Acoustic Associates Sussex Ltd

Assessment of Workshop Sound Pressure Levels

Site: **Burryer's Common Farm, Steep, Hampshire. GU32 2BJ.**
Client: **Mr and Mrs Bridger**

Report by: Scott Castle BSc (Hons) CEnvH, MCIEH PGDip: Acoustics MIOA

Date: **30/07/2021**
Project: **J3218**
Issue 1

Acoustic Associates Sussex Ltd.

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Acoustic Associates Sussex Ltd.

1 Introduction

Acoustic Associates have been appointed to undertake an acoustic assessment to assess the current levels of sound generated inside a workshop owned by the client and the likely impact on the nearest residential property.

Standards and guidance referenced for this assessment include:

- World Health Organisation (WHO) - Guidelines for Community Noise 1999
- BS8233 (Sound insulation and noise reduction for buildings) 2014
- ISO9613 (Attenuation of sound during propagation outdoors) 1996
- National Planning Policy Framework (NPPF) 2021
- BS4142:2014-A1:2019 (Methods for Rating and Assessing Commercial Sound)

Two class 1 sound level meters were left secured on the site unattended between 16th to 22nd July 2021. These were deployed inside the workshop and at the site boundary (externally) to assess ambient noise levels when the workshop was occupied and the resulting impact on the soundscape at the site boundary and additionally at the nearest noise sensitive premises.

The worst case and highest reading from inside the workshop was 69.4dB $L_{Aeq,5minutes}$. The worst case and highest measured single hour period inside the workshop was 61dB $L_{Aeq,\ 1\ hour}$. Four different assessment methodologies were applied to consider the sound pressure levels at the nearest residential property including, a manual calculation/prediction, comparisons of internal and external sound level meters, the use of noise modelling software and a BS4142:2014-A1:2019 assessment were all undertaken.

All methodologies indicate that the sound levels being generated inside the closest workshop are significantly below measured background sound pressure levels at the nearest residential receptor at Bowyers Cottage. This is caused by work activities being undertaken inside the workshop, very prohibitive planning conditions on activities which may not be undertaken at the workshops, distance attenuation and additionally the already elevated soundscape due to the close proximity of the A3. The measured internal sound pressure levels were also assessed against other commercial workshops that AASL have measured in situ to provide a degree of context.

A review of the complaints made to the Council have not identified the exact nature of the complaints and to date no complaints have been substantiated or proven by the local authority.

The workshops are also located on the Client's land which is part of an active farm premises which see vehicles and plant movements to and fro and potentially out of normal working hours.

In summary, the noise levels generated inside the workshops on the clients land are not deemed to present any noise concerns to the nearest noise sensitive receptor at Bowyers Cottage

2 Context, Noise Criteria & Noise Assessment Methodology

2.1 Context and Description of Site

The client owns the land and buildings as shown below in Figures 1 and 2. On the site is a large agricultural building which is approximately 55m in length. Approximately 23m of the building length is dedicated to two self enclosed workshops, with the remainder of the building remaining in agricultural use with storage of machinery/materials etc.

The workshops are constructed with blockwork (approximately 190mm width) to a height of approximately 2.3m and then timber to meet the pitched asbestos roof. The door to both workshop areas consists of a solid plate steel which is side hinged.

In one unit, MH Motorsports, the tenant builds rally car engines by hand. No air tools are used and all tools are hand tools. The loudest item of plant in the first workshop is an air compressor used for the inflation of tyres, which is not frequent.

The two workshop units are divided by a blockwork wall.

In the adjacent workshop unit, a hobby car collector stores his cars and carries out occasional maintenance of his own vehicles. 4 vehicles are stored and all registered to the tenant which are polished and maintained from time to time. The loudest activity was reported by the tenant as the movement of vehicles around. The use of trolley jacks, a disc cutter, radio, removal of an engine etc were all reported to have occurred during the survey period.

It should be noted that neither of the workshops are occupied on a full-time basis.

It is relevant to note that there are very specific planning conditions controlling hours of use, including servicing/deliveries to the site and importantly that panel beating and engine tuning are both prohibited activities. Any noisy activities must occur internally with the doors closed.

Figure 1. 2x Site Workshops

Aside from the two workshops it must be noted that the remainder of the site is part of a working farm yard. On the South West site boundary is an additional road called Steep Marsh Farm Cottages which is known to lead to a large chicken farm and have noisy trailers transiting close to the site and indeed the nearest residential property.

2.2 Location

The location of the building containing the workshop/s is seen in Figure 2 below (outlined in red). The building Eastern façade is approximately 85m from the edge of the A3 Northbound carriageway. The nearest residential receptor is shown in solid red.

