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NOISE IMPACT ASSESSMENT REPORT

PROPOSED CONVERSION OF EXISTING BARN 9 THE GREEN, CROFT, LEICESTERSHIRE, LE9 3EQ

Client: Mr. Michael Potter

REPORT REF: P4563-R1-V1

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1 INTRODUCTION

1.1.1 By instruction from Michael Potter ('the client'), NoiseAir was commissioned to undertake a noise impact assessment (NIA) for a proposed residential development at the location: Barn at 9 The Green, Croft, Leicestershire, LE9 3EQ, herein referred to as the 'development site'.

1.1.2 This noise report has been prepared with respect to a planning application and assesses the results of a noise survey carried out in accordance with current guidance and includes recommendations and mitigation as appropriate.

1.2 Site Description

1.2.1 At present the proposal site is a derelict disused barn no longer in operation.

1.2.2 The development site is located within a semi-rural area with a commercial quarry located approximately 50 m east of the development site.

1.2.3 The development site is located approximately 40 m east of The Green, 230 m east of Station Road and 200 m north of the Narborough to Hinckley local railway line.

1.2.4 Noise from Croft Quarry has been identified as the likely dominant source of noise at the development site.

1.2.5 **Figure** 1 provides an ariel image which identifies the development site with respect to the local area and its context.

Figure 1: Site and Contextual Surroundings

1.3 Development Proposals

1.3.1 It is understood that the client proposes is to convert the derelict, disused brick barn into a residential dwelling across the ground floor and first floor levels.

1.3.2 Proposed site layout plans (as provided by the client) are detailed within **Appendix C.**

2 ASSESSMENT METHODOLOGY AND SCOPE OF WORKS

2.1 Planning Guidance and Noise

2.1.1 This acoustic report has been prepared in support of a proposed 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 impact 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 NPPF[1].

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

2.2.1 It is considered that a detailed NIA is required to assess the likely impacts of environmental noise emissions (specifically noise breakout from commercial activity at the nearby Croft Quarry) upon the proposed development site.

2.2.2 The NIA presented within this report is based on site specific data collected at the development site and assesses the likely impacts with respect to future occupants of the proposal.

2.2.3 It is understood that Croft Quarry have recently made a planning application for the proposed lateral extension to the mineral extraction area, and as such it is reasoned that the NIA should allow for potential future expansion of general commercial activity. This could lead to potential development proposals upon land under the quarries current ownership, and is believed to extend into the green area located directly south of the proposed development.

2.2.4 The scope of the assessment includes consideration of noise at sensitive areas of the proposed development, i.e., proposed residential areas / bedrooms, specifically in terms of the potential impact of local noise sources.

2.3 Assessment Criteria

2.3.1 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 future occupants are unlikely to be exposed to noise levels which might breach the LOEL criteria.

2.3.2 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.

2.3.3 As the NIA is to consider the potential effect of noise from existing environmental noise sources specifically from neighbouring commercial noise (Croft Quarry inclusive of future expansion), it is considered that the NIA should be undertaken in accordance with Pro-PG Planning and Noise as well as BS4142:2014+A1:2019 "Methods for rating and assessing industrial and commercial sound", a summary of which is provided below.

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

2.3.4 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.

2.3.5 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.

2.3.6 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.

2.3.7 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.

2.3.8 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}

2.3.9 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.

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

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

2.3.12 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+A1:2019 – Methods for Rating and Assessing Industrial and Commercial Sound (BS414:2014)

2.3.13 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).

2.3.14 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.

2.3.15 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).

2.3.16 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.

2.3.17 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.*

2.3.18 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;

2.3.19 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;

2.3.20 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.

2.3.21 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;

2.3.22 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).

2.3.23 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;

2.3.24 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.

2.3.25 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.*

2.3.26 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 As part of this assessment, NoiseAir has carried out a series of primarily unattended noise measurements to establish the existing sound levels at the proposed development site.

2.4.2 The primary noise source to be assessed has been identified as:

- Commercial noise from the nearby croft quarry inclusive of potential future expansion.

2.4.3 The above noise source has been assessed in relation to the below identified receptors:

- Future occupants of the proposed conversion of the existing barn into a residential development.

2.4.4 It is noted that the noise monitoring undertaken as part of this NIA was undertaken during the global Covid-19 pandemic, and therefore general residual noise levels, are likely to be at a lower level that considered typical due to local traffic restrictions. Given 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.

This 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.

3 ACOUSTIC SURVEY

3.1 Acoustic Survey Details

3.1.1 NoiseAir carried out a programme of fixed position un-attended noise monitoring at the development site across the dates 8th January 2021 to the 12th January 2021.

3.1.2 Monitoring included respective daytime (07:00-23:00) and night-time (23:00-07:00) periods.

3.1.3 The monitoring location (ML1) is detailed within **Figure 2** and **Table 3** below.

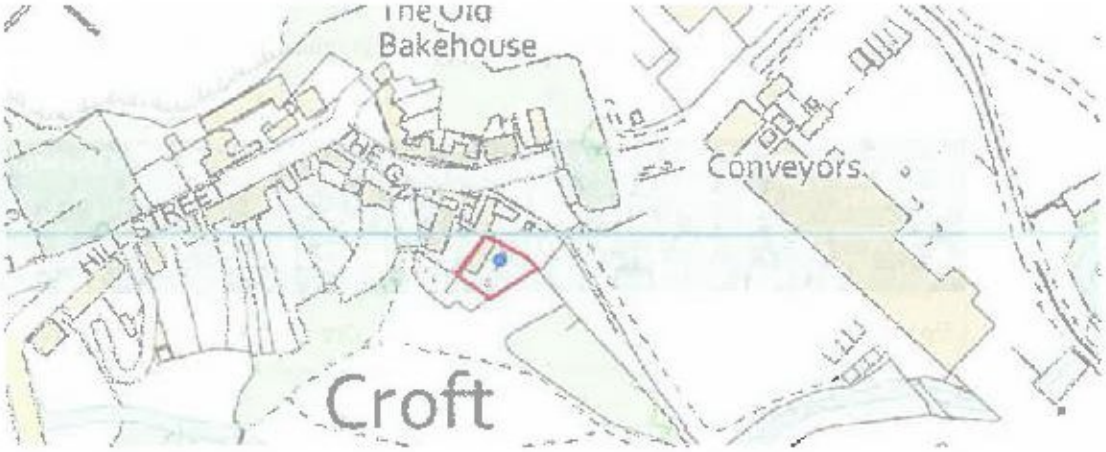


Figure 2: Site layout plan and noise monitoring locations.

Site Location **ML1**

Table 3: Summary of Noise Monitoring Locations

Monitoring Location Ref:	Location Description	Time Period Monitored		Attended or Unattended Monitoring
		Start	End	
ML1	Fixed on tripod approximately 1.5 m from the ground.	12:00 08/01/21	10:00 12/01/21	Un-attended

3.1.4 The monitor location (ML1) was positioned to be representative of the noise levels at the approximate location of the development site and so data from this location will be used for the calibration of the 3D sound model.

3.1.5 The microphone at ML1 was mounted on a tripod in the grounds of the development site at approx. 1.5 m from the ground.

3.1.6 The acoustic equipment was calibrated to comply with Section 4.2 of BS7445-1:2003[2] before and after the noise monitoring periods.

3.1.7 Details of the SLM 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)	08/01/21 -26.2 dB	12/01/21 -26.0 dB	0.2 dB

3.1.8 The weather conditions were noted during setup and collection of the monitoring equipment is outlined in **Table 5** below:

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

	10th November 2020	12th November 2020
Roads (Wet / Dry)	Dry	Dry
Temperature (°C)	2	9
Wind direction and speed (ms^{-1})	< 0.5	< 0.5
Cloud Cover (Approx. %)	100	100
Humidity (%)	98	94

3.1.9 The weather conditions remained approximately consistent over the duration of the noise survey with typical temperature fluctuations over night and daytime hours.

3.1.10 A-weighted[3] L_{eq}[4] and L_{AMax}[5] noise levels were measured to comply with the requirements of Pro-PG, WHO and BS8233. A-weighted L_{90}[6] were also measured to provide additional information. The measured noise levels are set out in full in **Appendix B.**

[2] BS7445-2003 "Description and measurement of environmental noise – Part 1: Guide to quantities and procedures.
[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 instantaneous maximum noise level recorded for a measurement period.
[6] The noise level which is exceeded for 90% of the measurement period.

3.1.11 Conducting attended monitoring provided opportunity for observations and detailed notes to be made of the significant noise sources which contribute to each of the measured levels. Noise sources were considered consistently across all survey monitoring periods.

ML1

Primary Noise: Vehicle and plant movements within the quarry.

Secondary noise: Rail vehicle movements operating on the local railway line to the south of the site.

3.2 Measured Sound Levels

3.2.1 The results for the monitoring location during the daytime and night-time periods are presented in **Table 6.**

Table 6: Average Measured Daytime and Night-time Noise Levels

Monitoring Location	Time	Measured Noise Level	
		dB $L_{Aeq,16hour}$ / dB $L_{Aeq,8hr}$	dB $L_{A90,1hour}$ / dB $L_{A90,15mins}$
ML1	07:00-23:00	44.0 – 49.0	27.4 – 48.8
	23:00-07:00	37.6 – 45.4	25.3 – 41.3

3.2.2 The maximum noise level recorded during the night-time period, is summarised in **Table 7.**

Table 7:Maximum Night-time Noise Level Recorded During the Night-Time Period (Figures in dB L_{Amax}).

Monitoring Location	Measured Maximum Noise Level During the Night-Time Period (dB)
ML1	60

3.2.3 Data is shown in **Figure 3** and details a level vs. time graph of the recorded L_{Amax}, L_{Aeq} and L_{A90} sound level over 15-minute time periods for ML1. It should be noted that the data presented displays noise levels monitored and recorded across each respective survey period and is presented to represent a continuous time period.

3.2.4 A Histogram displaying the distribution of existing $L_{Aeq,1hour}$ sound levels during daytime hours and $L_{Aeq,15min}$ sound levels during night-time hours at location ML1 are presented in **Figure 4** and **Figure 5** respectively.

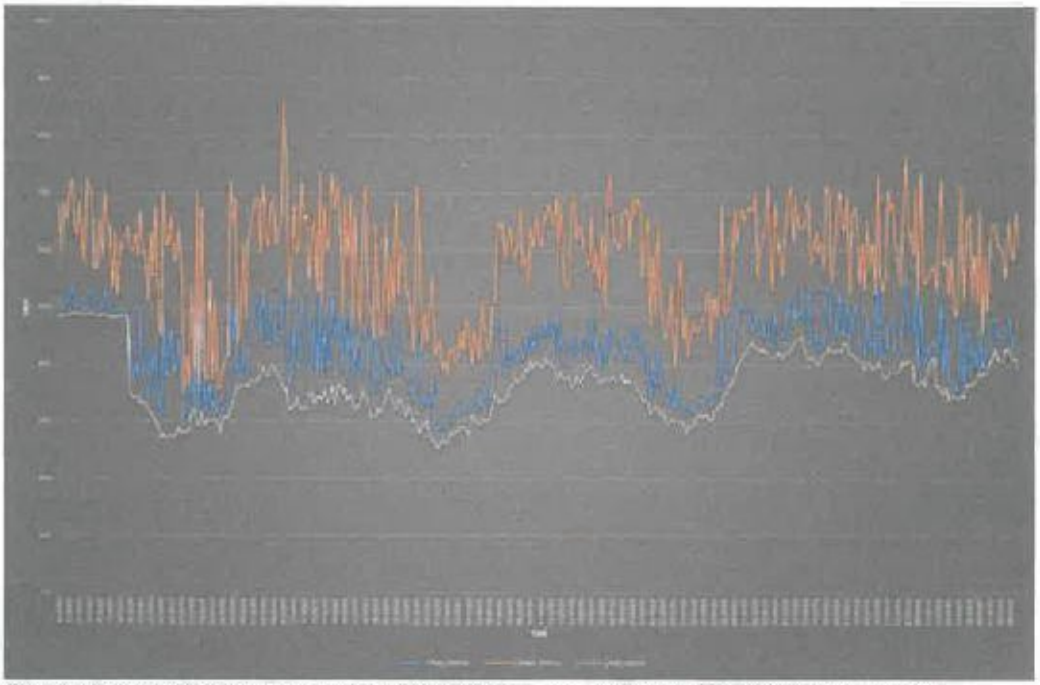


Figure 3: Level vs. time graph showing $L_{Amax,}$ L_{Aeq} and L_{A90} sound levels – ML1.

3.2.5 A histogram showing the distribution of existing $L_{Aeq,1hour}$ sound levels during daytime hours at location ML1 are presented in **Figure 4.**

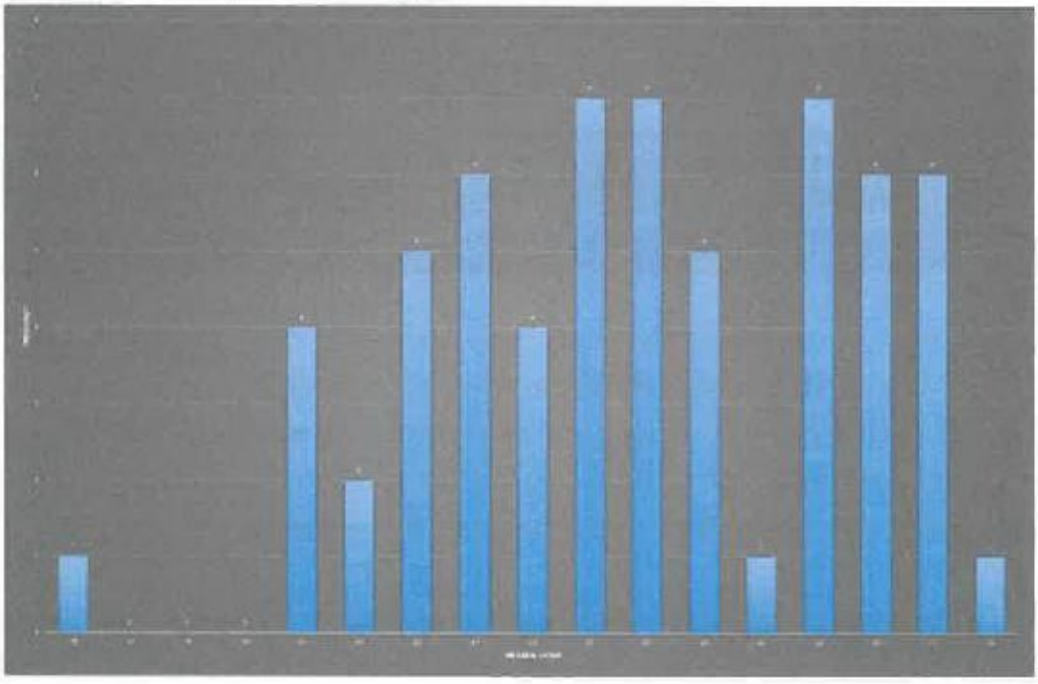


Figure 4: Histogram showing frequency distribution of $L_{Aeq,1hour}$ noise readings at ML1 – Daytime (07:00 – 23:00).

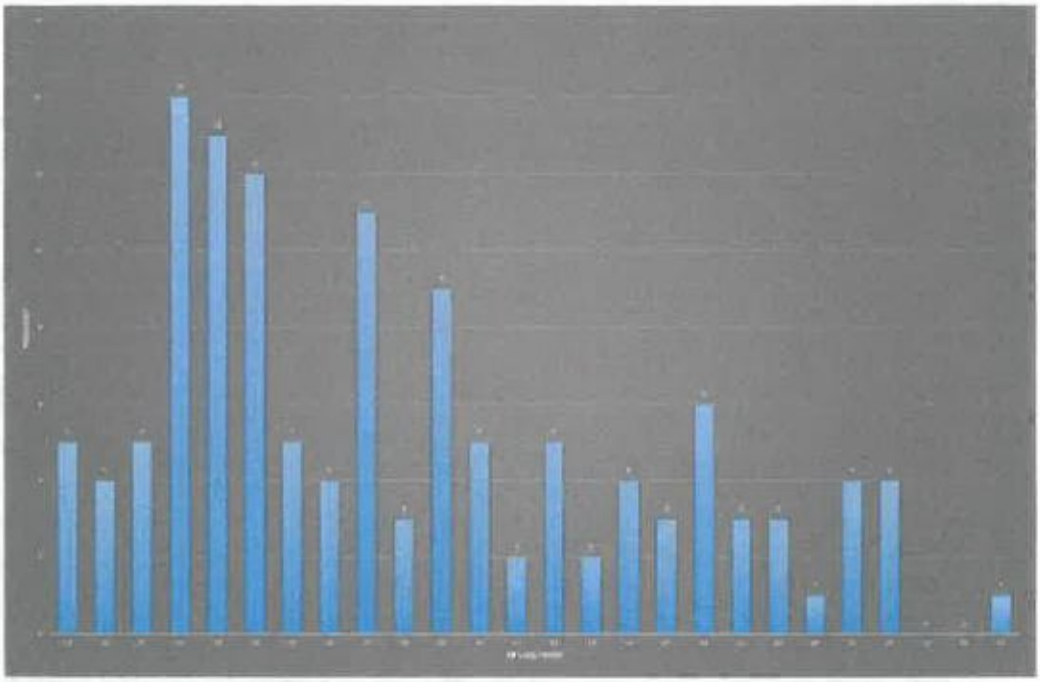


Figure 5: Histogram showing frequency distribution of $L_{A90,15min}$ noise readings at ML1 – Night-time (23:00 – 07:00).

