
HINCKLEY PETS IN HOME LIMITED

NOISE IMPACT ASSESSMENT REPORT

**LAND SOUTHEAST OF DAWSONS LANE, BARWELL,
LEICESTERSHIRE**

Client: Hinckley Pets in Home Limited

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REPORT VERSION CONTROL:

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CONTENTS

1	INTRODUCTION	4
2	ASSESSMENT METHODOLOGY AND SCOPE OF WORKS	6
3	ACOUSTIC SURVEY	12
4	3D SOUND MODEL	16
5	NOISE IMPACT ASSESSMENT	21
6	CONCLUSIONS	23

APPENDICES

APPENDIX A - REPORT LIMITATIONS

APPENDIX B - GLOSSARY

1 INTRODUCTION

1.1.1 By instruction from Hinckley Pets in Home Limited, ('the client'), NoiseAir was commissioned to undertake a noise impact assessment (NIA) for a proposed canine daytime care facility, to be located at land Southeast of Dawsons Lane, Barwell, Leicestershire, herein referred to as the 'development site'.

1.1.2 This noise report has been prepared in support of a planning application (Ref: 23/00455/FUL) for the change of use of land to provide a dog day care facility and associated fence, and assesses the results of a noise survey carried out in accordance with current guidance and includes recommendations and mitigation as appropriate.

1.1.3 Limitations associated with this report are outlined in **Appendix A**.

1.2 Site Description, Proposals and Noise Sensitive Receptors

1.2.1 At the time of writing the development site is a vacant plot of land located to the southeast of Dawsons Lane, which is on the southern fringe of the Barwell town suburban envelope.

1.2.2 Allotment area flanks the development site to the west side, open grazing land/ field to the east and south, and vacant land to the north, beyond which lies residential receptors at a distance of approximately 85 m.

1.2.3 Proposals for the development site include the construction of a small dog shelter, kennel facility which is to be located to the north side of the development site. The proposed location of the new shelter/ kennel is to be positions such that it offers good acoustic screening properties with respect to the nearest noise sensitive receptors (NSRs) located to the north. This report will investigate two options with respect to the proposed location of the shelter/ kennel.

1.2.4 It is also proposed to provide an enclosed area around the proposed kennel building which will be constructed as an acoustic barrier to 1.8 m in height to provide the outdoor area for the dogs to use. The acoustic barrier is constructed with a minimum surface density of 10 kg/ m² and imperforate in nature.

1.2.5 **Figure 1** shows an aerial photograph of the development site with respect to the local area and its context.



Figure 1: Site aerial photograph.

- 1.2.6 The business will operate at the developments site between the hours 10:15 to 15:15 Monday to Friday. The business will operate a collection and drop-off service, where a member of staff will collect and drop-off of dogs direct from the clients' homes. The vehicle will use existing vehicular access to the land.
- 1.2.7 The business will offer the following services for up to a maximum of 30 dogs.
- Collection of dogs from clients' homes;
 - Indoor and outdoor supervised play and stimulation; and,
 - Indoor rest.
- 1.2.8 It has been advised by the client that up to 2% of the available land will be used for the commercial activity of the dog day care operations.

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), 2021;
- 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 2021]

2.1.3 The NPPF was initially published in March 2012 with the most recent version updated in July 2021. 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 2021 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 2021 continues to state in Paragraph 180:

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

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

Noise Policy Statement for England [NPSE 2010]

2.1.6 The Noise Policy Statement for England (NPSE), published in March 2010, states the long-term vision of Government noise policy is to “*promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*”.

2.1.7 This long-term vision is supported by the following aims; through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life;
- Where possible, contribute to the improvement of health and quality of life.

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

‘NOEL – No Observed Effect Level

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

LOAEL – Lowest Observed Adverse Effect Level

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

SOAEL – Significant Observed Adverse Effect Level

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

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

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

Planning Practice Guidance - Noise [PPG 2019]

- 2.1.10 The National Planning Practice Guidance (PPG) is a web-based resource, launched by the Department for Communities and Local Government (DCLG) in March 2014 to support the NPPF¹.
- 2.1.11 The PPG advises on how planning can manage potential noise impacts in new development. The guidance is regularly reviewed and updated and noise is listed as a specific category, the noise category was most recently updated in 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 the proposed canine day care centre with respect to the existing residential receptors in the locality of the development site. The NIA presented in this report is based on site specific data collected at the development site and assesses the likely impacts of the proposals with respect to the closest noise sensitive receptors.

