

LIDSEY BARN, LIDSEY FARM, BOGNOR REGIS, PO22 9PG

Technical Note

Acoustic Assessment Report

23rd June 2017

Peter Clark

1. INTRODUCTION

1.1 A noise survey and assessment has been carried out at Lidsey Barn, Lidsey Farm, near Bognor Regis in West Sussex. The Barn itself has recently been granted (subject to prior approval) permission for change of use from Class B1(a) (office use) to Class C3 (residential dwellinghouse). Permission for the Change of Use was granted by Arun District Council (ADC), under their reference AL/44/17/PD, on 26th May 2017. In the Approval ADC has stipulated that *"Prior to commencement of development a comprehensive Noise Impact Assessment (Acoustic Report) shall be submitted to and approved by the Local Planning Authority taking into account all the potential noise sources which could affect future residents. This report should be prepared in accordance with the provisions of BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings, in particular in respect of residential development including reference to The Planning & Noise Advice Document: Sussex (July 2015)."* This follows advice from the Environmental Health Department of ADC which states that *"it is difficult to support such an application ... given the very close proximity of the industrial unit directly behind the proposed residential conversion. The problem is exacerbated in that although the current noise impact of businesses operating here may be calculated, this cannot take account of future use"*.

1.2 The site itself is set back some 30m from the A29 Lidsey Road. The Barn is a brickwork construction with a proposed new insulated tiled roof. There are some industrial/commercial units to the east immediately behind Lidsey Barn. During the noise survey, all the industrial units were in use. Many of the units are used for manufacturing industry which in turn are served by a number of external plant/equipment items located at the rear. The industrial units themselves are constructed from insulated panelwork which provides a significant degree of noise attenuation. Lidsey Caravan Site lies on the opposite of the road to the West.

1.3 The site location and surroundings is given in Figure 1 below.

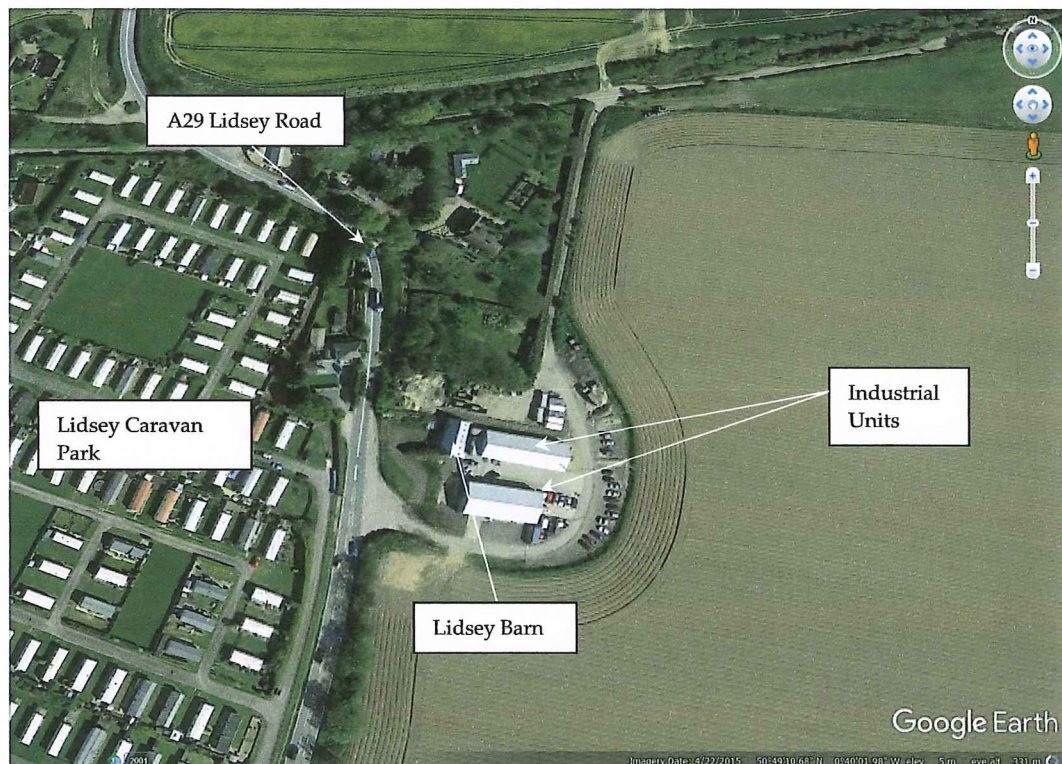


Figure 1: Site Location (© Google Maps)

1.3 To quantify and assess the impact of existing (*and to some extent*) future noise from the industrial units with respect to Lidsey Barn, a series of noise measurements have been undertaken. The noise climate is then assessed in terms of BS8233¹ criteria as required by ADC and recommendations for appropriate sound insulation/noise mitigation measures are made.

