



HEPWORTH
ACOUSTICS
Noise and Vibration Consultants

UK COAL SURFACE MINES LIMITED

**PROPOSED GREAT OAK SURFACE MINE SCHEME
NOISE IMPACT ASSESSMENT**

Report No. 22006.1v1

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NOISE IMPACT ASSESSMENT**

Report prepared by:

Hepworth Acoustics Limited

21 Little Peter Street

Manchester

M15 4PS

On behalf of:

UK Coal Surface Mines Limited

Report prepared by:

David Sproston BSc MIOA – Senior Consultant



Report checked by:

Peter Hepworth BSc FIOA – Managing Director



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1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Limited was commissioned by UK Coal Surface Mines Limited to assess the impact of noise associated with operations at the proposed Great Oak surface mine scheme.
- 1.2 The noise assessment has been requested in connection with a planning application for the proposed scheme. The assessment is based on a detailed working plan that has been developed by UK Coal Surface Mines Limited.
- 1.3 The assessment includes:
- i) A baseline noise monitoring survey carried out by Hepworth Acoustics Limited at a number of noise sensitive locations around the site;
 - ii) Calculation of noise levels generated by short-term site operations such as soil stripping, construction of screening mounds and the construction of permanent landforms;
 - iii) Calculation of noise levels associated with the proposed routine daytime site operations such as overburden removal and the extraction and processing of coal;
 - iv) Assessment of potential impact of noise generated by the proposed site operations by reference to relevant planning guidelines, such as Technical Guidance to the National Planning Policy Framework¹ (TG).
- 1.4 The various noise units and indices referred to in this report are described in Appendix I. All measured and calculated noise levels relate to 'free-field' conditions. All noise levels mentioned in the text have been rounded to the nearest decibel as fractions of decibels are imperceptible.

2.0 PLANNING POLICY

National Policy and Guidance

- 2.1 The main national guidance on planning and noise is the National Planning Policy Framework. The document states in paragraph 123 that planning policies and decisions should aim to “*avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development*”.
- 2.2 Specific guidance on noise from mineral workings is provided in the TG. Paragraph 29 of the TG states that as part of an application, a noise emissions assessment should be carried out. As part of this assessment, a noise survey should be carried out to assess background (L_{A90}) noise levels at nearby noise sensitive locations.
- 2.3 Paragraph 30 of the TG states that Mineral Planning Authorities (“MPAs”) should, subject to a maximum of 55 dB $L_{Aeq,1hr}$ (free field), aim to establish a noise limit at noise-sensitive properties that does not exceed the background level by more than 10 dB(A) during normal working hours (07:00-19:00hrs).
- 2.4 The TG recommends that evening (19:00-22:00) noise limits should not exceed background level by more than 10 dB(A) and night-time noise limits should not exceed 42 dB $L_{Aeq,1hr}$ at noise-sensitive dwellings.
- 2.5 The proposed hours of routine operation work at the proposed Site are 07:00-19:00hrs Monday to Friday and 07:00 – 13:00hrs on Saturday.
- 2.6 Paragraph 31 of the TG states that “*All mineral operations will have some particularly noisy short-term activities that cannot meet the limits set for normal operations. Examples include soil-stripping, the construction and removal of baffle mounds, soil storage mounds and spoil heaps, construction of new permanent landforms and aspects of site road construction and maintenance. However, these activities can bring longer-term environmental benefits. Increased temporary daytime noise limits of up to 70 dB(A) $L_{Aeq, 1h}$ (free field) for periods of up to 8 weeks in a year at specified noise-sensitive properties should be considered to facilitate essential site preparation and restoration work and construction of baffle mounds where it is clear that this will bring longer-term environmental benefits to the site or its environs*”.

- 2.7 The Institute of Environmental Assessment (IEA) has produced ‘Guidelines for the Environmental Assessment of Road Traffic’. The guidelines suggest assessing the environmental affects of development proposals on highway links where total traffic flows (or HGV numbers) will increase by more than 30%. Especially sensitive areas can be included where traffic flows increase by 10% or more as a result of the development.

Development Plan

Newcastle under Lyme and Stoke on Trent Core Spatial Strategy 2006 – 2026 – Adopted October 2009

- 2.8 Policy SP3 Spatial Principles of Movement and Access

This policy includes bullet point 8:

8. Addressing the environmental impacts of travel including congestion, air quality and noise pollution.

Staffordshire and Stoke on Trent Structure Plan 1996 – 2011 – adopted in May 2001 (and amended by high court ruling in 2002)

- 2.9 Policy D2

Development should generally conserve and, where possible, improve the quality of life and the environment and should:

- (c) minimise pollution of land, water and air, waste generation, nuisance from noise, and pollution by artificial sources of light;

The Staffordshire Minerals Local Plan 1999

- 2.10 Policy 12

Proposed mineral development should not cause an unacceptable adverse impact on sensitive development around (and in the case of underground workings, overlying) or within the sphere of influence of the site, and along proposed external haul routes except where material planning benefits, or, where appropriate, the need for the mineral outweighs the material planning objections.