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 existing residents are unlikely to be exposed to noise levels which might breach the acceptable planning criteria.
- 2.3.2 It should be noted however that planning guidance does not preclude development where some elevated noise levels are likely to be experienced 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 breakout from the proposed canine day care centre with respect to the existing residential receptors, it is considered that the NIA should be undertaken in accordance with the South Holland District Council Supplementary Planning Guidance – Location of Premises for the Boarding and Breeding of Dogs and Other Animals (1999), a summary of which is provided below.

2.4 South Holland District Council Supplementary Planning Guidance – Location of Premises for the Boarding and Breeding of Dogs and Other Animals (1999)

- 2.4.1 SPG-LPBBD provides a method for assessing sound from proposed dog boarding and breeding premises along with other animals also, it also provides a means of assessing the suitability of new proposals for noise sensitive uses (e.g. new housing) in the vicinity of boarding and breeding premises.
- 2.4.2 There is no specific guidance nor recommended noise level standards relating to animal boarding or breeding establishments. In the absence of these, reliance must be placed upon proven methods of measurement and assessment published elsewhere.
- 2.4.3 In general, a noise is liable to provoke complaints whenever it exceeds the background noise by a certain margin or when it attains a certain absolute level. Noise levels at or below the existing background level are unlikely to give rise to complaints.

-
- 2.4.4 This fundamental acoustic principle underpins the guidance contained in the most relevant noise control documents, BS4142:2014 and BS5228: Part 1 2009. The methodology set out in SPG-LPBBD is based on these aforementioned documents.
- 2.4.5 Operational experience shows that the distance between an animal boarding / breeding establishment and noise sensitive locations is key to the incidence of complaints. The distance required will depend upon specific circumstances of the individual case, particularly the background sound level which exists. SPG-LPBBD provides the procedure by which one can assess whether there is an adequate separation distance for a particular proposal. It provides safeguards to this particular type of commercial operation in any given location and at the same time ensures reasonable protection to nearby noise sensitive premises.
- 2.4.6 SPG-LPBBD provides an assessment procedure which takes into accounts the following influences on noise impact at the receptor location:
- The background sound level at the receptor location;
 - Specific factors about the location of the proposal including the types of ground and any screening between the noise source and noise sensitive receptors in the vicinity;
 - The influence of prevailing wind on noise impact; and,
 - Where there are already boarding and breeding establishments within the vicinity of the proposed premises and noise sensitive locations then the cumulative noise impact.

3 ACOUSTIC SURVEY

3.1 Acoustic Survey Details

- 3.1.1 NoiseAir carried out fixed position unattended noise monitoring on the dates ranging from 20th June 2023 to 23rd June 2023 at the development site.
- 3.1.2 Noise monitoring was undertaken at one monitoring location (ML). The noise monitoring location (ML) is shown in **Figure 2** and detailed in **Table 2** below.



Figure 2: Noise monitoring locations.

Table 2: Summary of Noise Monitoring Locations				
Monitor Location Number	Location Description	Time Period Monitored		Attended or Unattended Monitoring
		Start	End	
ML1	To the north side of the development site.	17:00 20/06/23	13:00 23/06/23	Unattended

- 3.1.3 The monitor location was positioned to be representative of the noise levels at the approximate location of the nearest residential receptors to the development site and so the data from this location will be used predominantly for the background sound level assessment.
- 3.1.4 The noise measurement was made using a Class 1, integrating sound level meter (SLM).

- 3.1.5 The microphone at ML1 was mounted on a tripod, at an approximate height of 1.8 m from ground level.
- 3.1.6 The acoustic equipment was calibrated to comply with Section 4.2 of BS7445-1:2003² before and after the noise monitoring periods.
- 3.1.7 Details of the SLM and associated field calibration can be found in **Table 3** below;

Table 3: Summary of SLM 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 (1403328)	NOR1209 (12042)	NOR1225 (72914)	SVAN SV30A (10818)	-26.1 dB	-26.2 dB	0.1 dB

- 3.1.8 The weather conditions were noted to be as outlined in **Table 4** during the site visits at the start and end of the monitoring periods.