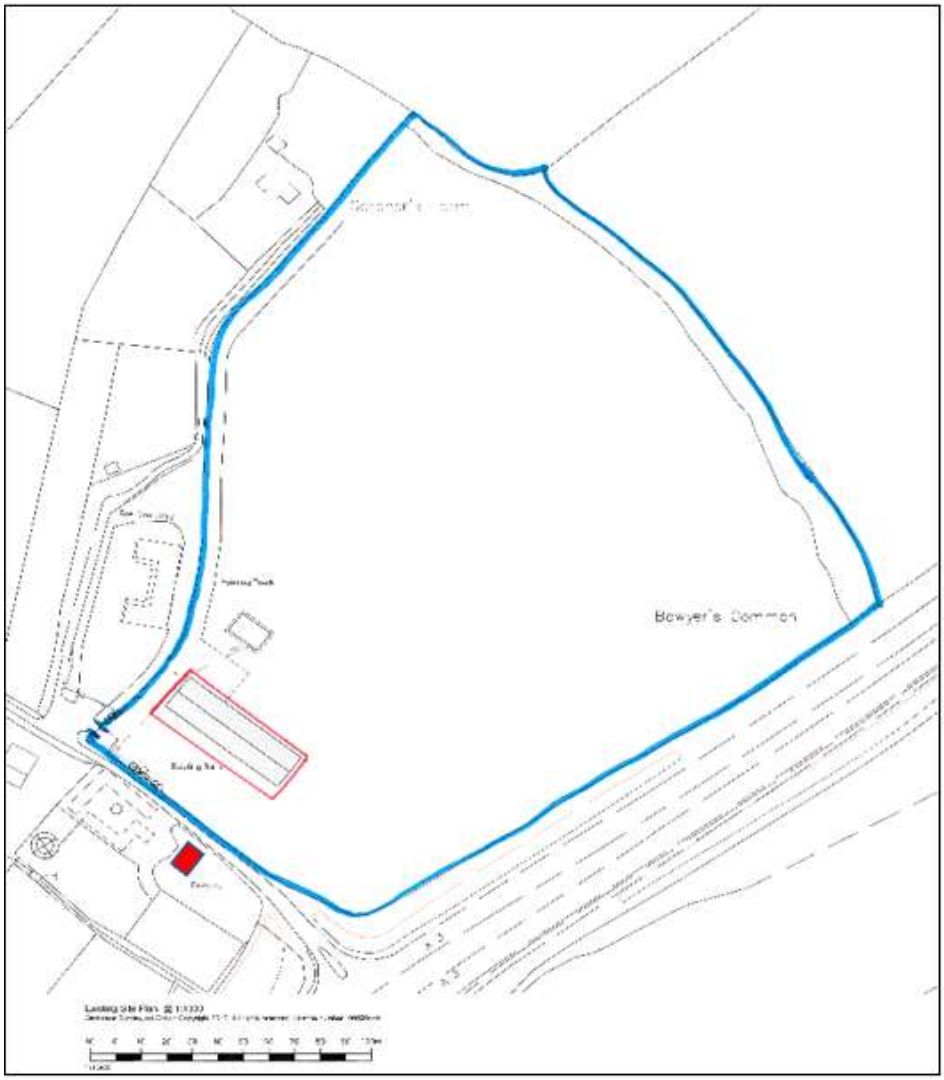

Figure 2. Site Location Plan

2.3 Consented Hours of Operation and Uses

The planning decision notices (see section 2.5 below) all list the same hours of operation as being 07:00 to 19:00 Monday to Friday and 09:00-14:00 hours Saturdays and no working on Sundays, bank or public holidays.

2.4 Nearest Residential Receptor Location

The nearest residential neighbours are across the single track carriageway called Bowyers at approximately 50m in distance.

2.5 Relevant Planning Consents

Three decision notices are apparent on the South Downs National Park Planning website and these are presented in chronological order. All were approved with the dates shown.

- SDNP/19/01184/FUL- Approved (24 May 2019) Retention and temporary change of use of existing B1 Light Industrial usage to B2 for the preparation and storage of rally cars. | Burryers Common Farm Pratts Lane Steep Marsh Petersfield Hampshire GU32 2BJ
- SDNP/20/00822/CND-Approved (20 May 2020) - Variation of Condition 5 of SDNP/19/01184/FUL to allow the continued use of the building as B2 use permanently | Land South East Of Gardners Farm Pratts Lane Steep Marsh Petersfield GU32 2BJ
- SDNP/20/04290/FUL – Approved (20 May 2021). Removal of condition 5 of permission SDNP/19/01184/FUL to allow the continued use of the building for B2 use permanently

2.6 Noise Complaints received by the Local Authority

A review of the Environmental Health consultation comments for the above planning applications suggest that there have not been any noise complaints received between November 2015 and summer 2018.

However, in the most recent comments (2021) to the planning office by Helen Le-Vallee (Technical Consultee, Env Health), it is noted that complaints have been received by the department, however it is not stated whether these were justified or actioned or what type of complaints these referred to.

Local Authorities have a duty to investigate complaints to determine whether a statutory nuisance may be occurring or alternatively, whether there are instances of anti-social behaviour under the Anti-social Behaviour, Crime and Policing Act 2014

A Freedom of information request was made by the client to identify exactly what complaints have been made and the status of these. The following is apparent and was received from East Hampshire District Council.