3.3 Background Sound Levels

3.3.1 A histogram showing the distribution of existing $L_{A90,1hour}$ sound levels for cumulative daytime and $L_{A90,5min}$ for cumulative night-time periods at location ML1 are presented in **Figure 6** and **Figure 7** respectively.

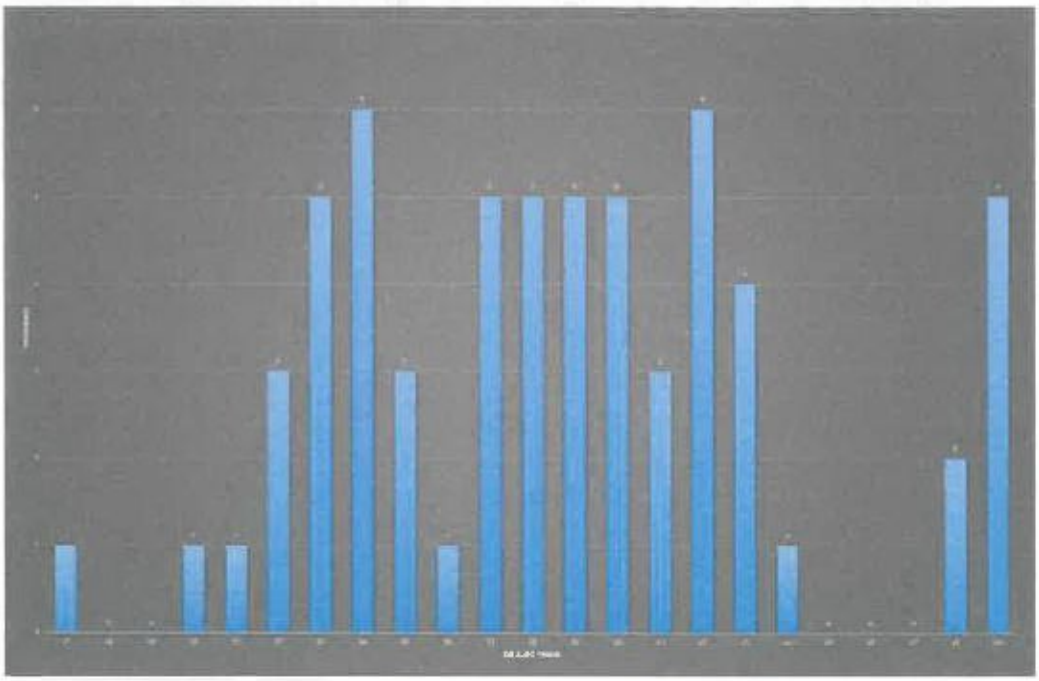


Figure 6: Histogram showing frequency distribution of $L_{A90,1hour}$ noise readings at ML1 – Daytime (07:00 – 23:00).

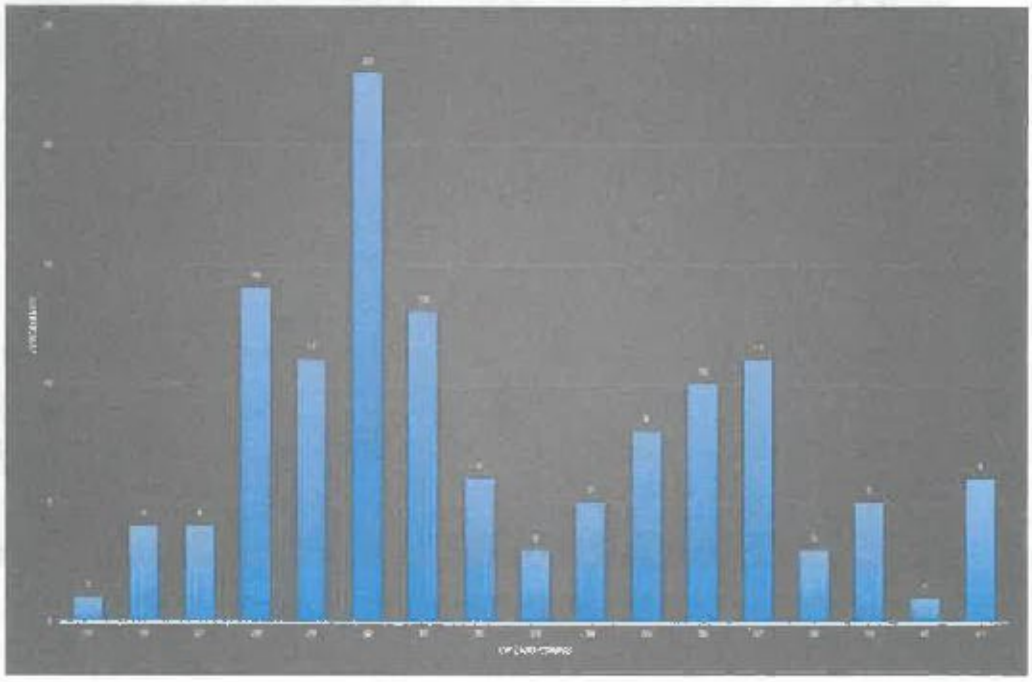


Figure 7: Histogram showing frequency distribution of $L_{A90,15min}$ noise readings at ML1 – Daytime (23:00 – 07:00).

3.3.2 **Figure 8** presents a histogram showing the distribution of existing $L_{A90,1hour}$ sound levels for cumulative daytime periods at ML1 which are believed to be outside hours of operation (understood to be 08:00 – 17:00, as advised by the client) at Croft Quarry which could have otherwise influenced results.

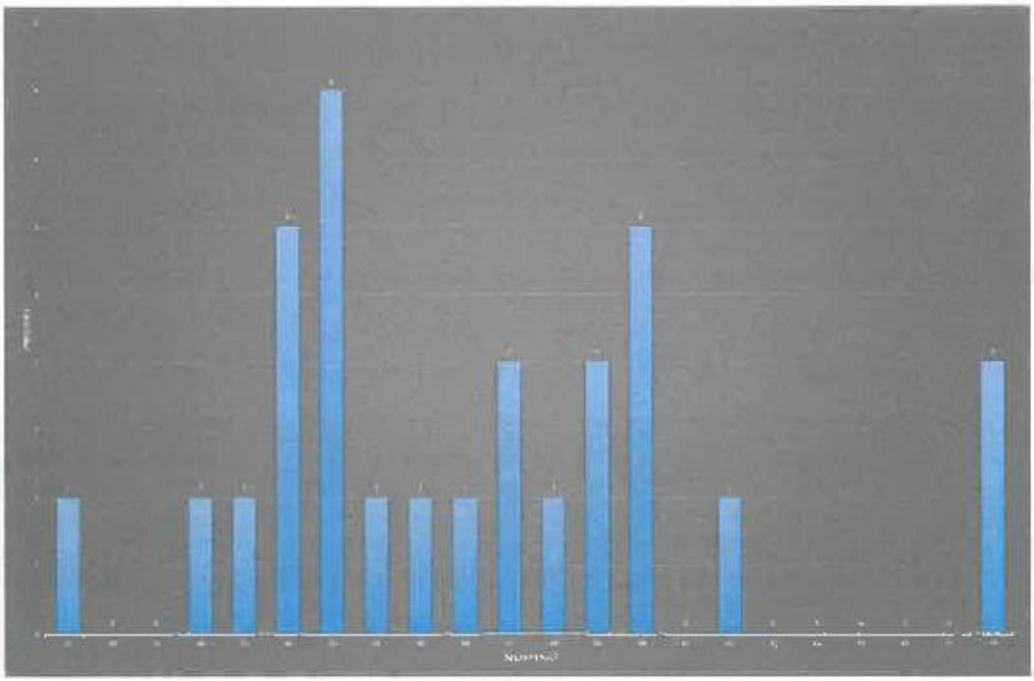


Figure 8: Histogram showing frequency distribution of $L_{A90,1hour}$ noise readings at ML1.

3.3.3 As such, a background sound level of 33 dB L_{A90} has been selected for subsequent BS4142 calculations, being the most typically occurring value presented within **Figure 8.**

4 SITE NOISE RISK ASSESSMENT

4.1.1 In accordance with Pro-PG 2017, a Site Noise Risk Assessment (SNRA) has been carried out. The SNRA assesses the initial risk of noise to have an adverse impact on a proposed development based on the overall measured levels with no mitigation in place.

4.1.2 The results of noise measurements carried out during the daytime and night-time periods are presented in **Table 8**, and have been compared to the information provided on Figure 1 of Pro-PG 2017.

Table 8: Stage 1 Risk Assessment of Noise Levels

Monitoring Location	Residential Property Location	Daytime Noise Level (Figures in dB L_{Aeq})	Risk of Adverse Effect	Night-time Noise Level (Figures in dB L_{Aeq})	Risk of Adverse Effect
ML1	Proposed development at 9 The Green	49	Low	45	Low

4.1.3 **Table 8** indicates that during the daytime and night-time periods, proposed receptors of the development are at a **'Low'** risk of adverse effect.

4.1.4 ProPG states that:

'At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.'

4.1.5 The Site Noise Risk Assessment shows that local noise mitigation and good acoustic design will be required to ensure that the potential risk of the noise impact is minimised, and guideline internal and external noise levels are achieved.

4.1.6 In accordance with Pro-PG 2017, a Stage 2 full noise assessment, which includes an acoustic design statement, is required to ensure future residents are protected and good acoustic design has been implemented.

5 NOISE IMPACT ASSESSMENT

5.1.1 The results of the Pro-PG Stage 1: Initial Site Noise Risk Assessment shows that receptors at the proposed development are likely to be at **'Low'** risk of experiencing an adverse noise impact, with no mitigation in place. Therefore, an assessment against the criteria in WHO / BS8233 has been undertaken with reference to the general sound levels at the site.

5.1.2 This section forms the Stage 2 Acoustic Design Statement of Pro-PG:2017.

5.2 3D Sound Model

5.2.1 A 3D sound model has been constructed in SoundPLAN™ to calculate the predicted sound pressure levels at selected potential receiver facades. The model uses the calculation method from ISO 9613-2:1996[7] 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 and calibrated against data collected during the survey presented in Section 3.2 of this report.

5.2.2 The 3D noise model specifically includes the following noise sources:

- **Traffic noise from the local road network** – Station Road, Huncote Road, Hill Street, Dovecote Road and The Green,
- **Breakout noise from commercial activity at the nearby Croft Quarry** – Specifically Croft Quarry, western boundary of which is located 50 m to the east of the boundary of the development site.

5.2.3 **Table 9** details the noise sources and calibration details adopted within the 3D sound model.

Table 9: Noise Source and Calibration Details – 3D Sound Model

Noise Source	Source Type	Calibration Description
Traffic Noise	Line source	The equivalent sound pressure level has been calculated following the sound pressure level formula (Equation 1), based on vehicle counts data from the department of transport website. $L_{Aeq,T} = L_{AE} + 10\log_{10}N - 10\log_{10}T$ (Equation 1) The data used for calibration of noise emissions was extracted from the manual vehicle count road traffic statistics (Count Point 940370), taken on 10/10/2008 over a period of 12 hours, available at the Department of Transport website. The data adopted for calculation was for Peers Way which is considered the closest count point that best represents road network conditions similar to the development site.

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

Table 9: Noise Source and Calibration Details – 3D Sound Model		
Noise Source	**Source Type**	**Calibration Description**
		Data obtained during the data count was across a 12-hour daytime period. **To calculate the** L_{Aeq} **used within calibration of the 3D sound model, the** L_{AE} **has been calculated based on noise data typical of a large car and is sourced from noise levels previously recorded by NoiseAir at a distance 1 m from the roadside. In Equation 1, N corresponds to the number of vehicles per time unit (T in seconds).** **Calibration of the 3D sound model for daytime noise exposure is based on 534 vehicles with a** L_{AE} **of 84.8 dB, resulting in a representative** L_{Aeq} **of 85.7 dB.** **Calibration of the 3D sound model for night-time noise exposure is based on 46 vehicles with a** L_{AE} **of 84.8 dB, resulting in a representative** L_{Aeq} **of 56.8 dB. The number of vehicles was derived by subtracting the number of Raw Data Counts recorded throughout the day on record, from the 'Average Annual Daily Flow' data provided on record as 8277 vehicles.** **Night-time Maximum noise levels have been calibrated to a sound pressure level of 85.7 dB.** **Spectral frequency content (previously recorded and used within calibration) is provided within Table 10**
Breakout Noise from Existing Neighbouring Commercial Activity (Crofts Quarry)	Area Source	**Calibrated to the highest** $L_{Aeq,1hr}$ **reference period obtained onsite at a sound pressure level (measured at ML1) of 51.6 dB.**
Breakout noise due to potential Future expansion of Neighbouring Commercial Activity (Crofts Quarry)	Area Source	**The assumed expansion area (identified directly to the south of the proposed development) is considered likely to operate in the same way as the existing area, should this be developed and is therefore calibrated to the highest** $L_{Aeq,1hour}$ **reference period obtained onsite at a sound pressure level (measured at ML1) of 51.6 dB.** **+ 3 dB has been applied to the existing area to represent intensified operations and is considered a conservative method of assessment.**

5.2.4 Spectral frequency content adopted for calibration of the local road network within the 3D sound model is detailed within **Table 10.**

Table 10: Spectral Frequency Content Adopted for 3D Sound Model – Local Road Network						
6.3 Hz	**8 Hz**	**10 Hz**	**12.5 Hz**	**16 Hz**	**20 Hz**	**25 Hz**
57.0	46.6	47.8	50.1	53.8	54.5	51.5
31 Hz	**40 Hz**	**50 Hz**	**63 Hz**	**80 Hz**	**100 Hz**	**125 Hz**
55.6	54.6	58.5	65.5	58.1	60.2	58.0

Table 10: Spectral Frequency Content Adopted for 3D Sound Model – Local Road Network						
6.3 Hz	8 Hz	10 Hz	12.5 Hz	16 Hz	20 Hz	25 Hz
160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz
57.1	60.2	61.0	60.5	60.1	60.8	64.1
800 Hz	1 KHz	1.25 KHz	1.6 KHz	2 KHz	2.5 KHz	3.15 KHz
66.3	67.5	65.3	62.9	59.6	54.4	49.8
4 KHz	5 KHz	6.3 KHz	8 KHz	10 KHz	12.5 KHz	16 KHz
45.9	42.7	39.1	36.9	34.0	30.2	27.0
20 KHz						
22.7						

5.2.5 Calculated noise levels within the 3D sound model based upon several scenarios.

5.2.6 Scenarios considered within the assessment are:

- BS8233:2014 assessment - Scenario 1 (Existing Conditions);
- BS8233:2014 assessment – Scenario 2 (Including Potential Future Expansion of the Neighbouring Quarry);
- BS4142:2014 assessment of Commercial Activity – Scenario 1 (Existing Conditions);and,
- BS4142:2014 assessment of Commercial Activity – Scenario 2 (Including Potential Future Expansion of the Neighbouring Quarry).

5.2.7 Noise contour plots illustrating the propagation of sound from source to receptor, as well as receptor locations for all scenarios are presented within **Appendix** E.

5.2.8 Based on the 3D sound model for BS8233:2014 assessment (scenario 1 and 2), **Table 11** below details the worst case predicted noise levels across all floors at each façade during respective daytime and night-time periods.

Table 11: Worst-Case Predicted Noise Levels Across All Floors at Each Façade.					
Receiver #	Facade	dB $L_{Aeq,16hour}$ Daytime	Scenario - Potential Expansion of Croft Quarry	dB $L_{Aeq,8hr}$ Night-Time	dB $L_{Amax,\ Night}$
1	SE	50.1	57.4	29.4	57.3
2	NW	47.6	52.0	38.6	58.5
3	External Amenity	52.7	60.1	-	-

5.3 WHO Assessment of Daytime Noise Levels in Outdoor Living Areas

5.3.1 Analyses of the 3D sound model, specifically the receiver locations placed within external amenity areas (calculated at 52.7dB A), indicate that exceedances of the lower WHO

guidance value of 50 dB L_{Aeq} for people being moderately annoyed are likely to occur in current conditions; however, are likely to remain below the upper WHO guidance value of 55 dB L_{Aeq} for people being seriously annoyed.