Paragraph 3.36 *“some types of mineral operations are particularly unsuitable for location in close proximity to housing and other sensitive locations. Structure Plan Policy 137 identifies opencast coal mining and hard rock quarrying as being of particular concern. Opencast coal extraction and hard rock quarrying development would be unlikely to meet acceptable environmental standards within 150 metres of sensitive locations. These developments generally involve the removal of consolidated rock strata, together with the use of larger plant and the movement of larger quantities of material than occurs in the extraction of other minerals. The intensity of operations, combined with the use of explosives to loosen material prior to removal, results in greater potential disturbance. Such mining or quarrying operations include all relevant aspects of the winning, working, preparation and dispatch of minerals or other ancillary activities associated therewith. The existence of this 150 metre should not be taken to imply that beyond the 150 metre zone would automatically not cause an unacceptable impact. It represents the starting point for the consideration of whether a particular proposal may be acceptable or otherwise. Each case will be judged on its merits.”*

2.11 Policy 13

Only in the most exceptional circumstances will opencast coal mining or hard rock quarrying proposals be permitted within 150 metres of any sensitive developments.

2.12 Policy 30

Planning applications for mineral development will, where appropriate, be accompanied by a Traffic Impact Appraisal and should ensure that:-

6. the traffic generated by the development can be satisfactorily absorbed into the highway network without causing unacceptable adverse impacts upon people or the environment through, inter alia, noise vibration, fumes or dust;
7. any adverse impacts caused by the proposed development can be mitigated to the satisfaction of the Mineral Planning Authority and that such mitigation may be secured by a legal agreement and/or planning conditions.

3.0 EXISTING NOISE LEVELS

- 3.1 Ambient noise monitoring surveys have been carried out by Hepworth Acoustics Limited at eight noise-sensitive locations around the proposed Great Oak reclamation site. The noise monitoring locations were agreed with Richard Peers of Staffordshire County Council prior to the surveys being carried out. Noise levels were measured during the daytime on two days between 07:00 hours and 19:00 hours at each of the monitoring locations. A number of 15 minute sample measurements were carried out on a rotational basis at each location. Weather conditions were dry with very low wind speeds on both days and represented good conditions for noise measurements.
- 3.2 The noise measurements were carried out using a Brüel & Kjær 2260 'Type 1' Sound Analyser (s/n 2554023). The sound level meter was mounted on a tripod at a microphone height of approximately 1.5 metres with windshields fitted to the microphones during all noise measurements. A calibration check was carried out before and after the monitoring periods and no variations in calibration level were noted. The results of the noise surveys are detailed in Appendix III and are summarised in Table 1.

Table 1: Summary of Existing Daytime Noise Levels (07:00 – 19:00 hours)

| Monitoring Location | Average dB L _{A90} | Average dB L _{Aeq} |
|---------------------|--------------------------------|--------------------------------|
| 1. Jamage Farm | 50 | 56 |
| 2. Woodlands Farm | 50 | 62 |
| 3. Audley Road | 50 | 56 |
| 4. Community Centre | 46 | 63 |
| 5. Diglake Farm | 37 | 44 |
| 6. Cinder Cottage | 35 | 45 |
| 7. Bignall End Road | 40 | 54 |
| 8. Great Oak Farm | 41 | 56 |

- 3.3 Table 1 indicates that the measured daytime average ambient noise levels range between 44 dB L_{Aeq} and 63 dB L_{Aeq} with average background noise levels of between 35 dB L_{A90} and 50 dB L_{A90}.