Table 4: Summary of weather conditions noted at the start and end of the monitoring duration.		
	20th June 2023	23rd June 2023
Roads (Wet / Dry)	Dry	Dry
Temperature (°C)	21	22
Wind speed (ms ⁻¹)	<5	<5
Cloud Cover (Approx. %)	10	90
Humidity (%)	71	60

- 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-weighted³ L_{eq}⁴ noise levels were measured to comply with the requirements of SPG-LPBBD. A-weighted L₉₀⁵ and L_{AMax}⁶ were also measured to provide additional information.

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

⁶ The instantaneous maximum noise level recorded for a measurement period.

- 3.1.11 Attending the development site at the start and end of the survey monitoring period provided opportunity for observations and detailed notes to be made of the significant noise sources which contribute to each of the measured levels.

ML1

Continuous distant traffic noise: Continuous distant traffic noise was dominant at ML1. The traffic noise was considered to originate from the A47 and further afield the M69 which are both located to the south of the development site.

3.2 Background Sound Levels

- 3.2.1 Data is shown in **Figure 3** detailing a level vs. time graph of the recorded L_{Amax} , L_{Aeq} and L_{A90} sound level over 15-minute time periods for ML1 for over the entire measurement period.

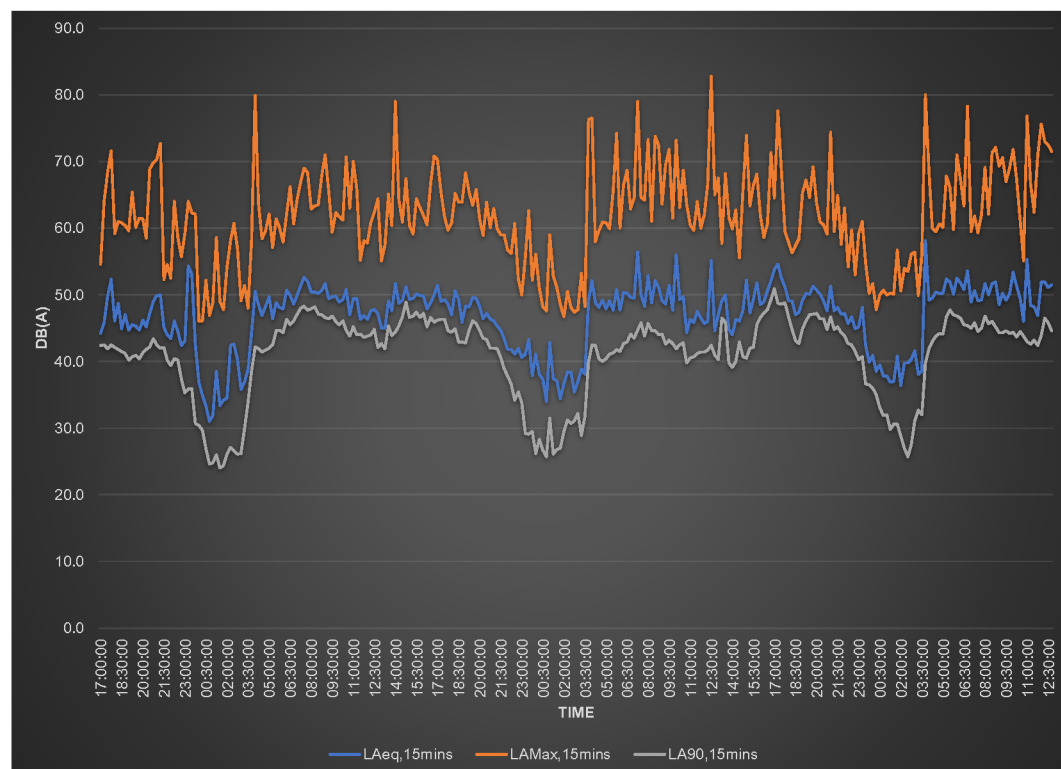


Figure 3: Level vs. time graph showing L_{Amax} , L_{Aeq} and L_{A90} sound levels – ML.