1 Complaint in 2018 (albeit the subject of which is not clear), diary sheets never returned and case closed.

3 Complaints in 2020 and three sets of diary sheets returned to the Council. One complaint was closed on the basis of diary sheet entries and the two remaining complaints were agreed to be investigated further to substantiate whether in the opinion of the local authority, there was a statutory nuisance occurring. Due to the COVID19 pandemic, it was reported that noise levels were not representative by the complainants and the two complaints were closed.

In short, there are no substantiated noise complaints which have been witnessed by the local authority and accordingly, no formal action has been taken.

2.7 Soundscape

The soundscape was dominated by the A3 to the South and South East of the site which is dual carriageway. Aviation sounds from light aircraft were also noted.

2.8 Relevant Assessment Criteria

As commercial workshops, it would be relevant to consider BS4142:2014-A1:2019 to review the impact that these have on the nearest residential receptor.

2.9 Methodology and Approach

To ensure that sufficient information is presented to the client, the following approach has been applied:

1. Measure sound pressure levels inside the workshop to determine noise levels on day to day basis inside the workshop.
2. Measure ambient and background noise levels as close as possible to the nearest residential property.
3. Assess the likely day to day sound pressure levels inside the workshop.
4. Extract information from the measured dataset which shows the sound pressure levels for the permitted hours that the workshops will be used (see 3x decision notices)

2.10 Planning Policy - National Planning Policy Framework 2021 (NPPF)

The National Planning Policy Framework (July 2021) defines the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so.

The following paragraphs are relevant within NPPF Section 15 (Conserving and enhancing the natural environment) states the following:

Paragraph 174(e) - Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; an

Paragraph 185 - Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) 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;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; an

Paragraph 187 – Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). 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.

3 Sound Survey Baseline Conditions & Results

A sound survey was carried out between the 16th July 2021 to 22nd July 2021 to assess the sound pressure levels as close as possible to the residential receptors located to the North. The time period was deliberately chosen to include a weekend to ensure that the soundscape was sufficiently understood and captured.

The sound level meter clocks were synchronised to allow a like for like comparison of data.

The sound level meters were calibrated before and after commencing the noise measurements (@94dB with no drift). All measurements were taken with the time base set record 1 second intervals with the data post processed through dBTrait. The workshop conditions were representative of a reverberant field internally, whilst the externally located 01dB Black solo was freefield.

3.1 Existing Sound Survey Details

Survey(s) carried out by	Scott Castle BSc(Hons) Env Health, MCIEH CEnvH PGDip Acoustics MIOA
Equipment Used	01dB SIP95, Class 1 Sound Level Meter (Inside Workshop)
	01dB Black Solo, Class 1 Sound Level Meter. Serial No.60673 (Site Boundary)
Equipment Used	01dB Calibrator (CAL21) – Serial Number 50241778
Location	SU76116/26067 2.1m above ground level.
Duration	16th July 2021 to 22nd July 2021

Table 1. Survey Equipment

Figure 3. Sound Level Meter Monitoring Locations (Left-01dB SIP95/Right 01dB Black Solo)

3.2 Measured Sound Pressure Levels

The tenant in the workshop helpfully kept a record of his timings of when he was in the unit which allow an idea of the internal sound pressure levels attributable to the tenant. As previously stated, the tenant is not a full-time occupant on the site.

The only outside activity occurring was when MH Motorsports washed down and hoovered vehicles between 14:00 and 16:00 hours on Wednesday 21st July 2021.

Both tenants for the workshops were contacted to ensure that an accurate record was kept of when workshop related activities occurred, as it is highly relevant to note that aside from the workshops, the area remains a working agricultural yard and does have plant and vehicles moving.

3.2.1 Occupation Matrix

Figure 4 below details when the two tenants were present at the workshops. Note is made that there was no Sunday operations, as per the planning consents and the fact that the finish hours were as early as 16:00 hours.

It was noted that on the majority of the days ie Saturday to Wednesday, the door of Unit 2 was wide open. Due to the high external temperatures on Thursday, the door was half closed at a 45 degree angle. S denotes Steve and M denotes Mick, the two unit tenants.

Workshop Occupation							
Time	**Friday**	**Saturday**	**Sunday**	**Monday**	**Tuesday**	**Wed**	**Thu**
07:00-08:00							
08:00-09:00							S
09:00-10:00					$S_{(10:40\text{-}16:00)}$	$S_{(09:48\text{-}15:00)}$	S
10:00-11:00					S	S	S
11:00-12:00					S	S	S
12:00-13:00		S		$S_{(12:30\text{-}14:00)}$	S	S	S
13:00-14:00				S	S	S+M	S
14:00-15:00					S	S+M	S
15:00-16:00	S				S		
16:00-17:00							
17:00-18:00							
18:00-19:00							

