

TECHNICAL REPORT

PARK FARM, WORMEGAY
Noise Impact Assessment

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Adrian James Acoustics Document Control Sheet

Report prepared for:	Tharros Ltd Botanic House 100 Hills Road Cambridge CB2 1PH
Filename:	13900 Report 1A.docx

QA Control

Rev	Date	Author	Checked by	Approved by
-	29 September 2023	George Moore MIOA	Gary Percival MIOA	Gary Percival MIOA
A	02 October 2023	George Moore MIOA	Gary Percival MIOA	Gary Percival MIOA

Revision History

Rev	Details
A	Section 7: VMS Logistics will leave the site on 11 December 2023

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1 INTRODUCTION

1.1 Background

We have been appointed by Tharros Ltd to assess the noise impact of the industrial and commercial use of former agricultural buildings at Park Farm, Wormegay. We understand that the buildings have been in industrial / commercial use for some time and that this noise impact assessment is to accompany a retrospective planning application for change of use from agricultural use.

The aims of this assessment are:

- To identify the current occupants / users of the industrial and commercial buildings
- Assess the noise impact of the current occupants / users on residents of nearby dwellings
- Recommend noise limits on the activities of current and future occupants in order to protect the amenity of nearby residents

1.2 Statement of technical competency

This assessment has been carried out by George Moore. I have a degree in Acoustics and Vibration from the ISVR at Southampton University and a Diploma in Acoustics and Noise Control from the Institute of Acoustics, of which I am a full member. I have carried out many similar noise impact assessments in accordance with the relevant standards so I have the expertise and experience required for this assessment.

1.3 Source information

The report used the following information provided by Tharros Ltd.

Information	Revision
Park Farm Occupancy List	29/07/2023

Table 1 – Details of information used to inform assessment

2 PLANNING POLICY

2.1 National Planning Policy Framework

The latest version of the National Planning Policy Framework (NPPF) was released in February 2019 and was last updated in July 2021

The NPPF does not set out quantitative criteria for assessing noise affecting proposed developments, but in paragraph 174 states that planning policies and decisions should actively contribute to the enhancement of 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.”

According to paragraph 185, planning policies and decisions should also ensure new development is appropriate for its location, particularly considering the likely effects on health and living conditions. Planning policy and decision makers should aim to:

“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”.

The ‘agent of change principle’ has been part of the NPPF since the July 2018 revision. This principle means that a person or business (i.e. the agent) introducing a new land use is responsible for managing the impact of that change. Paragraph 187 states:

“Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

2.2 Local Planning Policy

Local environment and development planning policy are the remit of Borough Council of King’s Lynn and West Norfolk (BCKLWN). The BCKLWN Site Allocations and Development Management Policies Plan was adopted in September 2016 and sets out all local development control policies. The plan relates to the potential impact of noise on proposed residential development, and states:

“Proposals will be assessed against their impact on neighbouring uses and their occupants as well as the amenity of any future occupiers of the proposed development. Proposals will be assessed against a number of factors including: Noise..”

2.3 Local authority consultation

We consulted with Suzi Pimlott, Senior Community Safety & Neighbourhood Nuisance Officer at BCKLWN on 11 August 2023 to discuss assessment criteria for the change of use of agricultural buildings at Park Farm.

Mrs Pimlott confirmed that noise from industrial / commercial use of the buildings should generally be assessed in accordance with the guidance BS 4142:2014+A1:2019 and that:

“...no new development should generate/introduce noise levels which exceed 5 decibels above the existing background noise level.”

Mrs Pimlott also requested that noise levels from existing units be reported. Further details of BS 4142 are provided below.

3 ASSESSMENT METHODOLOGY AND CRITERIA

3.1 BS 4142:2014+A1:2019

3.1.1 Introduction

British Standard 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' (BS 4142) describes appropriate technical methodology for the rating and assessment of sound of an industrial and/or commercial nature.

Sound of an industrial and/or commercial nature includes industrial and manufacturing processes, fixed mechanical and electrical plant installations, the unloading of goods and materials at industrial and/or commercial premises and sound from mobile plant that is an inherent part of the overall sound from industrial and/or commercial premises.

BS 4142 is applicable for the purposes of:

- Investigating complaints;
- Assessing sound from proposed, new, modified or additional source(s) of sound from an industrial and/or commercial nature; and
- Assessing sound at proposed new dwellings or premises used for residential purposes.

BS 4142 is not intended to be applied to the rating and/or assessment of sound from recreational activities (including motorsport), music and other forms of entertainment, shooting grounds, construction/demolition, domestic animals, people, public address systems and any other sources falling within the scope of other standards/guidance.

3.1.2 Summary of BS 4142 assessment methodology

The BS 4142 assessment methodology can be summarised as follows:

1. Determine the background sound level (dB $L_{A90,T}$) at the nearest noise sensitive receptor(s) of interest.
2. Determine the specific sound level of the source under assessment (dB $L_{Aeq,T}$) (T = 1 hour for day or 15 minutes at night) at the receptor location(s).
3. Apply a rating level acoustic feature correction if the sound source has tonal, impulsive, intermittent or other characteristics which attract attention.
4. Compare the rating level (dB $L_{Ar,Tr}$) with the background sound level; typically, the greater this difference, the greater the magnitude of impact.

Differences of around +10dB are likely to be an indication of significant adverse impact, depending upon the context; a difference of +5dB is likely to be an indication of adverse impact, depending upon the context. Where the rating level (dB $L_{Ar,Tr}$) does not exceed the background sound level ($L_{A90,T}$) at the nearest receptor of interest, the indication is that the specific sound source will have a low impact, depending upon the context.

Note: Adverse impacts include but are not limited to sleep disturbance. Not all adverse impacts will lead to complaints and not all complaints are proof of an adverse impact.

3.1.3 Acoustic features

Certain acoustic features (which include tonality impulsivity and/or intermittence) can also increase the significance of impact. Where such features are present a "character correction" should be added to the specific sound level to obtain the rating level.

The recommended BS 4142 character corrections are presented in Table 2.