1.4 The proposed development of the barn is such that there is no garden space to the front or rear. Elevation drawings (see Figure A1 at the end of this report) show that there will be two small windows in the rear (East) elevation of the barn. These windows will serve the staircase/landing. There are windows to the north and south elevations. The assessment has shown that noise from the neighbouring industrial units, although audible is not considered to be excessively high. Notwithstanding this, recommendations are made to reduce noise levels further.

2.0 NOISE MEASUREMENTS

2.1 Environmental noise measurements were carried out during the period from Thursday 8th June to Tuesday 13th June 2017. Sound level measurement equipment was installed at two locations adjacent to the barn and close to industrial units behind. The location of the noise monitors is given in Figure 2 below. The measurement equipment is listed below in Table 1.

¹ British Standard BS8233:2014 "Guidance on sound insulation and noise reduction in buildings"



Figure 2: Noise Monitoring Locations (© Google Maps)

Table 1 Environmental Noise Measurement Instrumentation

No.	Description
1.	2 off Larson Davis Model LxT Sound Level Meters.
2.	2 off Larson Davis Model 377B02 ½" Condenser Microphones.
3.	Larson Davis Model CAL200 Sound Level Meter Calibrator.

2.2 All acoustic equipment conforms to the relevant parts of BS EN 60651:1994 (equivalent to BS 5969:1981) for the requirements of Type 1 acoustic accuracy. Additionally, the relevant equipment conforms to the

specifications contained within BS EN 60804:1994 (equivalent to BS 6698:1976) for integrating sound level meters.

2.3 In order to verify the correct operation of the equipment on site, an acoustic calibrator was applied during the course of the measurements. A maximum change of 0.1 dB(A) was noted, this can be considered as an insignificant change. The calibrator complies with the specifications of IEC 942:2003. The instrumentation was previously factory calibrated in January 2017.

2.4 Fast meter response was used for all measurements carried out during the course of the survey.

2.5 Noise levels are expressed in terms of continuous equivalent noise levels (L_{Aeq}) over an appropriate time period. The use of L_{Aeq} allows non-steady and non-continuous noise to be assessed and compared to the existing noise climate. L_{Aeq} is referred to as the ambient noise level. In addition to this background noise levels have also been measured and are expressed as L_{A90} . A full explanation of terminology commonly used in the measurement and assessment of noise levels is given in Appendix B at the end of this report.

3.0 RESULTS

3.1 Noise level measurements were carried out at 15 minute intervals during the survey period. Ambient (L_{Aeq}) noise levels were measured. Although the industrial units only usually operate during normal working hours

(8am to 5pm weekdays) the assessment of the existing noise climate includes both daytime and night-time periods. Average noise levels for the day-time (07:00 to 19:00 hrs) have been determined at each of the measurement locations as follows:

Table 2: Summary Results – Mean Noise Levels (Day and Night)

	#1 (North East)	#2 (South)
<u>L_{Aeq,day}</u>	56.0	62.1
<u>L_{Aeq,night}</u>	51.7	55.6

3.2 Although the survey was not attended on a full time basis, it was noted that during site visits that the dominant noise source is from traffic using the A29 Lidsey Road. At the rear of the barn, some noise from the industrial units could be heard which emanated from fixed items of plant (i.e. condenser units etc). During the course of the noise survey, weather was variable with high winds at times. A full listing of 15 minute interval data for the period is given in the graphs at the end of this report (Figure A2.1 and A2.2). Each of the graphs also show mean (L_{Aeq}) day and night-time noise levels recorded. Photographs of the noise monitors in position is shown in Figures A3.1 and A3.2 respectively. The dominant noise source is actually the A29 Lidsey Road. The rear of the Barn (location 1 – East Elevation) is well shielded from traffic noise by the Barn itself. Notwithstanding this, noise from the external plant serving the industrial units could be heard and contributes to noise levels. It is further understood that these plant items are to be “sound-proofed” (with noise barriers enclosures etc) which will further reduce noise levels at the rear. Noise levels at the other elevations are dominated by road traffic using the A29 Lidsey Road. Noise from the industrial units at these facades is