5.3.2 It is noted that potential future expansion, (based on the reasoning within this report) may result in raised noise levels within external amenity spaces to around 60 dB A and would exceed the upper WHO guidance value of 55 dB L_{Aeq}.

5.4 WHO and BS8233 Assessment of Daytime Noise Levels in Living Rooms and Bedrooms

5.4.1 The predicted noise levels at the façades of the proposed building structure as detailed in **Table 11** for the daytime period, together with the level of attenuation required to achieve 35 dB L_{Aeq} in the living room and bedroom areas in accordance with BS8233 (2014) and WHO (1999) are presented in **Table 12** below.

Table 12: Level of Attenuation Required to Achieve the Internal Daytime Noise Guideline Levels (Figures in dB(A))

Façade	Worst Case Noise Level at the Façade of the Property	Scenario - Potential Expansion of Croft Quarry	Worst Case Level of Attenuation Needed to Achieve 35 dB L_{Aeq} in Living Room and Bedroom Areas	Scenario - Potential Expansion of Croft Quarry
SE	50	57	15	22
NW	48	52	13	17

5.5 Assessment of Night-time Noise Levels in Bedrooms

5.5.1 The noise levels calculated from the 3D sound model at the façades of the proposed building structures, as detailed within **Table 11** for the night-time period, together with the level of attenuation required to achieve 30 dB L_{Aeq} and 45 dB $L_{Amax,F}$ in the bedrooms, are summarised in **Table 13.**

Table 13: Level of Attenuation Required to Achieve the Internal Night-time Noise Guideline Levels (Figures in dB(A))			
Façade	Worst Case Noise Level at the Façade of the Property (dB L_{Aeq})	Maximum Noise Level at the Façade of the Property (dB $L_{Amax,F}$)	Worst Case Level of Attenuation Needed to Achieve the Noise Guideline Levels in Bedrooms (dB)
SE	29	57	12
NW	39	59	14

5.6 BS4142:2014 Assessment

5.6.1 Based on the sound levels reasoned within **Table 9** and the calculated results of a 3D sound model (displayed within **Appendix E**) a BS4142:2014 has been undertaken with regard to commercial noise breakout from the nearby Croft Quarry (scenarios 1 and 2 Respectively).

Background Sound Level

5.6.2 It is understood that the quarry assessed as part of this NIA operates within daytime hours and as such, a background sound level of 33 dB L_{A90} (as reasoned within **Section 3.3.3**) has been adopted for BS4142:2014 assessment.

Character Corrections

5.6.3 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 commercial activity and existing will likely produce modest tones which may be just perceptible at receptor locations. As such a + 2 dB character correction for tonality has been applied for the BS4142:2014 assessment.

Impulsivity – Blasting at the site is understood to be an organised event at the site communicated in advance to local residents and as such it is not considered to be a typical characteristic of the commercial activity noise source for assessment as part of this BS4142 assessment. It is therefore reasoned that no character correction has been applied for impulsivity.

Intermittency – It is considered that noise generated from commercial activity will likely exhibit intermittent characteristics. Subsequently, a + 3 dB character correction has been applied for BS4142:2014 assessment.

BS4142-2014 Assessment

5.6.4 The BS4142:2014 assessment (based on the worst-case calculated noise levels across all floors) of commercial noise emissions upon the proposed residential development is provided within **Table 14**.

Table 14: BS4142:2014 Assessment of Commercial Noise Emissions Upon the Proposed Residential Development.

Receiver and Facade	Scenario	Typical background sound level, dB L_{A90}	Specific sound level, dB L_{Aeq}	Character corrections, dB	Rating Level, dB	Excess rating level over background sound level, dB
1 SE	Current (1)	33	49.8	+5	**55**	+22
	Potential Future Expansion (2)	33	57.3	+5	**62**	+29
2 NW	Current (1)	33	31.5	+5	**37**	+4
	Potential Future Expansion (2)	33	50.1	+5	**55**	+22
External	Current (1)	33	51.1	+5	**56**	+23
	Potential Future Expansion (2)	33	59.9	+5	**65**	+32

5.7 Assessment Outcome

5.7.1 The results of the BS4142:2014 assessment indicate that a worst-case rating level of **Significantly Adverse impact** (calculated at +22 dB above background noise levels) on occasion at the proposed development, under current conditions.

5.7.2 It is reasoned that potential future expansion may see a rise in environmental noise levels due to increased commercial activity at the neighbouring quarry and is likely to result in significantly adverse impact (calculated at around +32 dB above background noise levels).

5.8 Context

5.8.1 It should be noted that the assessment methods adopted within this report, particularly the inclusion of worst-case dB $L_{Aeq,1hr}$ and noise levels from the nearby road network and potential future expansion are very conservative.

5.8.2 As the existing noise climate surrounding the proposed development is considered low (as indicated by daytime $L_{A90,1hr}$ measurements of 33 dB) commercial activity from the neighbouring Quarry (measured as 51.6 dB $L_{Aeq,1hr}$ at the proposed development) will be audible above background on occasion, however commercial noise levels obtained at the measuring location are not considered high and are comparable to noise levels from sources such as light traffic.

5.8.3 The calculated noise levels presented within **Table 11** (inclusive of commercial activity under current conditions) demonstrate that the internal noise criteria recommended by 'WHO' and detailed within BS8233:2014 for habitable rooms can be achieved when assuming a -15 dB reduction via partially open windows. It is, however, a consideration that characteristics of the noise (as included within BS4142:2014 assessment) which make the sound more distinguishable, may increase perceived annoyance and therefore require a scheme of sound insulation which allows for windows to remain closed whilst maintaining adequate ventilation, should it be desired by the occupant and is easily achievable at proposed development.

5.8.4 The sound insulation scheme presented within **Section 6** has been enhanced to accommodate a significant increase to the environmental noise floor based on potential increase in commercial activity surrounding the proposed development. The reason for the enhanced scheme is for safeguarding the amenity of future occupants of the proposed development and ensuring that internal noise criteria for habitable rooms satisfies Pro-PG guidelines, not only now but also in the future.

5.8.5 An important contextual consideration highlighted within this assessment is that the noise climate predicted at the proposed development will be highly like the existing residential properties who neighbour the quarry. As such, the decision of whether the proposal should be permitted or declined on noise grounds can be supported by archived planning applications and supporting document such as the noise survey conducted within 2016 (Ref: DRUK/ACC/RS/SCULDRCL/2557.1) available via the online planning portal, as well as any know noise complaints.

Uncertainty

5.8.6 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.

5.8.7 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

5.8.8 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.

5.8.9 As the noise survey has been undertaken during the global Covid-19 pandemic, in order to apply a conservative approach to noise levels the $L_{Aeq,1hour}$ and $L_{Aeq,15minute}$ noise levels have been adopted for the 3D sound model for the daytime and night-time conditions respectively. The worst-case level in each scenario has be adopted as the calibration level.

5.8.10 It is therefore considered that in this instance the uncertainty of the calculations may have minimal influence on the outcome of the assessment.

6 SOUND INSULATION SCHEME

6.1 Daytime Noise Levels in Outdoor Living Areas

6.1.1 The predicted noise levels, as detailed within **Section 5.3.1** of this report, indicate that resultant noise levels within proposed amenity of 52.7 dB will likely exceed the lower WHO guidance value of 50 dB L_{Aeq} for people being moderately annoyed; however, are likely to remain below the upper WHO guidance value of 55 dB L_{Aeq} for people being seriously annoyed.

6.1.2 It is noted that potential future expansion, (based on the reasoning within this report) may result in raised noise levels within external amenity spaces to around 60 dB A and would exceed the upper WHO guidance value of 55 dB L_{Aeq}.

6.2 Building Envelope Requirements – Windows Closed

6.2.1 Proposals for the development site outline residential use for all floors and therefore, internal noise levels are required to not exceed 35 dB L_{Aeq} during the daytime hours in all rooms and 30 dB L_{Aeq} and 45 dB L_{Amax} during the night-time hours in bedrooms.

6.2.2 When assessing sound levels in habitable areas of the proposed development, the sound attenuation provided by the overall building facade should be considered. To mitigate sound levels, the composition of the building facade can be designed to provide the level of attenuation required. Glazing is generally the building element which attenuates noise the least, so the proportion of glazing in a building facade is an important consideration when assessing overall sound attenuation. Additionally, any façade penetrations should also be considered such as for ventilation i.e. trickle ventilation.

6.2.3 Based on the design details forwarded, worst case façade attenuation calculations have been undertaken in accordance with BS EN ISO 12354-3:2000. Full details of the calculations undertaken are presented in **Appendix D.**

6.2.4 Calculations show that to achieve a reasonable internal acoustic environment in habitable rooms as specified within BS8233, the Building envelope constructions should be selected to meet the sound reduction index (SRI) values presented in **Table 15** and **Table 16.**

6.2.5 A summary of sound insulation requirements to meet internal noise criterion is detailed in **Table 15, Table 16.**

Table 15: Summary of Building Envelope Performance Requirements to – Living Rooms.		
Walls	50 R_w+C_{tr}	Typical Example: Concrete / Brick exterior wall with min. 100 mm insulated (60 kg / m3 rockwool) cavity constructed with timber studwork and resilient bars with min. 10 mm plasterboard lining.
Glazing	36 R_w+C_{tr}	Example: 10 mm Optiphon – 16 mm Argon – 8.8 mm Optiphon or similar. Specialist advise should be sought for final design.
Passive Vent – Wall or Window	36 $D_{ne,w}+C_{tr}$	Example: TA5223 (V50) + TA5005 (SF 418) 2500EA (based on 1 unit per room). Specialist advise should be sought.
Option 2.		
Walls	50 R_w+C_{tr}	Typical Example: Concrete / Brick exterior wall with min. 100 mm insulated (60 kg / m3 rockwool) cavity constructed with timber studwork and resilient bars with min. 10 mm plasterboard lining.
Glazing	36 R_w+C_{tr}	Example: 10 mm Optiphon – 16 mm Argon – 8.8 mm Optiphon or similar. Specialist advise should be sought for final design.
Mechanical Ventilation	N/A	Mechanical ventilation outlets to habitable rooms, measured at approx. seating / bed location, not to exceed noise criterion NR25.

Table 16: Summary of Building Envelope Performance Requirements – Bedrooms		
Walls	50 R_w+C_{tr}	Typical Example: Concrete / Brick exterior wall with min. 100 mm insulated (60 kg / m3 rockwool) cavity constructed with timber studwork and resilient bars with min. 10 mm plasterboard lining.
Glazing	30 R_w+C_{tr}	Example: 6 mm Optiphon – 16 mm Argon – 6.8 mm Optiphon or similar. Specialist advise should be sought.
Passive Vent – Wall or Window	30 $D_{ne,w}+C_{tr}$	Example: TA5220 (SF Xtra Vent) + TA5005 (SF 418) 2500EA (based on 1 unit per room). Specialist advise should be sought.
Option 2.		
Walls	50 R_w+C_{tr}	Typical Example: Concrete / Brick exterior wall with min. 100 mm insulated (60 kg / m3 rockwool) cavity constructed with timber studwork and resilient bars with min. 10 mm plasterboard lining.

Glazing	30 R_w+C_{tr}	Example: 6 mm Optiphon – 16 mm Argon – 6.8 mm Optiphon or similar. Specialist advise should be sought
Mechanical Ventilation	N/A	Mechanical ventilation outlets to habitable rooms, measured at approx. seating / bed location, not to exceed noise criterion NR25.

6.3 Building Envelope Performance – Windows Open

6.3.1 The sound performance requirements at the development site within habitable rooms with windows closed are summarised in Section 6.2.

6.3.2 With partially open windows, the attenuation provided by the façade will be approximately 10-15 dB(A).

6.3.3 Based on the noise levels presented within **Table 11**, **Table 17** and **Table 18** detail whether internal noise levels can be achieve when relying on open windows at the worst-case floor at all facades of the proposed development when allowing for up to 15 dB(A) attenuation across a partially open window. Consideration is given to current conditions and potential future expansion.

Table 17: Summary of exceedances where rooms are or are not likely to achieve acceptable internal noise levels with windows partially open providing min 15 dB attenuation – Current Conditions.

Façade	Room Type	Day / Night	Yes / No	Excess (dB)
SE	Living Room	Day	Yes	0
	Bedroom	Night	Yes	-3
NW	Living Room	Day	Yes	-2
	Bedroom	Night	Yes	-1

Table 18: Summary of exceedances where rooms are or are not likely to achieve acceptable internal noise levels with windows partially open providing min 15 dB attenuation – Expansion of Quarry.

Façade	Room Type	Day / Night	Yes / No	Excess (dB)
SE	Living Room	Day	No	+7
	Bedroom	Night	Yes	-3
NW	Living Room	Day	No	+2
	Bedroom	Night	Yes	-1

6.3.4 It is considered that in many circumstances, such as urban / sub-urban developments, an exceedance of up to 5 dB(A) in accordance with BS8233:2014 is likely to be acceptable to future residents and therefore is unlikely to breach the LOEL criteria discussed in Section 2 of this report.

6.3.5 Where exceedances are likely to be greater than +5 dB, on occasions this may be acceptable to a resident, but when quiet conditions are required, the resident should be able to close the windows whilst maintaining adequate ventilation. Some form of acoustic ventilation would therefore need to be installed in the apartments located at the site, ventilation is to be designed by others.

6.4 Acoustic Ventilation Requirements

6.4.1 It is recommended that the acoustic ventilation proposed at the site should, as a minimum, comply with Building Regulations 2000 Approved Document F1 Means of Ventilation and British Standard BS5925 1991: "Code of Practice for Ventilation Principles and Designing for

Natural Ventilation". Acoustic ventilation is only recommended for noise sensitive rooms, which are bedrooms and living/dining rooms.

6.4.2 Where a passive ventilation system is incorporated into the design, ventilators should be acoustically treated for habitable rooms to relevant facades. Ventilation openings to these rooms should match or exceed the minimum values set out in the **Table 15** and **Table 16.**

6.4.3 The implementation of the recommended glazing together with appropriate acoustic ventilation would ensure that the required internal daytime and night-time noise limits are achieved.

6.4.4 It should be further noted that the glazing and ventilation configurations within this report are for guidance only. Similar products to those used in NoiseAir calculations may achieve a similar level of sound reduction however this should be verified by the manufacturer.

6.4.5 Basic acoustic requirements for any passive ventilation which may be installed are outlined in Section 6.2 however it should be noted that ventilation requirements for future occupants of the proposed development are outside the scope of this report.

6.4.6 Any mechanical ventilation adopted for the noise sensitive rooms should have a noise output which complies with NR25 leq noise rating curve.

6.4.7 Additionally, any external plant equipment required as part of a proposed mechanical ventilation system should be designed to have an operational level no greater than the night-time Background sound level (33 dB L_{A90}) reasoned within **Section 3.3.3** of this report.

7 CONCLUSIONS

7.1.1 NoiseAir has carried out a noise impact assessment with respect to the proposed development to be located at: The Barn at 9 The Green, Croft, Leicester, LE9 3EQ.

7.1.2 Proposals for the development site detail a conversion of a derelict, disused brick barn into a residential dwelling across ground floor and first floor level.

7.1.3 As part of this assessment, NoiseAir has carried out a series of primarily unattended noise measurements to establish the existing sound levels at the proposed development site.

7.1.4 The primary noise source to be assessed has been identified as:

- Commercial noise from the nearby croft quarry inclusive of potential future expansion.

7.1.5 The above noise source has been assessed in relation to the below identified receptors:

- Future occupants of the proposed conversion of the existing barn into a residential development.

7.1.6 The results of the noise survey and initial site noise risk assessment show that areas of the development have a '**Low**' Risk of adverse effect in accordance with Pro-PG without mitigation.

7.1.7 The noise levels presented within **Table 11** demonstrate that the internal noise criteria recommended by 'WHO' and detailed within BS8233:2014 for habitable rooms can be achieved when assuming a -15 dB reduction via partially open windows.

7.1.8 As the existing noise climate surrounding the proposed development are low, commercial activity from the neighbouring quarry will be audible above background on occasion. As Such, a BS4142:2014 assessment on commercial activity from the quarry has been conducted with a calculated rating level of Significantly Adverse Effect.

