

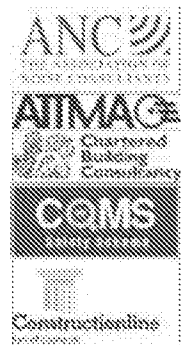
Acoustic Associates Sussex Ltd

Planning Application – Desktop Noise Assessment

Site: Hangleton Lane, Ferring, West Sussex. BN12 6PP
Client: WADARS Animal Rescue

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Date: 22/05/2020
Project: J2938
Issue 1



Sound Insulation Testing - Acoustic Design of Buildings - BS4142 - PPQ24 - Schools Acoustics BS893 -
Vibration - Expert Witness Testimony - Noise at Work - Air Tightness Testing - Auditorium Acoustics

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This report has been prepared for the private and confidential use of WADERS Animal Rescue. This report has been prepared by Acoustic Associates Sussex Limited with all reasonable skill, care and diligence and presents information included within the scope agreed with the client. If any third party whatsoever comes into possession of this report, they rely on it at their own risk and Acoustic Associates Sussex Ltd accepts no duty or responsibility (Including in negligence) to any such third party

1 Introduction and Executive Summary

Acoustic Associates Sussex Limited (AASL) have been appointed to undertake an acoustic assessment to support a planning application to develop an existing animal rescue centre at Hangleton Lane, Ferring in West Sussex. Specifically, the application seeks the introduction of three new dog kennel buildings.

Standards and guidance referenced for this assessment include:

- ISO9613 (Attenuation of sound during propagation outdoors) 1996
- BS4142:2014-A1:2019 – Methods for rating and assessing industrial and commercial sound
- BS 4142:2014+A1:2019 Technical Note, March 2020
- BS8233:2014 - Guidance on sound insulation and noise reduction for building
- ProPG2017- ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise

To understand the site layout and context, a site visit was made on 13th May 2020, where two class 1 sound level meters were used to measure 1 hour reference periods in line with BS4142:2014:A1-2019. The measurements were representative of both the Western residential receptors and the Eastern/Northern Equestrian uses.

Noise modelling software was used to predict sound levels arising from the newly introduced 3 dog-kennels at the East of the site, which incorporated previously measured sound data for dog barking and animal boarding sites.

The noise modelling software assessed four scenarios as worst cases with all kennels occupied and 4 of the 5 external exercise yards in use (daytime only). The scenarios considered daytime uses with all kennel doors open and exercise yards used, doors closed with exercise areas used and night time without any external exercise yards being used. The night time assessment considered both L_{Aeq} and L_{Amax} values to determine how dog barking might be perceived at the receptor locations.

As per the requirements of the local planning authority at Arun, receptor positions were also considered for the Equestrian Centre to the North and these are discussed in more detail within the report.

The report has used BS4142:2014-A1:2019, as well as the newly introduced Technical Note dated March 2020 regarding the use of the standard for assessing domestic animals in a commercial setting. Application of the guidance makes the report more robust, albeit not formally adopted at this stage.

The report concludes that due to the design of the new kennels, their distance from receptors and the mitigation measures being proposed, that the noise impact from the new kennels remains well below measured background sound levels. Uncertainty and context, in line with the requirements of BS4142:2014 have been stated and discussed within the report.

Planning consent should not therefore be withheld on noise grounds.

2 Context, Noise Criteria & Noise Assessment Methodology

2.1 WADARs Animal Rescue

WADARs is an animal rehoming charity which has been present on the application site since January 2014. Presently the site consists of an existing cattery unit and a number of stables, as a result of the fact that the site once belonged to the adjacent equestrian centre to the North.

It is proposed to develop and improve the site further by adding a number of buildings including a reception area, a new cattery unit, training area and 3 separate dog kennels. The kennelling is split into three distinct blocks with these being canine isolation, rehoming and intake. Intake as the name suggests is where a dog would be assessed on its first arrival at the site, whereas the rehoming block is for dogs which have been more accustomed to a kennelled environment and await a future home.

The proposed improvements to the site remove any reliance on dogs having to be boarded at third party commercial locations and reduces the stress of transit for animals accordingly by having everything required on one site. Having dogs on site also allows site staff to access the animals day or night, which would not be possible at a commercial boarding establishment restricted by hours of opening.

As part of a planning application to develop the site (FG/6/20/PL) the local planning authority at Arun have required an acoustic report to consider the noise impact of the new kennel areas. It has been required by Arun District Council that the noise impact must consider both residential receptors as well as the riding school in close proximity.

The report only assesses the impact of dog kennelling at the application site.

Accordingly, it has been agreed with the local planning authority at Arun, that a desktop assessment will be acceptable to consider the noise impact from the proposed kennels and external run/exercise areas.

2.2 Planning Context

The current planning application submitted to Arun District Council is reference number FG/6/20/PL and states as follows:

“Development of Animal Rescue Centre, to include new buildings for reception, training & education, cattery, kennels & associated ancillary accommodation, conversion of existing barn into staff accommodation along with driveways, car parking & landscaping. This application is a Departure from the Development Plan.”

It is noted that the previous change of use to allow the use of the site for kennelling was based on the assumption of re-using the numerous stable block accommodation on site. This is however not the case, with new bespoke designed accommodation being used for the kennels which will be a significant improvement on the reuse of the old horse stable areas.

The clients have spent a number of years planning as well as visiting other animal rehoming sites to understand what works and importantly, what techniques and structures represent best practice in terms of minimising noise to neighbouring properties.

2.3 Setting and Location

2.3.1 Wider Area

Figure 1 below shows the application area and the surrounding buildings.

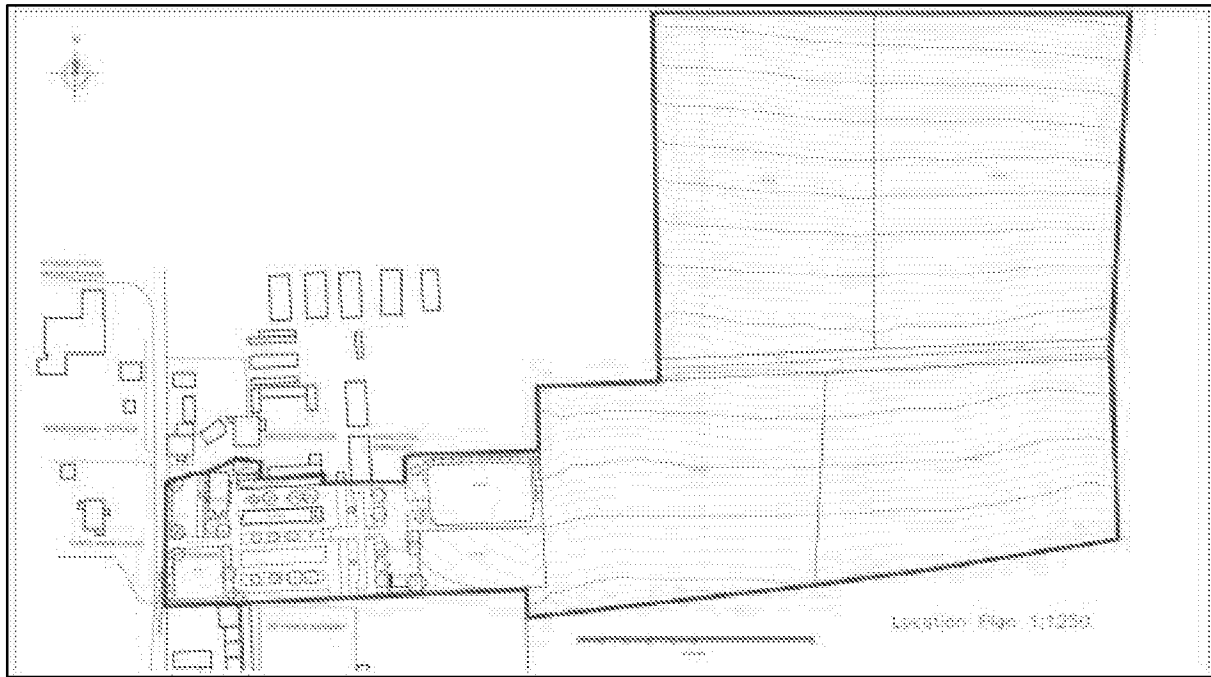


Figure 1. Existing Site Plan, Application area outlined in Red

2.3.2 Proposed WADARs Area

Figure 2 below details the proposed layout for the site. Orange buildings are those which already exist, whereas Red buildings are the proposed new buildings as part of the site improvements. Dark Green areas noted to the East of the three kennels are external exercise areas.

Also noted is the training area, located near the cattery and reception where dogs might be shown to prospective new owners, as opposed to members of the public visiting the kennels and unsettling/exciting the other dogs.

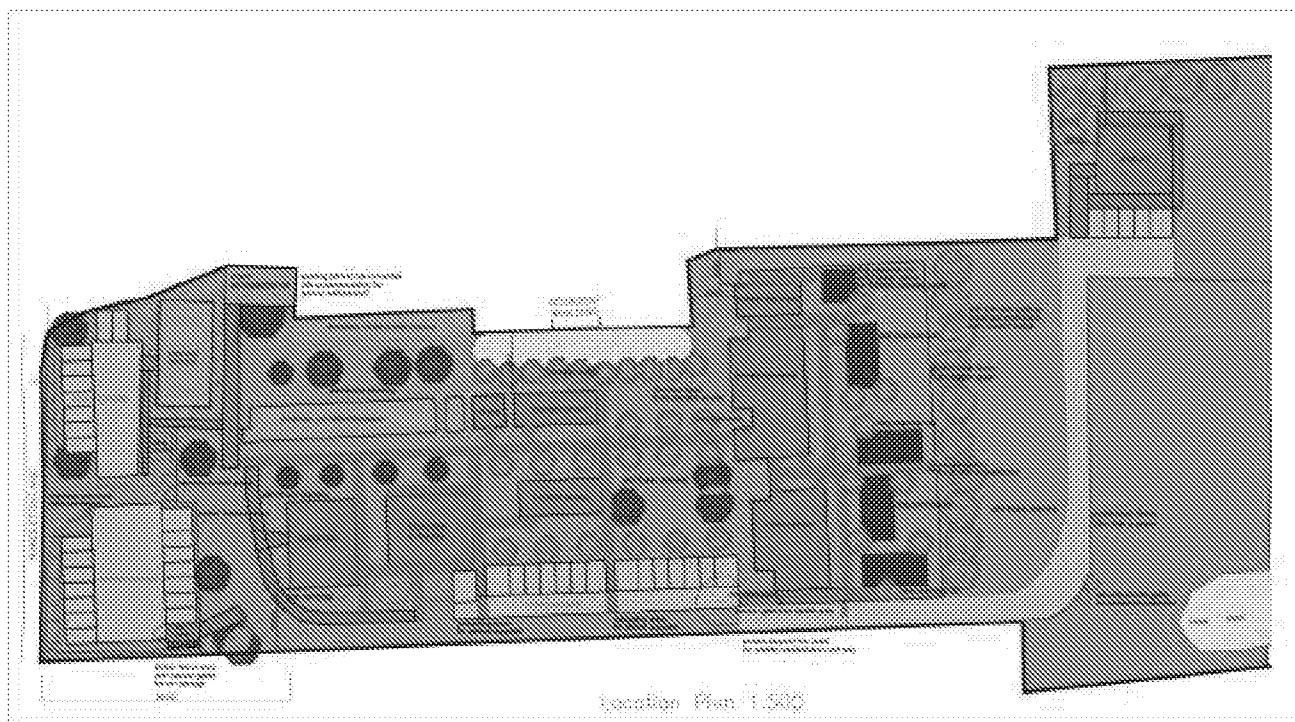


Figure 2. Proposed New Buildings and Site Layout (orientated North)

