Assessment of Environmental Impact of Noise at Proposed Western Extension to Collyweston Quarry, Duddington, Northamptonshire

HEATON PLANNING

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Report Title: Assessment of Environmental Impact of Noise at Proposed Western Extension to Collyweston Quarry, Duddington, Northamptonshire

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FIGURE

1 Sensitive Receptors
1.0 INTRODUCTION

1.1 At the request of Heaton Planning, Vibrock Limited were commissioned to undertake a noise evaluation study for a proposed western extension to mineral extraction operations at Collyweston Quarry, Duddington, Northamptonshire.

1.2 It is understood that this report will accompany the application for planning permission to be submitted to the Mineral Planning Authority.

1.3 This study benefits from a site inspection and noise monitoring undertaken on 17th May 2013.
2.0 SITE LOCATION

2.1 The current site is located approximately 500 metres to the east of Duddington village, Northamptonshire.

2.2 The proposed extension area is located to the west of the existing quarry and backfill operations. The land is currently in agricultural use, which reduces in height towards the limit of the western extension.

2.3 Site access is gained off the A47, to the north east of Duddington. The current internal haul road is hard surfaced and will run north to south between the current extraction area and the proposed western extension.

2.4 The dominant noise source affecting the proposed extension is from constant vehicle movements along the A43 and A47 truck roads. The A43 is situated approximately 100 metres to the west of the proposed extension area and the A47 approximately 40 metres to the north.

2.5 Robinswood, The Pines and Oak Cottage are three residential properties which lie to the west of the A47, approximately 210 – 230 metres from the proposed development at closest approach.
3.0 **SITE DESCRIPTION**

3.1 The proposed western extension contains an estimated 3 million tonnes of limestone rock, with an estimated 2 million tonnes of saleable material.

3.2 The quarry extension will be worked in a phased manner from south to north. This phased approach will limit the amount of land to be stripped and quarried at any one time.

3.3 Soils will be stripped and placed at the perimeter of the quarry workings at a minimum height of 3 metres to provide boundary screening.

3.4 It is proposed to strip the material overburden by means of tracked bulldozer.

3.5 Limestone rock will be extracted from the face by means of hydraulic excavator. The excavator will pull the material from the working face and be fed directly through a mobile crushing and screening plant. The screened material will be stockpiled by means of wheeled loading shovel.

3.6 The limestone aggregate will be collected from the quarry floor by means of HGV, loaded by wheeled loading shovel. HGVs will enter the working quarry phase by utilising the current haul route running north to south to the east of the proposed extension area.

3.7 Larger sections of limestone will be set aside for secondary breaking. This process would involve the use of a hydraulic breaker within the quarry floor.

3.8 Backfilling and infilling will see the area restored on a progressive basis. HGVs will tip the material into the quarry void and levelled by means of tracked bulldozer.
4.0 NOISE TERMINOLOGY

4.1 Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air.

4.2 Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure level. It is because of this wide range that a noise level scale based on logarithms is used in noise measurement. This is the decibel or dB scale.

4.3 Audibility of sound covers a range of about 0 to 140 decibels (dB) corresponding to the intensity of the sound pressure level. The ability to recognise a particular sound is dependent on the pitch or frequencies present in the source. Sound pressure measurements taken with a microphone cannot differentiate in the same way as the ear, consequently a correction is applied by the noise measuring instrument in order to correspond more closely to the frequency response of the ear which responds to sounds from 20 Hz to 20000 Hz. This is known as 'A-weighting' and written as dB(A).

4.4 The use of this unit is internationally accepted and correlates well with subjective annoyance to noise.

4.5 The logarithmic basis of noise measurements means that when considering more than one noise source their addition must be undertaken in terms of logarithmic arithmetic. Thus, two noise sources each of 40 dB(A) acting together would not give rise to 40 + 40 = 80 dB(A) but rather 40 + 40 = 43 dB(A). This 3 dB(A) increase represents a doubling in sound energy but would be only just perceptible to a human ear.

4.6 The following table gives typical noise levels in terms of dB(A) for common situations.

<table>
<thead>
<tr>
<th>Approximate Noise Level dB(A)</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Threshold of hearing</td>
</tr>
<tr>
<td>30</td>
<td>Rural area at night, still air</td>
</tr>
<tr>
<td>40</td>
<td>Public library</td>
</tr>
<tr>
<td>50</td>
<td>Quiet office, no machinery</td>
</tr>
<tr>
<td>60</td>
<td>Normal conversation</td>
</tr>
<tr>
<td>70</td>
<td>Inside a saloon car</td>
</tr>
<tr>
<td>80</td>
<td>Vacuum cleaner</td>
</tr>
<tr>
<td>100</td>
<td>Pneumatic drill</td>
</tr>
<tr>
<td>120</td>
<td>Threshold of pain</td>
</tr>
</tbody>
</table>
4.7 Noise levels can vary with time according to source activity and indices have been developed in order to be able to assign a value to represent a period of noise level variations and to correspond with subjective response.