Characteristic	Perceptibility		
	Just Perceptible	Clearly Perceptible	Highly Perceptible
Tonality	+2 dB	+4 dB	+6 dB
Impulsivity	+3 dB	+6 dB	+9 dB
Intermittency	0	+3 dB	+3 dB
Other	0	+3 dB	+3 dB

Table 2 – Summary of BS 4142:2014 character corrections

BS 4142:2014 describes suitable subjective methods for assessing character features, plus additional objective (one-third octave and reference) methods for tonality.

3.1.4 Uncertainty

The BS 4142 methodology also requires that the level of uncertainty in the technical data and/or calculations is reported. Where uncertainty could affect the conclusion, reasonable, practicable steps should be taken to reduce uncertainty. If appropriate, the level and potential effects of any identified uncertainty should also be reported.

4 DESCRIPTION OF SITE AND PROPOSALS

4.1 Description of site and proposals

Park Farm is a busy working farm situated a mile to the north-east of the village of Wormegay in Norfolk. The buildings still in use as agricultural buildings are situated to the north of the site and include machinery sheds, a grain store and 2 grain silos. The farm manager lives in the farmhouse to the east of the site.

The buildings which have changed use to industrial or commercial use occupy the centre and south of the site.

Park Farm Cottages to the west of the site are owned by the farm but are not occupied by its employees. Neither the Farm, nor West Norfolk Council have received any complaints from the residents of these properties due to noise.

The site is accessed from either the north, from New Road, or from the west from Castle Road. Access from the west is gated and restricted to cars and vans only. Tractors and larger goods vehicles must use the northerly access route.

The site layout is shown in Figure 1 with building type shown in the key.

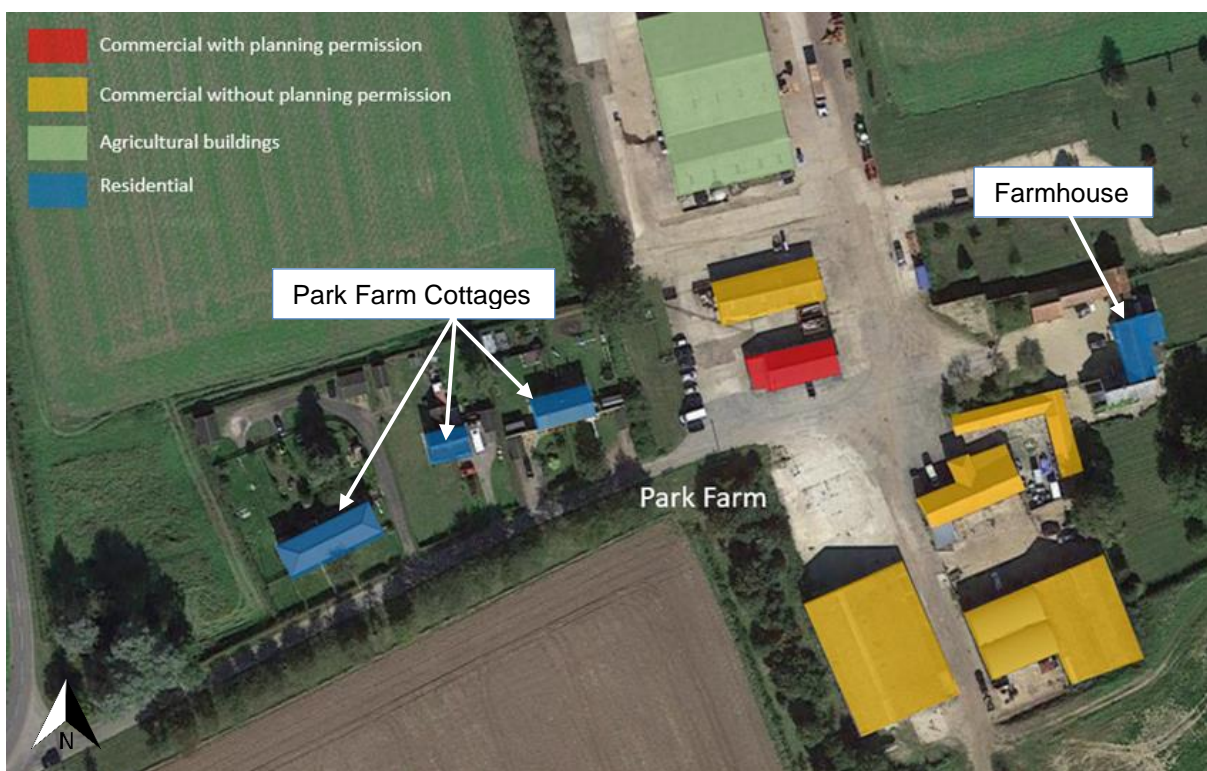


Figure 1 – Park Farm and nearest dwellings © Google 2023

4.2 Description of sound sources

The industrial / commercial buildings are divided up into 15 units of various sizes and uses. The units generally fall into one of three categories, i.e. units with:

- Regular use during the day (workshop / distribution)
- Storage with regular morning and evening access
- Storage with occasional access

An annotated plan showing the current occupation of some of the units can be seen in Figure 2 and a full list of the occupiers with a brief description of each can be found in Appendix C.

From a noise impact perspective, the units which are likely to represent the greatest impact are the ones with one or both of the following features:

- Activity that produces a high specific sound level at the nearest receptors
- Frequent daytime use or use outside normal working hours

The units with regular daytime use are:

Unit A: Dubs and Classics – VW and classic car servicing and restorations

Unit B: Donderry Gundogs – Dog cage installer for vans and 4x4s. This unit already has commercial planning permission

Unit 5a and 5b: Penny Wood Bespoke Ltd – wooden furniture maker

Units 13,14 & 18: VMS Logistics – multidrop delivery company

For this reason, our site survey and assessment centred around the activity of the above units with Unit B providing context for the assessment.