7.1.9 It should be noted that overall noise levels are not considered high and are comparable to levels from sources such as light traffic. However, characteristics of the noise make the sound more distinguishable and as such it is recommended that a scheme of sound insulation which allows for windows to remain closed whilst maintaining adequate ventilation, should it be desired by the occupant is employed at the development. Such a Scheme is easily achievable and is presented within **Section 6.**

7.1.10 The sound insulation scheme presented within **Section 6** has been enhanced to accommodate a significant increase to the environmental noise floor based on potential

intensification in commercial activity surrounding the proposed development. The reason for the enhanced scheme is for safeguarding the amenity of future occupants of the proposed development and ensuring that internal noise criteria for habitable rooms satisfies WHO guidelines, not only now but also in the future.

7.1.11 An important contextual consideration highlighted within this assessment is that the noise climate predicted at the proposed development will be highly like the existing residential properties who neighbour the quarry. As such, the decision of whether the proposal should be permitted or declined on noise grounds can be supported by archived planning applications and as well as any known noise complaints.

This Report is presented to Mr. Michael Potter 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 Mr. Michael Potter 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.

The methodology adopted and the sources of information used by NoiseAir Limited in providing its services are outlined in this report. The work described in this report was undertaken during the dates given in Section 1 and Section 2 and is based upon the conditions encountered as detailed in Section 2 and the information available up to the said date. The scope of this report and the services are accordingly factually limited by these circumstances.

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

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
08/01/2021	12:00:00	00:15:00	51.6	67.8	48.6
08/01/2021	12:15:00	00:15:00	49.4	59.6	48.4
08/01/2021	12:30:00	00:15:00	51.1	68.1	48.6
08/01/2021	12:45:00	00:15:00	51.0	65.4	48.7
08/01/2021	13:00:00	00:15:00	51.4	69.5	48.6
08/01/2021	13:15:00	00:15:00	53.8	72.5	49.1
08/01/2021	13:30:00	00:15:00	50.0	65.4	48.8
08/01/2021	13:45:00	00:15:00	49.8	62.1	48.8
08/01/2021	14:00:00	00:15:00	50.8	68.3	48.7
08/01/2021	14:15:00	00:15:00	50.0	61.8	48.8
08/01/2021	14:30:00	00:15:00	49.5	57.9	48.6
08/01/2021	14:45:00	00:15:00	49.9	72.6	48.7
08/01/2021	15:00:00	00:15:00	53.1	70.0	48.9
08/01/2021	15:15:00	00:15:00	52.2	69.2	48.7
08/01/2021	15:30:00	00:15:00	49.6	57.0	48.7
08/01/2021	15:45:00	00:15:00	49.5	56.9	48.6
08/01/2021	16:00:00	00:15:00	50.2	65.5	48.5
08/01/2021	16:15:00	00:15:00	49.8	58.6	48.7
08/01/2021	16:30:00	00:15:00	52.8	70.0	48.8
08/01/2021	16:45:00	00:15:00	50.6	65.1	48.5
08/01/2021	17:00:00	00:15:00	49.9	63.6	48.5
08/01/2021	17:15:00	00:15:00	49.2	53.4	48.3
08/01/2021	17:30:00	00:15:00	49.7	63.6	48.3
08/01/2021	17:45:00	00:15:00	49.3	52.4	48.4
08/01/2021	18:00:00	00:15:00	49.6	59.8	48.4
08/01/2021	18:15:00	00:15:00	49.5	61.6	48.5
08/01/2021	18:30:00	00:15:00	49.4	62.6	48.5
08/01/2021	18:45:00	00:15:00	49.3	64.0	48.2
08/01/2021	19:00:00	00:15:00	41.7	60.1	35.4
08/01/2021	19:15:00	00:15:00	37.5	60.0	34.1
08/01/2021	19:30:00	00:15:00	39.9	62.7	34.4
08/01/2021	19:45:00	00:15:00	37.5	58.8	34.3
08/01/2021	20:00:00	00:15:00	48.8	66.7	33.2
08/01/2021	20:15:00	00:15:00	37.6	59.8	33.3
08/01/2021	20:30:00	00:15:00	37.3	58.5	33.2
08/01/2021	20:45:00	00:15:00	33.9	51.1	32.1
08/01/2021	21:00:00	00:15:00	42.0	63.0	31.4
08/01/2021	21:15:00	00:15:00	38.2	55.3	30.9
08/01/2021	21:30:00	00:15:00	43.1	67.5	29.9
08/01/2021	21:45:00	00:15:00	32.7	47.3	29.3
08/01/2021	22:00:00	00:15:00	30.7	45.0	27.2
08/01/2021	22:15:00	00:15:00	48.8	70.4	27.9
08/01/2021	22:30:00	00:15:00	37.7	60.9	27.2
08/01/2021	22:45:00	00:15:00	42.1	60.9	27.2
08/01/2021	23:00:00	00:15:00	46.3	66.3	27.8

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
08/01/2021	23:15:00	00:15:00	38.7	58.5	27.3
08/01/2021	23:30:00	00:15:00	39.5	58.2	27.6
08/01/2021	23:45:00	00:15:00	44.9	63.9	29.0
09/01/2021	00:00:00	00:15:00	37.1	56.6	28.0
09/01/2021	00:15:00	00:15:00	29.3	34.7	28.2
09/01/2021	00:30:00	00:15:00	29.9	41.2	28.0
09/01/2021	00:45:00	00:15:00	30.5	36.6	28.7
09/01/2021	01:00:00	00:15:00	36.6	53.5	31.3
09/01/2021	01:15:00	00:15:00	34.0	39.2	32.4
09/01/2021	01:30:00	00:15:00	49.6	70.0	29.3
09/01/2021	01:45:00	00:15:00	31.1	36.7	29.4
09/01/2021	02:00:00	00:15:00	49.3	67.4	31.8
09/01/2021	02:15:00	00:15:00	31.5	38.4	29.4
09/01/2021	02:30:00	00:15:00	32.5	37.2	30.1
09/01/2021	02:45:00	00:15:00	36.5	55.1	30.3
09/01/2021	03:00:00	00:15:00	32.0	37.3	30.1
09/01/2021	03:15:00	00:15:00	35.6	51.4	30.5
09/01/2021	03:30:00	00:15:00	31.8	35.7	30.2
09/01/2021	03:45:00	00:15:00	30.3	36.0	27.8
09/01/2021	04:00:00	00:15:00	32.3	39.2	30.1
09/01/2021	04:15:00	00:15:00	33.0	40.9	31.1
09/01/2021	04:30:00	00:15:00	32.6	41.7	30.2
09/01/2021	04:45:00	00:15:00	50.7	72.1	32.2
09/01/2021	05:00:00	00:15:00	44.4	64.4	33.2
09/01/2021	05:15:00	00:15:00	50.1	68.8	35.5
09/01/2021	05:30:00	00:15:00	37.6	43.7	36.1
09/01/2021	05:45:00	00:15:00	38.1	48.2	36.0
09/01/2021	06:00:00	00:15:00	41.9	61.2	36.4
09/01/2021	06:15:00	00:15:00	38.5	47.6	36.4
09/01/2021	06:30:00	00:15:00	41.6	61.0	36.0
09/01/2021	06:45:00	00:15:00	45.6	64.2	37.2
09/01/2021	07:00:00	00:15:00	48.9	67.0	37.2
09/01/2021	07:15:00	00:15:00	51.5	68.9	37.0
09/01/2021	07:30:00	00:15:00	49.5	68.9	37.6
09/01/2021	07:45:00	00:15:00	44.8	59.5	38.0
09/01/2021	08:00:00	00:15:00	53.0	71.4	39.6
09/01/2021	08:15:00	00:15:00	44.4	62.6	37.9
09/01/2021	08:30:00	00:15:00	43.3	60.6	38.0
09/01/2021	08:45:00	00:15:00	50.4	67.7	39.9
09/01/2021	09:00:00	00:15:00	50.7	69.2	39.8
09/01/2021	09:15:00	00:15:00	43.7	60.5	38.4
09/01/2021	09:30:00	00:15:00	44.7	63.6	38.2
09/01/2021	09:45:00	00:15:00	47.1	65.2	37.0
09/01/2021	10:00:00	00:15:00	51.8	85.8	35.6
09/01/2021	10:15:00	00:15:00	54.7	75.9	35.8
09/01/2021	10:30:00	00:15:00	35.8	51.5	31.9

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
09/01/2021	10:45:00	00:15:00	41.0	58.7	32.5
09/01/2021	11:00:00	00:15:00	46.3	68.0	32.7
09/01/2021	11:15:00	00:15:00	40.4	59.4	34.3
09/01/2021	11:30:00	00:15:00	39.1	60.9	32.7
09/01/2021	11:45:00	00:15:00	51.9	71.7	32.1
09/01/2021	12:00:00	00:15:00	43.5	65.2	32.3
09/01/2021	12:15:00	00:15:00	43.9	66.2	32.7
09/01/2021	12:30:00	00:15:00	38.6	54.9	35.0
09/01/2021	12:45:00	00:15:00	40.5	62.4	35.1
09/01/2021	13:00:00	00:15:00	48.3	65.5	33.1
09/01/2021	13:15:00	00:15:00	38.5	52.8	34.2
09/01/2021	13:30:00	00:15:00	54.3	73.8	34.5
09/01/2021	13:45:00	00:15:00	36.2	50.7	33.7
09/01/2021	14:00:00	00:15:00	45.7	67.6	35.6
09/01/2021	14:15:00	00:15:00	39.3	60.2	33.2
09/01/2021	14:30:00	00:15:00	39.5	62.5	34.0
09/01/2021	14:45:00	00:15:00	53.1	73.4	36.3
09/01/2021	15:00:00	00:15:00	44.7	67.4	32.9
09/01/2021	15:15:00	00:15:00	48.4	71.5	36.1
09/01/2021	15:30:00	00:15:00	45.9	63.2	36.4
09/01/2021	15:45:00	00:15:00	39.0	48.8	34.8
09/01/2021	16:00:00	00:15:00	47.6	68.9	36.1
09/01/2021	16:15:00	00:15:00	42.5	59.0	33.7
09/01/2021	16:30:00	00:15:00	51.0	69.6	34.7
09/01/2021	16:45:00	00:15:00	36.2	46.5	33.3
09/01/2021	17:00:00	00:15:00	43.5	65.9	32.1
09/01/2021	17:15:00	00:15:00	37.9	52.2	32.3
09/01/2021	17:30:00	00:15:00	38.0	45.9	33.5
09/01/2021	17:45:00	00:15:00	43.6	67.5	35.7
09/01/2021	18:00:00	00:15:00	47.2	71.2	34.2
09/01/2021	18:15:00	00:15:00	37.6	49.8	33.5
09/01/2021	18:30:00	00:15:00	36.4	49.8	30.7
09/01/2021	18:45:00	00:15:00	35.0	44.5	30.9
09/01/2021	19:00:00	00:15:00	46.6	64.6	30.8
09/01/2021	19:15:00	00:15:00	36.9	50.1	32.1
09/01/2021	19:30:00	00:15:00	35.8	44.9	31.5
09/01/2021	19:45:00	00:15:00	37.0	47.3	32.9
09/01/2021	20:00:00	00:15:00	44.1	65.4	34.6
09/01/2021	20:15:00	00:15:00	39.4	48.7	35.7
09/01/2021	20:30:00	00:15:00	39.9	58.2	34.5
09/01/2021	20:45:00	00:15:00	38.2	50.3	33.1
09/01/2021	21:00:00	00:15:00	47.1	68.8	32.2
09/01/2021	21:15:00	00:15:00	38.4	52.1	33.8
09/01/2021	21:30:00	00:15:00	40.2	61.1	34.0
09/01/2021	21:45:00	00:15:00	40.4	60.8	32.1
09/01/2021	22:00:00	00:15:00	37.6	52.9	30.9

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
09/01/2021	22:15:00	00:15:00	37.3	51.4	32.6
09/01/2021	22:30:00	00:15:00	35.5	46.9	31.3
09/01/2021	22:45:00	00:15:00	33.7	42.6	29.9
09/01/2021	23:00:00	00:15:00	46.8	71.2	30.3
09/01/2021	23:15:00	00:15:00	42.7	63.5	28.0
09/01/2021	23:30:00	00:15:00	32.5	42.6	29.5
09/01/2021	23:45:00	00:15:00	34.0	49.3	29.1
10/01/2021	00:00:00	00:15:00	33.2	44.0	30.2
10/01/2021	00:15:00	00:15:00	32.8	49.2	27.3
10/01/2021	00:30:00	00:15:00	37.5	55.8	27.2
10/01/2021	00:45:00	00:15:00	30.6	42.2	26.3
10/01/2021	01:00:00	00:15:00	28.6	41.4	25.3
10/01/2021	01:15:00	00:15:00	29.2	44.6	26.1
10/01/2021	01:30:00	00:15:00	29.8	39.1	26.8
10/01/2021	01:45:00	00:15:00	29.0	40.5	26.2
10/01/2021	02:00:00	00:15:00	29.4	37.8	26.2
10/01/2021	02:15:00	00:15:00	32.0	42.7	28.2
10/01/2021	02:30:00	00:15:00	30.3	42.8	27.5
10/01/2021	02:45:00	00:15:00	30.6	40.3	28.3
10/01/2021	03:00:00	00:15:00	31.7	41.5	28.4
10/01/2021	03:15:00	00:15:00	33.3	46.0	29.2
10/01/2021	03:30:00	00:15:00	32.6	42.5	29.0
10/01/2021	03:45:00	00:15:00	31.5	48.1	28.4
10/01/2021	04:00:00	00:15:00	32.2	46.6	27.9
10/01/2021	04:15:00	00:15:00	32.9	40.2	30.7
10/01/2021	04:30:00	00:15:00	34.0	46.3	31.2
10/01/2021	04:45:00	00:15:00	32.3	43.1	29.8
10/01/2021	05:00:00	00:15:00	32.1	40.9	29.4
10/01/2021	05:15:00	00:15:00	37.0	51.4	30.3
10/01/2021	05:30:00	00:15:00	34.6	46.4	30.4
10/01/2021	05:45:00	00:15:00	33.2	44.2	30.4
10/01/2021	06:00:00	00:15:00	33.3	42.2	30.1
10/01/2021	06:15:00	00:15:00	36.6	49.3	32.4
10/01/2021	06:30:00	00:15:00	39.6	51.8	35.0
10/01/2021	06:45:00	00:15:00	47.1	65.0	34.1
10/01/2021	07:00:00	00:15:00	47.1	64.1	33.3
10/01/2021	07:15:00	00:15:00	47.5	64.5	33.4
10/01/2021	07:30:00	00:15:00	38.3	58.5	33.9
10/01/2021	07:45:00	00:15:00	39.8	62.4	34.4
10/01/2021	08:00:00	00:15:00	42.8	63.9	35.8
10/01/2021	08:15:00	00:15:00	41.3	60.5	36.8
10/01/2021	08:30:00	00:15:00	40.2	58.6	37.6
10/01/2021	08:45:00	00:15:00	41.1	60.9	37.0
10/01/2021	09:00:00	00:15:00	43.0	67.6	37.6
10/01/2021	09:15:00	00:15:00	40.8	57.1	37.6
10/01/2021	09:30:00	00:15:00	44.7	59.2	39.5

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
10/01/2021	09:45:00	00:15:00	41.8	53.0	38.7
10/01/2021	10:00:00	00:15:00	45.3	63.8	40.7
10/01/2021	10:15:00	00:15:00	42.9	60.5	39.5
10/01/2021	10:30:00	00:15:00	46.3	66.1	40.4
10/01/2021	10:45:00	00:15:00	46.6	63.5	40.4
10/01/2021	11:00:00	00:15:00	42.7	60.8	39.6
10/01/2021	11:15:00	00:15:00	45.1	64.7	39.8
10/01/2021	11:30:00	00:15:00	47.5	66.0	41.2
10/01/2021	11:45:00	00:15:00	45.2	67.9	40.7
10/01/2021	12:00:00	00:15:00	47.3	65.9	39.9
10/01/2021	12:15:00	00:15:00	44.5	64.4	39.8
10/01/2021	12:30:00	00:15:00	49.9	69.3	38.1
10/01/2021	12:45:00	00:15:00	42.2	60.3	37.3
10/01/2021	13:00:00	00:15:00	45.1	68.2	38.8
10/01/2021	13:15:00	00:15:00	40.3	55.2	37.4
10/01/2021	13:30:00	00:15:00	40.0	53.3	37.5
10/01/2021	13:45:00	00:15:00	41.0	55.3	37.8
10/01/2021	14:00:00	00:15:00	45.5	66.8	36.1
10/01/2021	14:15:00	00:15:00	42.4	69.6	36.3
10/01/2021	14:30:00	00:15:00	42.5	61.9	38.0
10/01/2021	14:45:00	00:15:00	41.1	64.1	37.5
10/01/2021	15:00:00	00:15:00	44.6	64.2	36.9
10/01/2021	15:15:00	00:15:00	45.1	60.2	38.5
10/01/2021	15:30:00	00:15:00	42.4	58.7	39.2
10/01/2021	15:45:00	00:15:00	42.6	57.2	39.5
10/01/2021	16:00:00	00:15:00	48.8	67.5	39.7
10/01/2021	16:15:00	00:15:00	42.9	56.2	37.9
10/01/2021	16:30:00	00:15:00	44.6	59.6	38.4
10/01/2021	16:45:00	00:15:00	39.6	53.4	36.5
10/01/2021	17:00:00	00:15:00	43.8	63.2	37.3
10/01/2021	17:15:00	00:15:00	40.1	50.0	37.7
10/01/2021	17:30:00	00:15:00	46.2	66.9	37.4
10/01/2021	17:45:00	00:15:00	43.6	73.4	37.2
10/01/2021	18:00:00	00:15:00	46.4	66.5	38.1
10/01/2021	18:15:00	00:15:00	42.3	61.3	37.2
10/01/2021	18:30:00	00:15:00	41.5	61.5	37.5
10/01/2021	18:45:00	00:15:00	41.0	60.1	37.4
10/01/2021	19:00:00	00:15:00	45.3	65.6	38.4
10/01/2021	19:15:00	00:15:00	42.1	66.8	36.9
10/01/2021	19:30:00	00:15:00	42.3	67.0	37.3
10/01/2021	19:45:00	00:15:00	40.8	60.7	36.7
10/01/2021	20:00:00	00:15:00	47.0	69.0	36.7
10/01/2021	20:15:00	00:15:00	43.0	66.2	36.7
10/01/2021	20:30:00	00:15:00	45.9	69.2	36.6
10/01/2021	20:45:00	00:15:00	44.8	67.8	35.6
10/01/2021	21:00:00	00:15:00	38.9	55.1	34.1