4.0 NOISE FROM THE PROPOSED OPERATIONS

Calculation Method and Assumptions

- 4.1 The likely noise levels associated with the proposed earthworks and coal extraction operations at the proposed Great Oak reclamation site have been evaluated using Part 1 of British Standard 5228² as the basis for the noise calculations. However, barrier screening and ground absorption effects have been calculated in accordance with the method set out in the Department of Transport memorandum 'Calculation of Road Traffic Noise'³ which results in greater accuracy than the simplified method in BS 5228.
- 4.2 Noise calculations have been carried out using the 'Sitenoise' computer program that enables accurate noise modelling of site operations to be carried out. The program creates a 3-dimensional computer model of the topography of the site and the surrounding area as a basis for undertaking automated noise calculations. The location of the individual items of plant and haul routes, together with details of the noise prediction points, are then added to the model. The contribution of noise from each item of plant and any haul routes, allowing for the attenuation of noise with distance and any noise shielding or ground absorption effects, is then calculated at each noise prediction point. The individual noise levels are then summed to obtain the overall noise level at each prediction point in terms of $L_{Aeq}(1 \text{ hour})$. Noise levels from the site operations have been calculated at eight locations in the vicinity of the site.
- 4.3 The impact of noise from the proposed activities will tend to vary over time as the operations progress across the site. The calculated noise levels have therefore been carried out for three representative phases during the life of the proposed site. The calculations relate to 'worst-case' conditions i.e. during excavation of overburden material near to the surface, and restoration operations at maximum height across the proposed site. The noise levels will tend to reduce as the proposed coal extraction operations are carried out deeper within the void. In addition, calculations have also been carried out for the worst case short term operations related to soil mound formation and removal.
- 4.4 The proposed hours of work at the site are between 07:00 hours and 19:00 hours on Monday to Friday and 07:00 hours and 13:00 hours on Saturday. Noise calculations have been carried out for a typical operational hour between these periods for all scenarios.
- 4.5 The plant and machinery to be used during the life of the proposed Great Oak site has been provided by UK Coal Surface Mines Limited. Associated noise levels have been obtained from Hepworth Acoustics file data and manufacturers data. All fixed plant has been given 100 % on-times for the purpose of

calculating worst-case noise levels. The plant noise levels used in the calculations are shown in Table 2.

Table 2: Noise Levels of Proposed Plant

| Proposed Plant | Sound Power Level dB(A) |
|------------------------|--------------------------------|
| O & K RH120 excavator | 108* |
| CAT 777 dump truck | 108* |
| CAT D9 dozer | 111 |
| CAT 16H grader | 113 |
| CAT 330 excavator | 104 |
| CAT 325 excavator | 108 |
| CAT 312 excavator | 107 |
| CAT 740 dump truck | 110 |
| CAT 970 loading shovel | 107 |
| Water Bowser | 110 |

* Sound attenuated models

Summary of Measures to Control Noise Emissions from the Great Oak Site

- 4.6 The site has been designed such that subsoil and topsoil mounds provide noise screening to all noise sensitive properties. In addition a 2.5m high noise fence is proposed in the south west corner of the site joining topsoil mounds T4 and T5. Excavators and dump trucks will be used instead of scrapers to move the soils.
- 4.7 During creation and removal of all overburden mounds the dozers and excavators will work behind the outer face of the mound for the majority of the time.
- 4.8 The site will use low noise versions of the RH120 excavators and the Cat 777 dump trucks.
- 4.9 The plant will use ‘white noise’ reversing alarms rather than the more intrusive tonal reversing beepers.
- 4.10 Any pumps or generators used on site at permanent or semi-permanent locations will be provided with screening.

- 4.11 Regular maintenance of all site plant and machinery will be carried out to ensure that noise levels from individual items of plant do not increase.
- 4.12 Where practicable/necessary, dozers and overburden excavators will operate in a screened position (e.g. dozers operating on overburden mound behind overburden) removing line of sight to noise sensitive receivers to proactively minimise noise from the site.

Calculation Scenarios

- 4.13 Noise calculations have been carried out for the following scenarios as follows:
- i) Short Term Workings
 - ii) Scenario 1: 6 month phasing plan
 - iii) Scenario 2: 12 month phasing plan
 - iv) Scenario 3: 24 month phasing plan
- 4.14 The workings represented by the modelled scenarios above are shown on the UK Coal Surface Mines phasing plans for the site.

Results of Noise Predictions

- 4.15 The results of the noise calculations, which relate solely to noise generated from the operations on the site, are shown in Appendix I and are summarised below.
- 4.2 Maximum noise levels for short term operations will range from 32 – 65 dB L_{Aeq} . As can be expected, higher noise levels are due to the close proximity of the short term operations to the properties, with a maximum predicted noise level of 65 dB L_{Aeq} . However, once installed, the soil mounds will provide acoustic screening for the properties from subsequent workings and therefore will reduce noise levels generated during the lifetime of the site.
- 4.3 Noise levels ranging between 34 dB L_{Aeq} (1 hour) and 54 dB L_{Aeq} (1 hour) have been calculated at the various assessment locations for the routine coal extraction and overburden operations.
- 4.4 The calculated external ‘free-field’ noise levels at ground floor height for each of the assessed properties are given below and the potential noise impact is assessed in Section 5.0.

1. Jamage Farm

- 4.5 The calculated worst mode noise levels at this location for the short-term screening bund construction operations do not exceed 56 dB $L_{Aeq} (1 \text{ hour})$. Calculated worst mode noise levels for the main coal extraction and site overburden operations range between 46 dB $L_{Aeq} (1 \text{ hour})$ and 50 dB $L_{Aeq} (1 \text{ hour})$.