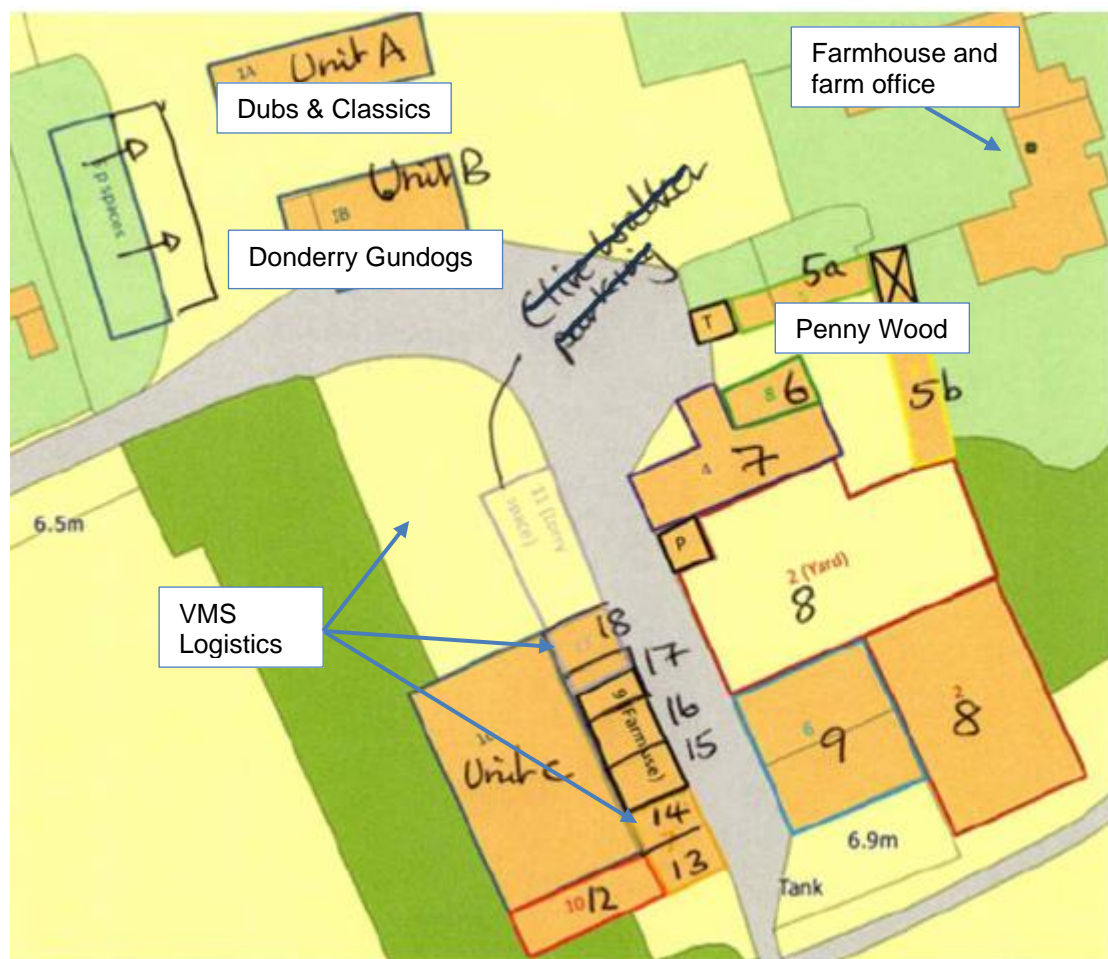


Figure 2 - Plan of industrial / commercial units showing units in regular daytime use

5 SITE SURVEY

5.1 Introduction

We visited Park Farm on 14, 21 and 22 September 2023 to view the site, observe typical activity and take sound level measurements. The aims of our survey were to:

- Establish the noise sources and typical sound levels to which the nearby dwellings are exposed.
- Quantify background sound levels in the absence of the specific sources.

5.2 Survey methodology

5.2.1 Measurement locations

We measured at 2 locations during our survey as shown in Figure 3:

P1 was 8m from the boundary of the closest dwelling to the west. This location was chosen to measure both the specific level of noise from the industrial / commercial units as well as background sound level when the units were not making any sound. An unattended meter was installed here for a week between 14 – 21 September.

P2 was on the edge of the farmhouse driveway, approximately 15 m from the nearest corner of the farmhouse and 27 m from windows to habitable rooms. This location was chosen for attended measurements of the sound from Penny Wood and VMS Logistics. The sound from Dubs and Classics was too low to measure accurately here.