Figure 4. Occupation Matrix

3.2.2 Workshop Levels – LT1

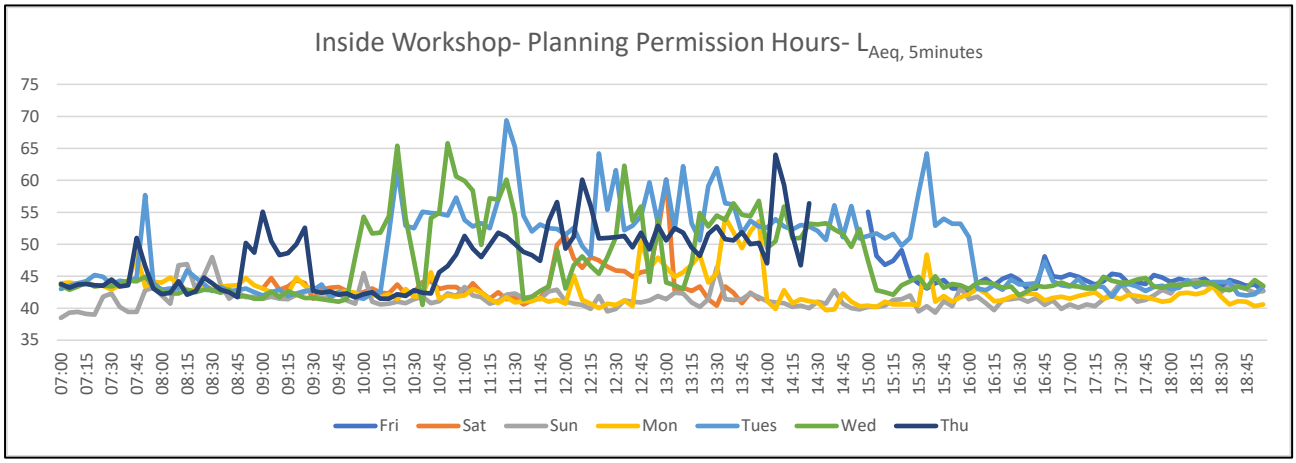

Figure 5. Internal Workshop Levels

3.2.3 Externally Measured Levels-LT2

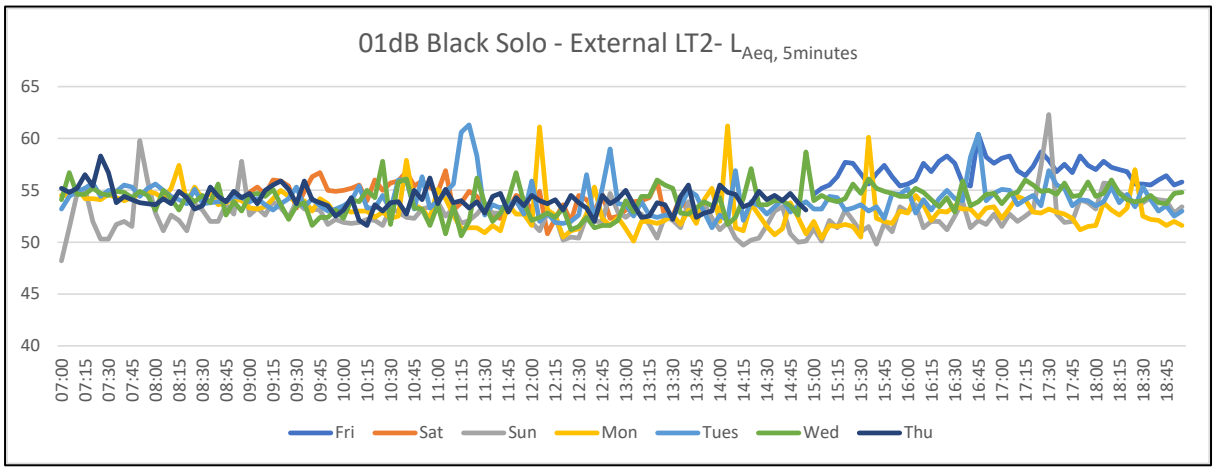

Figure 6. Externally Measured Sound Pressure Levels

3.2.4 Comparison of Internal and External Sound Pressure Levels

Figure 7 below shows the permissible operating days that were measured both internally and externally. It is noted that the external LT2 meter remains relatively stable and is not influenced by the workshop levels.

The external measurement position was 29.99m from the façade of the workshop and in line with the door of the workshop. A sense check of the calculations is made in section 3.3.