4.8 The $L_{Aeq}$ or A-weighted equivalent continuous noise level index is used to average the noise energy over a period of intermittent noise levels. It is the level of steady sound of equivalent energy and is usually referred to as the ambient noise level.

4.9 The $L_{A90}$ index represents the noise level exceeded for 90% of the measurement period and is used to indicate the quieter sections of the measurement period. It is usually referred to as the background noise level.

4.10 The $L_{Amax}$ index is the maximum root mean square A-weighted noise level occurring during the measurement period.
5.0 **NOISE CRITERIA**

5.1 **Introduction**

5.1.1 The ambient environmental noise at any location will vary according to the activities in progress around that location. In the vicinity of a busy motorway, for example, the noise level will remain fairly constant due to the relatively steady noise input from road traffic, whereas the noise level close to a source of high noise over short periods, such as an airport, will vary over a much wider range. It is therefore necessary to consider how to quantify the existing noise levels in an area in order to accurately assess the acceptability of the introduction of a new noise source.

5.1.2 The background noise level, defined as the $L_{A90}$ parameter, represents the noise level exceeded for 90% of a measurement period, or the ninety percentile level. It generally reflects the quieter noise level between noise events and generally ignores the effects of short term higher noise level events.

5.1.3 The fifty and ten percentile levels, $L_{A50}$ and $L_{A10}$, represent the average noise level and the level exceeded for 10% of the measurement period, respectively. The latter, for example, is commonly used to describe and quantify noise from road traffic.

5.1.4 The equivalent continuous sound pressure level, or $L_{Aeq}$ parameter, is a measure of the average sound energy over a given time period. It will include noise from all contributing sources. Unless the noise level at the receiving point is perfectly steady, the $L_{Aeq}$ will always be higher than the $L_{A90}$ over any one measurement period.

5.2 **National Planning Policy Framework (NPPF)**

5.2.1 The National Planning Policy Framework (NPPF) sets out the Government’s planning policies for England and how these should be applied. The Framework provides guidance at which local people and their councils can produce their own plans which reflect their local needs and priorities.

5.2.2 The planning system is required to contribute and enhance the natural and built environment. As a result, the system should prevent both new and existing developments from contributing to or being adversely affected by unacceptable levels of noise.
5.2.3 Paragraph 123 of NPPF states:

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 a new development;
- mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

5.2.4 The terms ‘significant adverse impact’ and ‘other adverse impacts’ are defined in the explanatory notes of the ‘Noise Policy Statement for England (NPSE). NPSE sets out the long term vision of the government’s noise policy by promoting good health and quality of life through the effective management of noise within the context of policy of sustainable development.

5.2.5 There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

- NOEL (No Observed Effect Level) – this is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise;
- LOAEL (Lowest Observed Adverse Effect Level) – this is the level above which adverse effects on health and quality of life can be detected.

5.2.6 Extending these concepts further, NPSE leads to the concept of a significant observed adverse effect level:

- SOAEL (Significant Observed Adverse Effect Level) – this is the level above which significant adverse effects on health and quality of life occur.

5.2.7 NPSE acknowledges that it is not possible to have a single objective noise-based measure that defines NOEL, LOAEL and SOAEL that is applicable to all sources, for different receptors and at different times. Guidance from other noise standards should therefore be employed to determine suitable levels within the overall principles of the NPPF.
5.2.8 The three aims of NPSE can therefore be summarised as follows:

1. avoid significant adverse effects (SOAEL) on health and quality of life;
2. the second aim refers to situations where noise levels are between the LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life. However this does not mean that such adverse effects cannot occur;
3. the third aim refers to situations where noise levels are between the NOEL and LOAEL. In such circumstances, where possible, noise reductions should be sought through the pro-active management of noise.

5.2.9 Paragraph 142 of NPPF acknowledges that minerals are essential to support sustainable economic growth and quality of life. According to NPPF local planning authorities should:

- set out policies to encourage the prior extraction of minerals, where practicable and environmentally feasible;
- set out environmental criteria, in line with the policies in this Framework, against which planning applications will be assessed so as to ensure that permitted operations do not have unacceptable adverse impacts on the natural and historic environment or human health, including from noise;
- when developing noise limits, recognise that some noisy short-term activities, which may otherwise be regarded as unacceptable, are unavoidable to facilitate minerals extraction.

5.2.10 Furthermore, Paragraph 144 states that local planning authorities should, “give great weight to the benefits of the mineral extraction, including the economy”.