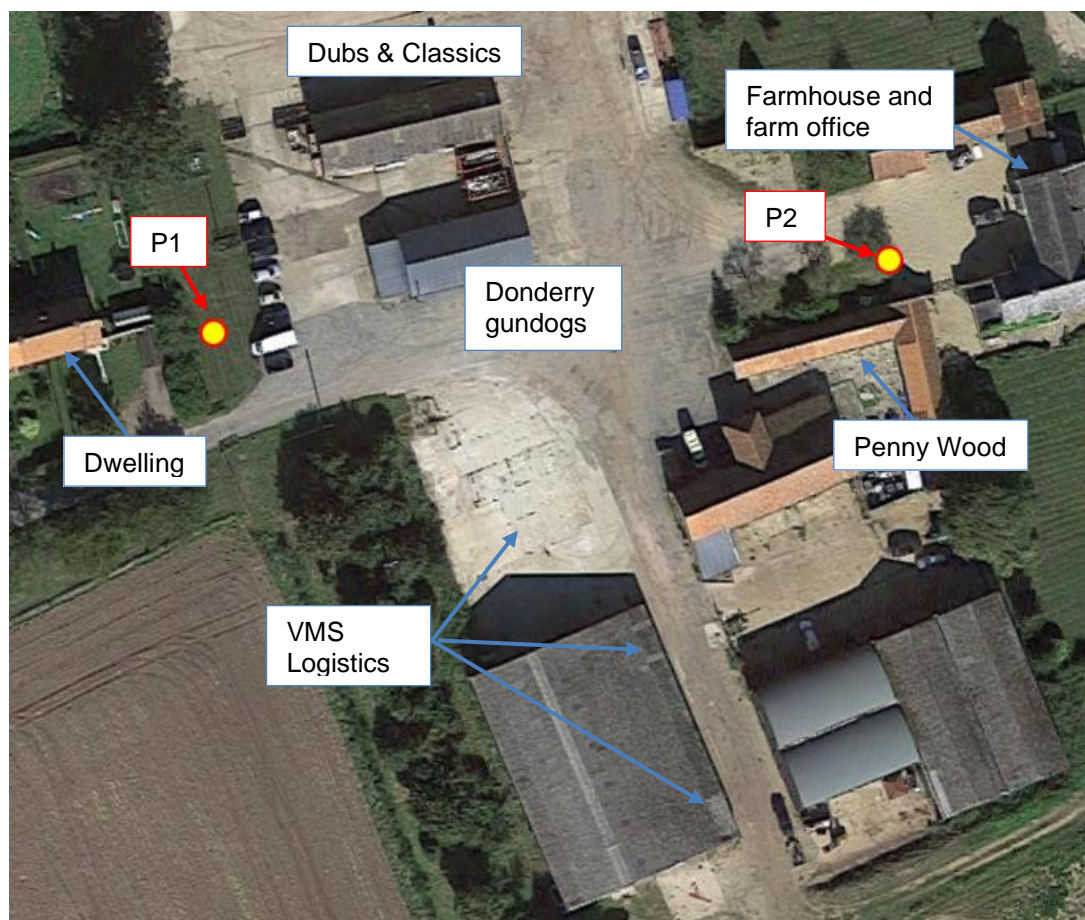


Figure 3 – Site plan showing measurement locations © Google 2023

Photos of the measurement positions are shown in Figure 4 and Figure 5 below.



Figure 4 - Position 1, Unattended monitoring position



Figure 5 - Position 2, Attended monitoring position

5.2.2 Instrumentation

Details of the sound measurement systems used are presented in Appendix B.

5.2.3 Weather conditions

The weather data for the survey was sourced from:

<https://www.timeanddate.com/weather/uk/kings-lynn/historic>.

The weather between Thursday 14 and Sunday 17 September was relatively calm with no rainfall and winds generally between 2 – 4 m/s from the south and east. Temperatures ranged from lows of 12° or 13°C at night to highs of 20° – 23°C during the day. Between Monday 18 and Wednesday 20 September, the wind exceeded 5 m/s so background measurements were excluded during this period. By 21 September the wind speed had fallen to 3 m/s so measurements then were included.

5.3 Subjective impressions

Our first visit on 14 September lasted for 3 hrs and 45 minutes between 09:45 hrs and 13:30 hrs. For most of this time the site was relatively quiet with the occasional delivery vehicle or farm vehicle crossing the site or moving around the farm buildings. The occasional car could be heard on Castle Road and New Rd travelling to or from Wormegay. The sound of wind in trees and birdsong could also heard. At one point a tractor was being prepared for work in the southernmost farm building. There was the sound of hammering and clanging for a few minutes before the tractor departed. On 21 September when we returned to collect our unattended survey, we observed grain being loaded from a grain store into an HGV. This was achieved using a telehandler with front loader and required repeated shunting forwards and backwards. The telehandler also has a reverse warning bleeper.



Figure 6 - HGV being loaded with grain (Dubs and Classics on the right)

The Donderry Gundogs workshop is approximately 39 m from the boundary with No.1 Park Farm Cottages. The business fits bespoke dog transit cages into vans or 4x4s. This unit already has planning permission for industrial use so the sound from this unit is not the subject of our assessment. Nevertheless, it forms important context for the other industrial units. Much of Donderry manufacturing involves power tools and takes place in the workshop which has a pedestrian access door to the west. The sound of a grinder and a welder could be heard to the west of the workshop. The completed cages are then fitted to vehicles standing outside the west side of the workshop.



Figure 7 - Donderry Gundogs (left) with Norfolk Timber Buildings (centre) and VMS Logistics (right)

The above sources already have planning permission and therefore form part of the existing acoustic environment and contribute to the existing background sound levels.

All of the industrial / commercial units except Donderry Gundogs require planning permission and are therefore subject to our assessment. The majority of these are used for storage with the only sound being occasional vehicle movements (see Appendix C). The following businesses were observed in operation during our survey.

5.3.1 *Dubs and Classics*

This 1-man operation carries out servicing and restoration of VWs and classic cars and typically works between 09:00 hrs – 17:00 hrs, Monday to Friday and 10:00 hrs – 14:00 hrs on Saturday. For most of our time on site there was very little sound coming from the workshop. In our experience this is typical of automotive service / repair garages where there are relatively long periods of low-noise activity with occasional hammering or grinding as required. The main doors to this workshop are on the north side of the building with a pedestrian access door to the south. We took attended measurements at P1 of angle grinding and of the air compressor running with the mains doors open but the pedestrian door closed. The workshop is approximately 29 m from the boundary of the nearest dwelling to the west.

5.3.2 *Penny Wood:*

This woodworking workshop is housed in an old brick barn with a tiled roof and typically operates between 08:00 hrs – 17:00 hrs Monday to Friday and between 10:00 hrs – 13:00 hrs on Saturday. The part of the barn marked 5a (in Figure 2) houses the workshop part of the business. The north wall faces the driveway of the farmhouse but has no serviceable doors or windows as access is from the south. The workshop has bench saws, an electric plane and sander and various other power tools. There is a small dust suction system which does not have an external extract. The sound of the dust suction and various power tools can clearly be heard in the driveway in front of the farmhouse. The easterly barn marked as Unit 5b in Figure 2 is used as an office and dispatch area and has no noisy tools.

5.3.3 *VMS Logistics*

VMS Logistics are a multi-drop courier company. An articulated HGV arrives daily around 1pm and is unloaded by forklift truck. The goods are then loaded into vans during the afternoon for local delivery the same day or the next morning. The sound from unloading and handling includes the sound of the forklift truck as well as general clangs and bangs, especially from empty metal stillages.



Figure 8 - VMS Logistics unloading an HGV

5.4 Specific source measurement results

5.4.1 Dubs and Classics

The owner of Dubs and Classics was rebuilding an engine when we took our survey so was not making any measurable noise. Angle grinding is one of the noisiest activities to take place at this unit, so this was arranged for our measurement. The workshop uses of an air compressor for inflating tyres and paint spraying so the sound from this was also measured.

A summary of the measurement is shown in Table 3.

Dubs and Classics	Measurement location	Measured $L_{Aeq,T}$ (dB)
Grinding	P1	43
Compressor	P1	38

Table 3 measurement results for Dubs and Classics

5.4.2 Penny Wood Bespoke

We measured the sound from Penny Wood bespoke at P2, 8m outside the north wall of the workshop, in the driveway of the farmhouse. The workshop was in full use during our survey with 2 craftsmen at work. We understand that this was representative of typically busy operation with some of the workshop's noisiest tools being used (e.g. sander and impact screwdriver). The measured levels of the noisiest tools used during this hour are shown in Table 4. Use of quieter hand tools was not audible at P2.