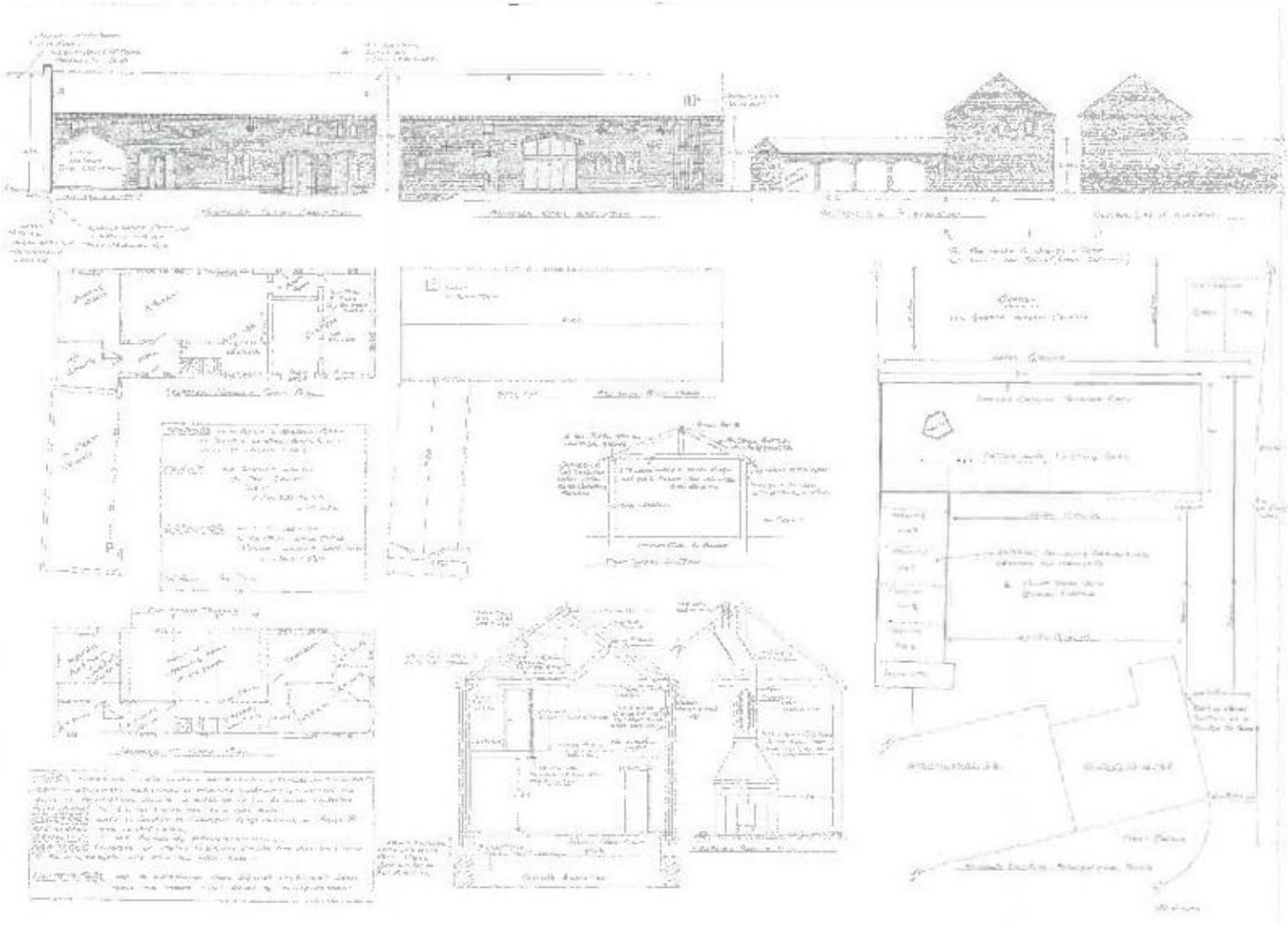
Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
10/01/2021	21:15:00	00:15:00	42.0	62.2	33.6
10/01/2021	21:30:00	00:15:00	42.5	65.6	33.7
10/01/2021	21:45:00	00:15:00	33.6	47.0	31.3
10/01/2021	22:00:00	00:15:00	38.9	58.9	32.1
10/01/2021	22:15:00	00:15:00	36.6	48.9	32.9
10/01/2021	22:30:00	00:15:00	43.1	63.9	32.4
10/01/2021	22:45:00	00:15:00	36.7	51.7	31.2
10/01/2021	23:00:00	00:15:00	35.0	46.3	32.0
10/01/2021	23:15:00	00:15:00	34.0	44.6	30.2
10/01/2021	23:30:00	00:15:00	33.5	46.8	29.6
10/01/2021	23:45:00	00:15:00	36.1	54.0	30.3
11/01/2021	00:00:00	00:15:00	33.4	44.3	30.6
11/01/2021	00:15:00	00:15:00	32.2	39.5	30.1
11/01/2021	00:30:00	00:15:00	37.2	52.5	30.2
11/01/2021	00:45:00	00:15:00	33.5	58.4	29.9
11/01/2021	01:00:00	00:15:00	33.5	44.9	30.1
11/01/2021	01:15:00	00:15:00	31.1	48.6	28.0
11/01/2021	01:30:00	00:15:00	31.5	41.7	29.5
11/01/2021	01:45:00	00:15:00	32.4	45.8	29.2
11/01/2021	02:00:00	00:15:00	31.9	47.4	29.2
11/01/2021	02:15:00	00:15:00	33.5	45.7	31.0
11/01/2021	02:30:00	00:15:00	33.9	46.2	31.3
11/01/2021	02:45:00	00:15:00	33.9	47.9	31.1
11/01/2021	03:00:00	00:15:00	33.5	47.5	31.1
11/01/2021	03:15:00	00:15:00	34.8	52.3	31.3
11/01/2021	03:30:00	00:15:00	35.0	53.0	30.6
11/01/2021	03:45:00	00:15:00	33.0	43.9	30.3
11/01/2021	04:00:00	00:15:00	33.7	51.6	31.3
11/01/2021	04:15:00	00:15:00	35.1	48.3	32.3
11/01/2021	04:30:00	00:15:00	36.2	52.5	33.0
11/01/2021	04:45:00	00:15:00	48.4	68.1	33.1
11/01/2021	05:00:00	00:15:00	37.0	48.9	34.5
11/01/2021	05:15:00	00:15:00	38.6	49.5	35.2
11/01/2021	05:30:00	00:15:00	39.3	53.3	36.8
11/01/2021	05:45:00	00:15:00	39.7	57.6	36.5
11/01/2021	06:00:00	00:15:00	47.9	67.5	38.0
11/01/2021	06:15:00	00:15:00	46.5	61.6	39.8
11/01/2021	06:30:00	00:15:00	50.6	65.2	40.7
11/01/2021	06:45:00	00:15:00	49.7	67.4	41.1
11/01/2021	07:00:00	00:15:00	50.0	65.4	42.0
11/01/2021	07:15:00	00:15:00	50.8	66.6	42.4
11/01/2021	07:30:00	00:15:00	50.1	67.7	43.6
11/01/2021	07:45:00	00:15:00	46.0	67.0	43.8
11/01/2021	08:00:00	00:15:00	48.7	69.6	42.9
11/01/2021	08:15:00	00:15:00	45.2	54.5	43.0
11/01/2021	08:30:00	00:15:00	46.0	59.8	42.4

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
11/01/2021	08:45:00	00:15:00	44.9	62.6	42.6
11/01/2021	09:00:00	00:15:00	48.0	63.2	42.5
11/01/2021	09:15:00	00:15:00	49.0	71.0	42.1
11/01/2021	09:30:00	00:15:00	43.6	58.6	41.4
11/01/2021	09:45:00	00:15:00	43.6	53.1	41.3
11/01/2021	10:00:00	00:15:00	48.9	68.6	41.5
11/01/2021	10:15:00	00:15:00	44.3	61.8	42.3
11/01/2021	10:30:00	00:15:00	43.8	58.9	41.2
11/01/2021	10:45:00	00:15:00	44.5	55.7	41.4
11/01/2021	11:00:00	00:15:00	46.9	64.0	42.1
11/01/2021	11:15:00	00:15:00	51.2	68.6	42.2
11/01/2021	11:30:00	00:15:00	47.6	71.2	42.9
11/01/2021	11:45:00	00:15:00	47.0	61.4	43.6
11/01/2021	12:00:00	00:15:00	52.7	69.7	44.1
11/01/2021	12:15:00	00:15:00	48.3	64.0	44.7
11/01/2021	12:30:00	00:15:00	49.6	64.2	45.0
11/01/2021	12:45:00	00:15:00	47.7	64.0	43.5
11/01/2021	13:00:00	00:15:00	47.5	66.7	41.7
11/01/2021	13:15:00	00:15:00	54.2	68.9	41.1
11/01/2021	13:30:00	00:15:00	44.3	57.7	41.2
11/01/2021	13:45:00	00:15:00	44.2	59.6	41.2
11/01/2021	14:00:00	00:15:00	45.5	63.4	40.3
11/01/2021	14:15:00	00:15:00	42.9	59.7	40.0
11/01/2021	14:30:00	00:15:00	43.4	61.6	41.1
11/01/2021	14:45:00	00:15:00	44.0	56.8	41.8
11/01/2021	15:00:00	00:15:00	53.9	71.4	42.2
11/01/2021	15:15:00	00:15:00	52.5	69.9	43.1
11/01/2021	15:30:00	00:15:00	45.1	54.8	42.5
11/01/2021	15:45:00	00:15:00	44.7	58.0	42.1
11/01/2021	16:00:00	00:15:00	48.2	66.4	42.7
11/01/2021	16:15:00	00:15:00	52.9	70.3	42.6
11/01/2021	16:30:00	00:15:00	45.2	64.8	42.5
11/01/2021	16:45:00	00:15:00	46.9	63.3	44.1
11/01/2021	17:00:00	00:15:00	51.3	69.2	43.6
11/01/2021	17:15:00	00:15:00	44.4	52.5	42.0
11/01/2021	17:30:00	00:15:00	47.5	65.5	42.1
11/01/2021	17:45:00	00:15:00	49.3	67.7	41.5
11/01/2021	18:00:00	00:15:00	50.6	66.3	41.0
11/01/2021	18:15:00	00:15:00	43.1	53.9	40.6
11/01/2021	18:30:00	00:15:00	43.3	61.3	40.6
11/01/2021	18:45:00	00:15:00	41.7	53.1	39.1
11/01/2021	19:00:00	00:15:00	49.0	65.4	40.1
11/01/2021	19:15:00	00:15:00	43.5	57.3	40.4
11/01/2021	19:30:00	00:15:00	43.9	61.3	39.4
11/01/2021	19:45:00	00:15:00	41.7	52.5	39.2
11/01/2021	20:00:00	00:15:00	54.5	73.2	40.5

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
11/01/2021	20:15:00	00:15:00	43.2	55.7	40.2
11/01/2021	20:30:00	00:15:00	42.2	52.8	38.4
11/01/2021	20:45:00	00:15:00	41.0	55.6	37.6
11/01/2021	21:00:00	00:15:00	47.2	70.7	38.2
11/01/2021	21:15:00	00:15:00	48.2	66.9	38.9
11/01/2021	21:30:00	00:15:00	46.0	68.6	38.8
11/01/2021	21:45:00	00:15:00	42.5	61.5	38.7
11/01/2021	22:00:00	00:15:00	42.4	58.4	38.8
11/01/2021	22:15:00	00:15:00	41.7	53.4	39.1
11/01/2021	22:30:00	00:15:00	48.4	65.0	40.8
11/01/2021	22:45:00	00:15:00	56.2	76.4	39.9
11/01/2021	23:00:00	00:15:00	46.3	64.7	41.0
11/01/2021	23:15:00	00:15:00	45.3	61.7	40.8
11/01/2021	23:30:00	00:15:00	45.9	59.3	39.4
11/01/2021	23:45:00	00:15:00	53.6	71.0	36.6
12/01/2021	00:00:00	00:15:00	39.1	52.0	36.5
12/01/2021	00:15:00	00:15:00	50.9	73.5	37.0
12/01/2021	00:30:00	00:15:00	40.4	54.5	37.3
12/01/2021	00:45:00	00:15:00	40.7	54.2	36.3
12/01/2021	01:00:00	00:15:00	42.1	55.8	39.4
12/01/2021	01:15:00	00:15:00	43.5	56.5	41.0
12/01/2021	01:30:00	00:15:00	44.3	57.4	41.3
12/01/2021	01:45:00	00:15:00	39.7	53.0	36.3
12/01/2021	02:00:00	00:15:00	43.5	60.9	36.5
12/01/2021	02:15:00	00:15:00	51.0	72.5	35.4
12/01/2021	02:30:00	00:15:00	39.4	57.5	34.7
12/01/2021	02:45:00	00:15:00	46.4	58.3	36.3
12/01/2021	03:00:00	00:15:00	37.4	52.3	33.7
12/01/2021	03:15:00	00:15:00	36.8	58.8	34.3
12/01/2021	03:30:00	00:15:00	36.8	49.5	34.8
12/01/2021	03:45:00	00:15:00	35.8	48.6	34.3
12/01/2021	04:00:00	00:15:00	41.1	59.9	33.9
12/01/2021	04:15:00	00:15:00	49.8	71.5	34.6
12/01/2021	04:30:00	00:15:00	36.9	51.7	34.5
12/01/2021	04:45:00	00:15:00	45.0	65.0	36.8
12/01/2021	05:00:00	00:15:00	45.7	66.3	36.4
12/01/2021	05:15:00	00:15:00	39.9	51.2	37.0
12/01/2021	05:30:00	00:15:00	42.5	59.1	37.0
12/01/2021	05:45:00	00:15:00	39.1	50.8	37.6
12/01/2021	06:00:00	00:15:00	48.1	67.2	38.6
12/01/2021	06:15:00	00:15:00	39.4	45.5	38.0
12/01/2021	06:30:00	00:15:00	41.7	59.1	38.6
12/01/2021	06:45:00	00:15:00	41.5	49.5	38.7
12/01/2021	07:00:00	00:15:00	43.1	60.4	40.9
12/01/2021	07:15:00	00:15:00	47.7	64.7	41.2
12/01/2021	07:30:00	00:15:00	48.1	64.3	43.1

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
12/01/2021	07:45:00	00:15:00	44.8	61.1	41.4
12/01/2021	08:00:00	00:15:00	45.3	60.8	40.8
12/01/2021	08:15:00	00:15:00	44.7	59.1	40.8
12/01/2021	08:30:00	00:15:00	45.4	65.4	42.7
12/01/2021	08:45:00	00:15:00	48.2	65.1	43.0
12/01/2021	09:00:00	00:15:00	46.7	61.1	42.2
12/01/2021	09:15:00	00:15:00	42.8	58.5	40.8
12/01/2021	09:30:00	00:15:00	43.8	66.6	41.3
12/01/2021	09:45:00	00:15:00	43.7	61.0	39.3