- 3.2.2 Given that the proposals outline the use of the development site between the hours of 10:15 to 15:15, the background sound level assessment dataset has been adjusted to include hours between 10:00 to 16:00.
- 3.2.3 The results for the monitoring location during the daytime are presented in **Table 5**.

Table 5: Average Measured Daytime Noise Levels			
Monitoring Location	Time	Measured Noise Level	
		dB L _{Aeq,1hour}	dB L _{A90,1hour}
ML	0800-1700	46.2 – 51.8	40.7 – 46.9

3.2.4 Data analyses has been performed on the background sound levels in order to determine typical values required for a NIA. A histogram showing the distribution of existing L_{A90,1hour} sound levels for the proposed operating hours of the canine day care facility is presented in **Figure 4** for ML1. The data shows a typical distribution for a rural area during the stated hours.

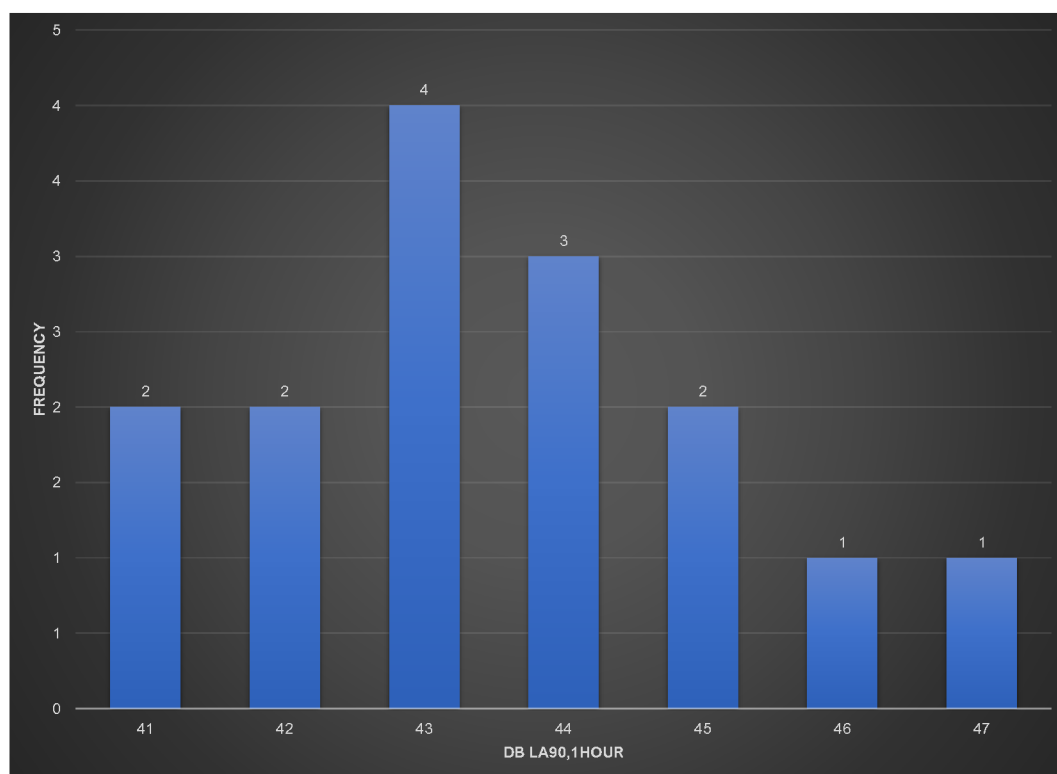


Figure 4: Histogram showing frequency distribution of L_{A90,1hour} noise readings at ML1 – Between 0800 and 1700 hours.

3.2.5 **Figure 4** above, shows the daytime background sound level ranged between 41 dB L_{A90} and 47 dB. For the selected period at ML1, a background L_{A90} sound level of 43 dB has been adopted for this assessment, being a typical value and being selected mode average value of the dataset obtained.

4 3D SOUND MODEL

4.1 Introduction

4.1.1 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 9613-2:1996⁷ 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 information provided in Section 2 and Figure D1 of SPG-LPBBD.