2.3.3 Proposed Kennel Areas

Figure 3 below details the plan view of the three respective kennel layouts with their ancillary areas such as stores, assessment areas, offices, laundry and quiet areas/assessment rooms. These are linked in a North to South layout via a footpath as shown in Figure 2 above. Note that the Western side of the kennels are used as a buffer with administrative rooms for storage etc.

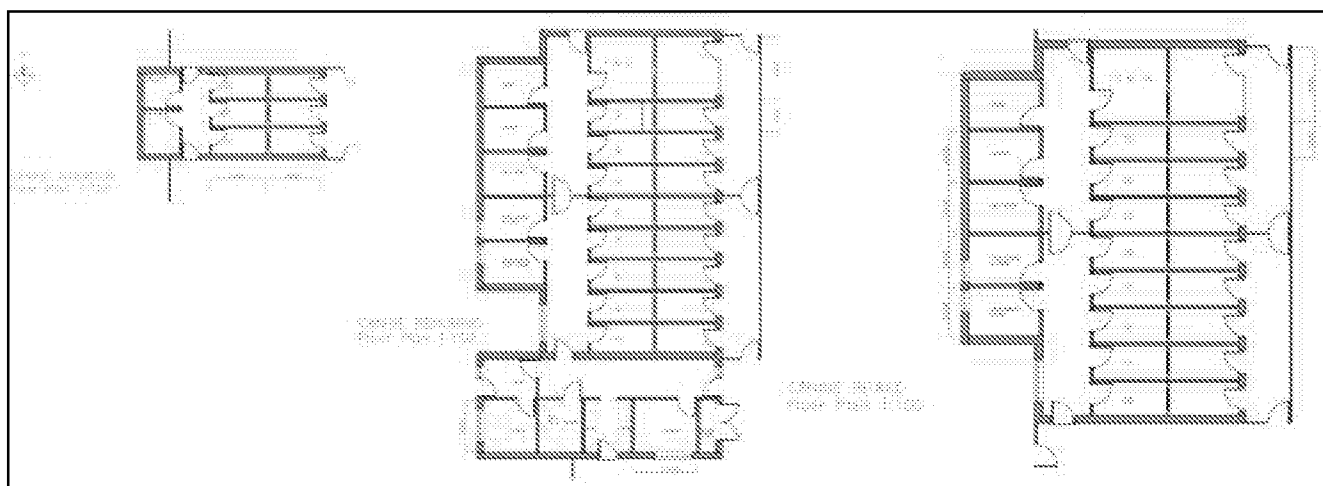


Figure 3. Proposed Kennel Internal Layout (Left to Right, Isolation, Rehoming, Intake)

The Isolation area is proposed to hold a maximum of 3 dogs, the Rehoming area, 10 dogs and the Intake area, 9 dogs. It is noted that the site will not continually be at full capacity. Isolation areas will only be used as a last resort and provides a useful and deliberate space/buffer in terms of locating the main dog kennel buildings further South from the riding area to the North.

Aside from the enclosed kennel areas, there are 5 fenced external dog exercise areas located further to the East which have a 2m solid timber fence enclosure designed to prevent the largest dogs from scaling the fence. Figure 4 below details the type of close boarded fence with return inward facing mesh fencing to prevent dogs scaling the walls.

It is noted that all dog kennel doors from the kennels face East and in front of the kennel East façades are an additional 1.8m close boarded timber fence designed to prevent having dogs with a direct line of sight to other dogs and/or activities.

Similarly, the East facing kennel doors are also proposed to be a mixture of solid panel and glazing with the solid panelling obscuring the bottom part of the door to prevent dogs seeing other dogs being removed from their kennel spaces. An example of the external facing kennel door is seen in Figure 4 below (right hand image). It is noted that the glazed panels are openable to allow ventilation of the kennel spaces.



Figure 4. External Exercise Areas and External Kennel doors

Whilst the consent does not allow more than 22 dogs, this would be at full capacity and it is more likely that 14-18 dogs would be present at any one time. It is relevant to reflect that one of the reasons which dogs bark is with them being able to see one another, which the kennel design has sought to prevent at an early stage of the design and as a result of visiting other successful dog boarding sites.

For the external exercise areas, these are likely to be used only when the dog's kennels are being cleaned out and would typically be used for up to 2 hours at a time. There are toys and structures to be positioned within the exercise areas to ensure that the dogs are not bored and do not bark unnecessarily. It is relevant to note again that no dog has sight of another dog within the animal rehoming centre.

Volunteers are used to walk the dogs daily off site for exercise and stimulus off site away from the WADARs centre.

2.4 Client Led Design

It is noted that the client has researched the design and layout of the kennels over a number of years which has included visits to other sites to ensure that best practice is applied in the design and running of the kennel buildings. This is reflected further in section 2.8 below.

2.5 Site Soundscape

The WADARs Animal Rescue site was visited briefly to understand the site layout. Whilst present on site, background sound levels were measured at the front and rear of the site using two Norsonic type 1 sound level meters which were tripod mounted and freefield.

2.5.1 Hangleton Lane

The soundscape at Hangleton Lane (ie front/East of the site) consisted of passing traffic, distant road traffic from the A259 to the South, metallic banging and welding from a garage unit to the South (The Scooter Warehouse), distant train horns and occasional reverse beepers. During the measurement process, an unexpected delivery/donation occurred via a HGV using both a reverse beeper, a tail lift and a hand truck to unload a pallet of animal feed. Birdsong and gulls were also noted.

In an hour reference period, 11 cars, 1 HGV, 2 bicycles and 6 pedestrians passed the centre.

2.5.2 Eastern/Northern Boundary – Manege

The site soundscape consisted of distant road traffic noise from the A259, as well as cockerels, occasional dog barks from the Equestrian centre and horse-riding instruction. At the beginning and end of the measurement period, the Northern most ménage belonging to the Equestrian centre was in use with a lesson at the beginning and a horse being exercised at the end. Vehicle movements were also noted on the equestrian site.

2.6 Proposed Hours of Use

The site is run by a small complement of regular staff and a number of volunteers who attend to run the offices and assist with cleaning out of the animals. The site is open to members of the public between 11:00 hours and 15:00 hours 6 days a week. The site is carefully and sympathetically laid out to ensure that animals are away from the road and not distressed by visitors.

2.7 Day to Day Routine (Dogs Only)

It is noted that the last welfare check of the animals occurs at 18:00 hours. There is no further contact with any of the dogs after this time and lights are minimised to ensure that the animals can sleep and rest. The routine for the dog care/kennelling is discussed below.

- Kennel staff would arrive at 8am to begin cleaning out and feeding dogs (cattery and wildlife staff arrive at the same time)
- Office staff arrive at 9am, but will be in a building 45m away from the kennels
- Visitors to the site will only be able to come between 11am and 3pm, Tuesday to Sunday (The centre will be closed to the public on Mondays) and dog viewing is by appointment only
- Once all animals have been cleaned out and fed, dogs will either be taken off-site for exercise or volunteers will sit with them in their kennels
- Early-afternoon will be 'quiet time' for dogs, when calming music is played and lights switched off – during this time no staff or volunteers will be in the kennels themselves and will instead be cleaning equipment and preparing feeds, etc
- Kennel staff clean and feed the dogs again mid-afternoon and then clean the exercise runs
- Kennel staff leave site by 5pm
- The person living on site will carry out a last check of dogs/security for that end of the site no later than 8pm

2.8 Measures Taken to Minimise Dog Barking

The measures that will be implemented to limit dogs barking at Ferring include the following:

- The kennels are deliberately sited away from areas of the Centre where there is most traffic (either foot traffic or vehicular) so that as far as possible the dogs are not disturbed by external sounds.
- All kennels will be facing the same direction (east). Historically kennels were built either around a central courtyard or in long blocks facing each other. Because the dogs could see each other they tended to bark. In our set up, dogs will not have direct views of each other
- Our kennels are divided into three blocks – isolation, intake, and homing. Each block will be self-contained, and the kennels will be enclosed. The design ensures that the isolation block (which will rarely be used) is the one closest to our boundary with the riding school to the North.
- Sound-reducing baffling on the walls of the corridors are proposed for each kennel block
- A sound system will be installed in order that the centre are able to play calming music for the dogs, and at certain times each day the lights will be turned off to encourage the dogs to be calm/sleep – this is done very successfully at other rehoming centres
- Volunteers will regularly come in and sit with/interact with dogs in their kennels so that the dogs recognise their kennel as a safe, happy space and remain calm
- The outdoor exercise areas will be fully fenced so that dogs cannot see each other or any external distractions which might otherwise encourage them to bark
- Each exercise run will be equipped with a range of enrichment toys and equipment to keep the dogs occupied whilst outside in the fresh air
- To prevent dogs getting over excited and setting off other dogs, potential adopters will not be able to go into the kennel blocks to view them, instead, they will be introduced to adopters in one of the socialisation/quiet rooms
- Dogs will be taken out daily for off-site exercise rather than purely having access to the exercise areas.