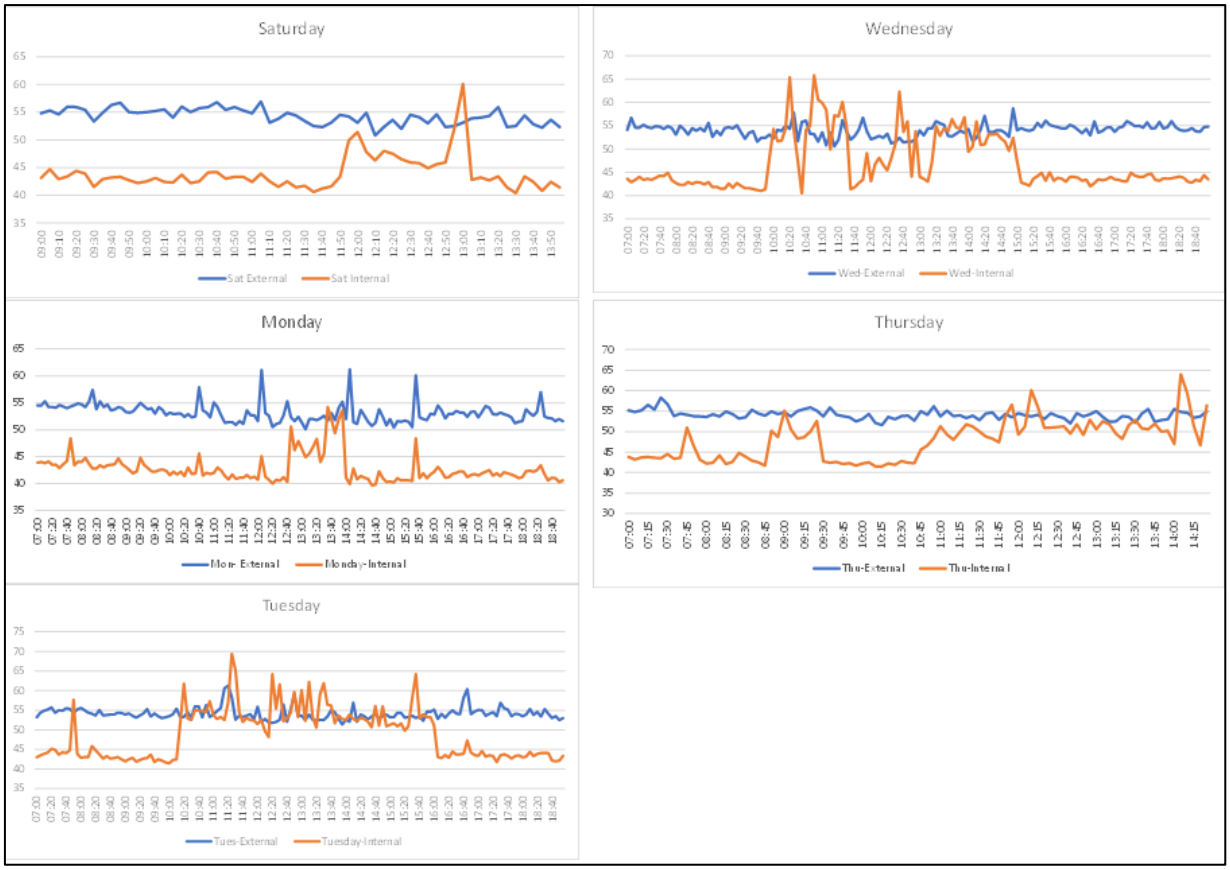

Figure 7. Comparison of Internal and Externally Measured Sound Pressure Levels, $L_{Aeq,5minutes}$

3.3 Expected Sound Pressure Levels from Workshop

With a sound pressure level of 69.4dB $L_{Aeq,5minutes}$ recorded in the workshop, in reverberant conditions it is reasonable to expect a 6dB reduction with an open door as the sound energy transfers into the wider outside environment. This would provide a sound pressure level of 63.4dB $L_{Aeq,\ 5minutes}$.

With a distance correction of 29.9m to the LT2 measurement position using a point sound source this would account for a reduction of 29.5dB(A). Such a reduction would result in a sound pressure level of 33.9dB $L_{Aeq,\ 5\ minutes}$ measured at the LT2 position. However, the measured L_{Aeq} for the 11:25 period when the tenant was working in the workshop was 58.3dB $L_{Aeq,\ 5\ minutes}$. The resulting sound pressure level from the workshop would be significantly below the noise levels measured at the LT2 position.

It must also be noted that between the LT2 position and the receptor first floor window is an additional 27m where further distance attenuation of the sound source would occur.

The direct distance between the first-floor window of the nearest receptor and the closest door is approximately 50m.

Using the same methodology of 69.4dB $L_{Aeq,\ 5minutes}$ as a reverberant internal workshop condition, this would reduce with an open door to 63.4dB $L_{Aeq,\ 5minutes}$. With 50 metres distance attenuation, a subtraction of 34dB may be made. 63.4 minus 34 =29.4dB at the receptor location.

3.3.1 Measured Levels Summary

In short, the measured external sound level meter at LT2, some 29.99m distant from the workshop façade was not influenced by internally generated workshop noise. This can be further demonstrated using a computer-generated noise model.

4 Noise Modelling Software

In order to see how noise varies at different positions around the proposed development it is possible to produce a noise contour map. A computer noise model has been completed using the computer package IMMI. Drawings of the area have been used to complete the noise models and the topography of the location recreated. IMMI faithfully implements the propagation method of ISO-9613:1996; Acoustics – Attenuation of sound during propagation outdoors.

4.1 Modelling Inputs

The workshop area has measured has been constructed as an area source.