shielded by either the Barn itself or by the 2m high concrete boundary wall (see Figure A2.2). To reduce noise levels further, it is proposed that acoustic barriers and enclosures will be fitted to the external plant items which serve the industrial units. There is also an industrial container unit which houses a compressor. The container is to be moved further away from the proposed dwelling. As a result, noise levels from the industrial units will be reduced by a further 10 dBA and noise levels ($L_{Aeq,T}$) at the East elevation (rear of the Barn) will be 46 dBA and 42 dBA for day and night-time periods respectively.

3.3 Noise levels at the other elevations are dominated by noise from the A29 Lidsey Road. The Applicant is proposing to plant a hedge adjacent to the road with a 2m high close-boarded wooden fence set back behind it. The noise reduction which results from the fence is calculated according to CRTN². The “path length difference” offered by the barrier will reduce day-time noise levels by 13 dBA and night-time noise levels by 11 dBA³. As a result, noise levels (see location 2) are reduced to 49 dBA for day-time and 45 dBA for night-time.

3.4 BS8233 recommends that it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$. There are no garden/amenity areas proposed but nevertheless this criterion is shown to be met. For internal noise levels in “habitable rooms” (living rooms, dining rooms, bedrooms etc), BS8233 (see Table 4 BS8233) recommends that day-time noise levels by 35 dB $L_{Aeq,T}$ whilst night-time

² Calculation of Road Traffic Noise (HMSO) Published 1988

³ Day-time noise levels are calculated with respect to ground floor windows and night-time with respect to first floor windows. Path length differences are 0.45m and 0.3m respectively.

noise levels in bedrooms by 30 dB $L_{Aeq,T}$. Single glazed windows provide 27 to 28 dBA noise reduction whilst double glazing would be provide at least 30 dBA noise reduction. A partially open window will provide 10 to 15 dBA noise reduction. It therefore follows that, with the noise mitigation measures proposed, noise levels criteria within the Barn will be satisfied.

4.0 CONCLUSION

4.1 A noise measurement survey and assessment has been carried out at Lidsey Barn, Lidsey Farm, near Bognor Regis, West Sussex. The survey and assessment is required to discharge a Condition imposed by Arun District Council as a part of the permission granted in May 2017 (referenced AL/44/17/PD).

4.2 The measurements show that noise levels are not excessively high. Although Arun District Council were principally concerned with noise from the industrial units located to the East of the Barn, the measurements and assessment have shown that the dominant noise source is actually from traffic using the A29 Lidsey Road. Notwithstanding this, recommendations are made to reduce noise from both the industrial units and the A29 Lidsey Road.

PC Environmental Ltd

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APPENDIX A: GRAPHS AND FIGURES.