Whilst the above measures seek to influence the behaviour of the dogs, it is noted that in the corridor areas, wall mounted sound absorbent baffles/panels are proposed to be introduced, which reduce the hard surface areas which allow the reflections from dog barks to occur. Such absorbers work by reducing the reverberant sound energy which will reduce sound levels and make the internal environment more acceptable to volunteers/staff who are expected to work inside the buildings.



Figure 5. Internal Wall Mounted Absorber Panels

Absorption is discussed later within the report in section 8.

2.9 Existing WADARs Animal Rehoming/Care Sites

Presently, dogs are kennelled elsewhere within a commercial boarding facility at Shoreham without any adverse noise complaints that the client is aware of.

Having the dogs and animals all in one place will reduce the stress caused by transit and also benefit the animals as access may be granted 24/7, whereas opening hours constrain visits at an existing boarding facility used. It is noted that the current site used, when at capacity can have as many as 100-150 dogs onsite which is significantly more than is being proposed at the Ferring application site.

2.10 Identification of Noise Sensitive Receptors

Liaison with the Senior Planning Officer at Arun District Council, Andrew Wood indicated that the riding school/equestrian centre located to the North would also need to be considered as a receptor location. The stables to the North have therefore been added to the computer model at a ridge height of 3.2 metres and a receptor position placed at 2.5 metres in height, representative of an open upper stable door. However, it is noted that the first building to the North is a former café and now serves as a reception area.

Whilst elements of the equestrian centre may be considered as receptors as part of the assessment process, it is queried as to what level of sound stimulus/ disturbance might cause interference with either a riding lesson or horse behaviour, as these are unknown areas with minimally published material.

In terms of residential receptors, Carol Anne House, White Lodge, Highdown Hill Cottage and Hangleton Lodge have all been added into the model as residential buildings with receptor positions added to represent ground floor (living accommodation) and first floor bedrooms at 1.5m and 4.0m respectively.

It is relevant to note that staff members for the safety, security and welfare of the animals will live on site in the converted barn. For the sake of a robust report, the staff accommodation has also been entered as a receptor point on the Eastern façade, as no further windows were being proposed.

2.11 Proposed Site Assessment Methodology

Whilst the original and updated version of BS4142:2014;A1-2019 states in the scope of the British Standard that it is not to be applied to the rating and assessment of sound from domestic animals, the recently published BS4142:2014 Technical Note dated March 2020 states as follows:

“The majority view of the WG was that the test for exclusion of ‘domestic animals’ (Subclause 1.3e) is applied to the setting rather than the type of animal. Animals kept on domestic premises are therefore considered to be beyond the scope of BS 4142 whilst the same animals in a commercial setting could, in theory, be within the scope, e.g. a kennel”

It is therefore proposed to consider a desktop assessment using a BS4142:2014;A1-2019 approach. With the Western and Eastern elements measured in line with the daytime 1-hour reference period, a noise modelling approach may be applied to consider various likely and worst case scenarios for the operation of the animal rescue centre.

To ensure a robust presentation, the daytime assessment will consider L_{Aeq} , whereas the night time assessment will consider both L_{Aeq} and L_{Amax} values also, the latter of which may be assessed against the scientific principles of restful sleep discussed in ProPG2017.

The assessment will apply previously measured data of dog barking for both internal and external areas which AASL have measured.

3 Measurements Previously Undertaken and Assumptions Made

3.1 Measured External Dog Barking (Kennel Edge)

During a previous acoustic assessment involving kennelled dogs Acoustic Associates Sussex Limited (AASL) recorded a large male dog barking inside a kennel at 1m of 96dB $L_{Aeq,1\text{ minute}}$ and 106dB L_{Amax} value.

The AASL measured values are consistent with other measurements made in relation to dog barking detailed in the Institute of Acoustics Bulletin dated June 2016, Page 47.

The latter L_{Amax} value is the short duration but high-level sound generated by dog barking. Given that the measurement was not freefield and in close proximity to the kennel with its hard surfaces, the dog barking was recorded in reverberant conditions. Reverberant conditions are where the sound energy is increased due to the enclosed nature of the environment and the energy produced propagates against hard surfaces.

Whilst L_{Aeq} and L_{Amax} values are equally important metrics for measuring sound, it is the short sharp bursts of sound energy which are reflected within the L_{Amax} value which may cause the sound to be heard or noticed due to their intermittent and potentially impulsive nature. The measured spectral frequency is shown below with the sound energy generated from dog barking located in the mid frequency range. The spectral frequency is important as it will be used to accurately enter into the noise modelling software.

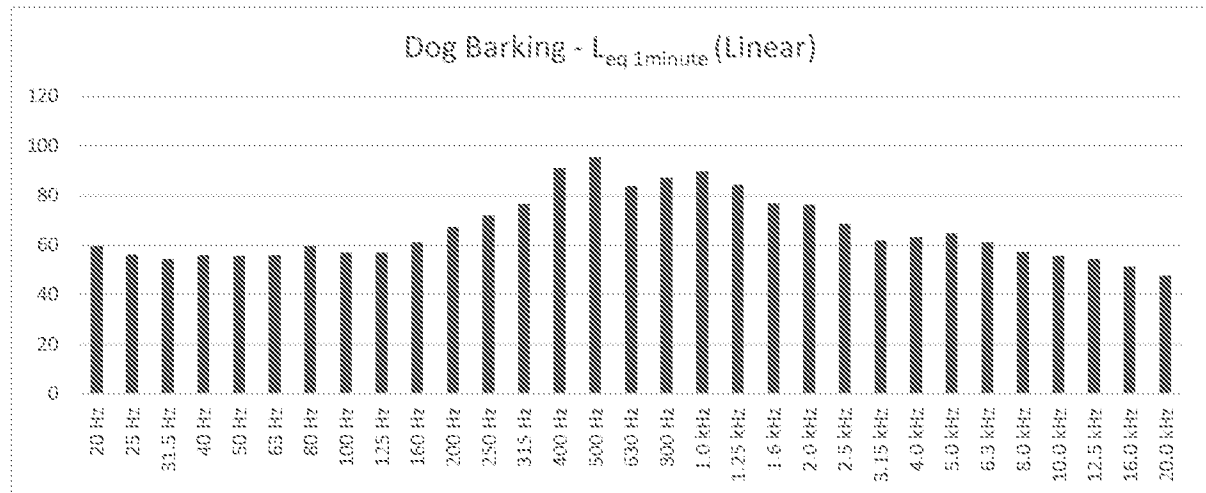


Figure 6. L_{eq} 1 minute of dog barking. Note that the measurement is Linear, ie not A weighted.

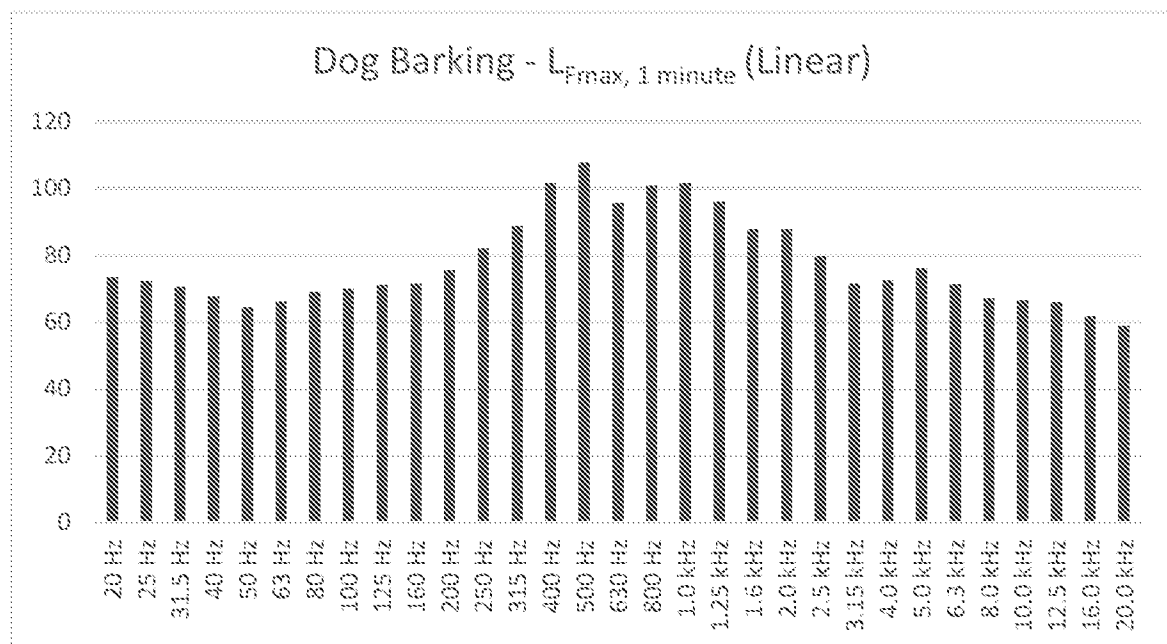


Figure 7. Same Dog Barking Profile as seen in Figure 6 above, but reviewing L_{Amax} spectral energy, again Linear.

The data from Figure 6 when input into a noise model for an external dog/noise source will be useful as entering spectral data into a noise model details more clearly the effectiveness of any barriers used or applied around the site.

3.2 Measured Dog Barking – Open Exercise Areas

A recent AASL project was undertaken to measure dog barking in an open field area, where measurements were made both with and without dogs present to be able to establish a reasonable indicator of where L_{Amax} events belonged to dog barking as opposed to road traffic. Whilst there were 50 dogs present and a full hour was measured, there were 920 events measured above 75dB L_{Amax} which was the threshold for road traffic noise and equated to a bark approximately every 4 seconds.

With the 1 second values filtered and all L_{Amax} values above 75dB grouped together, the $L_{Aeq, 1 \text{ second}}$ value was averaged as 77.9dB

With 4 seconds x 50 dogs equates to a single dog barking once every 200 seconds, or just over 3 minutes.

The on-time correction therefore equates to 20 events in an hour (assuming a bark is a second long) period and would be calculated as $10\log(20/3600) = -22.6\text{dB}$.

The corrected 1 hour value to account for measured background conditions was 77.3dB, therefore, for an hour daytime reference period, the sound pressure level would be $77.3 - 22.6 = 54.7\text{dB } L_{Aeq, 1 \text{ hour}}$.

