.2
08/11/2020	04:45:00	00:15:00	48.4	69.5	27.0
08/11/2020	05:00:00	00:15:00	50.1	70.8	27.4
08/11/2020	05:15:00	00:15:00	53.9	72.4	29.6
08/11/2020	05:30:00	00:15:00	50.9	72.3	26.2
08/11/2020	05:45:00	00:15:00	51.8	71.6	26.3
08/11/2020	06:00:00	00:15:00	54.4	73.8	27.2
08/11/2020	06:15:00	00:15:00	51.8	69.1	27.9
08/11/2020	06:30:00	00:15:00	51.8	72.1	28.0
08/11/2020	06:45:00	00:15:00	51.2	70.1	27.9
08/11/2020	07:00:00	00:15:00	51.0	69.8	28.1
08/11/2020	07:15:00	00:15:00	51.4	70.3	30.2
08/11/2020	07:30:00	00:15:00	52.8	73.8	29.8
08/11/2020	07:45:00	00:15:00	53.7	69.9	30.5
08/11/2020	08:00:00	00:15:00	52.5	68.8	30.1
08/11/2020	08:15:00	00:15:00	53.7	70.1	31.5
08/11/2020	08:30:00	00:15:00	54.5	72.9	29.9
08/11/2020	08:45:00	00:15:00	56.5	70.4	33.4
08/11/2020	09:00:00	00:15:00	60.5	87.6	36.2
08/11/2020	09:15:00	00:15:00	55.5	71.6	33.9
08/11/2020	09:30:00	00:15:00	57.3	73.8	36.4

Condenser Equipment



	<i>L_{eq}</i> [dB]
A	75.6
FRQ	
6.30 Hz	49.2
8 Hz	52
10 Hz	58.6
12.5 Hz	61.3
16 Hz	62.6
20 Hz	64.6
25 Hz	61.6
31.5 Hz	59.2
40 Hz	60.7
50 Hz	72.7
63 Hz	55.6
80 Hz	50.9
100 Hz	56
125 Hz	48.5
160 Hz	51.5
200 Hz	48.4
250 Hz	47.9
315 Hz	54.9
400 Hz	50.1
500 Hz	47.3
630 Hz	47.9
800 Hz	48.6
1 kHz	48.8
1.25 kHz	46.2
1.6 kHz	42.3
2 kHz	39.7
2.5 kHz	39.3
3.15 kHz	37.5
4 kHz	36.5
5 kHz	33.2
6.3 kHz	31.1
8 kHz	29.5
10 kHz	28.6
12.5 kHz	24.3
16 kHz	21.3
20 kHz	18.9

This page has been left blank intentionally

APPENDIX D - GLOSSARY

This page has been left blank intentionally

A-weighted sound pressure, p_A	Value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network. <i>NOTE: The A-weighting network modifies the electrical response of a sound level meter with frequency in approximately the same way as the sensitivity of the human hearing system.</i>
A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure in decibels (dBA).
Acoustic environment	Sound from all sound sources as modified by the environment [BS ISO 12913-1:2013].
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far. <i>NOTE: The ambient sound comprises the residual sound and the specific sound when present.</i>
Ambient sound level, $L_a = L_{Aeq,T}$ (BS4142:2014)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T <i>NOTE: The ambient sound level is a measure of the residual sound and the specific sound when present.</i>
Background sound	Underlying level of sound over a period, T, which might in part be an indication of relative quietness at a given location.
Background sound level, $L_{A90,T}$ (BS4142:2014)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Break-in	Noise transmission into a structure from outside.
Break-out	Noise transmission from inside a structure to the outside.
Cross-talk	Noise transmission between one room and another room or space via a duct or other path.
C_{tr}	Correction term applied against the sound insulation single-number values (R_w , D_w , and $D_{nT,w}$) to provide a weighting against low frequency performance. <i>NOTE: The reference values used within the C_{tr} calculation are based on urban traffic noise.</i>
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T, has the same mean-squared sound pressure as the sound under consideration that varies with time.
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ (BS4142:2014)	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time.
Equivalent sound absorption area of a room, A	Hypothetical area of a totally absorbing surface without diffraction effects, expressed in square metres (m ²), which, if it were the only absorbing element in the room, would give the same reverberation time as the room under consideration
Facade level	Sound pressure level 1 m in front of the façade. <i>NOTE: Facade level measurements of L_{pA} are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the facade.</i>
Free-field level	Sound pressure level away from reflecting surfaces. <i>NOTE: Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source). Estimates of noise from aircraft overhead usually include a correction of 2 dB to allow for reflections from the ground.</i>