5.3 National Planning Practice Guidance (NPPG)

5.3.1 The National Planning Practice Guidance (NPPG) is written in support of the NPPF and provides an increased level of specific planning guidance. NPPG states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. NPPG also states that, where practicable, there may be opportunities to consider improvements to the acoustic environment and that noise can over-ride other planning concerns but should not be considered in isolation, separately from the economic, social and other environmental dimensions of proposed development. NPPG reflects the overall aim of NPSE and expands on many of its concepts, in particular NOEL, LOAEL and SOAEL.
5.3.2 Regarding minerals sites, NPPG includes the appropriate noise standards for normal operations;

“Mineral planning authorities should aim to establish a noise limit, through a planning condition, at the noise-sensitive property that does not exceed the background noise level ($L_{A90,1h}$) by more than 10dB(A) during normal working hours (0700-1900). Where it will be difficult not to exceed the background level by more than 10dB(A) without imposing unreasonable burdens on the mineral operator, the limit set should be as near that level as practicable. In any event, the total noise from the operations should not exceed 55dB(A) $L_{Aeq, 1h}$ (free field). For operations during the evening (1900-2200) the noise limits should not exceed the background noise level ($L_{A90,1h}$) by more than 10dB(A) and should not exceed 55dB(A) $L_{Aeq, 1h}$ (free field). For any operations during the period 22.00 – 07.00 noise limits should be set to reduce to a minimum any adverse impacts, without imposing unreasonable burdens on the mineral operator. In any event the noise limit should not exceed 42dB(A) $L_{Aeq, 1h}$ (free field) at a noise sensitive property”.

5.3.3 The same document includes instances where short term operations may occur and the appropriate criteria for such circumstances;

“Activities such as 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.

Increased temporary daytime noise limits of up to 70dB(A) $L_{Aeq 1h}$ (free field) for periods of up to eight 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.

Where work is likely to take longer than eight weeks, a lower limit over a longer period should be considered. In some wholly exceptional cases, where there is no viable alternative, a higher limit for a very limited period may be appropriate in order to attain the environmental benefits. Within this framework, the 70 dB(A) $L_{Aeq 1h}$ (free field) limit referred to above should be regarded as the normal maximum”. 
6.0 NOISE LEVEL PREDICTIONS

6.1 Introduction

6.1.1 Noise has been defined as sound which is undesired by the recipient. The effects of noise on the neighbourhood are varied and complicated, including such things as interference with speech communication, disturbance of work, leisure or sleep. A further complicating factor is that in any one neighbourhood some individuals will be more sensitive to noise than others.

6.1.2 A measure that is in general use and is recommended internationally for the description of environmental noise is the equivalent continuous noise level or \( L_{Aeq} \) parameter.

6.1.3 In general, the level of noise in the local environs that arises from a development site will depend on a number of factors. The more significant of which are:-

(a) The sound power levels \( (L_{WA}) \) of the plant or equipment used on site.

(b) The periods of operation of the plant on site.

(c) The distance between the source noise and the receiving position.

(d) The presence or absence of screening effects due to barriers, or ground absorption.

(e) Any reflection effects due to the façades of buildings, etc.

6.2 Prediction Methodology

6.2.1 The prediction method used in this study is based upon that outlined within British Standard (BS) 5228: 2009 Code of practice for noise and vibration control on construction and open sites. Part 1: Noise.

6.2.2 The most important elements of this standard used in the report are calculated barrier attenuations, attenuation due to soft ground and angle of view corrections.

6.2.3 BS 5228-1:2009 indicates that a barrier attenuation of 10 dB(A) can be used when the noise screen completely hides the source from the receiver. The standard then states that “high topographical features and specifically designed and positioned noise barrier could provide greater attenuation”. Examples of which are overburden mounds and excavation high walls.

6.2.4 The reflection of sound via an excavation high wall or overburden mound causes the sound wave to be reflected back into the quarry and dissipate with distance. Any reflection of sound from vehicles or static plant would have a negligible effect on noise levels at sensitive receptors positioned outside of the quarry boundary.
6.3 Plant Complement

6.3.1 A list of plant sound power levels ($L_{WA}$) from which the noise predictions were made are presented in Table 2. The plant complement is based on information provided within manufacturer’s guidance, direct monitoring of the plant and BS 5228-1:2009. All measured sound power levels take into consideration where applicable the operation of any reverse warning systems fitted to the plant.

6.4 Noise Prediction Assumptions

6.4.1 The noise prediction exercises are based on a number of assumptions concerning the working of the site. These assumptions are presented as follows:

6.4.2 All predictions have been calculated with the combinations of plant working at the closest point to the prediction location. They are therefore worst case scenarios which may be of relatively short duration. However, they indicate the maximum $L_{Aeq}$ noise level to which a particular property or group of properties may be exposed during the working of the site. By definition, the worst case situation may occur intermittently over the lifetime of the site, but longer term noise levels perceived outside of the site boundary would normally be significantly less.