Whilst present on site a sound insulation test of the weakest façade, ie the front façade with the steel door was carried out, indicating a D_w of 18.8dB. The D_w is the weighted level difference between outside to inside corrected for background.

The steel door was entered as an opening measuring 12.3m^2

All walls and roof were modelled as having a sound insulation performance of 18.8dB as such presenting a worst case.

An internally measured sound pressure level of 69.4dB was applied as this was the highest measured event across the survey duration.

A receptor first floor window position was entered at Bowyers Farm at 4m above ground level

No barriers or vegetation were entered into the model.

The model was run with the plate steel door both open and closed.

The position of the external sound level meter, LT2 was also plotted to allow predictions to be made of both the nearest resident and additionally the site boundary.

4.2 Modelling Outputs

The door open outcome is seen on the left-hand side and the door closed outcome on the right-hand side of Figure 8 below. The resulting sound pressure levels are known to be faint in the legend and have been reproduced below in the summary 4.3.

Figure 8. IMMI Noise Modelling Outputs- 2D

4.3 Noise Modelling Summary

The resulting sound pressure levels from the noise modelling exercise of the loudest five minute period are detailed in Figure 9 below.

Location	Door Closed	Door Open
Bowyers FF window	22.5	29.1
Black Solo	27.3	36.7
Predicted data is dB(A) and Freefield		

Figure 9. IMMI Noise Modelling Predictions

It is noted that the manual prediction with the door open in 3.3 above was 29.4dB which is only 0.3dB different to the result predicted by IMMI. The model and the predictions therefore identify relatively low levels at the nearest residential location at Boywers Cottage.

5 Discussion

5.1 Context

Section 3.3 above demonstrates that the worst case measured sound pressure level across the survey duration (69.4dB $L_{Aeq, 5minutes}$) inside the workshop results in sound pressure levels which are comfortably below the measured ambient noise levels at the nearest residential receptor. It follows also that with the residential receptor closer to the A3 it is likely to experience an increase in the measured soundscape.

The predictions have been achieved using manual calculations, a review of the externally measured levels at LT2 vs Workshop levels (LT1) and through noise modelling software.

5.2 Measured Background Sound Pressure Levels at Site Boundary

The LT2 position measured data was assessed for a day when no works were taking place ie, a Sunday from 07:00 to 19:00 hours. This presents a worst-case scenario as weekday road traffic noise could well be higher still and would likely have greater commercial vehicles and freight movements via the road. However, for the sake of a robust assessment, a Sunday without any workshop generated sound has been applied.

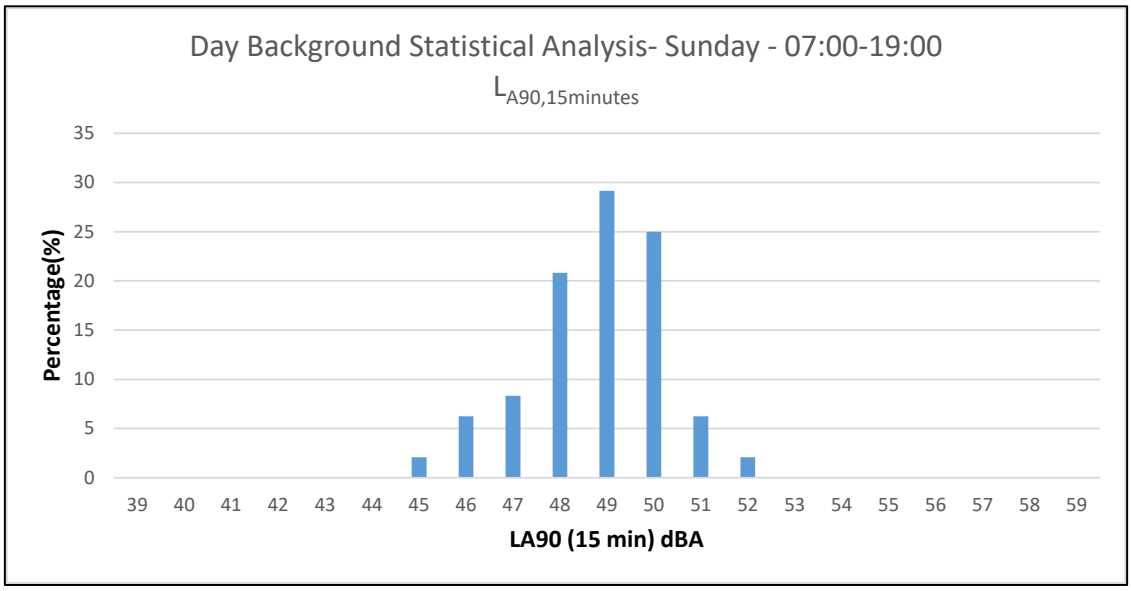

Figure 10. Measured Background Sound Pressure Levels - $L_{A90,15minutes}$, 07:00-19:00 hours

It follows that with the receptor position closer to the A3, inverse square law may be used to predict that the sound levels may be up to 1dB greater (0.9dB rounded). 10log(94.6/115.4). It is therefore fair to assume 50dB $L_{A90,15minutes}$ as the measured background at the receptor location.