Penny Wood	Measurement location	Measured L_{AeqT} (dB)
Table Saw	P2	43
Dust extract	P2	40
Sander	P2	46
Impact driver	P2	50

Table 4 - sound level of various tools at P2

5.4.3 VMS Logistics

On 14 September we observed VMS unloading an HGV. Our unattended audio log also recorded the subsequent handling and re-loading of goods into smaller vans. The sound of VMS logistics was audible at both P1 and P2 and so should be assessed to Park Farm Cottages as well as to the Farmhouse.

The sound level of loading and handling noise at P1 and P2 is shown in Table 5.

VMS Logistics	Measurement location	Measured L _{Aeq,T} (dB)
Forklift loading and handling	P1	51
Forklift loading and handling	P2	48

Table 5 - Measured level of VMS logistics at P1 and P2

5.4.4 Donderry Gundogs

West Norfolk Council requested that noise levels from existing units be reported to inform the context. These are included in our background sound analysis in Section 0. We also took measurements of Donderry Gundogs at a third position, P3, 10 m to the west of the unit. We measured the sound of a metal saw and a drill. The pedestrian access door was open during our measurements. A photo of the measurement position is shown in Figure 9 and the results of these measurements are shown in Table 6.



Figure 9 - Position 3, 10 m from the facade of Donderry Gundogs

Donderry Gundogs	Measurement location	Measured L _{Aeq,T} (dB)
Metal saw	P3	53
Drill	P3	50

Table 6 - Measurements of Donderry Gundogs at P3

5.5 Background measurement results

Background sound levels were taken from our unattended measurements at P1, excluding periods of windy weather on Monday 18th – Wednesday 20th September and noise from our specific sources identified in Section 4.2

We analysed the background sound levels in 1-hour intervals as described in BS 4142. Figure 10 shows the range of background sound levels at P1.

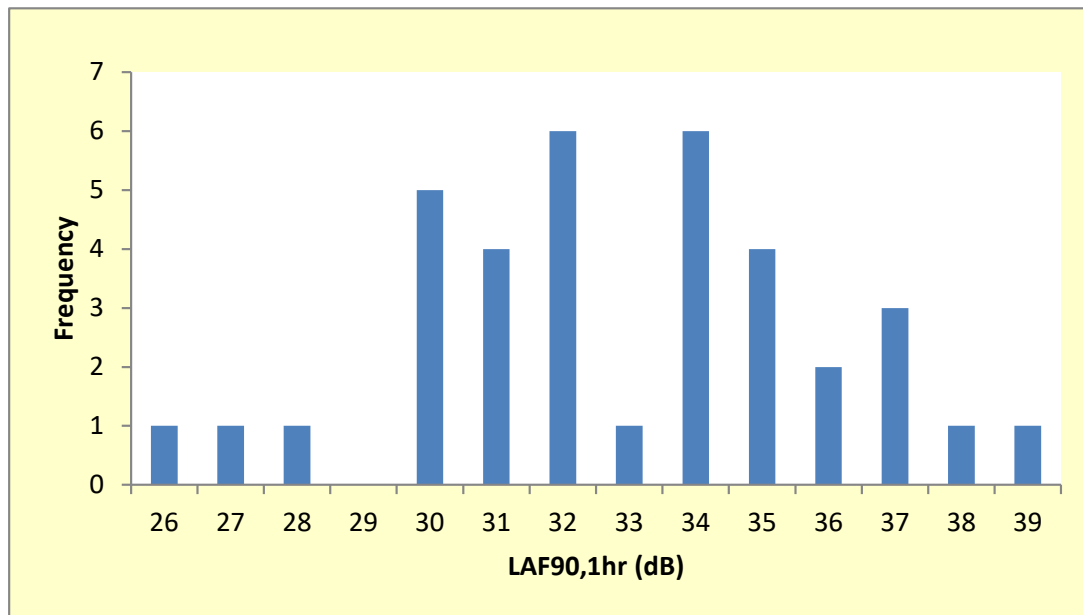


Figure 10 Background sound levels at P1 between 07:00 - 19:00 hrs, Monday to Saturday (excluding specific noise sources)

6 BS 4142 ASSESSMENT

6.1 Background sound level

The background sound level at P2 will be broadly similar to the background sound level at P1 as both positions are a similar distance from the working farm buildings which are the chief source of background noise.

With reference to Figure 10, the lowest typical background sound level may be taken to be 30 dB $L_{AF90,1hr}$. This is taken as the representative level for assessment.

6.2 Specific sound level

Our measured sound levels require a distance correction to the relevant receptor and an on-time correction for the BS 4142 one-hour daytime assessment period. These are both summarised in this section. For No.1 Park Farm Cottages we took the assessment position to be the garden. There is a 1.8 m high close-boarded fence between the garden and the farm which would provide 10 dB of reduction. For the farmhouse we took the assessment position to be the house itself as the outdoor amenity space to the south and east of the house are either further from or shielded from the industrial / commercial noise sources.

6.2.1 Dubs and Classics

As discussed in Section 5.4.1, the owner of Dubs and Classics was rebuilding an engine for most of the week of our survey so made very little sound. We measured grinding and air compressor noise, both of which are used sporadically as the job requires. We estimated the on-time, based on discussions with the owner and observations of these tools being used in similar situations elsewhere.

Dubs and Classics	Measurement location	Measured level $L_{Aeq,T}(dB)$	Measurement Distance to source (m)	Source to receptor (m)	Specific level at boundary $L_{Aeq}(dB)$	On time %	Time-corrected $L_{Aeq1hr}(dB)$
Compressor	P1	38	27	30	37	10	27
Grinding	P1	43	27	30	42	5	29
Boundary fence							-10
Total							21

Table 7 - Summary of distance, on-time and fence corrections to garden of No. 1 Park Farm Cottages

6.2.2 Penny Wood Bespoke

We measured this activity for just over an hour which provided real on-time data for use duty of these tools. Tool noise could be heard at P2 for 9.5 minutes of the assessment hour. We understand that this is typical and equates to 16 % on-time. Our data analysis showed that the average sound level during this time was 43 dB. A summary of the time and distance corrections are shown in Table 8.