3.3 Internal Measured Dog Barking

During a previous AASL project where daytime dog boarding was being assessed, there were rooms where a number of dogs resided and measurements were made over a number of 30-minute periods. The internal layout is shown below in Figure 8.

To ensure that the data remained representative, site staff, who were familiar with the dogs entered and placed the sound level meter, as unfamiliar individuals would have caused unnecessary barking.

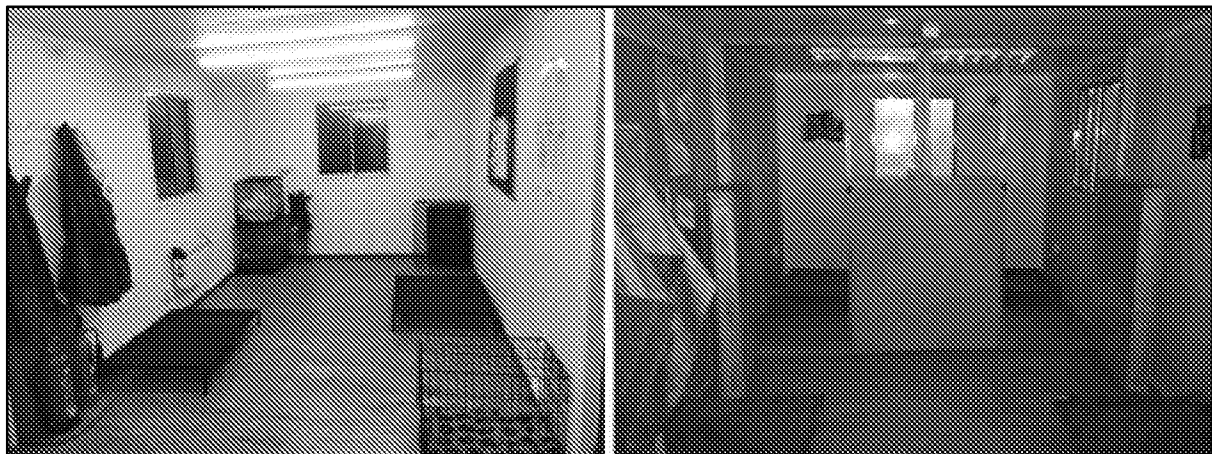


Figure 8. Internal Dog Cabins

The noise level measured inside the cabins was 79.8dB $L_{Aeq, 30 \text{ minutes}}$ and 106.1 dB $L_{Amax, 30 \text{ minutes}}$, the latter of which is consistent with what was measured historically by AASL for a kennel type environment.

Such sound levels are consistent with measurements taken for internal spaces carrying out dog boarding activities where numerous dogs of different sizes were present in another AASL project.

3.4 Assumptions Made

To ensure a logical approach to the assessment, the following assumptions have been made and confirmed by the client:

- Dogs for the majority of the time will be inside their respective kennels, aside from when they are either being walked or in the external exercise area.
- It is assumed in the reporting that each kennel will be used, when in reality, this might not be the case.
- Only a single dog will occupy an individual exercise area.
- It is assumed that the Northern most external exercise area will not be used, as if dogs are in isolation, they are not likely to be well and will be receiving attention accordingly.
- Where dogs are removed from the kennels this is only ever carried out one at a time. An example being where potential new owners might attend site and the dog would be brought from the rehoming kennels to the training room area. The dogs having restricted visibility of each other and minimised disturbance to the kennels prevents the dogs from unnecessary barking.
- A worst case would include dogs present in all 4 external exercise areas and all East facing kennel doors open
- During the daytime, dogs are walked but also will utilise the external exercise areas whilst their kennels are being cleaned etc. A single dog has therefore been entered into the noise modelling software as a point source located at 0.6m high within the exercise area.
- During the night time period (23:00-07:00 hours), dogs will not be located outside.
- During the night time period, there would not be any contact with the dogs which might encourage barking etc.
- Given that internal measurements (79.8 dB $L_{Aeq, 30 \text{ minutes}}$) are held for dog activity inside kennels for 30 minutes, these may be applied for a single hour period.
- In terms of the acoustic protection offered by the glazed and solid bottom kennel doors, these are likely to represent on conservative estimation 15 dB R_w . However, with the glazed partitions open which account for approximately 50% of the area, the sound will travel relatively freely outside of the kennel. The doors will therefore be modelled as both open and closed to present a robust report. In reality, it is likely that more than 15dB of attenuation may be provided.
- It is also assumed that during the night time period the kennel doors are closed.
- With the dogs asleep at night, it is not assumed that there will be barking. With site staff living on site, any cause for concern can be rapidly investigated.
- An L_{Amax} value is not relevant for a daytime assessment, but can be applied for a night time period, ie 23:00-07:00 hours. The consideration for restful sleep being taken from ProPG2017 is that L_{Amax} events inside a bedroom should not exceed 45dB L_{Amax} more than ten times a night.
- Given the desk top assessment, it has been assumed that there remains a 10dB drop in the measured $LA90$ background levels for the night time period at the application site.

- Whilst the dogs will inevitably sleep during the night time period, the model has been left as daytime to present a robust case, and to apply also L_{Amax} data in addition to the L_{Aeq} data.
- There is a 2m fence-line to be constructed at the Northern boundary which will separate the northern most manege used by the Equestrian centre from the kennel buildings to the South.

3.5 Scenarios to be Examined

The noise modelling software will be used to construct the following 4 scenarios:

- Worst case – Daytime – dogs in kennels with all East facing kennel doors open and exercise yards being used.
- Best Case – Daytime – Dogs in Kennels with East facing kennel doors closed and exercise yards being used
- Worst case night time – Dogs secured in kennels, doors closed and no use of external exercise areas. Use of L_{Aeq} values
- Worst case night time – Dogs secured in kennels, doors closed and no use of external exercise areas. Use of L_{Amax} values

4 Site Visit and Survey Work Undertaken

The animal rehoming site was visited on 13th May 2020 to better understand the existing site infrastructure and whilst present, background readings were taken of a 1-hour reference period, consistent with BS4142:2014 for the daytime period.

Survey(s) carried out by	Scott Castle BSc(Hons) Env Health, MCIEH CEnvH PGDip Acoustics MIOA
Equipment Used	Norsonic 118 Class 1 Sound Level Meter – Norsonic A (Attended) Norsonic 118 Class 1 Sound Level Meter – Norsonic B (Attended)
Equipment Used	01dB Acoustic Calibrator. Serial Number. 50241778
Location	Norsonic A – TQ 08993/03717 Norsonic B – TQ 08886/03686
Duration	1 hour – 13 th May 2020 Norsonic A (Eastern/Northern Menage) – 11:48 to 12:48 hours Norsonic B (Hangleton Lane)c – 12:02 to 13:02 hours

Table 1. Measurement and Survey Details

The measurement locations are presented below in Figure 9 (photographs) and Figure 10 (plan view of locations).

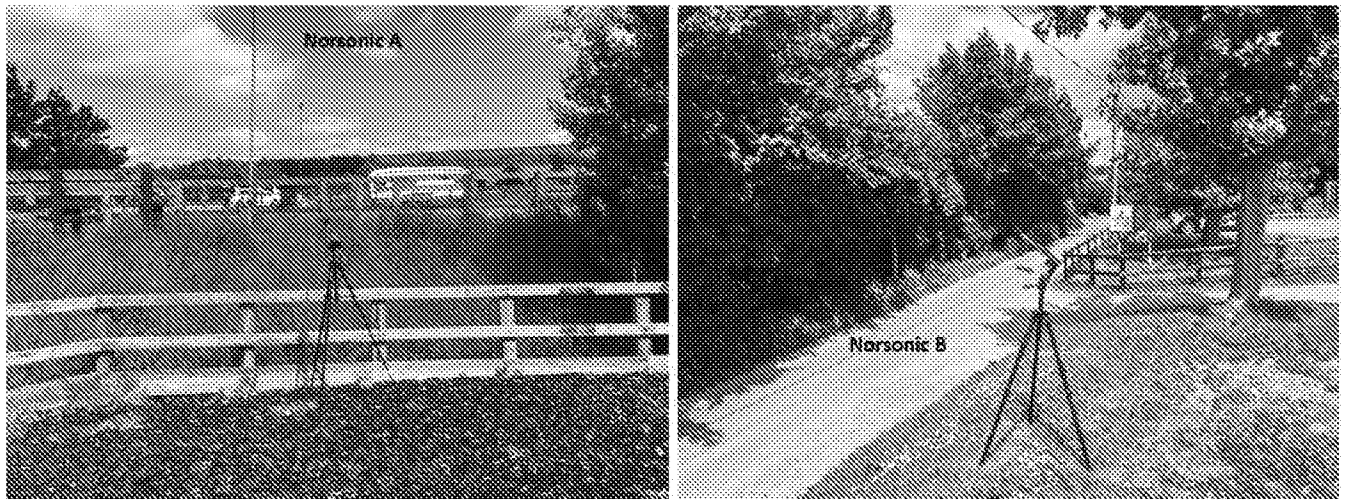


Figure 9. Location of Sound Level Meters - 1-hour Measurement

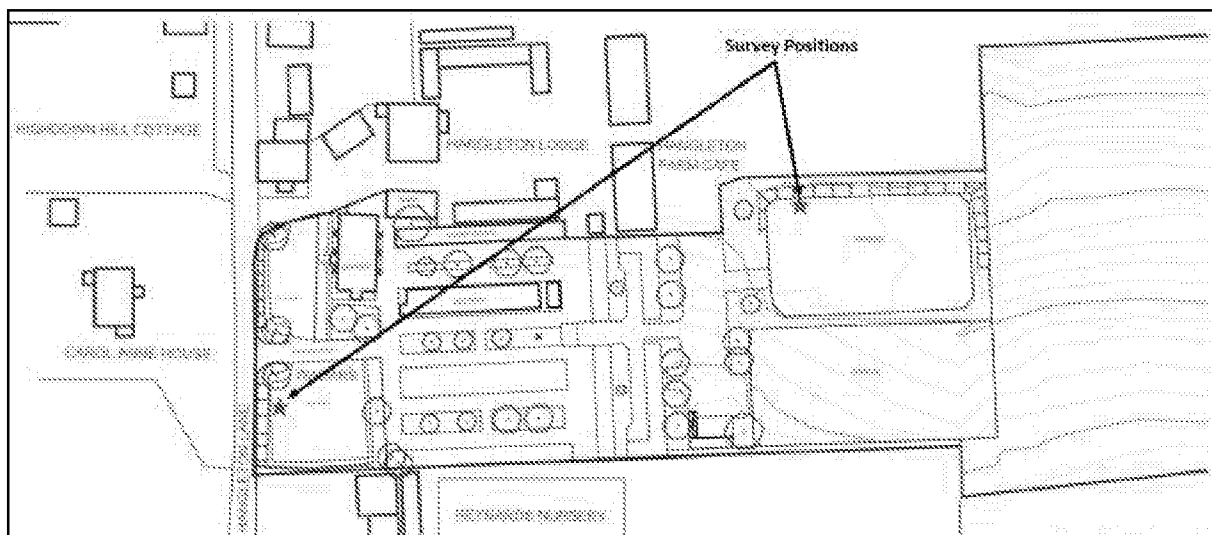


Figure 10. Survey Locations in plan view

The measured noise data is presented in Figure 11 below and indicates a very similar background sound level, within 0.1dB of one another, despite being in different locations and separated by approximately 127m distance from each meter.