5.3 BS4142 Assessment based on Measured Internal Noise Levels

BS4142:2014-A1-2019 is used to assess industrial and commercial sounds and works by considering the Rating Level or $L_{Ar,Tr}$ against the measured background sound pressure level without the sounds occurring. Where the Rating Level at the receptor location is below or equal to background, there should be a low to no impact. Where the Rating Level is above background, the greater the increase, the greater the impact which is discussed as an adverse impact.

The following text is important and is found is the foreword of BS4142:2014-A1:2019

"Response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact, for example, can depend on such factors as the margin by which a sound exceeds the background sound level, its absolute level, time of day and change in the acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood. This edition of the standard recognizes the importance of the context in which a sound occurs. Great care has, therefore, been taken in the use of the words "sound" and "noise". Sound can be measured by a sound level meter or other measuring system. Noise is related to a human response and is routinely described as unwanted sound, or sound that is considered undesirable or disruptive."

A workshop generating a noise level at distance is referred to as a specific sound level. It becomes a Rating Level or $L_{Ar,Tr}$ when character corrections are added. These may be added for tonality (0-6dB), impulsivity (0-9dB), intermittency (3dB) and other (3dB). The character corrections are only applied where they are detected at the receptor location and the final rating level and background must be considered in line with context as it is critical to not just become a numbers exercise.

In this instance, context would dictate that the workshops operate intermittently during the daytime period only, that the site is part of a larger operational farm, that there are prohibitive planning conditions in place detailing what may not be undertaken at the site and importantly that the soundscape is dominated by the nearby A3 dual carriageway.

The reference period for the daytime for BS4142:2014 is a single hour.

The background sound pressure levels for the daytime period are shown in 5.2 above, namely 50dB $L_{A90,15minutes}$

The hours for the workshop use have been reviewed from LT1 position (inside workshop) as below with a worst-case hour of 61dB $L_{Aeq,1hour}$.

It was understood from the workshop tenant that the workshop door was only closed on the day of the equipment collection, Thursday 22nd July 2021. It is therefore relevant to model the event with the door open to present a worst-case scenario.

Day	Time	$L_{Aeq,1\ hour}$
Saturday	12:00-13:00	47.9
Sunday	N/A	N/A
Monday	12:30-13:30	46.2
Tuesday	10:40-11:40	61.0
	11:40-12:40	56.8
	12:40-13:40	58.0
	13:40-14:40	53.1
	14:40-15:40	56.3
Wednesday	09:50-10:50	56.4
	10:50-11:50	58.8
	11:50-12:50	53.7
	12:50-13:50	52.5
	13:50-14:50	53.2
Thursday	09:00-10:00	49.0
	10:00-11:00	44.0
	11:00-12:00	51.4
	12:00-13:00	53.5
	13:00-14:00	51.1

Figure 11. Measured Hourly Periods at LT1 $L_{Aeq,1\ hour}$ (Inside Workshop)

Daytime- Monday to Saturday			
Results	Measurement Parameter		Relevant Clause
Specifc sound level	$L_{Aeq(T)}$	20.7	7.3.4
On time corrected value	Not Applicable- Worst Case Hour Used	N/A	
Acoustic feature correction	Intermittent (+3dB) and impulsive(3dB)	6	9.2
Rating level	$L_{Ar,Tr}$	26.7	9.2
Background sound level	$L_{A90(T)}$	50	8
Excess of rating level over background sound level		-23.3	11
Assessment indicates a	Significantly below measured background		11
Uncertainty of the assessment	Discussed		10

Figure 12. BS4142:2014-A1:2019 Assessment (At Residential Receptor)

Using a BS4142:2014-A1:2019 assessment to consider the sound levels generated inside the workshop, these show a no/low impact, and reflecting on the context which has already been discussed, the sound generated from inside the workshop should not be a problem to the nearest residential property.

This is based on containment at source, prohibitive planning conditions about what activities may not be undertaken, distance attenuation and an already noisy soundscape from the adjacent A3. The activities undertaken are also not inherently noisy.

5.4 Increased Workshop Noise Levels

Given the BS4142 assessment above, the Rating Level is clearly well below the measured background sound pressure levels resulting in a low/no impact. It is also questionable as to whether such character corrections should have been applied in the first instance as the sound is not likely audible at the receptor location. However, for the purposes of a robust report the character corrections were applied.

It is noted that if the 6dB of character corrections remained applied then the sound levels inside the workshop could increase by an additional 23dB and still achieve parity with background. This would make 84dB as a worst-case hour inside the workshop where the tenants should actively be considering wearing hearing protection and it would be a very noisy and uncomfortable working environment.

It is relevant to consider how measurements in other workshops/commercial garages compare to those obtained at Burryer's Common Farm. Figure 13 below details three different projects which AASL have measured and show 1-hour values for project B inside a workshop ranging from 62-68dB(A) $L_{Aeq,\ 1\ hour}$.