Figure A1: Proposed Elevation Drawings

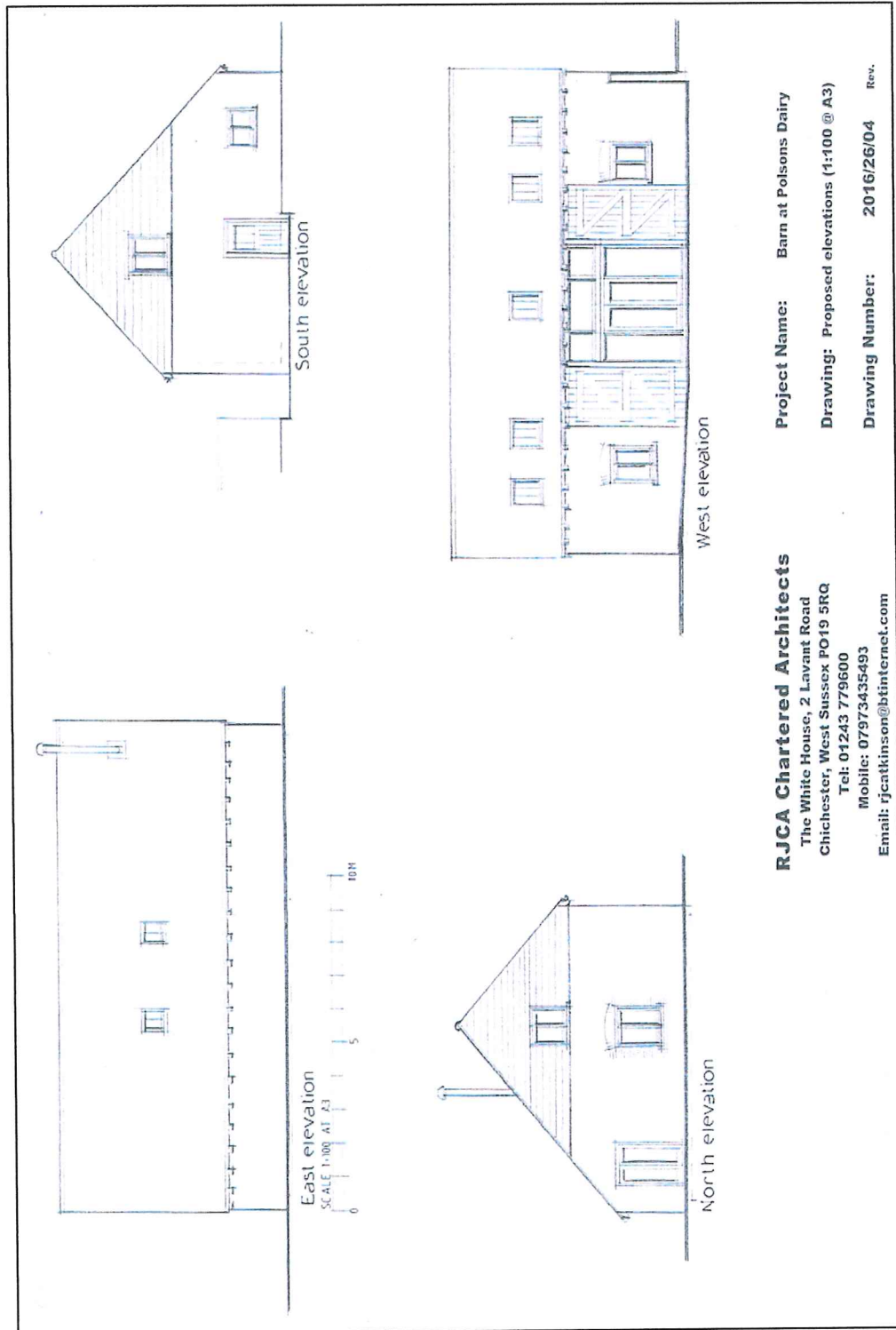


Figure A2.1: Environmental Noise Measurement Data (Location 1 – North East)