Measured Background Sound Levels - $L_{A90,1 \text{ hour}}$		
Equipment	Norsonic A	Norsonic B
Location	North/East Boundary with Equestrian Centre	Adjacent to Hangleton Lane
$L_{A90,1 \text{ hour}}$	43.8 dB(A)	43.7 dB(A)
Measurements were freefield and A Weighted		

Figure 11. Results of Attended Site Measurements – Background Sound Levels ($L_{A90,1 \text{ hour}}$)

5 Noise Modelling Software

IMMI Wolfel Noise modelling software has been used to plot both area sources (kennels) as well as point sources (dogs in external exercise areas) within a model. The model works by predicting how the sound is likely to propagate across the site with careful attention paid to items such as building heights, barriers, buildings etc.

5.1 Noise Modelling Inputs

To ensure that the predictions made within the noise modelling software are as accurate as possible, care has been taken to list the modelling inputs to understand how the model has been constructed. The following model inputs are noted.

- All buildings on site in terms of footprint, location and height have been derived from architects plans.
- For the kennel construction, the three kennels have been constructed as area noise sources to ensure that the east facing doors can be appropriately built within the model.
- For the kennel walls and roof, discussion with the architect was undertaken to determine the proposed build and the specification was further constructed within INSUL noise software* to provide an indication of how the walls and roof will perform acoustically. Whilst there will be an additional render applied to the outside, this has not been included within the modelling.*INSUL noise software allows certain construction panels and frames to be built and predicts the levels of attenuation which will be provided using such materials.
- The kennel walls are dense concrete block with a 100mm cavity and a further course of dense concrete block to provide high levels of sound insulation. The 100mm cavity has been modelled with mineral wool(fibre) placed into the void and the walls are tied/secured using a butterfly tie. The wall provides an estimated R_w of 57dB.
- The roof uses a Kingspan style profiled deck with a void and a timber MDF board. Again, the 100mm cavity has been designed with 70 mm fill of mineral wool to control the build-up of reverberant sound within the cavity space. The roof is predicted to provide an estimated 42dB R_w .
- As a conservative assessment, the East facing kennel doors have been modelled as providing 15dB R_w when closed, which is consistent with a polycarbonate roofing panel and in reality with a glazed and solid panel combination the proposed dooring system may work with greater efficiency.
- Whilst an open door will provide some attenuation, for the purposes of this particular report and a robust assessment, the East facing kennel doors being open, these have not had any R_w applied and just amount to an open door, as per the architects plans.
- The model uses hard ground as a default setting.
- In terms of dog barking values, for the external exercise area, the on-time correction for a daytime hour has been applied for a dog as a point source at 0.6m above ground level. To ensure that the model remains accurate, the spectral profile ($L_{eq,1minute}$) taken from a male dog measured at 1m has been used and corrected to reflect the required 1-hour value. Using spectral energy profiles within noise modelling ensures that any barrier effects may be properly taken into consideration.

- For internal dog barking values, applied for inside the three kennel spaces, again, the spectral profile inside the dog cabins has been applied to ensure an accurate reporting process.
- Receptor positions have been applied for the residential as well as equestrian centre settings at both 1.5m to reflect ground floor and 4.0m high to reflect bedrooms. Receptor positions were also added at the closest positions of the 5 northern stables on the Equestrian site.
- For dog barking where 4 dogs in total from both the rehoming and intake kennels are located in the individual exercise areas (ie four in total), this leaves 2 doors in each kennel building where there is no noise source coming from the Eastern kennel door opening, as the dog is already outside and modelled within the exercise area.
- The noise modelling software already applies a 6dB inside to outside loss in sound pressure levels.

5.2 Noise Model Outputs

As discussed above, it is relevant to consider two daytime scenarios and two night time scenarios. For the daytime, the model considers East facing kennel doors both open and closed and four of the five external exercise yards used and uses $L_{Aeq, 1 \text{ hour}}$, whereas, for the night time assessment, the dogs are inside the kennels with doors closed and no use of the external exercise areas. For night, both $L_{Aeq, 1 \text{ hour}}$ and L_{Amax} will be used to determine how the residential receptors may be impacted.

To present a robust assessment, all scenarios make use of all three kennels at full occupancy, which may not always be the case.

5.2.1 Daytime. Kennel Doors Open and 4 Exercise Yards Occupied.



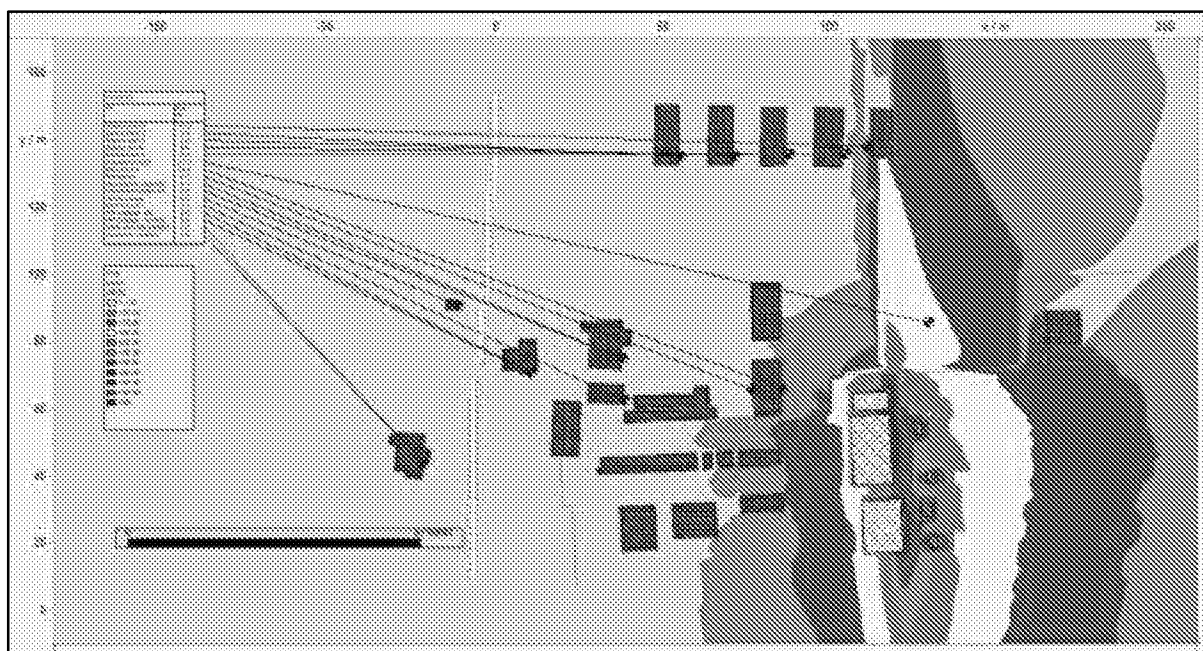
Figure 12. Daytime Model Predictions - Kennel Doors All Open and Exercise Areas In Use

Whilst the legend data detailing the predictions is relatively small in Figure 12 above, it is replicated below for ease of reference. Note also that the colour contours begin at below 10dB(A) in all model outputs to ensure a like for like comparison.

Locations	Predicted Freefield External A Weighted Sound Pressure Level- dB
Residential Properties	
Carol Ann House(Grd)	16.2
CarolAnn 1st-Bed	16.1
HH Cottage- Grd	17.1
HH Cottage- 1st-Bed	16.8
HangletonLodge-Grd	18.5
HangletonLodge-1st	21.3
Staff Accom	19.0
White Lodge	15.1
Equestrian Centre Receptor Positions	
Reception	23.3
Reception2	25.4
EquestrianStaff	37.0
Stable Door 1	16.3
Stable door 2	17.0
Stable door 3	17.7
Stable door 4	21.7
Stable door 5	29.7

Figure 13. Predicted External Noise Levels at both Residential and Equestrian Centre Uses

5.2.2 Daytime. Kennel Doors Closed and 4 Exercise Yards Occupied



5.2.3 Night Time, Kennel Doors Closed. No Exercise Yards Occupied- L_{Aeq}

The reception area and Equestrian Staff have been removed as receptors as these are not likely to be operational at night time. Note also that this is a worst-case scenario, when in reality, the dogs will be asleep.