Project	Plant	Notes	Distance	L_{Aeq}	L_{Amax}
Project A	15 mins inside workshop	Indoor	Middle of room	72.5	98.4
Project A	15 mins inside workshop	Indoor	Middle of room	69.7	91.7
Project A	15 mins inside workshop	Indoor	Middle of room	64.7	74.5
Project B	1hr inside workshop	Indoor	Edge of small workshop	68	92
Project B	1hr inside workshop	Indoor	Edge of small workshop	62	88
Project B	1hr inside workshop	Indoor	Edge of small workshop	63	93
Project C	15 mins inside workshop	Indoor	Middle of room	65.9	88.9
Project C	15 mins inside workshop	Indoor	Middle of room	61.2	86.1
Project C	15 mins inside workshop	Indoor	Middle of room	72	93.1
Project C	15 mins inside workshop	Indoor	Middle of room	70.2	97.7

Figure 13. AASL Measurements of other Garages/Workshops

6 Uncertainty

It is relevant to list how and where uncertainty may occur within a report and what measures have been taken to reduce uncertainty in the reporting process. The following steps have been taken to minimise uncertainty.

- All sound level meters used and deployed to site were calibrated before and after the survey period to determine that the meters were operating as intended and there was no significant drift.
- The weather conditions were suitable for environmental monitoring.

- The survey and monitoring period deliberately included a weekend period without any workshop activities to ensure that a baseline could be derived for background sound pressure levels.
- The measured background sound levels for a daytime period would likely be further increased still due to the shift of traffic types on the A3, ie more commercial vehicles would likely be present on a weekday.
- An estimate was also made using inverse square law of the difference between the surveyed external position and that of the rear of the residential property in terms of soundscape.
- The workshop selected deliberately targeted the tenant who was likely to be present and generating increased noise levels.
- Sound level meters were deployed inside the workshop as well as outside the workshop at the site boundary to measure the impacts.
- The tenant also kept an account of their occupation of the workshop, and this coincided with the increased noise levels inside the workshop.
- A sound insulation test of the façade was also carried out to determine a worst-case scenario of the front façade, which was then applied to all facades to present a robust case.
- In constructing the noise modelling area source, the measurements taken from site were used.
- The noise modelling outcomes used in the BS4142:2014 assessment also assumed an open doorway to present a worst case scenario, when in fact there are planning conditions which state that when undertaking noisy works, the doors must be closed
- Four different methodologies were applied to review the internal noise levels.
- Other AASL measured projects were also included to present some idea of context.
- To counter the argument that the noise levels were low due to the post pandemic unlocking, an estimate was made of how loud the sound pressure levels inside the workshop would have to be to still achieve parity with measured background sound levels and what this might sound like in terms of a worst-case hour.

7 Conclusion

Two class 1 sound level meters were left secured on the site unattended between 16th to 22nd July 2021. These were deployed inside the workshop and at the site boundary (externally) to assess ambient noise levels when the workshop was occupied and the resulting impact on the soundscape at the site boundary and additionally at the nearest noise sensitive premises.

The worst case and highest reading from inside the workshop was 69.4dB $L_{Aeq,5minutes}$. The worst case and highest measured single hour period inside the workshop was 61dB $L_{Aeq,\ 1\ hour}$. Four different assessment methodologies were applied to consider the sound pressure levels at the nearest residential property including, a manual calculation/prediction, comparisons of internal and external sound level meters, the use of noise modelling software and a BS4142:2014-A1:2019 assessment were all undertaken.

All methodologies indicate that the sound levels being generated inside the closest workshop are significantly below measured background sound pressure levels at the nearest residential receptor at Bowyers Cottage. This is caused by work activities being undertaken inside the workshop, very prohibitive planning conditions on activities which may not be undertaken at the workshops, distance attenuation and additionally the already elevated soundscape due to the close proximity of the A3. The measured internal sound pressure levels were also assessed against other commercial workshops that AASL have measured in situ to provide a degree of context.

A review of the complaints made to the Council have not identified the exact nature of the complaints and to date no complaints have been substantiated or proven by the local authority.

The workshops are also located on the Client's land which is part of an active farm premises which see vehicles and plant movements to and fro and potentially out of normal working hours.

In summary, the noise levels generated inside the workshops on the clients land are not deemed to present any noise concerns to the nearest noise sensitive receptor at Bowyers Cottage.

8 Glossary

$L_{Aeq,T}$ Equivalent continuous A-weighted sound pressure level**,** value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, *T*, has the same mean-squared sound pressure as the sound under consideration that varies with time

$L_{A90,T}$, A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels

$L_{Ar,Tr}$, Rating Level. Used in BS4142:2014-A1-2019. The specific sound level from the plant being assessed, but adjusted for any character corrections.

D_w, Weighted Level Difference. The sound insulation of the façade when measured in situ and corrected for background effects

dB(A) – A Weighted deciBel. The A weighting corresponds to the frequencies detected by the human ear.

IMMI – Computer Noise Modelling Software.