2. Woodlands Farm

- 4.6 The highest calculated noise levels for short-term operations at this location is 58 dB $L_{Aeq} (1 \text{ hour})$. Calculated worst mode noise levels for the main coal extraction and overburden operations are between 46 dB $L_{Aeq} (1 \text{ hour})$ and 50 dB $L_{Aeq} (1 \text{ hour})$.

3. Audley Road

- 4.7 The calculated noise levels at this location for the short-term screening bund construction operations do not exceed 32 dB $L_{Aeq} (1 \text{ hour})$. Calculated worst mode noise levels for the main coal extraction and overburden operations range between 34 dB $L_{Aeq} (1 \text{ hour})$ and 37 dB $L_{Aeq} (1 \text{ hour})$.

4. Community Centre

- 4.8 The calculated noise levels at this location for the short-term site operations do not exceed 48 dB $L_{Aeq} (1 \text{ hour})$. Calculated worst mode noise levels for the main coal extraction and overburden operations range between 43 dB $L_{Aeq} (1 \text{ hour})$ and 45 dB $L_{Aeq} (1 \text{ hour})$.

5. Diglake Farm

- 4.9 The calculated noise levels at this location for the proposed short-term screening bund construction operations do not exceed 64 dB $L_{Aeq} (1 \text{ hour})$. Calculated worst mode noise levels for the main coal extraction and overburden operations are 48 - 54 dB $L_{Aeq} (1 \text{ hour})$.

6. Isaac House

- 4.10 The calculated noise levels at this location for the proposed short-term screening bund construction operations do not exceed 52 dB $L_{Aeq} (1 \text{ hour})$. Calculated worst mode noise levels for the main coal extraction and overburden operations are between 42 - 45 dB $L_{Aeq} (1 \text{ hour})$.

7. Bignall End Road

- 4.11 The calculated worst mode noise levels at this location for the short-term site operations do not exceed 65 dB L_{Aeq} (1 hour). Calculated worst mode noise levels for the main coal extraction and overburden operations range between 43 dB L_{Aeq} (1 hour) and 46 dB L_{Aeq} (1 hour).

8. Great Oak Farm

- 4.12 The calculated worst mode noise levels at this location for the short-term screening bund construction do not exceed 48 dB L_{Aeq} (1 hour). Calculated worst mode noise levels for the main coal extraction and overburden operations range between 42 dB L_{Aeq} (1 hour) and 46 dB L_{Aeq} (1 hour).

Assessment of Short Term and Operational Noise Impact: TG Assessment

- 4.16 The results of the calculation, and noise criteria used in the assessment are summarised and discussed below. Results of the calculations are shown in Appendix I.

Short-term Operations

- 4.17 For construction and short term earthwork operations associated with mineral extraction, guidance on appropriate noise criteria is contained in the TG. Paragraph 31 of the document states:-

" All mineral extraction operations will have some particularly noisy short-term activities that cannot meet the limits set for normal operations. Examples include soil stripping, the construction and removal of baffle mounds, soil storage mounds and spoil heaps, construction of new permanent landforms and aspects of site road construction and maintenance. However, these activities can bring longer-term environmental benefits...

...Increased temporary daytime noise limits of up to 70 dB(A) $L_{Aeq}(1h \text{ Free field})$ for periods of up to 8 weeks in a year at specified noise sensitive properties should be considered to facilitate essential site preparation and restoration work...

...Where work is likely to take longer than 8 weeks, a lower limit over a longer period should be considered."

- 4.18 As shown above, TG suggests limits of up to 70 dB L_{Aeq} (1h free-field) as being appropriate for such activities for periods of up to 8 weeks. However if operations are likely to take longer than 8 weeks a lower limit for a longer period should be considered.
- 4.19 The maximum calculated short-term noise levels for the proposed Great Oak site are up to 65 dB L_{Aeq} (1 hour) (shown in Appendix I). Therefore, all of the assessed locations are within the 70 dB L_{Aeq} (1 h free-field) criterion for short-term earthwork operations as recommended in TG.

Routine Operations

- 4.20 For routine mineral operations, guidance on noise criteria is outlined in Paragraph 30:-

“Subject to a maximum of 55dB(A) L_{Aeq} 1h (free field), mineral planning authorities should aim to establish a noise limit at the noise sensitive property that does not exceed the background level by more than 10 dB(A). It is recognised, however, that in many circumstances it will be difficult to not exceed the background level by more than 10dB(A) without imposing unreasonable burdens on the mineral operator. In such cases, the limit set should be as near that level as practicable during normal working hours (0700-1900) and should not exceed 55 dB(A) L_{Aeq} 1h (free field).”