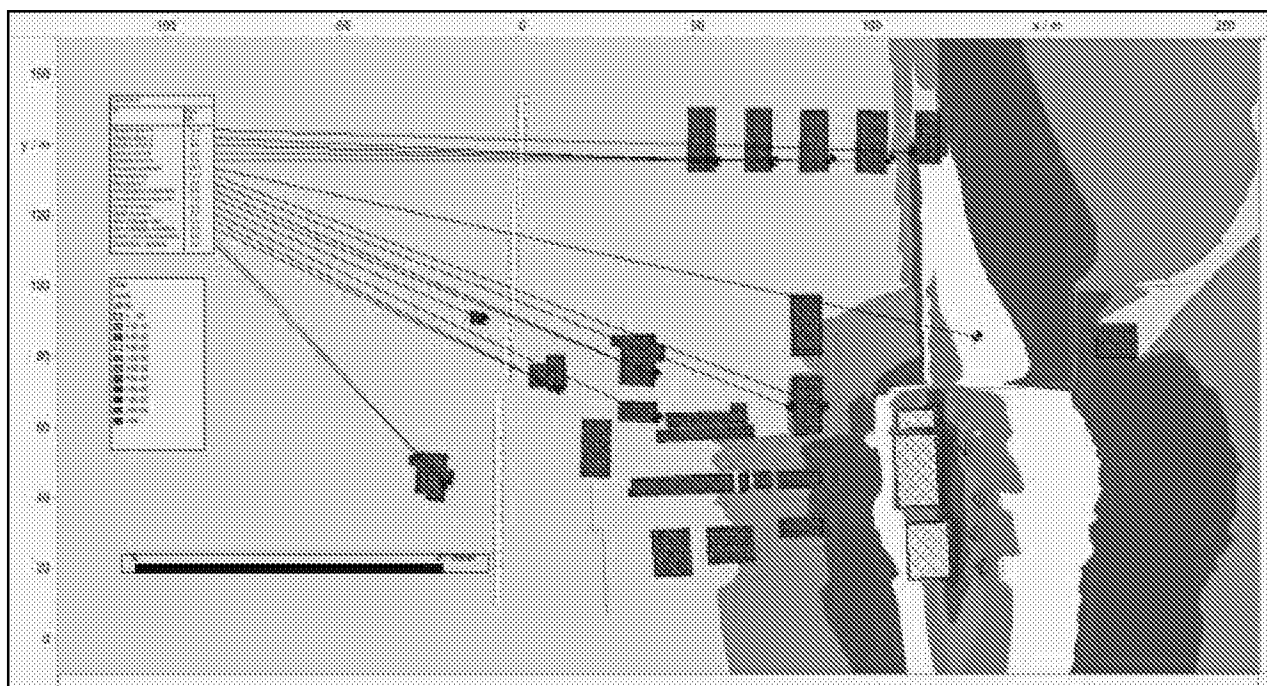


Figure 16. Night Time Use, Kennel Doors Closed - No Use of Exercise Areas- L_{Aeq}

Locations	Predicted Freefield External A Weighted Sound Pressure Level- dB
Residential Properties	
Carol Ann House(Grd)	2.9
CarolAnn 1st-Bed	3.4
HH Cottage- Grd	3.3
HH Cottage- 1st-Bed	3.3
HangletonLodge-Grd	4.9
HangletonLodge-1st	7.8
Staff Accom	5.2
White Lodge	1.3
Equestrian Centre Receptor Positions	
Stable Door 1	3.1
Stable door 2	4.0
Stable door 3	4.6
Stable door 4	7.6
Stable door 5	16.8

Figure 17. Predicted External Noise Levels at both Residential and Equestrian Centre Uses (no commercial operations)

5.2.4 Night Time, Kennel Doors Closed, No Exercise Yards Occupied – L_{Amax}

As per 3.1 above, an internal L_{Amax} value of 106 dB(A) has been applied into the model using the measured spectral energy values

The Equestrian reception area and Equestrian Staff have been removed as receptors as these are not likely to be operational at night time. Note also that this is a worst-case scenario, when in reality, the dogs will be asleep.

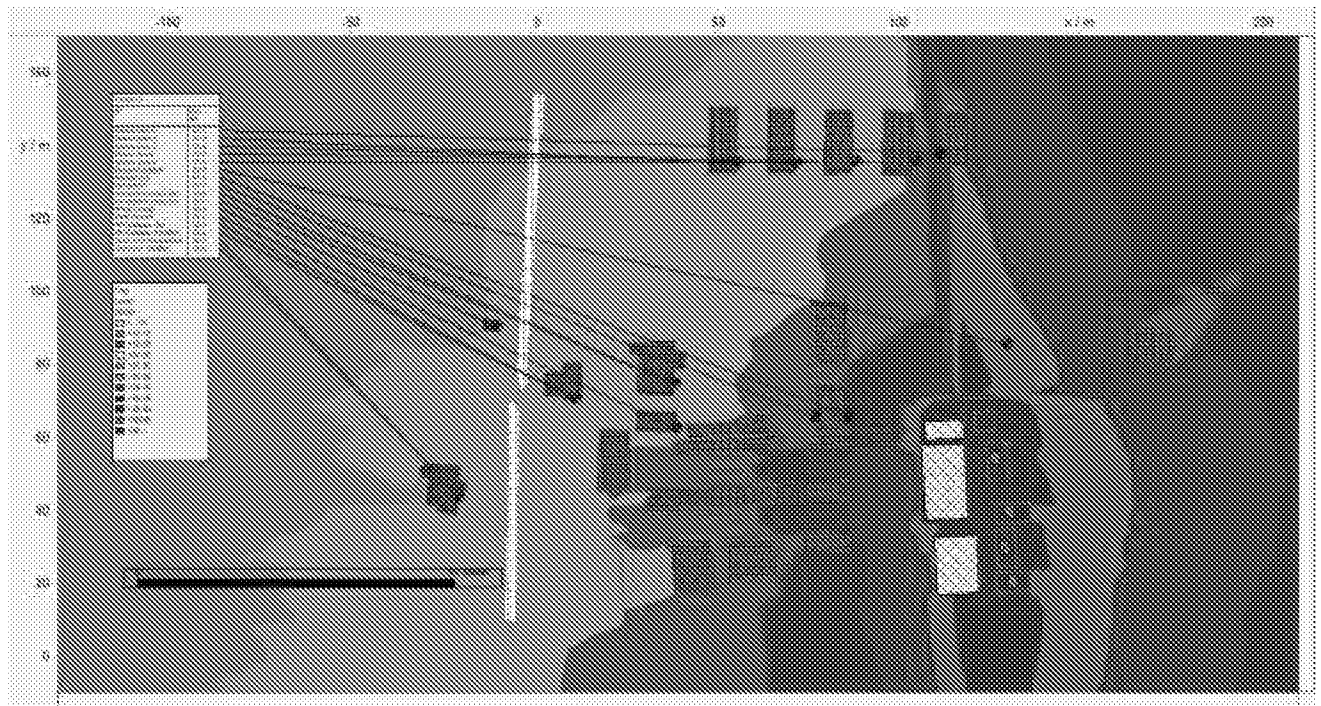


Figure 18. Night Time- Kennel Doors Closed - No Use of Exercise Areas- L_{Amax} Values

Note the consistent scale of 10dB and above has been applied.

Locations	Predicted Freefield External A Weighted Sound Pressure Level- dB*
Residential Properties	
Carol Ann House(Grd)	32.4
CarolAnn 1st-Bed	32.8
HH Cottage- Grd	32.3
HH Cottage- 1st-Bed	32.4
HangletonLodge-Grd	33.6
HangletonLodge-1st	36.5
Staff Accom	34.2
White Lodge	30.2
Equestrian Centre Receptor Positions	
Stable Door 1	31.9
Stable door 2	32.8
Stable door 3	33.5
Stable door 4	37.0
Stable door 5	45.7
Note the above are LAMax values	

Figure 19. Assessment of L_{AMax} Values at Night Time

6 Assessment of IMMI outputs

6.1 Outputs Assessed in line with BS4142:014-A1:2019

The IMMI noise modelling software predicts a specific sound level only. To consider a sound source in line with the British Standard 442:2014-1:2019, character corrections are made to consider the nature of the sound.

In this particular instance and for dog barking, it is noted that character corrections might be appropriate for intermittency and impulsivity as the dog barks are typically short and sharp. A 3dB linear penalty for intermittency and 3dB for impulsivity has been applied where the sound source in question is just heard/noticeable at the receptor locations.

Whilst it is relevant that penalties should only be applied where the sound source is audible at the receptor location, for the sake of a robust report, both character corrections have been applied, as it might be reasonable to hear the occasional distant dog bark. This is particularly relevant for the daytime period when dogs are likely to be outside of the kennels in the external exercise areas.

6.1.1 Daytime – All Kennel Doors Open and Exercise Areas Used

Figure 20 below shows that the predicted $L_{Aeq,1 \text{ hour}}$ as a worst case, with all kennel doors modelled as open and allowing sound energy to freely leave the kennel block, with four dogs located in the separate external exercise areas. The Rating level when assessed against the measured daytime background sound level is not a problem. Even when the predicted specific sound levels from the modelling software are adjusted to Rating Levels or $L_{Ar,Tr}$, with an additional 6dB, these are still below measured daytime background sound levels.

Locations	Predicted Freefield External A Weighted Sound Pressure Level- dB	Addition of Character Correction of 6dB to Predicted External Value	Measured Background Sound Level Day	Difference Between Rating Level and Measured Background Sound Levels
Residential Properties				
Carol Ann House(Grd)	16.2	22.2	43.7	-21.5
CarolAnn 1st-Bed	16.1	22.1	43.7	-21.6
HH Cottage- Grd	17.1	23.1	43.7	-20.6
HH Cottage- 1st-Bed	16.8	22.8	43.7	-20.9
HangletonLodge-Grd	18.5	24.5	43.7	-19.2
HangletonLodge-1st	21.3	27.3	43.7	-16.4
Staff Accom	19.0	25.0	43.7	-18.7
White Lodge	15.1	21.1	43.7	-22.6
Equestrian Centre Receptor Positions				
Reception	23.3	29.3	43.7	-14.4
Reception2	25.4	31.4	43.7	-12.3
EquestrianStaff	37.0	43.0	43.7	-0.7
Stable Door 1	16.3	22.3	43.7	-21.4
Stable door 2	17.0	23.0	43.7	-20.7
Stable door 3	17.7	23.7	43.7	-20.0
Stable door 4	21.7	27.7	43.7	-16.0
Stable door 5	29.7	35.7	43.7	-8.0

Figure 20. BS4142:2014 Assessment of Daytime Uses - Doors Open and External Exercise Areas Used

The highest impact, albeit, still below measured background sound levels is predicted to be the equestrian staff member who stands in the middle of the Northern most manege conducting a lesson or training horses.

6.1.2 Daytime – All Kennel Doors Closed and Exercise Areas Used

An assessment is also made, as per scenario 2 with the kennel doors closed and the exercise areas in use during the daytime period.