6.4.3 For the purposes of this prediction exercise, the above described worst case situation has been considered at all times, thus operations are assumed to be undertaken at their realistic minimum distances and maximum heights. In this exercise only the major operations have been considered as they are likely to have the most impact on the local environs.

6.4.4 During temporary soil stripping the noise predictions have accounted for a tracked bulldozer.

6.4.5 The noise predictions during normal operations have accounted for the operation of a loading shovel, hydraulic 45 tonne excavator, mobile crushing and screening plants and the movements of HGV’s along the internal haul roads. The noise predictions have accounted for the attenuation provided by the nature of the overlying land and the screening bunds along the perimeter of the extension at noise sensitive location.

6.4.6 The noise predictions have also taken into account the operation of a hydraulic breaker within the quarry floor. This operation is estimated to occur approximately 2 – 3 weeks per year, during times when there is an excess of larger sections of limestone.

6.4.7 During backfilling and restoration, the noise predictions have taken into account the use of a tracked bulldozer and HGV’s along the internal haul road.
6.4.8 Given that all prediction methods are estimates and that in practice measured levels are invariably lower due to the effects of interactions between such things as meteorological conditions and air absorption, these predicted levels are a reasonable representation of the worst case predictions assuming ideal meteorological conditions for sound propagation.
7.0 SURVEY METHOD

7.1 Introduction

7.1.1 The methodology described below was employed during the noise survey. Wherever possible all measurements were undertaken to comply with the requirements of BS 7445:2003.

7.2 Environmental Noise Measurement Technique

7.2.1 At all locations the microphone was placed 1.5 metres above the ground and where possible at least 3.5 metres from the nearest reflecting surface. The sound level meters were programmed to monitor over 15 minute periods and the following parameters were recorded:

\[
\begin{align*}
L_{A10} & \quad \text{in dB} \\
L_{A90} & \quad \text{in dB} \\
L_{Amax} & \quad \text{in dB} \\
L_{Aeq} & \quad \text{in dB}
\end{align*}
\]

7.2.2 Three 2 hour noise surveys were undertaken to establish the existing noise levels in the vicinity of potentially sensitive properties around the site.

7.3 Existing Noise Measurement Locations

7.3.1 The locations of the noise survey are listed in the table below:

<table>
<thead>
<tr>
<th>Location No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Robinswood</td>
</tr>
<tr>
<td>2</td>
<td>The Pines</td>
</tr>
<tr>
<td>3</td>
<td>Small Holding</td>
</tr>
</tbody>
</table>

7.3.2 All locations were chosen as being those at closest approach to the proposed development, whilst taking into account the movement in the working phases from south to north.

7.3.3 During the site inspection it was unclear whether the agricultural small holding to the west of the proposed Phase 3 extension area is residential. Access to this location was not permitted and as such, the monitoring took place on the adjacent field.
7.3.4 Since the initial site survey and after discussion with the local authority, the ‘small holding’ has been scoped out of the assessment. Oak Cottage is positioned to the west of the A43 along a row of residential properties in Duddington and is deemed to be the closest residential property to the proposed development.

7.3.5 For the purpose of this assessment, the noise monitoring conducted at the agricultural small holding is deemed to be representative of the local noise climate at Oak Cottage due to its similar proximity to the A43, which was the dominant noise source during the survey.
8.0 SURVEY DETAILS

8.1 Instrumentation

8.1.1 The following instrumentation was used for all noise measurements:

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Description</th>
<th>Type</th>
<th>Serial No.</th>
<th>Cal. Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cirrus</td>
<td>Type 1: Integrating Sound Level Meter</td>
<td>CRL 800</td>
<td>C17699FF</td>
<td>06-Feb-13</td>
</tr>
<tr>
<td>Cirrus</td>
<td>Type 1: Integrating Sound Level Meter</td>
<td>CRL 800</td>
<td>C18229FF</td>
<td>09-May-13</td>
</tr>
<tr>
<td>Cirrus</td>
<td>Type 1: Integrating Sound Level Meter</td>
<td>CRL 800</td>
<td>D20518FD</td>
<td>17-Aug-12</td>
</tr>
<tr>
<td>Cirrus</td>
<td>½” Pre polarised Cond. Microphone</td>
<td></td>
<td>CRL 224</td>
<td></td>
</tr>
<tr>
<td>Cirrus</td>
<td>Foam Windshield</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cirrus</td>
<td>Electronic Calibrator</td>
<td>CRL 511E</td>
<td>037734</td>
<td>06-Dec-12</td>
</tr>
</tbody>
</table>

8.1.2 The following set-up parameters were used on the sound level meters during all noise measurements:

- Time Weighting: Fast
- Frequency Weighting: A
- Measurement Period: 15 minutes

8.2 Calibration

8.2.1 The sound level meters were calibrated with the electronic calibrator prior to commencement and on completion of the surveys. No significant drift in calibration was observed.