- 4.21 The calculated worst mode daytime noise levels generated by routine site operations (shown in Appendix I), range between 34 dB L_{Aeq} (1 hour) and 54 dB L_{Aeq} (1 hour) at the assessed locations.
- 4.22 As shown in Appendix 1, with the exception of Diglake Farm, all of the assessed locations meet with the $L_{A90} + 10dB(A)$ criterion for all routine operations. At Diglake Farm, the calculated routine noise levels are above the $L_{A90} + 10dB(A)$ criterion, but are within the maximum permitted level of 55 dB L_{Aeq} during normal working hours.
- 4.23 It is noted that Policy 13 of The Staffordshire Minerals Local Plan 1999 states that *“Only in the most exceptional circumstances will opencast coal mining or hard rock quarrying proposals be permitted within 150 metres of any sensitive developments”*.
- 4.24 It is noted from Policy 12 of the Plan that the reason for the distance restriction is that the Plan considers that *“Opencast coal extraction and hard rock quarrying development would be unlikely to meet acceptable environmental standards within 150 metres of sensitive locations”*.
- 4.25 The Plan was published in 1999 and does not contain any specific noise limits to be met by mineral developments. Since the Plan was published, national guidance on noise from mineral developments

has been published in MPS 2 Annex 2 in March 2005, and the noise limits have been reiterated in the TG published in 2012. These documents provide the latest national guidance on what is considered acceptable environmental standards in relation to noise for sensitive properties adjacent to minerals workings. It is clear that the noise levels from working the Great Oak site would meet the latest guidance on acceptable environmental standards for noise, and therefore the approach adopted has been that the site would meet the requirements of the Minerals Local Plan as long as the noise levels are within the guidelines contained within the TG. As confirmed above, the noise levels from working the site would meet the noise limits contained within the TG.

Compliance Noise Monitoring

- 4.13 UK Coal Surface Mines Ltd has developed an Environmental Management System (EMS) to cover all potential environmental impacts of their business. As part of the EMS, a Noise Management and Action Plan (NMAP) is developed for each site, to provide a co-ordinated approach to the effective management and control of noise.
- 4.14 The NMAP provides for a scheme for noise monitoring at key noise sensitive locations to be agreed with the Local Authority prior to commencement of works.
- 4.15 Similar noise monitoring locations are envisaged, and the requirement to carry out a suitable scheme of noise monitoring to assess compliance with the adopted noise criteria can be formalised by an appropriately worded planning condition attached to any planning approval for the site.

5.0 CHANGES IN EXISTING ROAD TRAFFIC NOISE LEVELS

- 5.1 An assessment of changes in road traffic noise levels on existing highways has been made using the methodology contained in the 'Calculation of Road Traffic Noise' document produced by the Department of Transport and Welsh Office in 1988. The assessment has looked at the change in 'Basic Noise Level' to determine the level of change in source noise levels for the road.
- 5.2 Road traffic calculations have been made for Talke Road adjacent to the Site using the traffic data contained in the URS Transport Assessment. The calculations have looked at the impact of an average of 98 coal HGV movements per day on the existing average daily traffic flows. The change in 'Basic Noise Level' is 1.1 dB L_{A10} for Talke Road.
- 5.3 It is commonly understood that a change of 3 dB(A) is the lowest change in environmental noise that is noticeable, and therefore the addition of the coal HGV traffic to the public highway in the vicinity of the Site will not lead to a noticeable change in road traffic noise levels.

6.0 SUMMARY AND CONCLUSIONS

- 6.1 The impact of noise resulting from proposed operations at the Great Oak surface mine has been assessed at eight noise sensitive locations. Proposed operations at the site include the removal of topsoil and subsoil and the formation of screening bunds, overburden removal and replacement, coal extraction and the progressive restoration of the site.
- 6.2 TG recommends that ‘construction type’ and short-term activities, such as soil stripping, baffle mound construction, removal of spoil heaps and construction of new permanent landforms are assessed separately from the main mineral extraction operations. TG suggests limits of up to 70 dB $L_{Aeq}(1 \text{ hour})$ as being appropriate for such activities for periods of up to 8 weeks, and also recommends that if operations are likely to take longer than 8 weeks a lower limit should be considered. The calculated worst mode noise levels for the proposed short-term operations at the Great Oak site are 65 dB $L_{Aeq}(1 \text{ hour})$, and are therefore within 70 dB $L_{Aeq}(1 \text{ hour})$ criterion at all of the assessed locations.
- 6.3 For routine daytime mineral extraction operations, TG recommends that MPA’s should aim to achieve a noise limit of $L_{A90} + 10 \text{ dB(A)}$ at noise sensitive properties, however, TG also recognises that this limit may be difficult to achieve without imposing unreasonable burdens on the operator. In such cases TG recommends setting a limit as near as possible to $L_{A90} + 10 \text{ dB(A)}$ as practicable. For the Great Oak site, the calculated worst mode noise levels generated by routine operations are within the $L_{A90} + 10 \text{ dB(A)}$ limit at all of the assessed locations, with the exception of Diglake Farm, where noise levels exceed the $L_{A90} + 10 \text{ dB(A)}$ criterion by 7 dB(A) due to the very low background noise level at this property. However, noise levels do not exceed the maximum permitted level of 55dB $L_{Aeq}(1 \text{ hour})$.
- 6.4 It is therefore concluded that with the implementation of mitigation measures as proposed, noise associated with the proposed Great Oak site will be within the criteria contained within the TG at all times and will not cause adverse noise impact at the nearest residential properties. It is also considered that the site will meet the noise requirements of all local planning noise policies.