Locations	Predicted Freefield External A Weighted Sound Pressure Level- dB	Addition of Character Correction of 6dB to Predicted External Value	Measured Background Sound Level Day	Difference Between Rating Level and Measured Background Sound Levels
Residential Properties				
Carol Ann House(Grd)	1.7	7.7	43.7	-36.0
CarolAnn 1st-Bed	1.8	7.8	43.7	-35.9
HH Cottage- Grd	2.3	8.3	43.7	-35.4
HH Cottage- 1st-Bed	2.5	8.5	43.7	-35.2
HangletonLodge-Grd	4.1	10.1	43.7	-33.6
HangletonLodge-1st	6.8	12.8	43.7	-30.9
Staff Accom	4.1	10.1	43.7	-33.6
White Lodge	0.3	6.3	43.7	-37.4
Equestrian Centre Receptor Positions				
Reception	8.1	14.1	43.7	-29.6
Reception2	12.5	18.5	43.7	-25.3
EquestrianStaff	21.9	27.9	43.7	-15.8
Stable Door 1	3.4	9.4	43.7	-34.3
Stable door 2	4.4	10.4	43.7	-33.3
Stable door 3	5.4	11.4	43.7	-32.3
Stable door 4	8.3	14.3	43.7	-29.4
Stable door 5	14.8	20.8	43.7	-22.9

Figure 21. BS4142:2014 Assessment of Daytime Uses - Doors Closed and External Exercise Areas Used

With kennel doors closed, the noise impact of the three new kennels reduces further still and the most impacted receptor which was the member of equestrian staff in the Northern manege, is seen to reduce by at least 15dB(A) which would be a significant and noticeable reduction in the site soundscape. Indeed, at these levels, the sound from dogs is likely to be inaudible and the character corrections will cease to apply. This renders the predicted received noise rating level 6dB lower still, i.e. 21dB below background in the worst case.

6.1.3 Night Time – Use of L_{Aeq} and Kennel Doors Closed – No use of Exercise Yards

The BS4142:2014-A1:2019 assessment also considers the night time element using L_{Aeq} , albeit with daytime barking (L_{Aeq}) inside the kennels, when in reality the dogs should be asleep. As previously stated, it has been assumed that there is a diurnal difference of 10dB for the drop in background sound levels from those measured during the daytime period.

Locations	Predicted Freefield External A Weighted Sound Pressure Level- dB	Addition of Character Correction of 6dB to Predicted External Value	Assumed Background Sound Level - Night	Difference Between Rating Level and Measured Background Sound Levels
Residential Properties				
Carol Ann House(Grd)	2.9	8.9	33.7	-24.8
CarolAnn 1st-Bed	3.4	9.4	33.7	-24.3
HH Cottage- Grd	3.3	9.3	33.7	-24.4
HH Cottage- 1st-Bed	3.3	9.3	33.7	-24.4
HangletonLodge-Grd	4.9	10.9	33.7	-22.8
HangletonLodge-1st	7.8	13.8	33.7	-19.9
Staff Accom	5.2	11.2	33.7	-22.5
White Lodge	1.3	7.3	33.7	-26.4
Equestrian Centre Receptor Positions				
Stable Door 1	3.1	9.1	33.7	-24.6
Stable door 2	4.0	10.0	33.7	-23.7
Stable door 3	4.6	10.6	33.7	-23.1
Stable door 4	7.6	13.6	33.7	-20.1
Stable door 5	16.8	22.8	33.7	-10.9

Figure 22. BS4142:2014 Assessment of Night Time Uses - Doors Closed and External Exercise Areas Not Used

Whilst Figure 22 still shows dogs barking in an enclosed kennel with the doors closed, it is likely that the dogs will be sleeping at night.

Notwithstanding this, the night time assessment still predicts noise rating levels from the dogs and their barking as significantly below (minus 10.9dB to minus 26.4dB) assumed background sound levels. Note also that the night time assessment has removed the receptors for the equestrian staff and the equestrian reception area.

6.1.4 Night Time – Use of L_{Amax} Value and Kennel Doors Closed- No use of Exercise Yards

Locations	Predicted Freefield External A Weighted L_{Amax} Sound Pressure Level- dB*	Likely reduction through an Open Window (12dB)**	Internal L_{Amax} Value - Less than 45dB
Residential Properties			
Carol Ann House(Grd)	32.4	20.4	Yes
CarolAnn 1st-Bed	32.8	20.8	Yes
HH Cottage- Grd	32.3	20.3	Yes
HH Cottage- 1st-Bed	32.4	20.4	Yes
HangletonLodge-Grd	33.6	21.6	Yes
HangletonLodge-1st	36.5	24.5	Yes
Staff Accom	34.2	22.2	Yes
White Lodge	30.2	18.2	Yes
*Note the above are L_{Amax} values			
**Whilst 15dB is typically applied for a reduction for an open window at a façade value, 12dB is used as a freefield reduction			

Figure 23. Assessment of L_{Amax} Values During the Night Time Period for the Residential Receptors

To consider how individual dog barks might be construed at night time, the L_{Amax} level of 106 dB(A) was used within the kennel environments, again with the kennels at full capacity to determine how the sound might propagate across the site. It is noted that for the residential receptors, the L_{Amax} value likely to be received in a bedroom environment with an open window is well below that likely to cause sleep disturbance. It is relevant again to note that the dogs are likely to be sleeping at night with management measures in place to prevent them being disturbed and minimising any barking activities.

6.2 Consideration of Results and BS4142:2014-A1-2019 Context

The following points present relevant contextual information.

- The results of the predicted daytime and night time dog barking assessment which use both L_{Aeq} and L_{Amax} indicate that the predicted specific sounds, later corrected to $L_{Ar,Tr}$, are sufficiently below measured background sound levels, even with character corrections applied
- The site is already an animal rehoming site
- The residential properties being assessed are some distance away from the proposed kennels and are not likely to have any direct line of sight.
- The kennel placement and design has utilised best practice with all kennel doors facing East to ensure that any impact to the North or West is minimised. Similarly, the use of functional rooms and areas on the Western side of the kennel buildings assists with compartmentalisation of the sound sources.
- Staff will be living on site in order to respond to any concerns should these occur out of hours.

- The assessment has applied character corrections only to present a worst-case scenario, when in reality, if the sound in question is not heard, it should not be considered for a penalty to be applied.

When interpreting the results of a BS4142:2014 assessment, the narrative effectively states that where the measured sound in question or rather the Rating Level is above the measured background sound level, the impact increases. Where the Rating Level is below background, it is stated as follows:

“The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

NOTE 2 Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.”

7 Discussion

An assessment has taken place to consider as robustly as possible the impact of the three new kennels being introduced onto the site.

7.1 Receptor Locations

Residential receptors, as well as the Equestrian Centre to the North have been considered, at the request of the local planning authority. The results indicate, certainly for the human receptors, that the design and placement of the kennels is not likely to have any impact with the $L_{A_{r,Tr}}$ significantly below measured background sound levels.

Despite a recent literature search for noise on equine activities and Equestrian Schools, substantive science backed data has not been identified on the likely sound levels at which horses may become impacted and any cause and effect relationships regarding noise levels. Notwithstanding this, the equestrian centre instructor, the equestrian offices and the stables were all considered as receptors with the data presented accordingly.

7.2 Equestrian Centre Offices

As noted above, receptor points were placed in the model to consider the impact of dog barking on the reception building, which is once understood to have been a café. As a worst case, the freefield external sound level outside the office area was 25.5dB $L_{Aeq, 1 \text{ hour}}$. With this in mind, and using an assumption that the office may wish to have windows open, the sound level would be reduced further still as the sound is attenuated through an open window by approximately 12dB (from freefield values).

The likely internal sound pressure level if windows were open on both sides of the office, with all kennel doors open, the kennels at full capacity and the 4 exercise yards in use would be calculated by the logarithmic addition of the East and West windows:

$$10\log (10^{1.12}+10^{1.34}) = 15.5 \text{ dB } L_{Aeq, 1 \text{ hour.}}$$

This is significantly below the levels one might expect from an office (as suggested in BS8233:2014), as per Figure 24 below.

Table 2 Indoor ambient noise levels in spaces when they are unoccupied and privacy is also important		
Objective	Typical situations	Design range $L_{Aeq,T}$ dB
Typical noise levels for acoustic privacy in shared spaces	Restaurant	40 – 45
	Open plan office	45 – 50
	Night club, public house	40 – 45
	Ballroom, banqueting hall	35 – 40
	Living room	35 – 40
NOTE See Noise control in building services [28] and BS EN ISO 1392.		

Figure 24. Extract from BS8233:2014 - Reference Noise Levels in Open Plan Offices

7.3 Noise Modelling Conclusions

The noise modelling software is useful as it enables a viewer to see the predicted noise contours and how these change with sound levels at source. The design by the client to locate the kennels as far as possible to the East and to have the openings facing the East are instrumental in keeping sound levels reduced for the residents around the site.

It is also useful to determine from Figure 16 above replicated below why the sound travels in such a direction, as there is seen to be a linear behaviour North to South of the external sound levels.

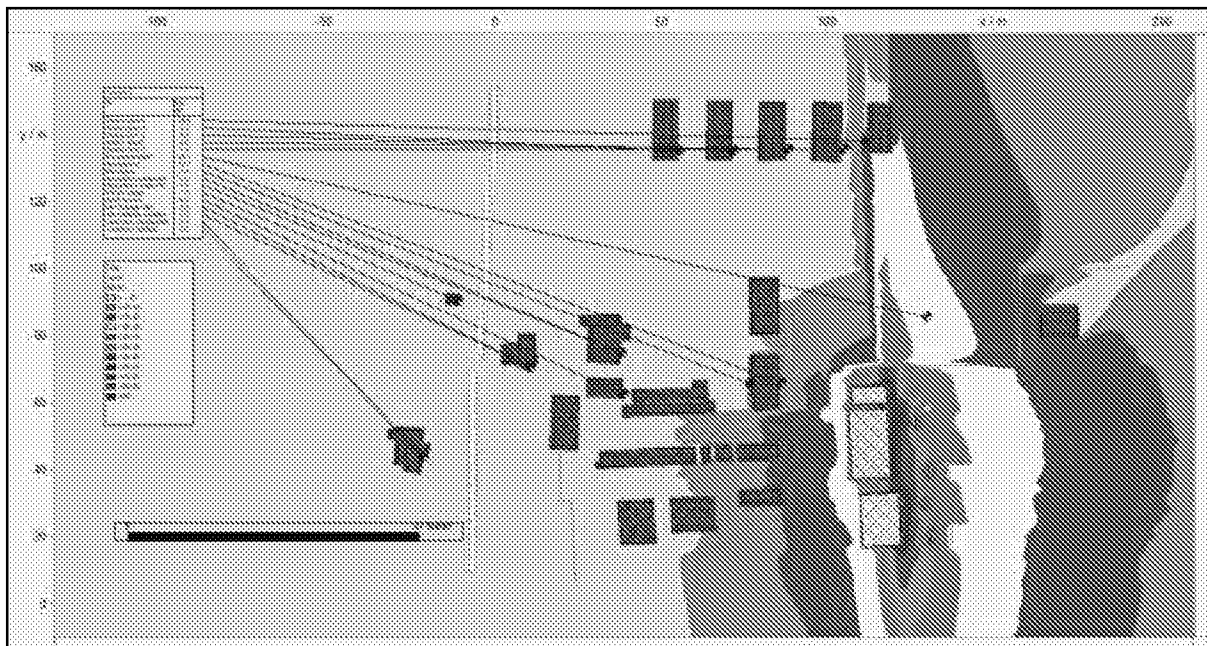


Figure 25. Figure 16 Reproduced

Due to the limitations of the noise modelling software, a fence-line was created at 1.8m in front of the kennels East facing doors. The effect that this has is to reflect the sound back against the kennels and allow a linear pattern which stretches North to South.