Penny Wood	Sound level at P2 from analysis L _{Aeq,T} (dB)	Measurement Distance to source (m)	Source to receptor (m)	Specific level at house	On time %	Time-corrected L _{Aeq1hr} (dB)
Workshop noise	43	8	27	32	16	24

Table 8 - Summary of distance and on-time corrections to the Farmhouse

6.2.3 VMS Logistics

We identified the specific level of sound from VMS logistics at both Park Farm Cottages and the farmhouse. A summary of distance and on-time calculations are shown in Table 9.

VMS Logistics	Assessment location	Measured LAeq (dB)	Measurement position to source (m)	Source to receptor (m)	Specific level at receptor LAeqT (dB)	On time %	Time-corrected L _{Aeq1hr} (dB)	-10 dB for garden fence
Forklift loading and handling	No.1 Park Farm Cottages	51	50	50	51	100	51	41
Forklift loading and handling	Farm house	48	60	85	45	100	45	

Table 9 - Summary of distance and on-time calculations for VMS logistics

6.3 Rating level

The specific levels at the two assessment locations are summarised in Table 10.

Assessment location	Noise source	Specific sound level dB L _{Aeq,Tr}
Garden of No.1 Park Farm Cottages	Dubs and Classics	21
	VMS Logistics	41
Farmhouse	Penny Wood Bespoke	24
	VMS Logistics	45

Table 10 Summary of Specific levels

BS 4142 takes into account any acoustic features of the specific sound by adding a character correction as set out in Table 2. This section allocates and justifies the character corrections for each of the noise sources.

6.3.1 *Dubs and Classics*

The sound from Dubs and Classics is often intermittent and can also be percussive (e.g. hammering). Angle grinding produces a harsh abrasive sound that may not strictly be tonal but would qualify for a feature correction in the “*other*” category. The specific sound level is relatively low compared to background so the intermittent and percussive features would be “*just perceptible*”. The grinding character would be clearly perceptible. This sound therefore requires a character correction of 3 dB for Impulsivity, + 0 dB for intermittency and + 3 dB for “*other*” characteristics. The total character correction is therefore + 6 dB.

6.3.2 *Penny Wood Bespoke*

The sound from Penny Wood Bespoke is intermittent, percussive and in the case of the table saw, subjectively tonal. This requires a character correction of + 2 dB for just perceptible tonality, + 3 dB for just perceptible impulsivity and + 0 dB for just perceptible intermittency. Total character correction is therefore + 5 dB.

6.3.3 *VMS Logistics*

The sound of unloading and goods handling involves a forklift with a reverse warning bleeper which is tonal. There are also percussive elements to the sound in the bangs and crashes of the forklift and metal stillages and the sound is intermittent. Tonality is clearly perceptible + 4 dB, impulsivity is clearly perceptible + 6 dB, and intermittency is clearly perceptible + 3 dB. Total character correction is therefore + 13 dB.

6.4 **Assessment of impacts**

The impact of the specific sound source can initially be estimated by subtracting the representative background sound level from the rating level. Typically, the greater this difference, the greater the magnitude of impact (depending on context).

The results of the BS 4142 assessment are presented in Table 11.

Assessment location	Noise source	Specific sound level dB L _{Aeq,Tr}	Combined feature corrections dB	Rating level dB L _{Ar,Tr}	Background sound level dB L _{A90,T}	Difference (+/- dB)
Garden of No. 1 Park Farm Cottages	Dubs and Classics	21	6	27	30	-3
	VMS Logistics	41	13	54	30	+24
Farm house	Penny Wood Bespoke	24	5	29	30	-1
	VMS Logistics	45	13	58	30	+28

Table 11 – Summary of BS 4142 assessment results

In accordance with BS 4142, the above assessment indicates that the sound from Dubs and Classics and from Penny Wood Bespoke are likely to result in a low impact. The sound from VMS Logistics is likely to produce a significant adverse impact as the rating level is more than 10 dB over the background sound level.

6.5 Context

BS 4142 requires that the context of the specific sound be taken into account in its assessment. The context includes the acoustic context as well as the circumstantial context of the sound.

6.5.1 Acoustic Context

The acoustic context assess how the character and level of the specific sound compares with the residual acoustic environment. In this case, the residual sound includes farm machinery and workshop noise from a busy working farm. On our surveys we observed tractors being prepared for work which included clangs and short periods of hammering. We also observed grain from the grain store being loaded onto an HGV which involved an extended period of a diesel telehandler driving to and fro with a reverse warning bleeper. The Donderry Gundogs workshop also produces grinding noise and occasional percussive noise. These sounds were very similar to the sounds being assessed which are therefore not out of place in this location.

Although there are regular sounds of farm and workshop activity, the background sound level is still relatively low. BS 4142 states in Section 11 that: “Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.”

The standard does not specify thresholds below which background sound and rating levels should be considered low. However, the Association of Noise Consultants guidelines for the use of BS 4142 state:

“BS 4142 does not define ‘low’ in the context of background sound levels nor rating levels. The note to the Scope of the 1997 version of BS 4142 defined very low background sound levels as being less than about 30 dB L_{A90} , and low rating levels as being less than about 35 dB L_{Ar} .

The WG suggest that similar values would not be unreasonable in the context of BS 4142, but that the assessor should make a judgement and justify it where appropriate.”

The lowest typical background sound level during the day is 30 dBA which is relatively low. The BS 4142 methodology may therefore indicate a greater impact than is or would be experienced by the nearby residents (evidenced by the lack of complaints). The relevance of the absolute sound levels is discussed further in Section 7.

6.5.2 Circumstantial Context

Both the farmhouse and Park Farm Cottages are owned by the Farm. The farmhouse is occupied by the farm manager who not only works on the farm but decides which businesses are allocated to which industrial unit. Donderry Gundogs is an established manufacturing workshop which has established planning permission. None of the farm operations or industrial / commercial units have been the subject any noise complaints from any nearby residents.

6.6 Uncertainty

Certain aspects of the field measurement method in this case introduce uncertainty. BS 4142 recommends that any significant uncertainties are reported, potential effects highlighted and, where practicable, reasonable steps taken to reduce the effects.