Key:



- Noise measurement position



Title: Figure 1: noise monitoring positions

Project: 21535



References

- ¹ Department for Communities and Local Government, 'Technical Guidance to the National Planning Policy Framework' 2012.
- ² British Standard 5228: 'Noise and vibration control on construction and open sites', 1997.
- ³ Department of Transport, 'Calculation of Road Traffic Noise', HMSO, 1988.

Appendix I - Calculated Noise Levels from Proposed Site Operations**(All results 'free-field' dB L_{Aeq} (1 hour))**

| Location | TG Short Term Workings Criterion | Short Term Workings | TG Criteria for Routine Operations | | Scenario 1 | Scenario 2 | Scenario 3 |
|---------------------|----------------------------------|---------------------|------------------------------------|-------------------|------------|------------|------------|
| | | | L _{A90} + 10 dB* | Maximum criterion | | | |
| 1. Jamage Farm | 70 | 56 | 55 | 55 | 46 | 46 | 50 |
| 2. Woodlands Farm | 70 | 58 | 55 | 55 | 48 | 50 | 46 |
| 3. Audley Road | 70 | 32 | 55 | 55 | 37 | 36 | 34 |
| 4. Community Centre | 70 | 48 | 55 | 55 | 43 | 43 | 45 |
| 5. Diglake Farm | 70 | 64 | 47 | 55 | 54 | 49 | 52 |
| 6. Isaac House | 70 | 52 | 45 | 55 | 43 | 43 | 41 |
| 7. Bignall End Road | 70 | 65 | 50 | 55 | 46 | 43 | 44 |
| 8. Great Oak Farm | 70 | 48 | 51 | 55 | 46 | 45 | 42 |

* Subject to a maximum of 55 dB(A)

Appendix II - Noise Units and Indices

a) Description of Noise Characteristics

Sound Pressure Level and the decibel (dB)

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

Frequency and hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Large frequency values are often written as kilohertz (kHz), where 1 kHz = 1000 Hz.

A single frequency is perceived as having an identifiable 'pitch'. Most sounds are made up of many different frequencies, each with different (and often varying) loudness'. It is the relative proportions of each frequency (and how they change with time) that gives a sound its perceived 'character'. This is how the human ear distinguishes between the sound of a bass drum (mainly low frequencies) and a cymbal (mainly high frequencies) for example, or between a ventilation fan and traffic noise.

A-weighting

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear.

b) Description of Noise Indices

When a noise level is constant and does not fluctuate over time, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices, including statistical parameters, are used. The indices used in this report are described below.

L_{Aeq} This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.

L_{A90} This is the A-weighted noise level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise.

L_{Amax} This is the maximum A-weighted noise level that was recorded during the monitoring period.

Appendix III - Results Of Noise SurveysDate: Friday 10th August/Monday 13th August 2012

Equipment: Brüel & Kjær 2260 Type 1 sound level meter (s/n: 2467015), tripod, calibrator

Weather: Dry, partially cloudy, warm, light variable breeze 0-2 m/s

Location 1: Jamage Farm

| Time | L _{AMax} | L _{A10} | L _{Aeq} | L _{A90} | Comments |
|-------------------|-------------------|------------------|------------------|------------------|-----------------------------|
| 10/08/2012 | | | | | |
| 08:56 09:11 | 77.8 | 55.2 | 54.6 | 50.4 | Distant Road Traffic |
| 12:16 12:31 | 60.7 | 54.6 | 52.4 | 48.8 | Distant Road Traffic |
| 15:19 15:34 | 65.4 | 59.4 | 57.2 | 54.0 | Distant Road Traffic |
| 13/08/2012 | | | | | |
| 07:42 07:57 | 62.2 | 54.2 | 52.8 | 50.2 | Distant Road Traffic |
| 11:20 11:35 | 71.6 | 53.6 | 52.6 | 49.2 | 1 Car, Distant Road Traffic |
| 14:53 15:08 | 79.6 | 53.0 | 59.9 | 48.8 | Distant Road Traffic |
| 18:48 19:03 | 71.7 | 54.2 | 53.3 | 49.0 | Distant Road Traffic |
| Averages | - | 54.9 | 55.6 | 50.1 | |