APPENDIX C – CLIENT DRAWINGS



APPENDIX D – BS12354-3:2000 CALCULATIONS

Barn at 9 The Green, Croft, Leics, LE9 3EQ

BA Outside1.baf - Interior level calculations

Living Room / The Barn at 9 The Green, Croft, Leics, LE9 3EQ

Room type:	Living room PR, GF, HOS	Room geometry:	5.60 m x 4.50 m = 25.20 m²
L2,nT,valid:	35.0 dB	L2,nT,existent / improved:	22.5 / 22.5 dB

facade 1

Facade geometry:	5.60 m x 2.30 m = 12.88 m²
L2,nT,existent / improved:	22.5 / 22.5 dB

Assessment level Day:	57.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	57.0 dB

Nr.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	1.37	50	-	=	Wall	1	1.37	50	-	-
2	Window	1	11.50	35	-	=	Window	1	11.50	35	-	-
3	Acoustic Ventilator	1	0.01	-	34	=	Acoustic Ventilator	1	0.01	-	34	-

Barn at 9 The Green, Croft, Leics, LE9 3EQ

BA Outside1.baf - Interior level calculations

Bedroom / The Barn at 9 The Green, Croft, Leics, LE9 3EQ

Room type:	Sleeping room PR, GR, ROS	Room geometry:	4.00 m x 3.90 m = 15.60 m²
L2,nT value:	30.0 dB	L2,nT existent / improved:	9.0 / 9.0 dB

Facade 1

Facade geometry:	4.00 m x 2.30 m = 9.20 m²
L2,nT existent / improved:	9.0 / 9.0 dB

Assessment level Day:	39.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by DSEI:	0.0 dB
Exterior level:	39.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	DnT,w [dB]		Component improved	Count	Area [m²]	R'w [dB]	DnT,w [dB]	Fan
1	Wall	1	7.19	50	-	=	Wall	1	7.19	50	-	
2	Window	1	2.00	30	-	=	Window	1	2.00	30	-	-
3	Acoustic Ventilator	1	0.03	-	38	=	Acoustic Ventilator	1	0.01	-	30	-

Barn at 9 The Green, Croft, Leics, LE9 3EQ

SA Outside1.baf - Interior level calculations

Bedroom Max / The Barn at 9 The Green, Croft, Leics, LE9 3EQ

Room type:	Sleeping room others	Room geometry:	4.00 m x 3.20 m = 12.80 m²
LZ,nT value:	45.0 dB	LZ,nT existant / improved:	29.9 / 29.9 dB

Facade 1

Facade geometry:	6.00 m x 2.50 m = 15.00 m²
LZ,nT: existant / improved:	25.9 / 25.9 dB

Assessment level Day	59.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	59.0 dB

ser. No.	Component existant	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Sim
1	Wall	1	7.19	50	-	=	Wall	1	7.19	50	-	-
2	Window	1	2.00	30	-	=	Window	1	2.00	30	-	-
3	Acoustic Ventilator	1	0.01	-	30	=	Acoustic Ventilator	1	0.01	-	30	-

Barn at 9 The Green, Croft, Leics, LE9 3EQ

BA Outside1.baf - Interior level calculations

Living Room - Option 2 / The Barn at 9 The Green, Croft, Leics, LE9 3EQ

Room type:	Sleeping room PR '08, NQ5	Room geometry:	5.60 m x 4.50 m = 25.20 m²
L2,nT valid:	30.0 dB	L2,nT existent / improved:	18.8 / 18.8 dB

facade 1

Facade geometry:	5.60 m x 2.30 m = 12.88 m²
L2,nT existent / improved:	18.8 / 18.8 dB

Assessment level Day:	57.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	57.0 dB

sec. No	Component existent	Qty/R	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fun
1	Wall	1	1.38	50	-	=	Wall	1	1.38	50	-	-
2	Window	1	11.50	36	-	=	Window	1	11.50	36	-	-

Barn at 9 The Green, Croft, Leics, LE9 3EQ

BA Outside1.baf - Interior level calculations

Bedroom - Option 2 / The Barn at 9 The Green, Croft, Leics, LE9 3EQ

Room type:	Sleeping room (S, G, H06	Room geometry:	4.00 m x 3.90 m = 15.60 m²
L2,n1 value:	30.0 dB	L2,nT existent / improved:	1.4 / -1.2 dB

Facade 1

Facade geometry:	4.00 m x 2.30 m = 9.20 m²
L2,n1 existent / improved:	1.4 / -1.2 dB

Assessment level Day:	39.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	39.0 dB

ser No	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fact
1	Wall	1	7.20	50	-	=	Wall	1	7.20	50	-	-
2	Window	1	2.00	30	-	=	Window	1	2.00	36	-	-

Barn at 9 The Green, Croft, Leics, LE9 3EQ

BA Outside1.baf - Interior level calculations

Bedroom Max - Option 2 / The Barn at 9 The Green, Croft, Leics, LE9 3EQ

Room type:	Sleeping room others	Room geometry:	5.00 m x 3.90 m x 15.60 m³
LAeq value:	45.0 dB	LAeq existent / improved:	21.4 / 18.6 dB

facade 1

Facade geometry:	4.00 m x 2.30 m = 9.20 m²
LAeq existent / improved:	21.4 / 18.6 dB

Assessment level Bez:	59.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	59.0 dB

Nr	Component existent	Count	Area [m²]	R'w [dB]	Dnc [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dnc [dB]	Fan
1	Wall	1	7.20	50	-	x	Wall	1	8.20	50	-	-
2	Window	1	2.00	30	-	x	Window	1	1.00	30	-	-

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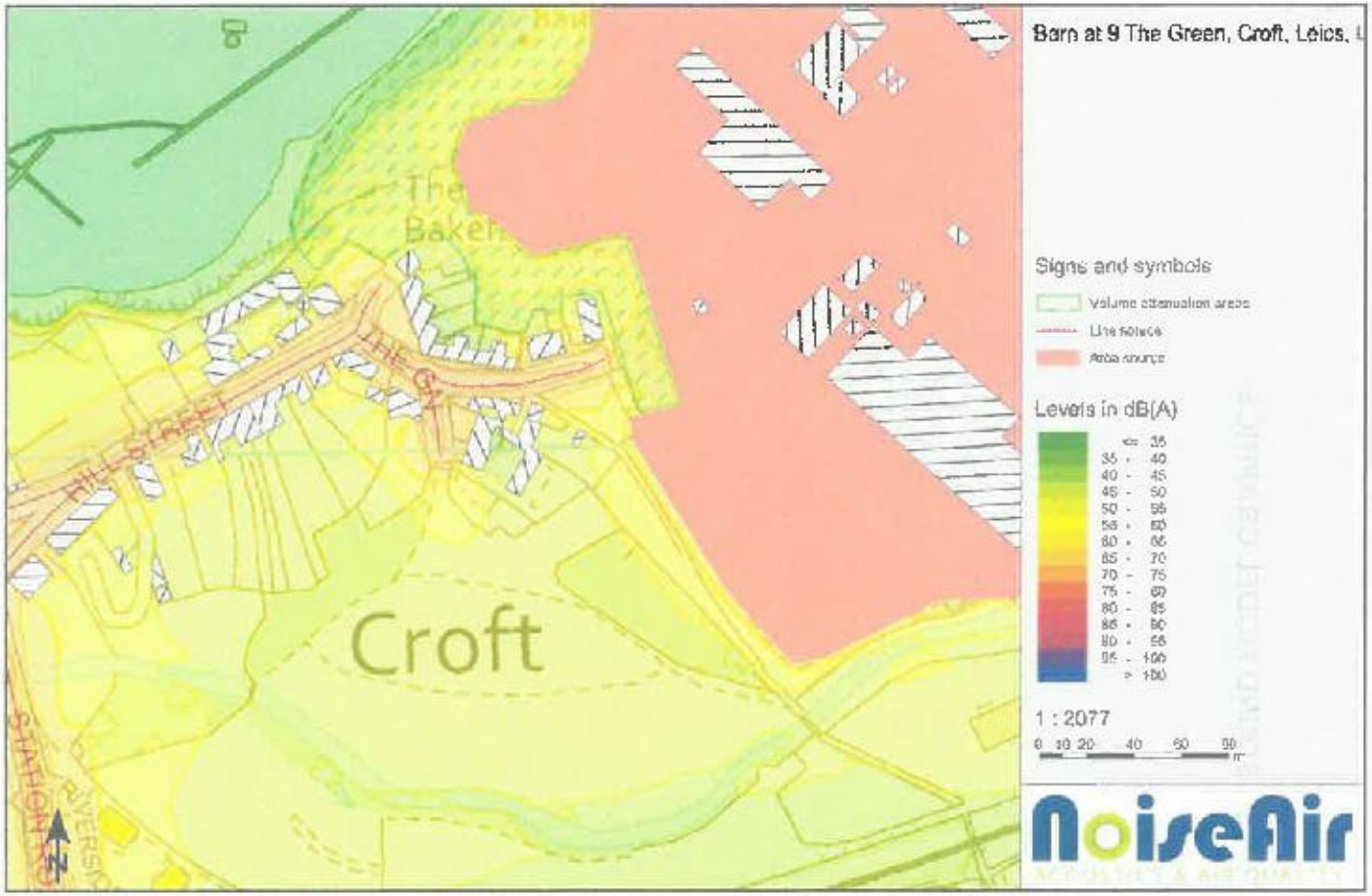
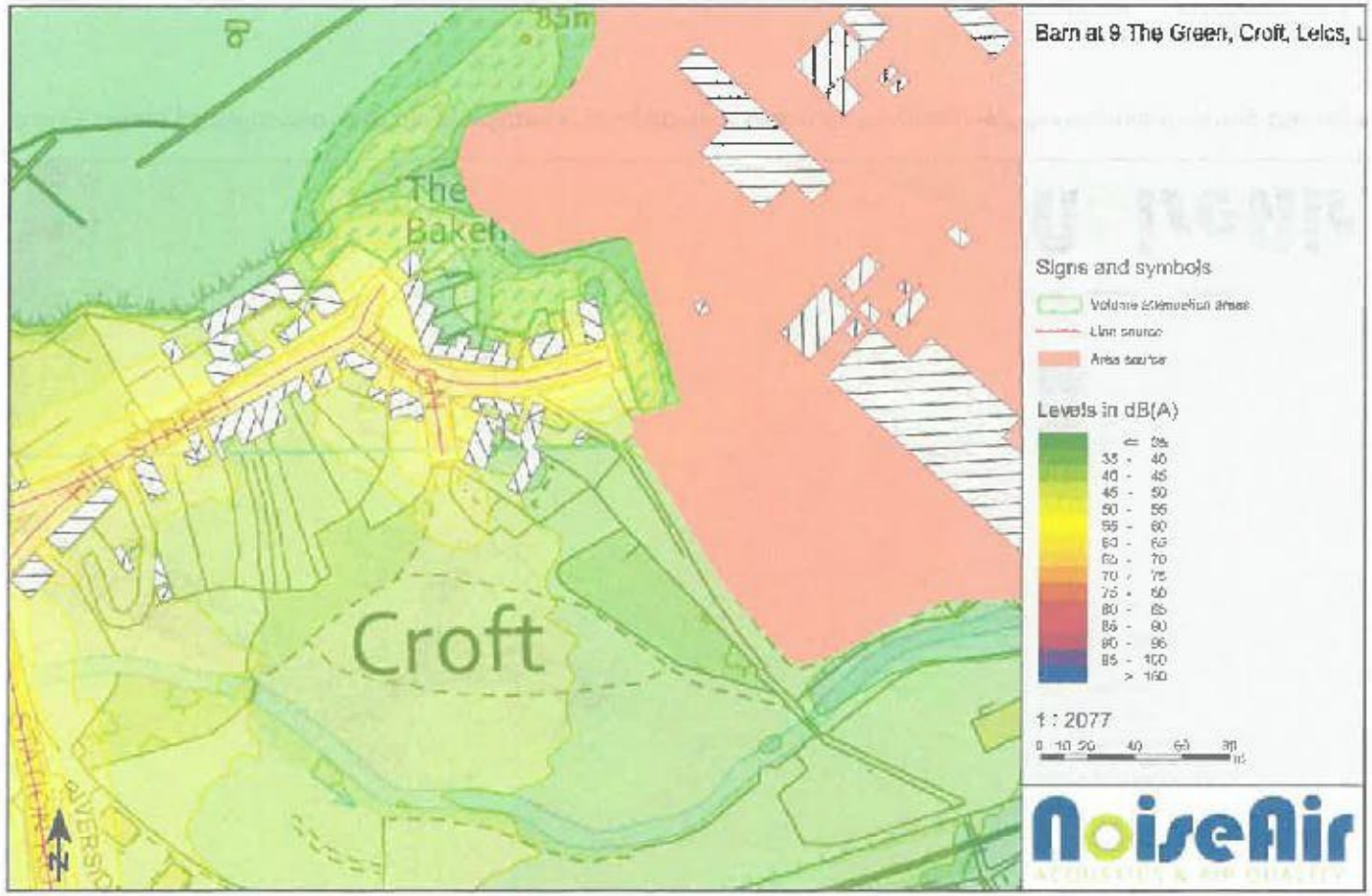
APPENDIX E – 3D SOUND MODEL GRAPHICS

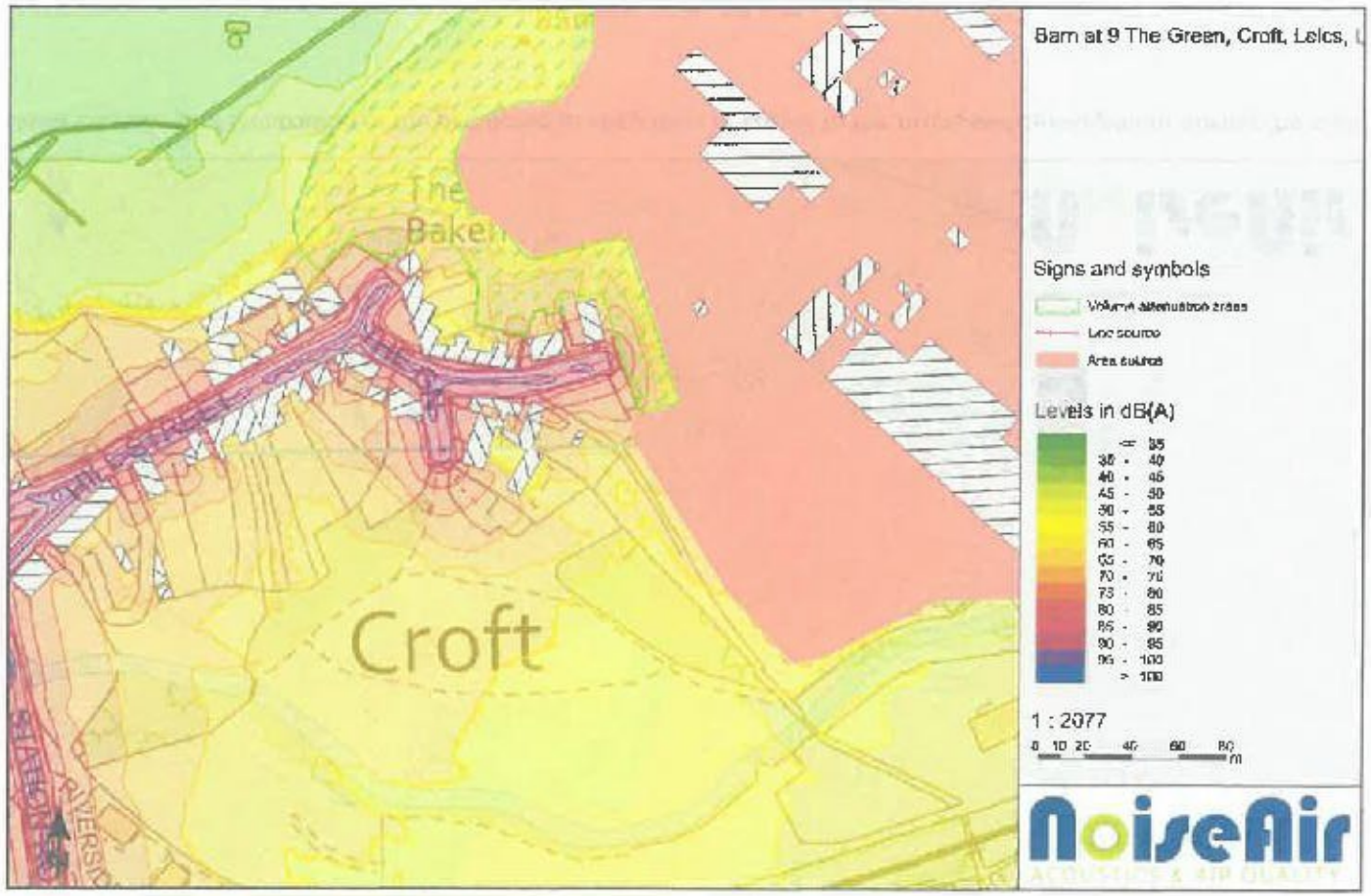
BS8233:2014 assessment – Scenario 1 (Current Conditions)



Noise contour plot illustration of the predicted propagation of sound to the proposed development during the daytime – $L_{Aeq,T}$.