6.6.1 Uncertainty of measured values

Our measured values were taken from attended as well as unattended measurements and included three site visits. Our attended measurements were helpful in identifying the source of many of the repetitive sounds recorded on our unattended measurements. We were therefore able to distinguish for example, between the sound of the VMS forklift truck and the sound of the farm telehandler. We were not able to identify the source of all sounds recorded on our unattended survey, for example the sound of a diesel engine idling in the near distance. This introduces some uncertainty to our assessment.

Many of the units were storage units who were not open during any of our visits. The noise impact from these units would be likely to be low given the context of the other noise sources and the fact that most of them are some distance from the dwellings (except Tighe Plant Hire at Unit 8 who are not far from the Farmhouse).

The one manufacturing business who we were not able to observe was Norfolk Timber Frames Ltd at Unit 7. Timber framed buildings are made and assembled in their workshop before being dismantled and transported to their destination where Norfolk Timber Frames will remain on site to complete the building. There are therefore long periods of time when the workshop has no use at all, other than storage. We spoke to the owner of the business to arrange for some sound measurements at their premises but we were told they were away on site and would not be back for 5 weeks. We understand that as the pieces of wood used for their buildings are large and heavy, the workshop tools are mainly handheld power tools e.g. saws and drills which are taken to the wood rather than the other way round. We do not expect the sound of these tools to be louder than those at Penny Wood Bespoke.

The weather on three days of our survey was not suitable for acoustic measurements. No data from these days were used for determining the background sound level.

6.6.2 Uncertainty in calculations

Our measurement locations were close to our noise sensitive receptors but some distance calculation was still required. In the case of VMS Logistics, uncertainty was introduced in determining the exact distance from the noise source to the measurement microphone and to the receptor as the activity took place over a wide area. The distance to the receptors was relatively large by comparison so this uncertainty would be small.

Our distance calculations assumed point-source propagation which in the case of Penny Wood Bespoke is not entirely accurate as the sound emanated from some of the roof space as well as a closed up doorway. This was mitigated by taking our measurements at some distance (8m) away from the building where the uncertainty due to the size source is reduced as sound would propagate more like a point source.

The nature of the sound output of some units, e.g. Dubs and Classics vary considerably from day to day or week to week. On the week of our survey, the owner was rebuilding an engine and so making very little noise at all. Our on-time calculations are therefore based on discussions with the owner and our experience of similar situations. It is of course possible that on some days the tools will be used more or less often than we have calculated in our assessment.

6.7 Future occupants

In the interests of protecting the amenity of nearby residents, any future occupants of the industrial / commercial units should not introduce noise sources which would be any noisier than those that we have assessed and/or which would cause an adverse impact, i.e. result in a rating level in excess of 5 dB over the background sound level at the nearest dwellings. This could be achieved by locating noisy businesses in the units further from the dwellings, ensuring that any noisy activity takes place within buildings themselves or by not accepting excessively noisy tenants.

7 MITIGATION

Mitigation is required to reduce the impact of VMS Logistics on Park Farm Cottages and on the Farmhouse, if desired.

A 2m tall noise barrier between the source and receptor could reduce the sound by up to 10 – 15 dB, depending on the relative location of the source and the barrier. The barrier should have an area density of at least 10 kg /m² and have no holes or gaps. Ideally, the barrier would be as close to the source (or the receiver) as possible. A suggested location is shown in Figure 11.



Figure 11 - Possible location of barrier around VMS Logistics © Google 2023

Although a reduction of 15 dB would reduce the impact of the sound, this would not be sufficient to make an adverse impact unlikely in terms of BS 4142.

However, this would reduce worst-case specific sound levels to 30 dB $L_{Aeq,T}$ at the farmhouse and 26 dB $L_{Aeq,T}$ at Park Farm Cottages (or 43 dB $L_{Aeq,T}$ and 39 dB $L_{Aeq,T}$ respectively if you include the character corrections). These levels are relatively low in absolute terms and would easily comply with BS 8233 and WHO guidelines both externally and internally (assuming 15 dB across a partially open window per BS 8233)

Aside from acoustic screening, further mitigation would require relocating the unloading operation further from the houses or moving it indoors, neither of which may be practicable. It is, however, the remit of West Norfolk Council to decide whether further noise mitigation is necessary to reduce the impact of noise from VMS Logistics.

As of 02 October 2023, we have been informed that VMS Logistics will be leaving the site on 11 December 2023. It follows that from this date, this mitigation would no longer be required.

8 CONCLUSIONS

- The industrial / commercial units at Park Farm are located close to a busy working farm. One of the units already has planning permission for industrial use.
- The units are occupied by a range of users, the majority of which are used for storage with either daily or infrequent access required.
- Units with regular daytime use are Dubs and Classics, Penny Wood Bespoke and VMS Logistics. Norfolk Timber Buildings uses their workshop for short periods to prepare buildings for installation elsewhere.
- VMS logistics load and unload delivery vehicles with a forklift truck in an open area approximately 50 m from the nearest dwellings. According to the BS 4142 assessment methodology, this is likely to result in a significant adverse impact on the nearby inhabitants. The impact of all other units is likely to be low.
- The sound from the industrial / commercial units is similar in nature to sound from the existing farm operations and the existing industrial unit. The nearest houses at Park Farm Cottages are occupied by tenants of the farm. The farmhouse is occupied by the farm manger.
- Background sound levels in this location are relatively low and in this situation BS 4142 advises that absolute sound levels may be a more reliable indicator of impact than a comparison of rating levels and background sound levels. Indeed, the lack of any noise complaints to the Farm or West Norfolk Council indicates that there is currently a lower impact than the BS 4142 methodology suggests.
- An acoustic barrier close to VMS Logistics would reduce their impact on residents of Park Farm Cottages and the Farmhouse, if required. Although this mitigation would not reduce the rating level to 5 dB above background, this would represent best practicable means and reduce the impact on nearby dwellings. With the barrier, absolute sound levels would comfortably comply with BS 8233 and WHO guidelines, which is relevant due to the low background sound levels.
- Future occupants should restrict any noisy activities to within buildings or to the furthest units from the dwellings. The rating level from any new noise source should not exceed 35 dB at the nearest dwellings. This could be secured by a planning condition if required.
- With the recommended mitigation in place, and given the lack of complaints, we expect the noise impact of the proposed commercial / industrial use to be acceptable and see no noise-related reason to withhold planning permission for the change of use of the farm buildings in question to industrial / commercial use.