Location 2: Woodlands Farm

| Time | L _{AMax} | L _{A10} | L _{Aeq} | L _{A90} | Comments |
|-------------------|-------------------|------------------|------------------|------------------|------------------------------------|
| 10/08/2012 | | | | | |
| 07:35 07:50 | 84.6 | 58.2 | 62.4 | 51.8 | Road Traffic, Distant Road Traffic |
| 10:53 11:08 | 78.5 | 55.6 | 56.1 | 49.6 | Road Traffic, Distant Road Traffic |
| 14:06 14:21 | 82.7 | 58.8 | 62.3 | 51.4 | Road Traffic, Distant Road Traffic |
| 16:44 16:59 | 83.9 | 63.8 | 63.8 | 48.2 | Road Traffic, Distant Road Traffic |
| 18:48 19:03 | 88.6 | 58.6 | 63.2 | 50.4 | Road Traffic, Distant Road Traffic |
| 13/08/2012 | | | | | |
| 09:47 10:02 | 79.9 | 56.0 | 60.2 | 49.0 | Road Traffic, Distant Road Traffic |
| 13:26 13:41 | 78.9 | 55.0 | 58.5 | 48.0 | Road Traffic, Distant Road Traffic |
| 16:13 16:28 | 81.2 | 58.2 | 62.5 | 50.0 | Road Traffic, Distant Road Traffic |
| Averages | - | 58.0 | 61.7 | 49.8 | |

Location 3: Audley Road

| Time | L_{AMax} | L_{A10} | L_{Aeq} | L_{A90} | Comments |
|-------------------|-------------------------|------------------------|------------------------|------------------------|-----------------|
| 10/08/2012 | | | | | |
| 08:35 08:50 | 72.0 | 65.2 | 61.2 | 47.0 | Road Traffic |
| 11:54 12:09 | 79.9 | 69.2 | 64.7 | 41.0 | Road Traffic |
| 14:57 15:12 | 78.3 | 70.4 | 65.9 | 49.0 | Road Traffic |
| 16:03 16:18 | 78.6 | 69.4 | 65.7 | 54.0 | Road Traffic |
| 13/08/2012 | | | | | |
| 07:18 07:33 | 78.0 | 70.2 | 65.7 | 47.2 | Road Traffic |
| 10:56 11:11 | 79.1 | 69.2 | 65.0 | 51.4 | Road Traffic |
| 14:34 14:49 | 76.0 | 69.2 | 64.9 | 52.2 | Road Traffic |
| 18:14 18:29 | 83.7 | 70.2 | 66.5 | 54.4 | Road Traffic |
| Averages | - | 69.1 | 65.2 | 49.5 | |

Location 4: Community Centre

| Time | L_{AMax} | L_{A10} | L_{Aeq} | L_{A90} | Comments |
|-------------------|-------------------------|------------------------|------------------------|------------------------|-----------------|
| 10/08/2012 | | | | | |
| 09:17 09:32 | 74.9 | 65.6 | 60.4 | 39.6 | Road Traffic |
| 12:34 12:49 | 78.2 | 69.0 | 63.7 | 42.6 | Road Traffic |
| 15:40 15:55 | 77.9 | 70.4 | 66.0 | 44.6 | Road Traffic |
| 13/08/2012 | | | | | |
| 07:59 08:14 | 80.4 | 69.0 | 63.9 | 46.2 | Road Traffic |
| 11:42 11:57 | 79.0 | 67.8 | 63.0 | 49.8 | Road Traffic |
| 15:12 15:27 | 75.3 | 66.4 | 61.4 | 49.4 | Road Traffic |
| 18:31 18:46 | 75.7 | 66.2 | 61.8 | 50.8 | Road Traffic |
| Averages | - | 67.8 | 63.2 | 46.1 | |

Location 5: Diglake Farm

| Time | L_{AMax} | L_{A10} | L_{Aeq} | L_{A90} | Comments |
|-------------------|-------------------------|------------------------|------------------------|------------------------|-----------------------------------|
| 10/08/2012 | | | | | |
| 11:14 11:29 | 60.4 | 43.4 | 41.0 | 31.6 | Birds, Distant Road Traffic |
| 14:29 14:44 | 58.0 | 44.2 | 42.6 | 37.2 | Distant Road Traffic |
| 17:26 17:41 | 56.8 | 42.4 | 39.6 | 35.4 | Distant Road Traffic |
| 17:56 18:11 | 57.5 | 43.6 | 42.1 | 37.2 | Distant Road Traffic |
| 13/08/2012 | | | | | |
| 06:57 07:12 | 69.0 | 49.0 | 48.1 | 38.4 | Cows, Birds, Distant Road Traffic |
| 10:13 10:28 | 65.1 | 43.8 | 42.9 | 35.2 | Birds, Distant Road Traffic |
| 13:52 14:07 | 57.1 | 45.6 | 42.7 | 38.4 | Distant Road Traffic |
| 16:39 16:54 | 54.5 | 48.4 | 45.1 | 39.2 | Distant Road Traffic |
| Averages | - | 45.1 | 43.8 | 36.6 | |