7.4 BS4142:2014-A1-2019 – Character Corrections

As previously detailed, character corrections or penalties are applied where a sound is perceived at the receptor location as having some characteristics which might make it more noticeable to the listener. A classic example of this is a dog bark, which might be infrequent but just about perceptible. However, the noise modelling predictions indicate that the specific sound levels are well below the measured background sound levels. The 3dB penalty for intermittent sounds and 3dB for just audible impulsivity has been applied only to ensure a robust report and are not strictly necessary. However, even with the character corrections applied, the predicted Rating Levels are significantly below measured (daytime) and assumed (night time) background sound levels.

7.5 Discussion Summary

The proposed addition of 3 new kennels as seen above is not likely to have any adverse impact on the residential receptors. This can not be conclusively stated for the riding school, as at the time of writing, the scientific basis for how sound might impact horses is not known, however, at the request of the local planning authority, the equestrian centre has been included and reported on.

It is important to reflect on the fact the noise model inputs have used real time measured dog barking data, the site has been modelled as if at full capacity and has presented information in as much detail as possible. The location and design of the kennels which incorporates best practice observed from visits to other sites is key in ensuring that sound energy is both contained where practical at source and directed away from more sensitive uses to the East.

The reality is that the site will not operate at full capacity all of the time, yet to present a conservative and robust report, this has been the basis of the assessment. The night time scenarios have used daytime dog barking data which are likely to significantly overestimate the impact, as dogs will in all likelihood be sleeping at night.

Information on day to day site management and routine has also been included to provide some assurance of the measures taken by the WADARs Animal Rescue Centre to minimise dog barking and ensure that the three new kennels are capable of being sited, operated and run, without detriment to other adjacent site uses.

In short, the outputs generated by the noise modelling software do not provide any cause for concern with regards to noise to residential receptors. Planning permission should not therefore be withheld by the local planning authority on noise grounds.

8 Recommendations

The above sections detail that the site is capable of being used without detriment to the adjacent site uses, however, some recommendations are made to ensure that sound is minimised from dog barking.

The construction of the kennel walls has been designed with significant mass in mind and uses dense concrete blockwork, as well as a cavity filled with mineral wool fibre. Only butterfly

ties or Type A ties should be used between the two courses of masonry and care must be taken to prevent mortar falling in between the masonry or settling onto the wall ties.

When packing mineral wool fibre into the 100mm cavity, this should not be packed so tight as to form a solid contact between both walls, as this is likely to have an adverse impact and create an acoustic bridging effect. This applies also to mineral fibre being placed into the roof cavity.

The model had applied a Kingspan style roof with a 100mm cavity and 18mm plyboard, with the cavity filled with mineral wool fibre, albeit, not tightly packed.

It is often the case with dog kennels that staff and volunteers who work with the dogs can experience high levels of noise. Having good absorbent panels/baffles placed in areas such as the corridors between the kennels and the functional rooms will assist in reducing some of the reflected sound energy. It is known that such absorber baffles have been observed by the client to good effect in other premises. It is strongly recommended that the corridors have absorbent panels/baffles applied where space permits.

It may also be relevant to consider the use of absorbent panel materials inside the roof of the kennels and creating as much mass as possible between the kennel roof and the roofing materials being proposed. Given the need for such panelling to be cleanable, capable of disinfection and not to harbour bacteria etc, you may wish to consider looking at Ecophon Hygiene Advance A, which has a 40mm class A absorber and designed to be used in food type environments.

Where there are doors which break the building envelope and face either West, South or North, these should be upgraded to acoustic doors and attention paid to the threshold and stop seals to ensure that these do not act as a weak point within the building façade. The centre may wish to consider the merits of self-closure mechanisms on doors to prevent doors being inadvertently left open. Aside from the obvious escape risk, this is likely to ensure that sound remains contained at source.

Where staff will live on site, they may wish to consider CCTV with audio quality or a baby monitor type set up where they can be warned of unnecessary barking during the night time period and attend to the welfare of the animals.

In filling up the kennels with dogs, where practicable, distance attenuation will be greatest if these are filled up from the Southern end first to maximise distances between the dogs and the equestrian activities to the North. It is noted that the isolation kennels will only be used as a last resort where dogs are unwell.

Where fencing(2m) has been used within the modelling, this is likely to be more effective if placed onto the side of the Equestrian centre, due to the slight change in elevation on site. This will allow a greater shadow zone and better attenuation of the fencing.

Rather than feather edge boarding, any fence-line designed to attenuate sound will need be a high specification timber fence. The same specification for the separating fence line needs also to be applied to the external exercise areas for the dogs.

The noise fence should be constructed from butt jointed timbers (minimum of 20mm thick). 12-20mm cover strips should also be fitted over the whole of the butt joint as shown below:

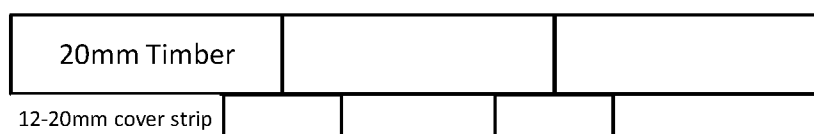


Figure 26. Fencing Specification

9 Uncertainty

It is a requirement of a BS4142:2014 report to describe the measures taken to limit and reduce uncertainty in the measurement and assessment process. The following measures were taken to reduce uncertainty in the assessment and reporting process:

- The sound level meters were calibrated before and after the attended survey in situ, without any drift having occurred. This ensures that the information and data being obtained was representative and that the sound level meter was operating correctly.
- Background measurements ($L_{A90,1\text{hour}}$) were taken during suitably dry weather conditions within limited wind.
- With any calculations made, including the determination of background sound levels as well as predictions from the noise modelling software, there has not been any additional rounding of numbers to prevent double handling, this has only occurred once at the final part of the sum and is presented to the reader with an easy to understand reference level or single figure.
- Measurements were made to be representative of both the receptors to the West as well as the Equestrian centre to the North. The site visit was useful to understand the site infrastructure, as well as the soundscape and being able to report accurately the site conditions.
- Data was used from previous dog barking and animal boarding assessments to ensure that a robust case could be presented and specifically used spectral data within the noise model to maximise the accuracy of the information being fed into the model.
- The report has presented a worst-case assessment, with all kennel doors open as well as external exercise yards being used. The assessment also considered maximum capacity.
- INSUL noise software was used to predict the performance of the walls and roof, which was subsequently entered, again using the spectral performance where possible into the noise model. Within the INSUL software it was also apparent that on the outer skins of the kennels will be an additional timber effect weather proofing which will seek to further enhance the acoustic qualities of the building, however, this was not modelled.
- Due to the constraints of the noise modelling process, the use of an area source is exactly that, it is an area which is assigned an internal sound level with apertures such as doors then modelled as per the architects plans. However, in reality, the kennel elements of the buildings only occupy the Eastern portion of the buildings and use rooms such as storage, linen, toilets, washing and laundry as a buffer on the Western elevations. The compartmentalisation of the kennels on the Eastern façade is not easy to be able to model, and accordingly, the IMMI noise modelling software presents a worst-case scenario of sound energy inside the whole of the building.
- In only carrying out a desktop assessment, there is a risk that the noise levels may be under reported. This is why it was useful to be able to take measurements from the site whilst present and consistent with the required daytime reference period from BS4142:2014. The lack of night time data was overcome by using an assumed 10dB diurnal difference in measured L_{A90} levels from the measured daytime reference period. Should however the site have lower background sound levels than those assumed, the night time predicted sound levels and importantly, the Rating Levels, are still very low indeed with approximately minus 11 to minus 26dB below assumed background sound levels.

10 Conclusion

To understand the site layout and context, a site visit was made on 13th May 2020, where two class 1 sound level meters were used to measure 1 hour reference periods in line with BS4142:2014:A1-2019. The measurements were representative of both the Western residential receptors and the Eastern/Northern Equestrian uses.

Noise modelling software was used to predict sound levels arising from the newly introduced 3 dog-kennels at the East of the site, which incorporated previously measured sound data for dog barking and animal boarding sites.

The noise modelling software assessed four scenarios as worst cases with all kennels occupied and 4 of the 5 external exercise yards in use (daytime only). The scenarios considered daytime uses with all kennel doors open and exercise yards used, doors closed with exercise areas used and night time without any external exercise yards being used. The night time assessment considered both L_{Aeq} and L_{Amax} values to determine how dog barking might be perceived at the receptor locations.

As per the requirements of the local planning authority at Arun, receptor positions were also considered for the Equestrian Centre to the North and these are discussed in more detail within the report.

The report has used BS4142:2014-A1:2019, as well as the newly introduced Technical Note dated March 2020 regarding the use of the standard for assessing domestic animals in a commercial setting. Application of the guidance makes the report more robust, albeit not formally adopted at this stage.

The report concludes that due to the design of the new kennels, their distance from receptors and the mitigation measures being proposed, that the noise impact from the new kennels remains well below measured background sound levels. Uncertainty and context, in line with the requirements of BS4142:2014 have been stated and discussed within the report.

Planning consent should not therefore be withheld on noise grounds.