8.3 Survey Dates and Personnel

8.3.1 Noise levels were measured between the hours of 11:10 and 13:52 on 17th May 2013. The surveys were conducted by Mr J. Mart of Vibrock Limited.

8.4 Meteorological Conditions

8.4.1 Weather conditions were noted during the survey period.

17th May 2013

8.4.2 The weather was clear, with 90 - 100% cloud cover and a northerly breeze of 3 - 4 ms⁻¹. The maximum temperature was 11°C.
9.0 RESULTS

9.1 Summaries of the results of the noise survey of existing noise levels around the proposed development are presented in Tables 1.1 – 1.3.

9.2 Typical sound power levels of plant used in the noise predictions are presented in Table 2.

9.3 Noise predictions during normal and temporary operations and an assessment in accordance with the NPPF and NPPG are shown in Tables 3 - 5 respectively.
10.0 DISCUSSION

10.1 Introduction

10.1.1 Summaries of the absolute worst case noise level predictions from the proposed development area to each of the three locations are given in Tables 3 - 5, together with an indication as to the difference between the predicted and measured existing levels and the criteria recommended in the NPPF and NPPG.

10.1.2 All predictions have been calculated with the combinations of plant working at the closest point to the prediction location.

10.1.3 It is important to note that the predictions for normal operations also take into account the use of a hydraulic breaker operating at closest approach within the proposed extraction area. Although this operation is due to occur for a short period in any one year, for the purposes of the assessment a worst case situation has been predicted during normal working operations.

10.2 Robinswood

10.2.1 The environmental noise monitoring at Robinswood was conducted at the rear of the property. The noise climate during the monitoring was influenced by constant road traffic noise along the A43 and A47. The operation of the quarry was inaudible throughout the survey.

Existing Ambient Noise Levels

10.2.2 Referring to Table 1.1, the average daytime background noise level, $L_{A90,2h}$ was 51 dB(A), with measurements in the range 48.6 to 52.3 dB(A). The corresponding average weekday daytime $L_{Aeq,2h}$ was 55 dB(A) comprising 15 minute measurements in the range 53.0 to 56.3 dB(A).

Predicted Operational Noise Levels

10.2.3 The worst case predicted noise level during normal operations is 52 dB $L_{Aeq,1h}$, which is 3 dB(A) below the existing $L_{Aeq,2h}$ measured at this location. It is 3 dB(A) below the 55 dB $L_{Aeq,1h}$ criterion contained within NPPG which is the normally justified limit for operations at mineral extraction sites.

10.2.4 During temporary soil stripping operations the calculated maximum noise level is 47 dB $L_{Aeq,1h}$, which is significantly below the 70 dB $L_{Aeq,1h}$ criterion of the NPPG.

10.2.5 During backfilling operations the calculated maximum noise level is 43 dB $L_{Aeq,1h}$, which is significantly below the 55 dB $L_{Aeq,1h}$ criterion contained within NPPG which is the normally justified limit for operations at mineral extraction sites.
10.3 The Pines

10.3.1 The environmental noise monitoring at The Pines was conducted within the rear garden of the property. The noise climate during the monitoring was influenced by constant road traffic noise along the A43. The operation of the quarry was inaudible throughout the survey.

**Existing Ambient Noise Levels**

10.3.2 Referring to Table 1.2, the average daytime background noise level, $L_{A90,2h}$, was 46 dB(A), with measurements in the range 43.5 to 48.6 dB(A). The corresponding average weekday daytime $L_{Aeq,2h}$ was 52 dB(A) comprising 15 minute measurements in the range 47.6 to 56.9 dB(A).

**Predicted Operational Noise Levels**

10.3.3 The worst case predicted noise level during normal operations is 52 dB $L_{Aeq,1h}$, which is at the existing $L_{Aeq,2h}$ measured at this location. It is 3 dB(A) below the 55 dB $L_{Aeq,1h}$ criterion contained within NPPG which is the normally justified limit for operations at mineral extraction sites.

10.3.4 During temporary soil stripping operations the calculated maximum noise level is 47 dB $L_{Aeq,1h}$, which is significantly below the 70 dB $L_{Aeq,1h}$ criterion of the NPPG.

10.3.5 During backfilling operations the calculated maximum noise level is 43 dB $L_{Aeq,1h}$, which is significantly below the 55 dB $L_{Aeq,1h}$ criterion contained within NPPG which is the normally justified limit for operations at mineral extraction sites.

10.4 Oak Cottage

10.4.1 As discussed in Section 7.3.3 – 7.3.5, the noise monitoring was conducted along the fence line adjacent to the agricultural small holding. The noise climate during the monitoring was influenced by constant road traffic noise along the A43. The operation of the quarry was inaudible throughout the survey.

10.4.2 Oak Cottage is at a similar distance from the monitoring location to the dominant noise source (A43), and is therefore deemed representative to utilise the results obtained from the agricultural small holding for the purpose of this assessment.