APPENDIX A TECHNICAL TERMS AND UNITS RELEVANT TO THIS REPORT

Acoustic environment - Sound from all sources as modified by the environment

Ambient sound level, $L_A = L_{Aeq,T}$ - Totally encompassing sound, usually composed of many sources. Comprises the residual sound and specific sound when present.

Background sound level, $L_{A90,T}$ - A weighted SPL exceeded by the residual sound for 90% of the a given time interval, T and rounded to the nearest whole dB.

Measurement time interval, T_m - Total time over which measurements are taken. May be the sum of multiple non-contiguous, short-term intervals

Rating level, $L_{Ar,Tr}$ - Specific sound level plus adjustment for characteristic features

Reference time interval, T_r - Specified interval over which the specific sound level is determined, i.e. 1h during the day (0700-2300) and 15mins at night (2300-0700).

Residual sound level, $L_r = L_{Aeq,T}$ - Ambient sound remaining when specific sound source does not contribute

Specific sound level, $L_s = L_{Aeq,Tr}$ - Level produced by specific sound source over reference time interval, T_r . Can also be calculated and/or predicted.

Sound Pressure Level (L_p or SPL) - This is a function of the source and its surroundings and is a measure in decibels of the total instantaneous sound pressure at a point in space. The SPL can vary both in time and in frequency. Different measurement parameters are therefore required to describe the time variation and frequency content of a given sound. These are described below.

Frequency - This refers to the number of complete pressure fluctuations or cycles that occur in one second. Frequency is measured in Hertz (Hz). The rumble of thunder has a low frequency, while a whistle has a high frequency. The sensitivity of the ear varies over the frequency range and is most sensitive between 1KHz and 5KHz.

Octave and One-Third Octave Bands - The human ear is sensitive to sound over a frequency range of approximately 20 Hz to 20,000 Hz and is more sensitive to medium and high frequencies than to low frequencies. To define the frequency content of a sound, the spectrum is divided into frequency bands, the most common of which are octave bands. Each band is referred to by its centre frequency, and the centre frequency of each band is twice that of the band below it. Where it is necessary for a more detailed analysis octave bands may be divided into one-third octave bands.

'A' Weighting - The sensitivity of the human ear varies with frequency, some frequencies sound louder than others. The 'A'-weighting curve represents the non-linear frequency response of the human ear and is incorporated in an electronic filter used in sound level meters. Measurements using an 'A'-weighting filter makes the meter more sensitive to the middle range of frequencies, which approximates to the response of the ear and the subjective loudness of the sound. Sound level measurements using 'A'-weighting will include the subscript A, e.g. dB(A).

Statistical Analysis - These figures are normally expressed as LN, where L is the sound pressure level in dB and N is the percentage of the measurement period. The LN figure represents the sound level that is exceeded for that percentage of the measurement period. L_{90} is commonly used to give an indication of the background level or the lowest level during the measurement period.

APPENDIX B MEASUREMENT SYSTEMS AND CALIBRATION

Job reference and title: 13900 – Park Farm, Wormegay

Measurement location: See Section 5.2.1 of this report

Measurement date(s): 14 – 22 September 2023

Measuring equipment used:

Equipment description / serial number	Type number	Manufacturer	Date of calibration expiration	Calibration certificate number
Position 1 Unattended (Kit 7)				
Precision sound level meter serial no. A2A-09025-E0	XL2-TA	NTi Audio	19/05/2025	TCRT23/1387
Microphone serial no. 8123	MC230	NTi Audio	19/05/2025	TCRT23/1387
Microphone pre-amplifier serial no. 5139	MA220	Neutrik	19/05/2025	TCRT23/1387
Microphone calibrator serial no. 2342835	4231	B&K	19/05/2025	TCRT23/1386
Position 2 Attended (Kit 1)				
Precision sound level meter serial no. A2A-04410-D2	XL2	NTi Audio	08/10/2023	38894
Microphone serial no. A16324	MC230	NTi Audio	08/10/2023	38893
Microphone pre-amplifier serial no. 5309	MA220	Neutrik	08/10/2023	38894
Microphone calibrator serial no. 042951	GA607	Castle Group	08/10/2023	38892

Calibration level Kit 1 93.7 dB @ 1 kHz

Calibration level Kit 7 114.0 dB @ 1 kHz

Persons in charge of measurements: George Moore MIOA

Measurement parameters Octave band and A-weighted $L_{eq,T}$
Octave band and A-weighted $L_{F90,T}$

APPENDIX C OCCUPIER LIST AND SITE PLAN

Tharros Ref	Occupier	Description	Notes
Unit A	Dubs & Classics	One man operation servicing and restoring VWs and classic cars.	Occasional hammering or power tool use
Unit B	Donderry Gundogs	Dog cage conversions to 4x4s and pickups	Metal fabrication tools eg saw, welder
Unit C	Coastal Red Limited t/a Lynx	Storage of vintage busses	Rarely seen
5a/b	Penny Wood Bespoke Ltd	Wood furniture workshop	Table saw and other power tools, local dust extractor
6	FIFP & Carpentry Solutions Ltd	Builder's storage	Rarely seen
7	Norfolk Timber Frames Ltd	Timber framed buildings	Builds timber framed buildings which are then transferred to site for erection. Long periods away on site.
8	Michael Tighe Plant Hire Ltd	Plant hire eg earth-moving equipment:	Employees arrive in the morning to collect the machines and return end of the day
9	C & S Builders LLP	Builders storage	Rarely seen
12	Featherby Flooring Ltd	Carpet fitter	Employees come in the morning to collect tools, then out on site for the day. Lorry delivers carpet, once a day at the most.
13 – 14 and 18	VMS Logistics Limited	Distribution	HGV arrives around 2pm each day. Goods unloaded by forklift, then loaded into small vans for delivery
15	Downham Cider	Storage: IBC containers etc for taking to fayres.	Rarely seen
16	EKO Homes	Builder's storage	Rarely seen
17	Andrew Atack	Antique storage	Rarely seen