Noise contour plot illustration of the predicted propagation of sound to the proposed development during the night-time – $L_{Aeq,T}$



Noise contour plot illustration of the predicted propagation of sound to the proposed development during the night-time – L_{Amax}.

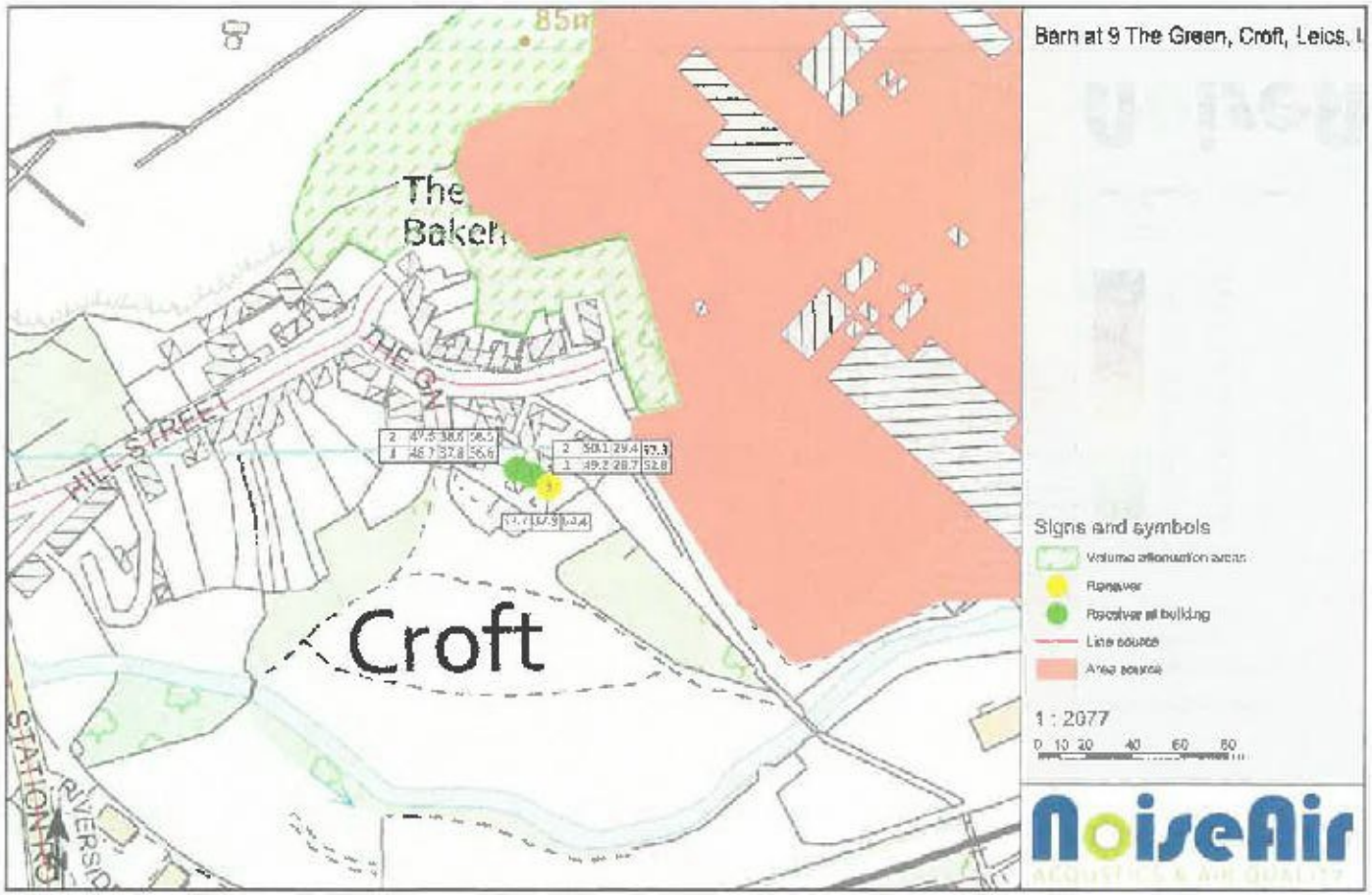
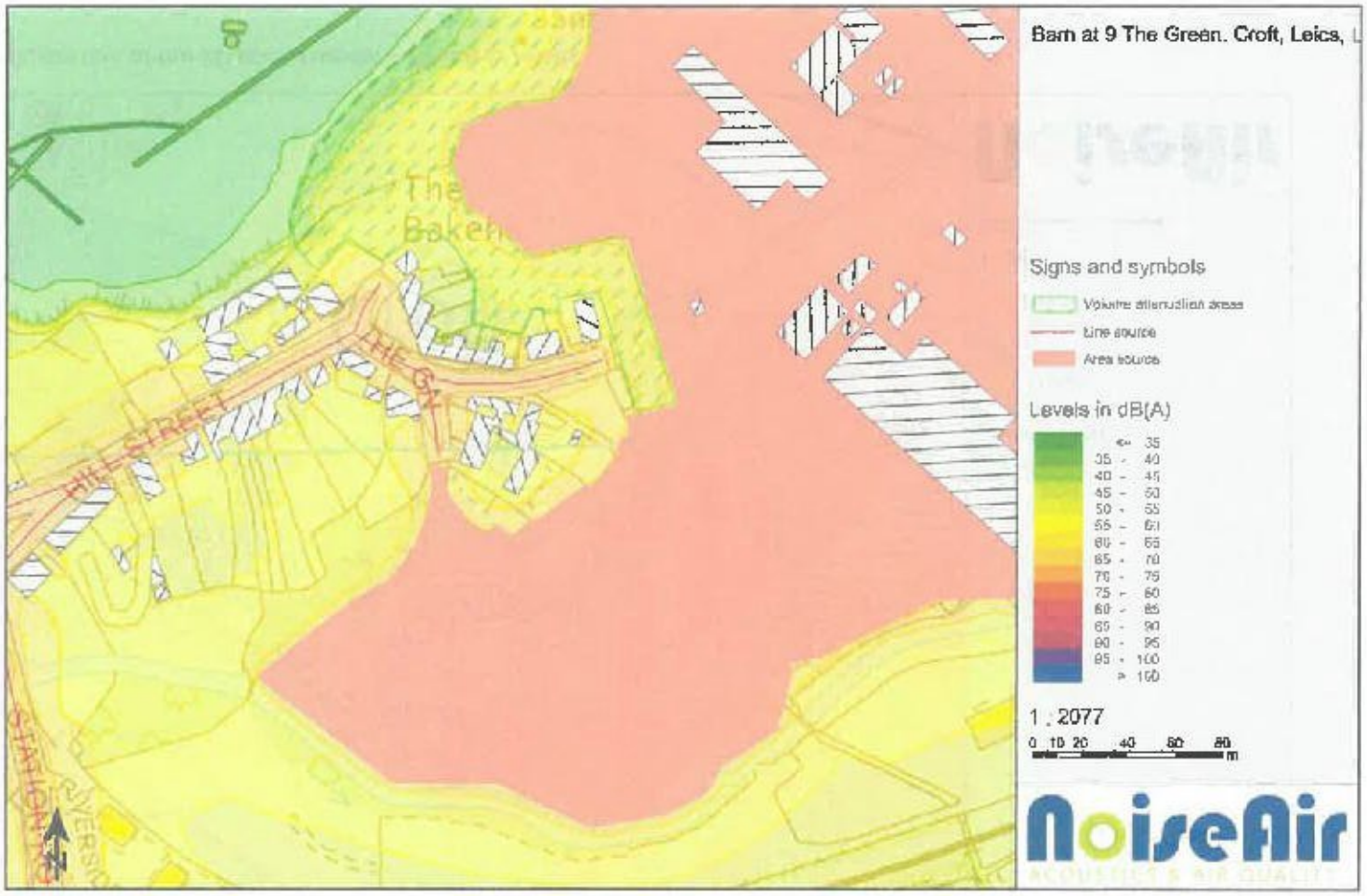


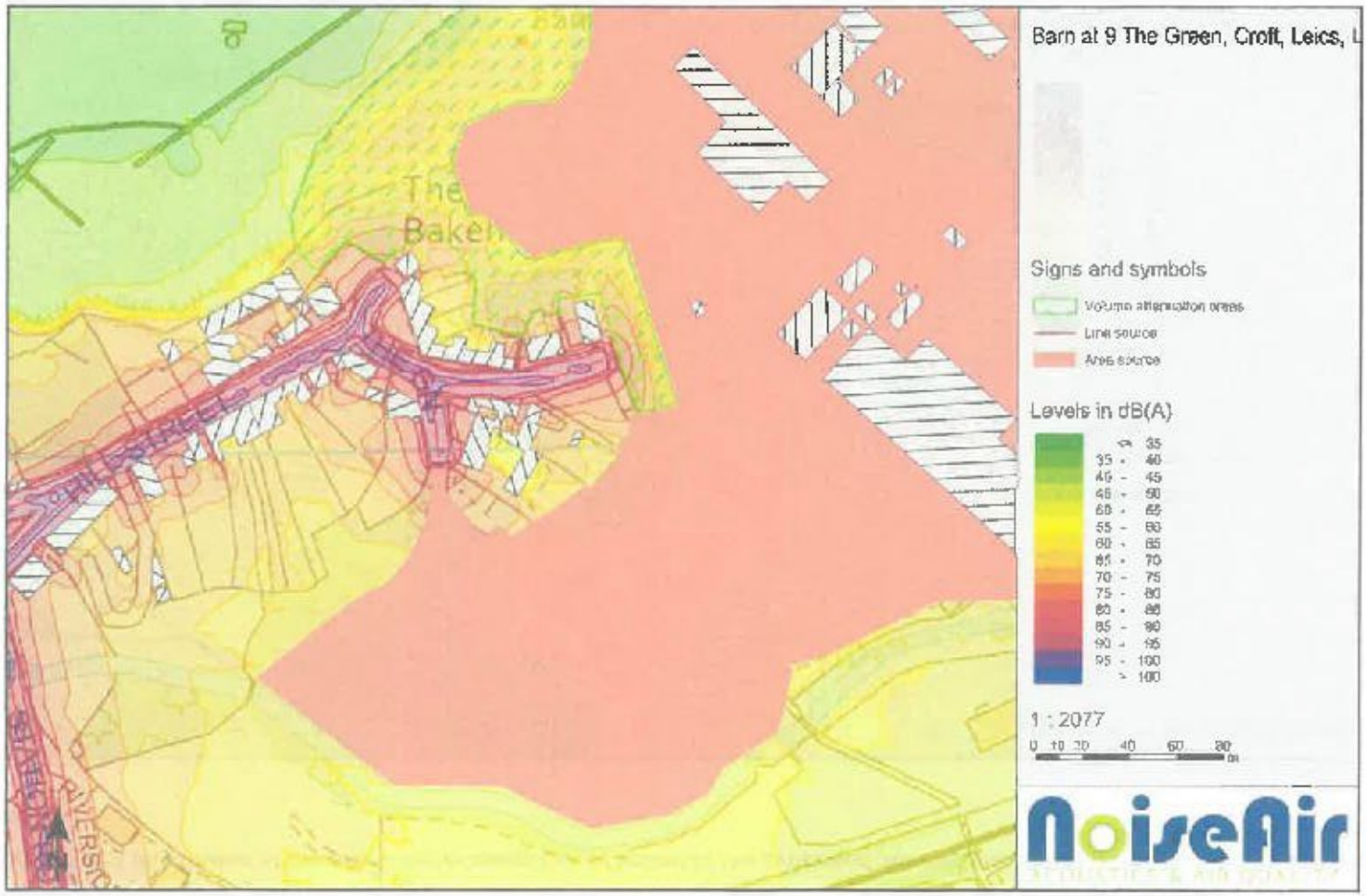
Illustration of the 3D sound model – Receiver levels.

BS8233:2014 assessment – Scenario 2 (Including Potential Future Expansion of the Neighbouring Quarry)

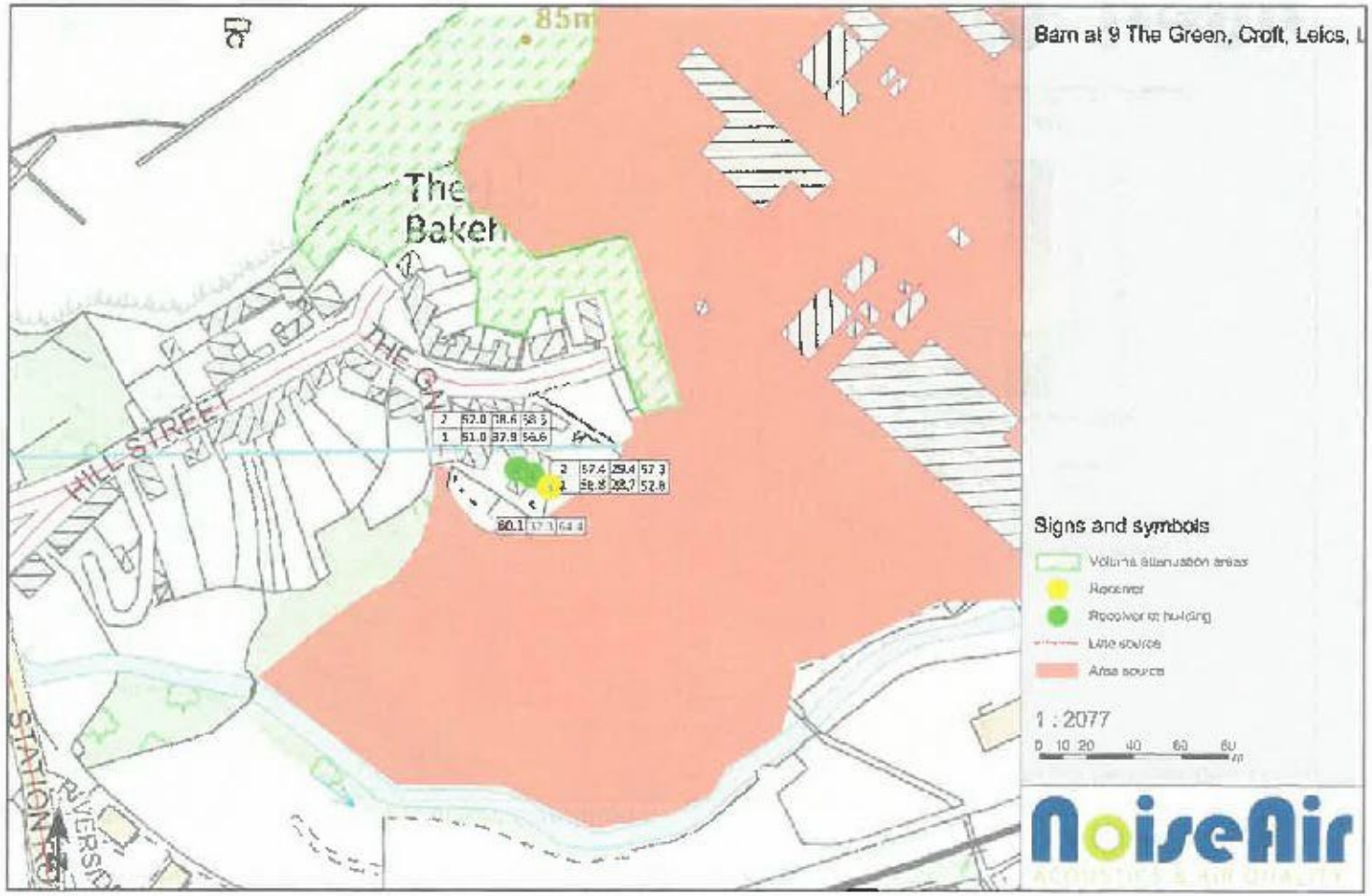


Noise contour plot illustration of the predicted propagation of sound to the proposed development during the daytime – $L_{Aeq,T}$ (Potential future expansion)

Noise contour plot illustration of the predicted propagation of sound to the proposed development during the night-time – $L_{Aeq,T}$ (Potential future expansion)