**Existing Ambient Noise Levels**

10.4.3 Referring to Table 1.3, the average daytime background noise level, $L_{A90,2h}$, was 46 dB(A), with measurements in the range 45.0 to 47.3 dB(A). The corresponding average weekday daytime $L_{Aeq,2h}$ was 51 dB(A) comprising 15 minute measurements in the range 48.5 to 53.1 dB(A).
Predicted Operational Noise Levels

10.4.4 The worst case predicted noise level at Oak Cottage during normal operations is 53 dB $L_{Aeq,1h}$, which is 2 dB(A) above the existing $L_{Aeq,2h}$ measured at this location. It is 2 dB(A) below the 55 dB $L_{Aeq,1h}$ criterion contained within NPPG which is the normally justified limit for operations at mineral extraction sites.

10.4.5 During temporary operations the calculated maximum noise level is 47 dB $L_{Aeq,1h}$ which is below the 70 dB $L_{Aeq,1h}$ criterion in the NPPG.

10.4.6 During backfilling operations the calculated maximum noise level is 43 dB $L_{Aeq,1h}$, which is below the 55 dB $L_{Aeq,1h}$ criterion contained within NPPG which is the normally justified limit for operations at mineral extraction sites.
11.0 CONCLUSIONS

11.1 A visual survey of the proposed development area has been made and existing ambient noise levels measured at the proposed development. Measurements were made in terms of $L_{Aeq}$, $L_{A10}$, $L_{A90}$ and $L_{Amax}$ thus enabling the existing noise climate to be characterised.

11.2 A series of noise predictions, based upon BS 5228: 2009 and including the assumptions embodied in Section 5 of this report, have been made to three noise sensitive locations around the proposed extraction area and these have been assessed against criteria in the NPPG.

11.3 It should be noted that the predicted noise levels in this report refer to worst case scenarios, when operations are undertaken at their closest distances to sensitive properties and therefore have the greatest influence on the noise levels at these locations. These worst case noise scenarios may only last for a few weeks or even days throughout the envisaged working life of the proposed extraction area.

11.4 From the results discussed in earlier sections it is apparent that calculated worst case noise levels from mineral extraction operations:

(a) Normal operations do not exceed the 55 dB $L_{Aeq,1h}$ criterion considered as an upper limit for mineral extraction operations in the NPPG;

(b) Without exception do not exceed the 70 dB $L_{Aeq,1h}$ criterion considered a normally justifiable limit for temporary operations, such as soil stripping and bund construction at mineral extraction sites in the NPPG;

(c) Backfilling operations do not exceed the 55 dB $L_{Aeq,1h}$ criterion considered as an upper limit for such operations in the NPPG.

11.5 With the exercise of reasonable engineering control over general site operations, the proposed extraction site should be able to be worked within the noise criteria in the NPPG to be normally justified for mineral extraction operations.
12.0 RECOMMENDATIONS

12.1 The following are recommended as positive statements of the maximum noise levels which could be permitted in accordance with the NPPF and NPPG:-

12.2 During the permitted working hours the noise level ($L_{Aeq,1h}$ free field) for the period due to mineral operations and subsequent backfilling, shall not exceed an upper limit of 55 dB $L_{Aeq,1h}$ free field as recorded at any inhabited property.

12.3 Specifically, we recommend the following limits:-

<table>
<thead>
<tr>
<th>Property</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robinswood</td>
<td>55 dB $L_{Aeq,1h}$</td>
</tr>
<tr>
<td>The Pines</td>
<td>55 dB $L_{Aeq,1h}$</td>
</tr>
<tr>
<td>Oak Cottage</td>
<td>55 dB $L_{Aeq,1h}$</td>
</tr>
</tbody>
</table>

12.4 Topsoil and subsoil stripping and other works in connection with landscaping shall not exceed 70 dB $L_{Aeq,1h}$ free field at any inhabited property and be limited to a period not exceeding 8 weeks at any one property.

12.5 Where possible, control measures should be employed on site in accordance with BS 5228-1: 2009, such as:

(a) Avoid unnecessary revving of engines and switch off equipment when not required;

(b) Keep internal haul routes well maintained;

(c) Minimise drop heights of materials;

(d) Ensure machinery is regularly well maintained;

(e) Ensure perimeter bunds are to the required height, with no gaps or inconsistencies.

12.6 Audible reversing warning systems on mobile plant and vehicles should be of a type which, whilst ensuring that they give proper warning, has a minimum noise impact on persons outside sites.

12.7 Bullimores Sand and Gravel Limited have fitted a number of ‘white noise’ vehicle reversing alarms to the mobile plant within the existing quarry development area, with notable benefits, the primary of which is the reduction in peak noise levels.