Location 6: Cinder Cottage

| Time | L_{AMax} | L_{A10} | L_{Aeq} | L_{A90} | Comments |
|-------------------|-------------------------|------------------------|------------------------|------------------------|----------------------|
| 10/08/2012 | | | | | |
| 07:54 08:11 | 66.6 | 51.2 | 47.8 | 37.4 | Distant Road Traffic |
| 08:15 08:30 | 65.7 | 50.8 | 50.0 | 35.8 | Distant Road Traffic |
| 11:33 11:48 | 62.1 | 43.0 | 40.6 | 33.2 | Distant Road Traffic |
| 14:51 14:53 | 62.0 | 42.4 | 40.5 | 34.6 | ASKED TO LEAVE ROAD |
| 17:03 17:18 | 60.5 | 39.4 | 38.5 | 33.4 | Distant Road Traffic |
| 13/08/2012 | | | | | |
| 10:35 10:50 | 57.8 | 39.6 | 37.5 | 34.0 | Distant Road Traffic |
| 14:12 14:27 | 58.3 | 45.2 | 42.6 | 36.6 | Distant Road Traffic |
| 16:59 17:14 | 52.1 | 42.4 | 40.4 | 37.0 | Distant Road Traffic |
| 17:56 18:11 | 67.5 | 45.4 | 44.5 | 36.4 | Distant Road Traffic |
| Averages | - | 44.4 | 44.5 | 35.4 | |

Location 7: Bignall End Road

| Time | L_{AMax} | L_{A10} | L_{Aeq} | L_{A90} | Comments |
|-------------------|-------------------------|------------------------|------------------------|------------------------|---|
| 10/08/2012 | | | | | |
| 07:16 07:31 | 67.8 | 52.4 | 50.4 | 43.2 | Road Traffic, Distant Road Traffic |
| 10:34 10:49 | 70.1 | 55.6 | 52.4 | 37.2 | Road Traffic, Distant Road Traffic |
| 13:46 14:01 | 78.6 | 56.6 | 55.8 | 36.4 | Road Traffic, Distant Road Traffic |
| 18:31 18:46 | 70.3 | 56.4 | 53.0 | 41.8 | Distant Aircraft, Distant Road Traffic |
| 13/08/2012 | | | | | |
| 09:26 09:41 | 84.3 | 56.0 | 57.7 | 38.8 | Birds, Road Traffic, Distant Road Traffic |
| 13:08 13:23 | 81.5 | 54.6 | 53.3 | 40.2 | Road Traffic, Distant Road Traffic |
| 15:56 16:11 | 65.8 | 56.6 | 52.3 | 39.0 | Road Traffic, Distant Road Traffic |
| Averages | - | 55.5 | 54.2 | 39.5 | |

Location 8: Great Oak Farm

| Time | L_{AMax} | L_{A10} | L_{Aeq} | L_{A90} | Comments |
|-------------------|-------------------------|------------------------|------------------------|------------------------|--|
| 10/08/2012 | | | | | |
| 06:58 07:13 | 75.9 | 50.4 | 50.4 | 45.4 | Distant Aircraft, Distant Road Traffic, Road Traffic |
| 10:12 10:27 | 75.6 | 45.2 | 52.4 | 35.8 | Tractor in adjacent field, Road Traffic, Distant Road Traffic |
| 13:28 13:43 | 91.8 | 49.2 | 63.6 | 40.0 | Motorbikes, Road Traffic, Distant Road Traffic |
| 16:23 16:38 | 68.4 | 46.2 | 46.6 | 40.2 | Road Traffic, Distant Road Traffic |
| 18:14 18:29 | 71.9 | 44.2 | 46.2 | 39.4 | Distant Aircraft, Road Traffic, Distant Road Traffic |
| 13/08/2012 | | | | | |
| 09:08 09:23 | 85.8 | 52.0 | 58.1 | 42.0 | Tractor, Road Traffic, Distant Road Traffic |
| 12:50 13:05 | 75.7 | 49.2 | 49.9 | 40.2 | Road Traffic, Distant Road Traffic |
| 15:38 15:53 | 71.0 | 53.2 | 50.0 | 41.2 | Road Traffic, Distant Road Traffic |
| Averages | - | 48.7 | 56.4 | 40.5 | |