4.1.2 The model has been constructed with a ground absorption set to 1.0, being located in a rural area, appropriate volume attenuation areas have been included where dense vegetation and trees are located and the model also includes a 2. M high brick wall along the northern boundary of the development site.

4.2 Noise Sources

4.2.1 The level of noise from the proposed dogs has been determined in accordance with Section 2 and Figure D1 of SPG-LPBBD along with the provided typical spectrum for a dog barking at 10 m distance. It has been advised by the client that up to 30 no. dogs will be at the canine day care facility at any one time, in accordance with SPG-LPBBD it is generally considered that up to 60% of dogs are likely to bark at any one time and therefore noise breakout levels will be based on up to 18 no. dogs barking.

4.2.2 The 3D noise model specifically includes the noise sources as outlined in **Table 6**:

Table 6: Summary of Dog Barking Noise Adopted for 3D Sound Model								
Noise Source	Source Type	Frequency*						LwA dB
		125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	LpA	
Dog Barking	Point Source (18 no.)	26.0*	38.5*	60.9*	63.1*	55.4*	65.6**	97
* Lp level at 10 m distance.								
* LpA level at 10 m distance.								

4.2.3 As outlined in Section 1, it is proposed to construct a small shelter/ kennel in the northern area of the development site, it is anticipated that the building structure will provide a level of acoustic screening properties with respect to noise propagation in the northerly direction.

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

Two building positions have been investigated and are separated in Scenario 1 and Scenario 2.

4.3 Scenario 1

- 4.3.1 A noise contour plot illustrating the propagation of sound from source to receptor during the day ($L_{Aeq,1hour}$) is given in **Figure 5**. Scenario 1 positions the proposed building to the northeast corner of the development site.

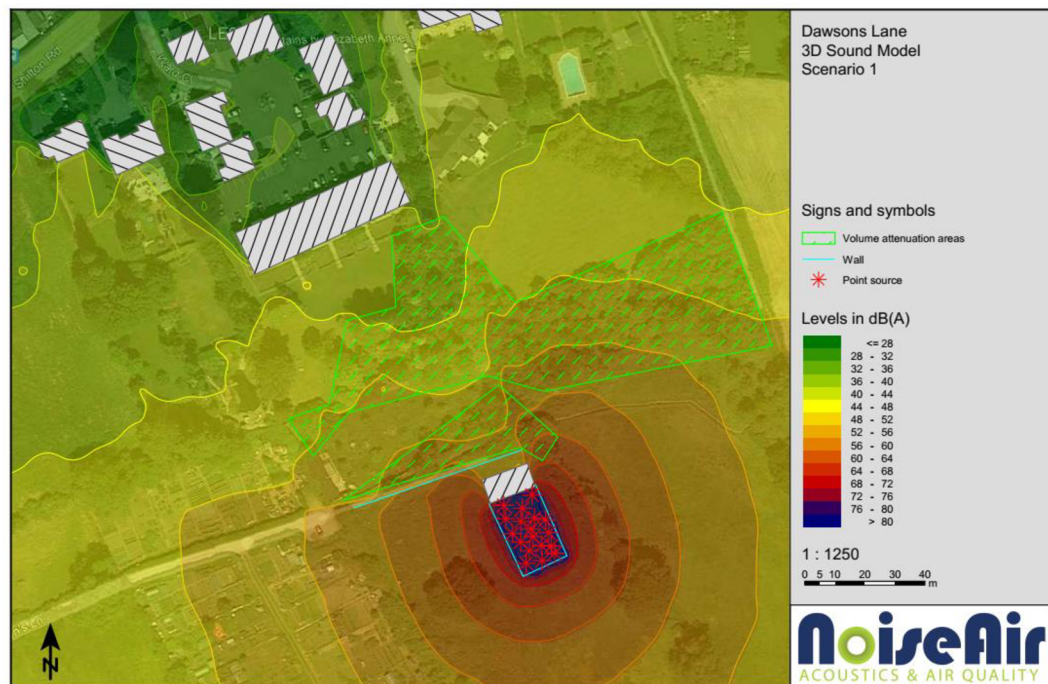


Figure 5: Noise contour plot illustration of the predicted dog barking noise propagation to the existing residential receptors during the daytime for Scenario 1 – $L_{Aeq,1hour}$.