12.8 It is recommended the mineral operator incorporates this type of reversing alarm on all mobile plant in order to reduce peak noise levels whilst satisfying the requirements of NPPG.
13.0 REFERENCES


6. Calculation of Road Traffic Noise. Department of Transport, Welsh Office HMSO.
## INDEX TO TABLES

<table>
<thead>
<tr>
<th>Table No.</th>
<th>Description</th>
</tr>
</thead>
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<td>Summary of Worst Case Predicted Noise Levels During Temporary Operations</td>
</tr>
<tr>
<td>5</td>
<td>Summary of Worst Case Predicted Noise Levels During Backfilling Operations</td>
</tr>
</tbody>
</table>
### TABLE 1.1

**Results of Existing Noise Level Survey**

**Location 1: Robinswood**

**Survey Date: 17th May 2013**

<table>
<thead>
<tr>
<th>Monitoring Period</th>
<th>Duration</th>
<th>Statistical Parameters (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L(_{Aeq})</td>
</tr>
<tr>
<td>11:10</td>
<td>15:00</td>
<td>55.1</td>
</tr>
<tr>
<td>11:25</td>
<td>15:00</td>
<td>56.3</td>
</tr>
<tr>
<td>11:40</td>
<td>15:00</td>
<td>55.6</td>
</tr>
<tr>
<td>11:55</td>
<td>15:00</td>
<td>55.4</td>
</tr>
<tr>
<td>12:10</td>
<td>15:00</td>
<td>55.2</td>
</tr>
<tr>
<td>12:25</td>
<td>15:00</td>
<td>54.6</td>
</tr>
<tr>
<td>12:40</td>
<td>15:00</td>
<td>55.1</td>
</tr>
<tr>
<td>12:55</td>
<td>15:00</td>
<td>53.0</td>
</tr>
<tr>
<td><strong>Resultant over 2.0 hour period</strong></td>
<td></td>
<td>55</td>
</tr>
</tbody>
</table>
### TABLE 1.2

Results of Existing Noise Level Survey

**Location 2: The Pines**

**Survey Date: 17th May 2013**

<table>
<thead>
<tr>
<th>Monitoring Period</th>
<th>Duration</th>
<th>Statistical Parameters (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L_{A_{eq}}</td>
</tr>
<tr>
<td>11:27</td>
<td>15:00</td>
<td>51.4</td>
</tr>
<tr>
<td>11:42</td>
<td>15:00</td>
<td>51.6</td>
</tr>
<tr>
<td>11:57</td>
<td>15:00</td>
<td>51.3</td>
</tr>
<tr>
<td>12:12</td>
<td>15:00</td>
<td>49.5</td>
</tr>
<tr>
<td>12:27</td>
<td>15:00</td>
<td>47.6</td>
</tr>
<tr>
<td>12:42</td>
<td>15:00</td>
<td>51.1</td>
</tr>
<tr>
<td>12:57</td>
<td>15:00</td>
<td>56.9</td>
</tr>
<tr>
<td>13:12</td>
<td>15:00</td>
<td>50.4</td>
</tr>
<tr>
<td><strong>Resultant over 2.0 hour period</strong></td>
<td></td>
<td><strong>52</strong></td>
</tr>
</tbody>
</table>
TABLE 1.3

Results of Existing Noise Level Survey

Location 3: Small Holding (representative of Oak Cottage)

Survey Date: 17th May 2013

<table>
<thead>
<tr>
<th>Monitoring Period</th>
<th>Duration</th>
<th>LAeq</th>
<th>LA10</th>
<th>LA90</th>
<th>LAmax</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:52</td>
<td>15:00</td>
<td>48.5</td>
<td>50.6</td>
<td>45.2</td>
<td>59.3</td>
</tr>
<tr>
<td>12:07</td>
<td>15:00</td>
<td>48.9</td>
<td>50.9</td>
<td>45.9</td>
<td>57.8</td>
</tr>
<tr>
<td>12:22</td>
<td>15:00</td>
<td>48.8</td>
<td>51.0</td>
<td>45.2</td>
<td>59.2</td>
</tr>
<tr>
<td>12:37</td>
<td>15:00</td>
<td>48.8</td>
<td>51.1</td>
<td>45.0</td>
<td>57.9</td>
</tr>
<tr>
<td>12:52</td>
<td>15:00</td>
<td>53.1</td>
<td>52.9</td>
<td>46.1</td>
<td>76.8</td>
</tr>
<tr>
<td>13:07</td>
<td>15:00</td>
<td>51.1</td>
<td>53.4</td>
<td>46.7</td>
<td>67.1</td>
</tr>
<tr>
<td>13:22</td>
<td>15:00</td>
<td>51.8</td>
<td>53.9</td>
<td>47.3</td>
<td>68.8</td>
</tr>
<tr>
<td>13:37</td>
<td>15:00</td>
<td>52.4</td>
<td>55.0</td>
<td>47.3</td>
<td>73.7</td>
</tr>
<tr>
<td>Resultant over 2.0 hour period</td>
<td>51</td>
<td>52</td>
<td>46</td>
<td>77</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 2