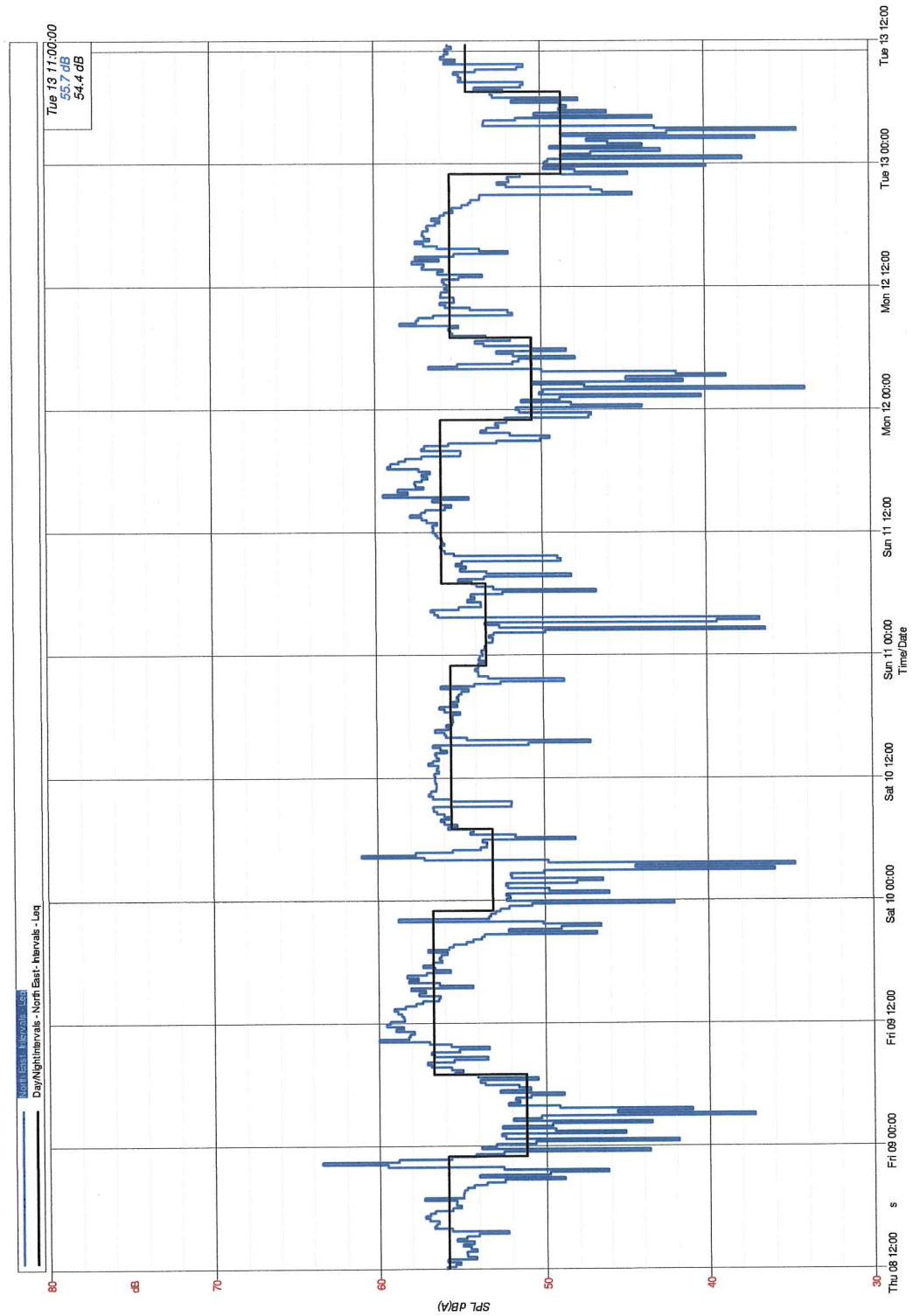


Figure A2.2: Environmental Noise Measurement Data (Location 2 – South)