- 4.3.2 Predicted façade readings have also been calculated. **Figure 6**, presented below, details the predicted façade noise levels at the nearby residential receptor locations investigated.



Figure 6: 3D sound model façade noise levels for Scenario 1.

4.4 Scenario 2

- 4.4.1 A noise contour plot illustrating the propagation of sound from source to receptor during the day ($L_{Aeq,1hour}$) is given in **Figure 7**. Scenario 2 positions the proposed building towards the northwest corner of the development site, after the site entrance.

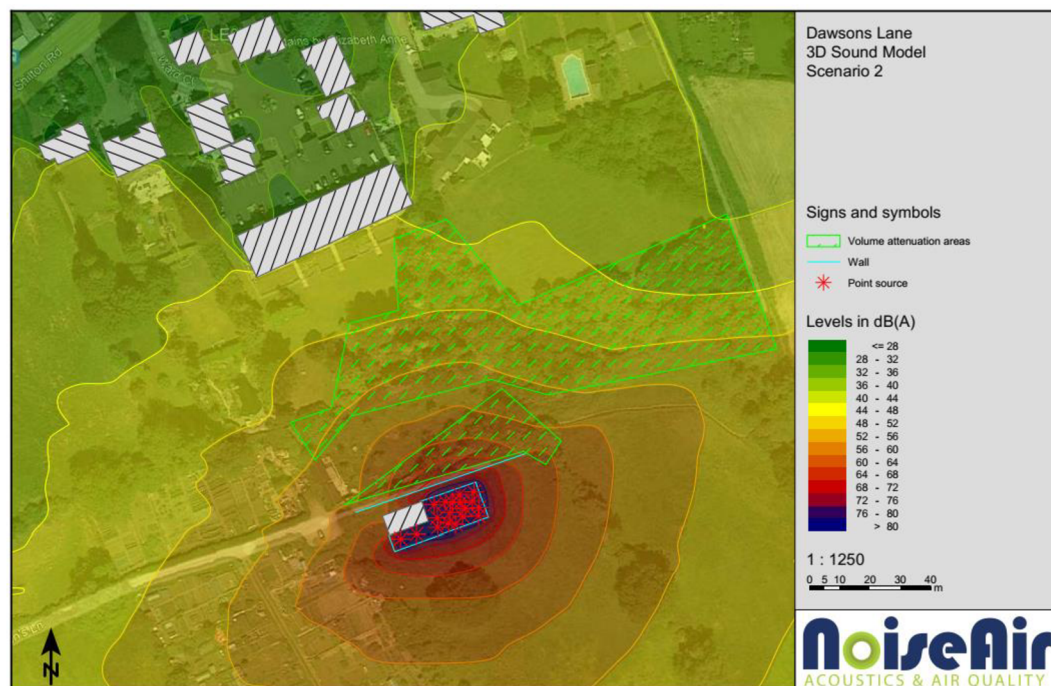


Figure 7: Noise contour plot illustration of the predicted dog barking noise propagation to the existing residential receptors during the daytime for Scenario 2 – $L_{Aeq,1hour}$.

4.4.2 Predicted façade readings have also been calculated. **Figure 8**, presented below, details the predicted façade noise levels at the nearby residential receptor locations investigated.



Figure 8: 3D sound model façade noise levels for Scenario 2.

4.5 3D Sound Model Results

4.5.1 **Table 7** below details the predicted noise levels at each façade receptor location.

Table 7: Summary of predicted façade sound levels from 3D sound model			
Façade Receptor Number.	Floor	Calculated Noise Level (Figures in dB L _{Aeq,T})	
		Scenario 1	Scenario 2
1	GF	39.6	44.4
	1.FL	43.8	45.9
2	GF	42.9	44.5
	1.FL	45.2	46.3

5 NOISE IMPACT ASSESSMENT

- 5.1.1 Data collected from the development site over approx. two days has provided a robust dataset from which to determine a typical background sound level.
- 5.1.2 As discussed in Section 2 of this report assessment of the proposed canine day care facility is to be undertaken in accordance with SPG-LPBBD 1999.
- 5.1.3 The SPG-LPBBD assessment for the proposed canine day care facility with respect to the nearest noise sensitive receptors is detailed in **Table 8** for the proposed operating hours.