**List of Plant and Sound Power Levels During Normal and Construction Operations**

<table>
<thead>
<tr>
<th>Plant Description</th>
<th>Quantity</th>
<th>Sound Power Level / dB(A)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Komatsu D65 Bulldozer</td>
<td>1</td>
<td>108</td>
<td>Manufacturers Data</td>
</tr>
<tr>
<td>Komatsu WA470 Loading Shovel</td>
<td>1</td>
<td>107</td>
<td>Manufacturers Data</td>
</tr>
<tr>
<td>Hitachi Zaxis 45 Tonne Excavator</td>
<td>1</td>
<td>107</td>
<td>Manufacturers Data</td>
</tr>
<tr>
<td>Kleeman Mobicat Crusher</td>
<td>1</td>
<td>104</td>
<td>Direct Measurement</td>
</tr>
<tr>
<td>Powerscreen H5163R</td>
<td>1</td>
<td>104</td>
<td>Direct Measurement</td>
</tr>
<tr>
<td>Volvo EC240BLC Breaker</td>
<td>1</td>
<td>118</td>
<td>Direct Measurement</td>
</tr>
<tr>
<td>HGV</td>
<td>3</td>
<td>106</td>
<td>BS 5228 (Table C11, ref 17)</td>
</tr>
</tbody>
</table>
### TABLE 3

Summary of Worst Case Predicted Noise Levels During Normal Operations

<table>
<thead>
<tr>
<th>Location</th>
<th>Existing Noise Levels / dB(A)</th>
<th>Predicted Worst Case / dB L_{Aeq,1h}</th>
<th>Difference / dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L_{Aeq}</td>
<td>L_{A90}</td>
<td></td>
</tr>
<tr>
<td>1. Robinswood</td>
<td>55</td>
<td>51</td>
<td>-3</td>
</tr>
<tr>
<td>2. The Pines</td>
<td>52</td>
<td>46</td>
<td>0</td>
</tr>
<tr>
<td>3. Oak Cottage</td>
<td>51</td>
<td>46</td>
<td>+2</td>
</tr>
</tbody>
</table>

**Existing L_{Aeq}**

- Robinswood: 55 dB
- The Pines: 52 dB
- Oak Cottage: 51 dB

**NPPF Max. 55 L_{Aeq}**

- Robinswood: -3 dB
- The Pines: -3 dB
- Oak Cottage: -2 dB
### TABLE 4

**Summary of Worst Case Predicted Noise Levels During Temporary Soil Stripping Operations**

<table>
<thead>
<tr>
<th>Location</th>
<th>Existing Noise Levels / dB(A)</th>
<th>Predicted Worst Case / dB L_{Aeq,1h}</th>
<th>Difference / dB(A)</th>
<th>Existing L_{Aeq}</th>
<th>NPPF Max. 70 L_{Aeq}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L_{Aeq}</td>
<td>L_{A90}</td>
<td>Predicted</td>
<td>Difference / dB(A)</td>
<td>L_{Aeq}</td>
</tr>
<tr>
<td>1. Robinswood</td>
<td>55</td>
<td>51</td>
<td>47</td>
<td>-8</td>
<td>-23</td>
</tr>
<tr>
<td>2. The Pines</td>
<td>52</td>
<td>46</td>
<td>47</td>
<td>-5</td>
<td>-23</td>
</tr>
<tr>
<td>3. Oak Cottage</td>
<td>51</td>
<td>46</td>
<td>47</td>
<td>-4</td>
<td>-23</td>
</tr>
</tbody>
</table>
**TABLE 5**

Summary of Worst Case Predicted Noise Levels During Backfilling Operations

<table>
<thead>
<tr>
<th>Location</th>
<th>Existing Noise Levels / dB(A)</th>
<th>Predicted Worst Case / dB L_{Aeq,1h}</th>
<th>Difference / dB(A)</th>
<th>Existing L_{Aeq}</th>
<th>NPPF Max. 55 L_{Aeq}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L_{Aeq}</td>
<td>L_{A90}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Robinswood</td>
<td>55</td>
<td>51</td>
<td>43</td>
<td>-12</td>
<td>-12</td>
</tr>
<tr>
<td>2. The Pines</td>
<td>52</td>
<td>46</td>
<td>43</td>
<td>-9</td>
<td>-12</td>
</tr>
<tr>
<td>3. Oak Cottage</td>
<td>51</td>
<td>46</td>
<td>43</td>
<td>-8</td>
<td>-12</td>
</tr>
</tbody>
</table>
FIGURE 1

Sensitive Receptors

KEY
1. Robinswood
2. The Pines
3. Oak Cottage

Proposed Western Extension Area