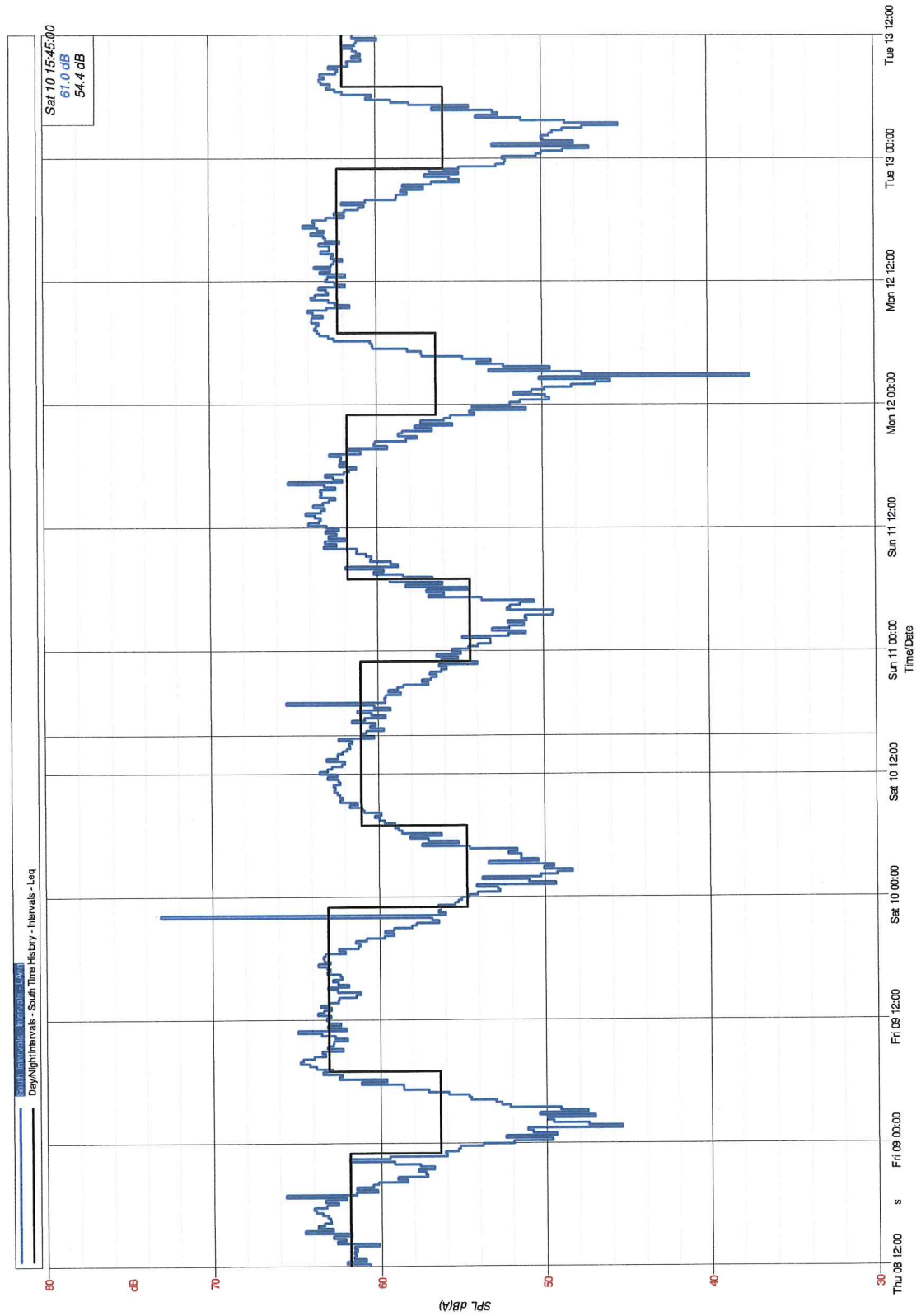


Figure A3.1 Noise Monitoring Location 1 (North East)



Looking west at rear of Lidsey Barn

Figure A3.2 Noise Monitoring Location 2 (South)



Looking East from A29 towards Lidsey Barn

APPENDIX B: GLOSSARY OF NOISE TERMS AND UNITS.

1.0 Noise

- 1.1 The sounds that we hear are as a result of successive air pressure changes. These air pressure changes are generated by vibrating sources, such as train engines or wheels, and they travel to a receiver, i.e. the human ear, as air pressure waves.
- 1.2 The human ear is capable of detecting a vast range of air pressures, from the lowest sound intensity that the normal ear can detect (about 10^{-12} watts/m²) to the highest that can be withstood without physical pain (about 10 watts/m²). If we were to use a linear scale to represent this range of human sensitivity it would encompass more than a billion units. Clearly this would be an unmanageable scale yielding unwieldy numbers.
- 1.3 The scale can be compressed by converting it to a logarithmic or Bel scale, the number of Bels being the logarithm to the base 10 of one value to another (as applied by Alexander Graham Bell to measure the intensity of electric currents). The Bel scale gives a compressed range of 0 to 12 units which in practice is a little too compressed. A more practical operating range of 0 to 120 is obtained by multiplying by 10, ie. 10 x Bel, which produces the scale units known as decibels or dB.
- 1.4. *Examples of typical sound intensity levels within the decibel range of 0 to 120 dB are listed below:*

Commercial four-engine jet aircraft at 100m	120dB
Riveting of steel plate at 10m	105dB
Pneumatic drill at 10m	90dB
Circular wood saw at 10m	80dB

Heavy road traffic at 10m	75dB
Male speech, average, at 10m	50dB
Whisper at 10m	25dB
Threshold of hearing, 100Hz	0dB

- 1.5. Due to this logarithmic scale noise levels have to be combined logarithmically rather than arithmetically. For example, two equal sound sources of 70 dB each, when operated simultaneously, do not produce a combined level of 140 dB but instead result in a level of 73 dB, ie. A rise of 3dB for each doubling of sound intensity. Subjectively, a 3dB change does not represent a doubling or halving of loudness; to make a sound appear twice as loud requires an increase in sound pressure level of about 10dB.
- 1.6. The subjective loudness of noise can be measured by applying a filter or weighting which equates to the frequency response of the human ear. This is referred to as an A-weighting and when applied results in noise levels expressed as dB(A).
- 1.7. dB(A) noise levels can be measured using a variety of noise indices. The index which correlates best with human response due to machinery noise is the L_{Aeq} this is the A-weighted L_{eq} which is referred to as the 'equivalent continuous noise level' and is a measure of the total sound energy generated by a fluctuating sound signal within a given time period.