Table 8: Summary of SPG-LPBBD for the proposed canine day care centre at the development site					
Receptor	Background Sound Level dB(A)	Sound level dB(A)			
		Scenario 1		Scenario 2	
		Specific Sound Level	Excess of Rating over Background	Specific Sound Level	Excess of Rating over Background
1	43	44	+1	46	+3
2	43	45	+2	46	+3

5.2 Assessment Context, Residual Risk and Recommendations

- 5.2.1 We calculate that the dog barking noise level will marginally exceed the measured background sound level, in the case of Scenario 1 up to +2 dB(A) and Scenario 2 up to +3 dB(A). It is noted however that when compared against the measured typical $L_{Aeq,T}$ noise level (46-51 dB(A)), the calculated noise levels are unlikely to exceed this level.
- 5.2.2 Given that the assessment of 18 dogs barking simultaneously represents a conservative approach, the aforementioned dog barking noise level therefore indicates that the noise is likely to be largely inaudible however there may be some occasions when dog barking noise is just audible at the NSRs.
- 5.2.3 Given the slightly lower noise levels associated with Scenario 1, we would recommend this option. We also consider that the position and proposed location of the acoustic barrier represent good acoustic design to ensure that noise level breakout is maintained at as low a level as possible.

5.2.4 In addition however and to ensure that noise level breakout remains at a low level in the future, we would also recommend that a noise management plan is implemented at the development site which is agreed with the local authority.

5.2.5 The noise management plan should seek to actively reduce noise levels through good management by ensuring that all staff operating at the development site are aware of the potential for noise breakout and measures which can be taken to reduce the aforementioned noise breakout. The noise management plan should also outline a complaints procedure which as a minimum provides a process for how complaints are logged and what actions should be taken. The noise management plan should be maintained as a live document which can be updated over time as the local environs change.

5.2.6 It is considered that with the implementation of a noise management plan and good acoustic design, while it is acknowledged that a risk of audibility exists under certain circumstances, the overall noise breakout from the development site is likely to present as a **low impact**.

5.3 Uncertainty

5.3.1 Uncertainty of measurements can have a significant effect on the outcome and findings of an assessment and therefore such constraints are documented and discussed below.

5.3.2 The SLM used was Norsonic Class 1 SLM, 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

5.3.3 The sound levels measured (which include busier and quieter periods) are considered to be typical for a rural area.

5.3.4 Wind speeds during the survey visits were typically less than 5 ms^{-1} and the effect of wind generated noise is not considered to have a significant impact on this assessment.

5.3.5 It is acknowledged that the SPG-LPBBD assessment has been undertaken without the specific sound source details however given all considerations uncertainty of the measurements and assessments are unlikely to affect the outcome.

6 CONCLUSIONS

- 6.1.1 NoiseAir has carried out a noise impact assessment with respect to a proposed canine day care facility to be located at land Southeast of Dawsons Lane, Barwell, Leicestershire.
- 6.1.2 At the time of writing, proposals provided to NoiseAir detail the change of use of land to provide a dog day care facility and associated fence.
- 6.1.3 As part of this assessment, NoiseAir has carried out a primarily unattended noise survey to complete an NIA with respect to likely noise breakout from the development site.
- 6.1.4 We recommend that a noise management plan is implemented at the development site which is agreed with the local authority to help minimise noise breakout from the development site.
- 6.1.5 It is considered that with the implementation of a noise management plan and good acoustic design, while it is acknowledged that a risk of audibility exists under certain circumstances, the overall noise breakout from the development site is likely to present as a **low impact**.

APPENDIX A - REPORT LIMITATIONS

This Report is presented to Hinckley Pets in Home Limited 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 Hinckley Pets in Home Limited 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.

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

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

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

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

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

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

Symbols

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

$p_{A(t)}$	Instantaneous A-weighted sound pressure (Pa)
R	Sound reduction index (dB)
R_w	Weighted sound reduction index (dB)
T	Time interval (also used for reverberation time) (s)
t_0	Reference time interval (s)

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