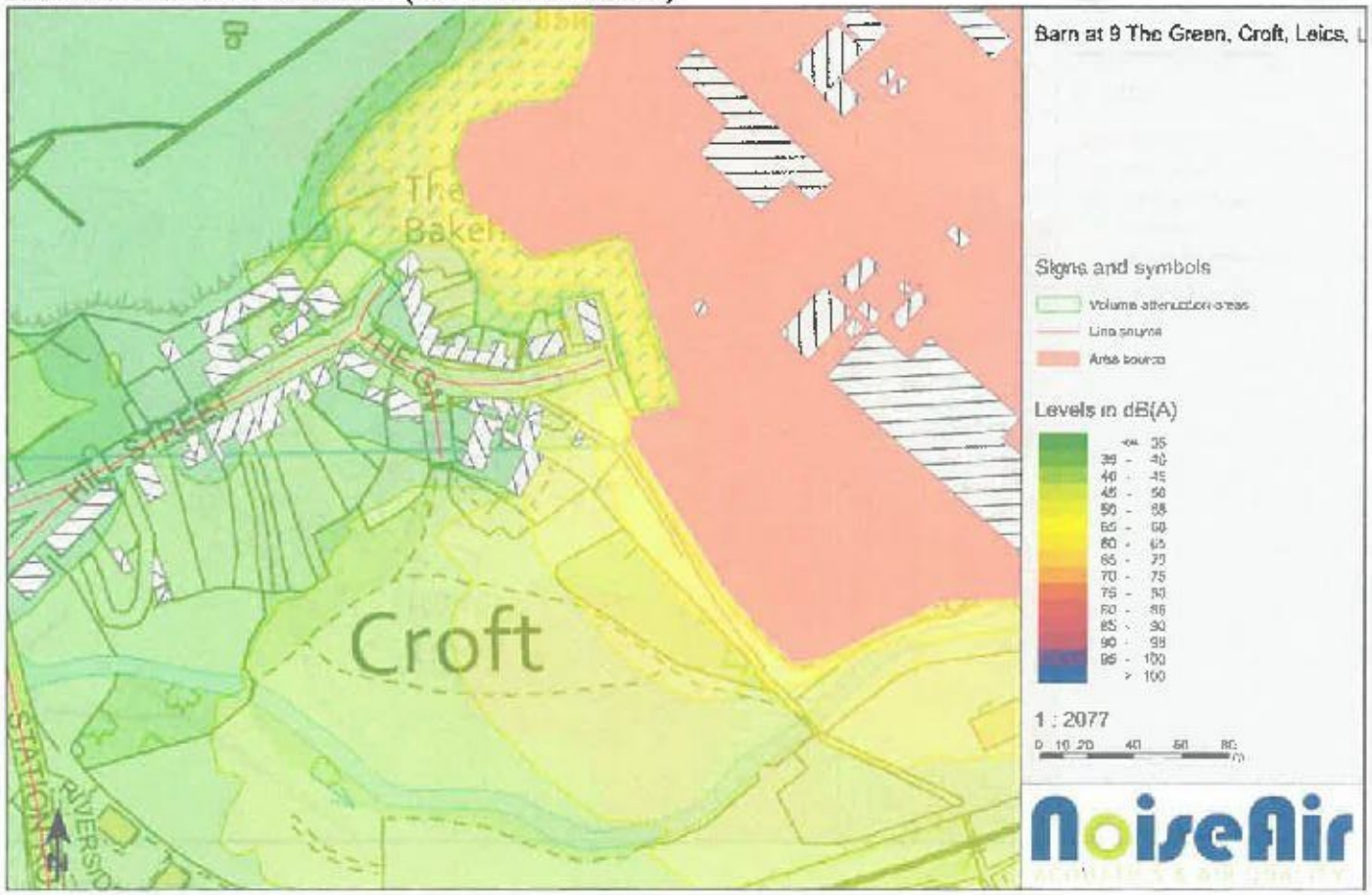


Noise contour plot illustration of the predicted propagation of sound to the proposed development during the night-time – L_{Amax} (Potential future expansion)

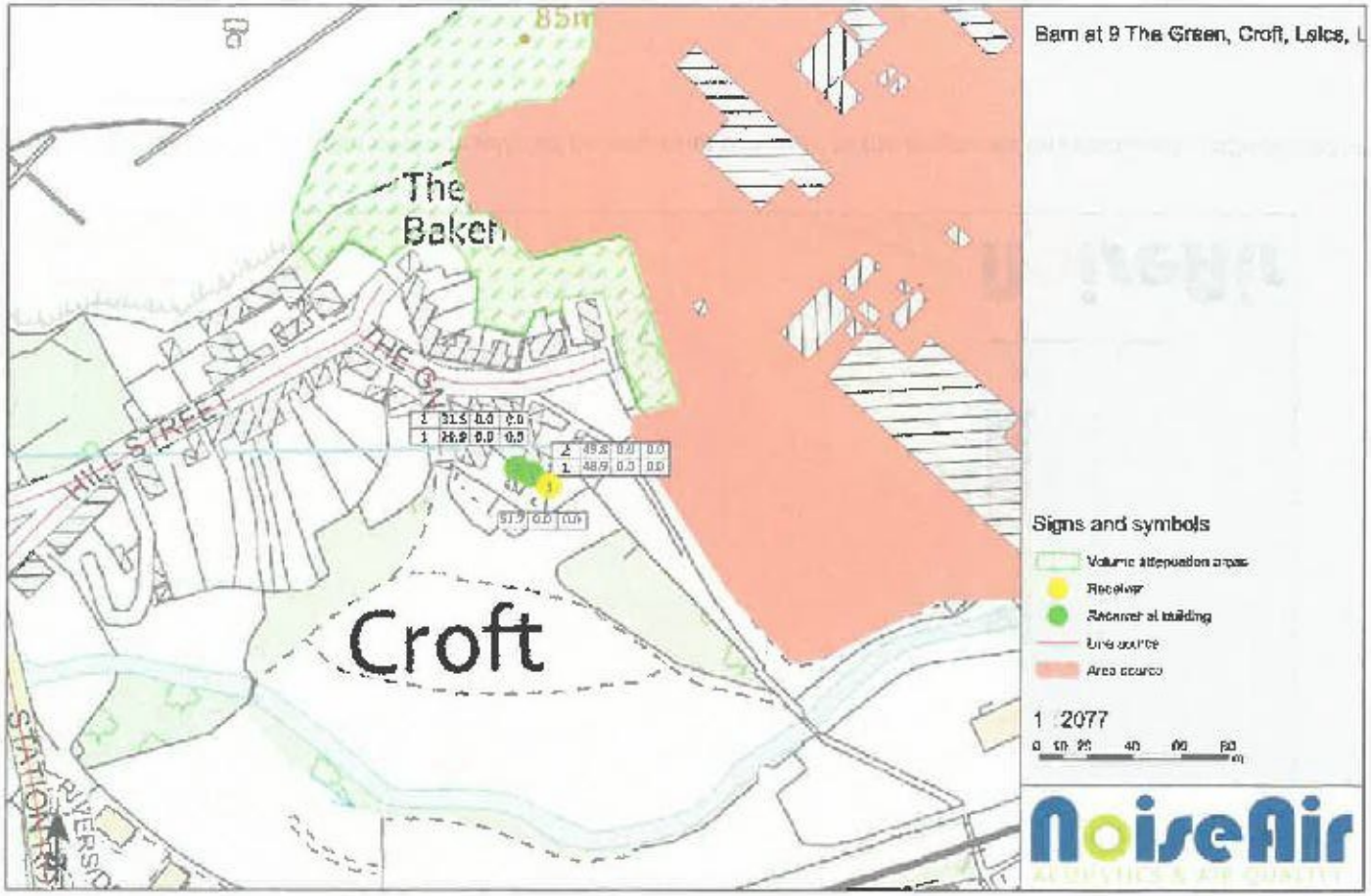


3D sound model – Receiver levels with potential future expansion.

BS4142:2014 assessment – Scenario 1 (Current Conditions)

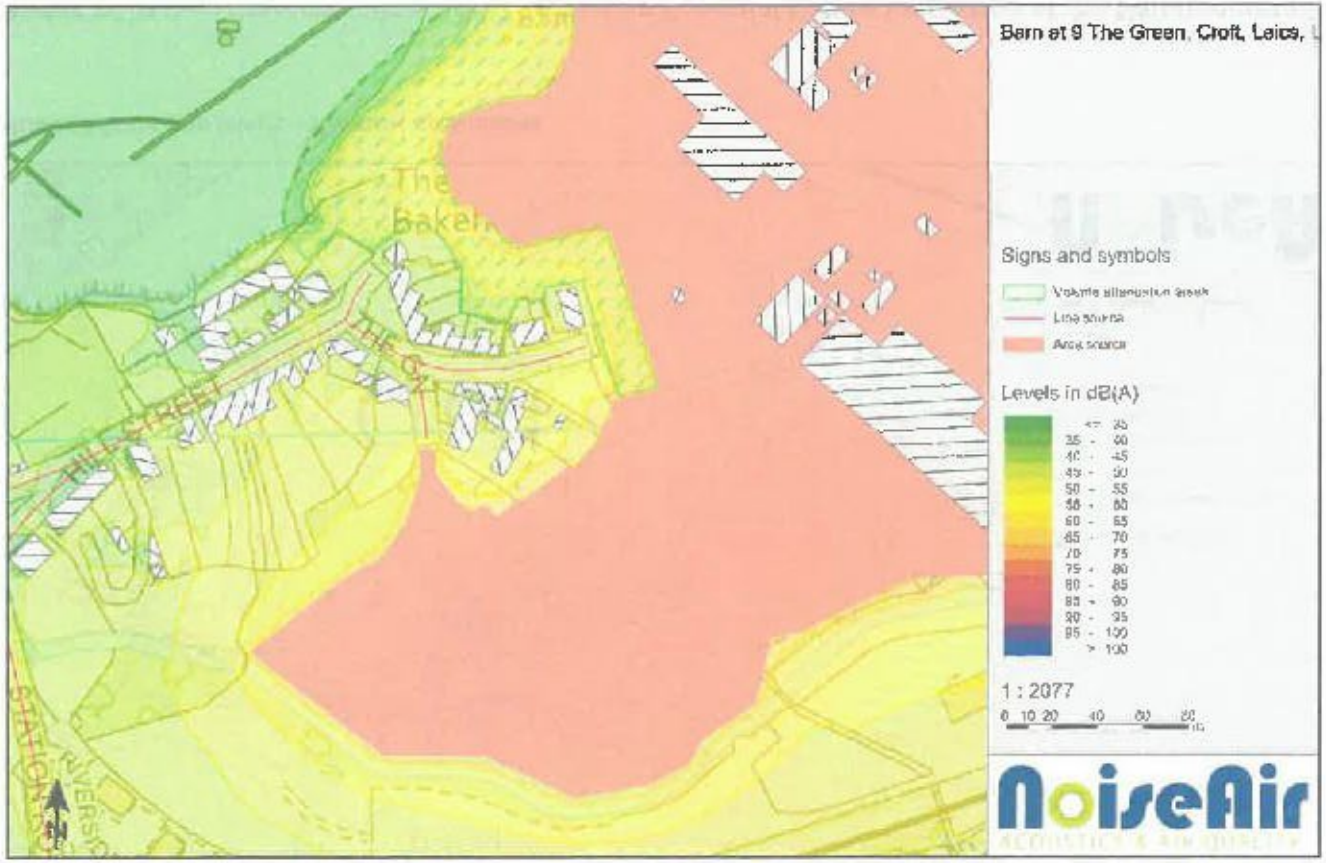


Noise Contour Plot illustration of the predicted propagation of sound to the proposed development – BS4142:2014 Assessment – Current operations.



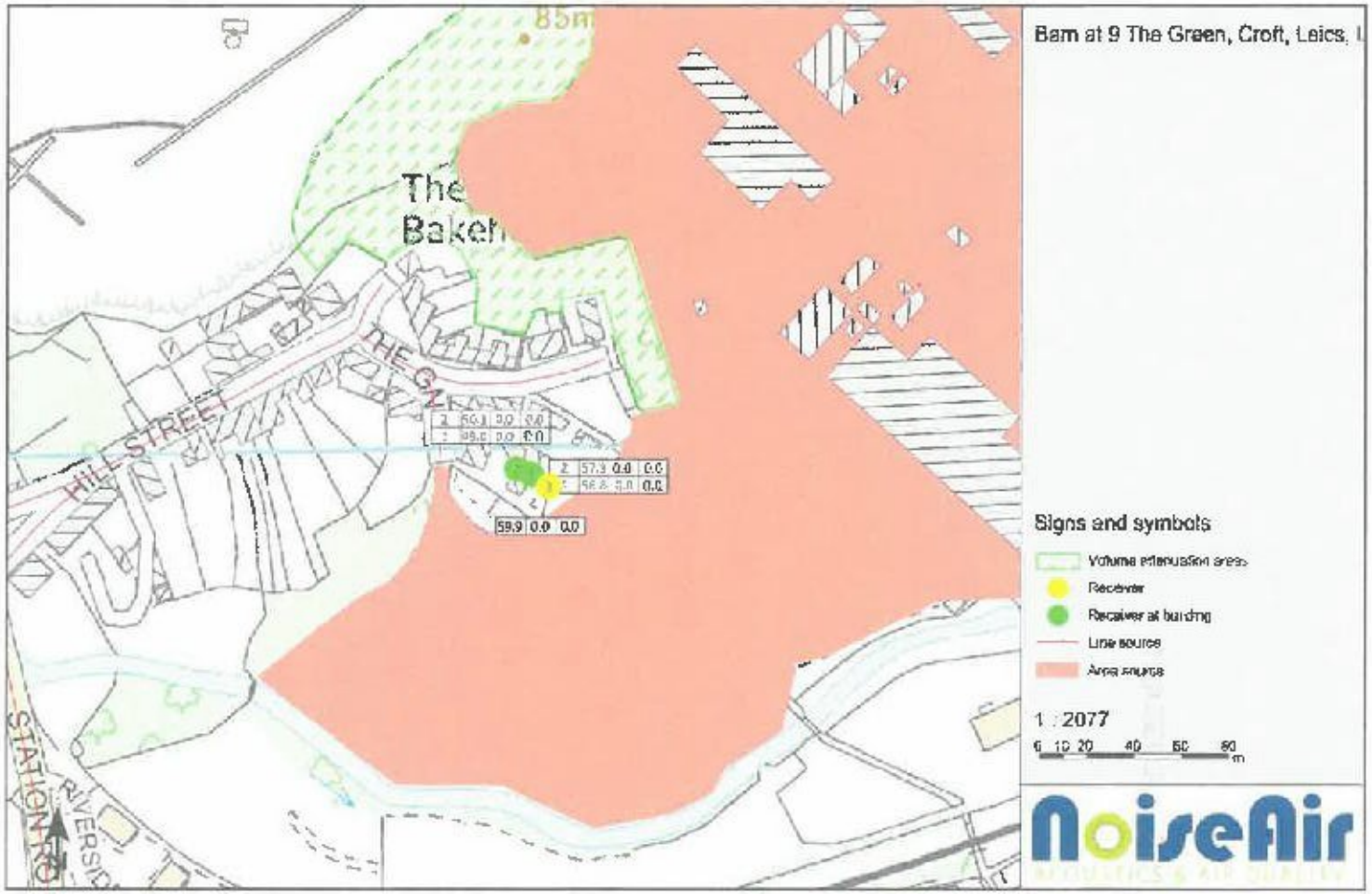
BS4142 Receiver levels – Current operations.

BS4142:2014 assessment – Scenario 2 (Including Potential Future Expansion of the Neighbouring Quarry)



7.1.12

Noise Contour Plot illustration of the predicted propagation of sound to the proposed development – BS4142:2014 Assessment Potential future expansion..



BS4142 Receiver levels – Potential futre expansion.

APPENDIX G – GLOSSARY

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. *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.*
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. *NOTE: The ambient sound comprises the residual sound and the specific sound when present.*
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 *NOTE: The ambient sound level is a measure of the residual sound and the specific sound when present.*
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. *NOTE: The reference values used within the C_{tr} calculation are based on urban traffic noise.*
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 (m2), 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. *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.*

Free-field level	Sound pressure level away from reflecting surfaces. *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.*
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. *NOTE: The location(s) within the room at which the ambient indoor noise is to be measured or calculated ought to be considered.*
Measurement time interval, T_m (BS4142:2014)	Total time over which measurements are taken. *NOTE: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.*
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. *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.*
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. *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.*
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, $L_{Ar,Tr}$	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise. *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.*
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, $L_s = L_{Aeq,Tr}$ (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. *NOTE Common sources of ground-borne noise include railways and heavy construction work on adjacent construction sites.*
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. *NOTE Common sources of structure-borne noise include building services plant, manufacturing machinery and construction or demolition of the structure.*
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. *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).*
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)
$L_{Ar,Tr}$	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)
$LAeq,T$	Equivalent continuous A-weighted sound pressure level (dB)
p	Sound pressure (Pa)
p_A	A-weighted sound pressure (dB)

$p_{A(i)}$	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)

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