Impact sound pressure level, L_i	Average sound pressure level in a specific frequency band in a room below a floor when it is excited by a standard tapping machine or equivalent.
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants. <i>NOTE: The location(s) within the room at which the ambient indoor noise is to be measured or calculated ought to be considered.</i>
Measurement time interval, T_m (BS4142:2014)	Total time over which measurements are taken. <i>NOTE: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.</i>
Noise criteria	Numerical indices used to define design goals in a given space.
Noise rating, NR	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves.
Normalised impact sound pressure level, L_n	Impact sound pressure level normalized for a standard absorption area in the receiving room. <i>NOTE: Normalised impact sound pressure level is usually used to characterize the insulation of a floor in a laboratory against impact sound in a stated frequency band.</i>
Octave band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.
Percentile level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting "F", which is exceeded for $N\%$ of a specified time interval.
Reference time interval, T_r (BS4142:2014)	Specified interval over which the specific sound level is determined. <i>NOTE: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h.</i>
Residual sound (BS4142:2014)	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level, $L_r = L_{Aeq,T}$ (BS4142:2014)	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T .
Rating level, L_{Ar,T_r}	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise. <i>NOTE: This is used in BS 7445 and BS 4142 for rating industrial noise, where the noise is the specific noise from the source under investigation.</i>
Reverberation time, T	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped.
Sound exposure level, LAE	Level of a sound, of 1 s duration, that has the same sound energy as the actual noise event considered.
Sound level difference, D	Difference between the sound pressure level in the source room and the sound pressure level in the receiving room.
Sound pressure, p	Root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound.
Sound pressure level, L_p	Quantity of sound pressure, in decibels (dB).

Sound reduction index, R	Laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.
Specific sound level, $L_s = L_{Aeq,T_r}$ (BS4142:2014)	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .
Specific sound source (BS4142:2014)	Sound source being assessed.
Standardised impact sound pressure level, L_{nT}	Impact sound pressure level normalized to a reverberation time in the receiving room of 0.5 s.
Standardised level difference, D_{nT}	Difference in sound level between a pair of rooms, in a stated frequency band, normalized to a reference reverberation time of 0.5 s for dwellings.
Groundborne noise	Audible noise caused by the vibration of elements of a structure, for which the vibration propagation path from the source is partially or wholly through the ground. <i>NOTE Common sources of ground-borne noise include railways and heavy construction work on adjacent construction sites.</i>
Structure-borne noise	Audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements. <i>NOTE Common sources of structure-borne noise include building services plant, manufacturing machinery and construction or demolition of the structure.</i>
Third octave band	Band of frequencies in which the upper limit of the band is 2% times the frequency of the lower limit.
Weighted level difference, D_w	Single-number quantity that characterizes airborne sound insulation between rooms, but which is not adjusted to reference conditions. <i>NOTE Weighted level difference is used to characterize the insulation between rooms in a building as they are. Values cannot normally be compared with measurements made under other conditions (see BS EN ISO 717-1).</i>
Weighted normalised impact sound pressure level, $L_{n,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or
Weighted standardised impact sound pressure level $L_{nT,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted standardised level difference, $D_{nT,w}$	Single-number quantity that characterizes the airborne sound insulation between rooms.

Symbols

D_w	Weighted level difference (dB)
D_{nT}	Standardized level difference (dB)
$D_{nT,w}$	Weighted standardized level difference (dB)
L_{Amax}	Maximum noise level (dB)
$L_{A,r,T}$	Rating level (dB)
L_n	Normalised impact sound pressure level (dB)
L'_{nT}	Standardised impact sound pressure level (dB)
$L'_{nT,w}$	Weighted standardised impact sound pressure level (dB)
$L'_{n,w}$	Weighted normalised impact sound pressure level (dB)
L_p	Sound pressure level (dB)
L_{pA}	A-weighted sound pressure level (dB)
$L_{AN,T}$	Percentile level (dB)
L_{AE}	Sound exposure level (dB)
$L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level (dB)
p	Sound pressure (Pa)
p_A	A-weighted sound pressure (dB)
$p_{A(t)}$	Instantaneous A-weighted sound pressure (Pa)

R	Sound reduction index (dB)
R_w	Weighted sound reduction index (dB)
T	Time interval (also used for reverberation time) (s)
t_0	Reference time interval (s)

NoiseAir Limited

Specialist acoustic engineers providing a fast, professional, cost-effective service for all types of Acoustic Consultancy services across the UK.

Over 25 years of experience in the field.

Contact us now for a free, no obligation quote or to discuss your requirements.

NOISEAIR LIMITED, THE COUNTING HOUSE, HIGH STREET,
LUTTERWORTH. LE17 4AY

TEL. 0116 272 5908

EMAIL. INFO@NOISEAIRCONSULTANTS.CO.UK

WWW.NOISEAIRCONSULTANTS.CO.UK

