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NOISE ASSESSMENT

PROPOSED SAND AND GRAVEL QUARRY
PINCET LANE, NORTH KILWORTH

MICK GEORGE LTD

AUGUST 2015

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Contents

1. Introduction

1.1. LF Acoustics Limited have been appointed by Mick George Ltd to carry out a noise assessment to support a planning application for the extraction of sand and gravel on land off Pincet Lane, North Kilworth.

1.2. It is proposed to work the quarry progressively from north to south, with the extraction carried out on a campaign basis, with the land progressively restored.

1.3. This report presents an assessment of the likely noise levels generated at surrounding noise sensitive receptors during the working and restoration of the quarry. Section 2 provides a summary of the applicable standards and guidelines. Section 3 provides information on the surrounding land uses and existing noise environment. Calculations and assessment of the noise generated by the extraction and restoration are provided in Section 4, with recommendations for additional mitigation control measures provided in Section 5. Finally, Section 6 presents a summary of this report.

2. Applicable Standards and Guidance

A description of the noise units referred to within this report is provided in Appendix A.

2.1. National Planning Policy Framework

2.1.1. The principal planning guidance in the UK was updated in March 2012 and is now contained within the National Planning Policy Framework [1]. At the heart of the NPPF is a presumption in favour of sustainable development, although environmental criteria should be set out to ensure that the permitted operations do not have unacceptable adverse impacts, with appropriate noise limits adopted to control noise.

2.1.2. The current technical guidance attached to the NPPF relating to noise was updated in March 2014 [2], which covers mineral extraction and related processes, including aggregate recycling and the disposal of construction waste, provides guidance and advises upon acceptable levels of noise from minerals operations.

2.1.3. For normal daytime works the guidance seeks to ensure that the operations do not result in significant adverse effects and advises for normal daytime operations that the following limits should not exceed:

- 10 dB above the background (L_{A90}) noise level; subject to
- a maximum value of 55 dB $L_{Aeq,\ 1\ hour}$ (free field).

2.1.4. Where background noise levels are low, the guidance accepts that it may be very difficult to achieve a limit based upon background + 10 dB(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 and should not exceed 55 dB $L_{Aeq,\ 1\ hour}$ (free field).

2.1.5. The guidance suggests that in the evening (19:00 – 22:00) $L_{Aeq,\ 1\ hour}$ noise levels should not exceed the background (LA90) noise level by more than 10 dB and during the night-time a limit of 42 dB LAeq, 1 hour should be adopted.

2.1.6. In addition to the general daytime works, the guidance advises that all mineral operations will have some particularly noisy short-term activities that cannot meet the limits set for normal operations. These include soil-stripping, construction or removal of bunding or spoil heaps and construction of new permanent landforms. A level of 70 dB $L_{Aeq,\ 1\ hour}$ is suggested as a limit for these activities for periods of up to eight weeks in any one year. Where the duration of temporary works may exceed eight weeks it can be appropriate to apply a lower limit for a longer period. The guidance also recognises that, in wholly exceptional cases, where there is no viable alternative, a limit of more than 70 dB $L_{Aeq,\ 1\ hour}$ may be appropriate in order to obtain other environmental benefits.

3. Baseline Assessment

3.1. Identification of Potentially Affected Noise-Sensitive Receptors

3.1.1. There are relatively few properties in close proximity to the site. The potentially most affected dwellings are indicated on Figure 1.

3.1.2. Brickyard Farm is located directly adjacent to the north western corner of the proposed extraction area and approximately 200 metres to the west of the processing area.

3.1.3. Tophouse Farm is located to the north west of the quarry, approximately 500 metres from the proposed mineral processing area.

3.1.4. Bosworth Grange Farm is locate to the east, approximately 500 metres from the main processing area, with the proposed soils storage approximately 250 metres from the property.

3.1.5. The Bungalow is the closest dwelling, situated approximately 30 metres from the boundary of the proposed extraction area.

3.1.6. Pincet Lodge to the east is derelict at present, with a new farmhouse having recently been constructed to the east of Pincet Lane, approximately 150 metres from the closest working areas.

3.1.7. Sparrows Cottage is located to the south, adjacent to Pincet Lane and set back a similar distance from the road. This property is approximately 200 metres from the southern boundary of the quarry.

3.2. Baseline Noise Monitoring

3.2.1. A noise monitoring exercise was carried out on 28 July 2015 to determine the existing noise environment at locations representative of dwellings surrounding the proposed quarry. The measurement exercise comprised unattended measurements taken at one location during the morning, supplemented with attended noise surveys at a further 2 positions.

3.2.2. During the survey, weather conditions were good, fine and dry, with a light to moderate westerly wind (2 – 4 m/s). The weather conditions were suitable for undertaking baseline noise monitoring.

3.2.3. The measurements were obtained using a Rion NL-52 Class 1 Sound Level Meter and a Rion NA-28 Class 1 Sound Analyser, which were calibrated before and after the exercise using a Rion NC-74 Class 1 Acoustic Calibrator, with no drift recorded. At each position, the microphone was positioned at a height of between 1.2 – 1.3 metres and freefield (i.e. at least 3.5 metres from any building facades).

3.2.4. The noise monitoring positions are indicated on Figure 1.

Brickyard Farm

3.2.5. The monitoring location for this property was located in the field to the east of the dwelling. Noise levels measured at this location were considered to be representative of this dwelling and Tophouse Farm.

3.2.6. Unattended noise measurements were obtained at this position over a period of 2 hours during the morning period. The main influences on the noise levels at this location were associated with traffic using Pincet Lane, with regular HGV movements observed heading towards the airfield, and leaves rustling in the breeze.

3.2.7. The results obtained at this location are presented in Table 3.1 below.

Time	Measured Noise Levels [dB]		
	L_{Aeq}	$L_{Amax,F}$	L_{A90}
09:15 – 09:30	46.1	54.5	37.2
09:30 – 09:45	48.2	66.9	38.1
09:45 – 10:00	46.2	58.1	38.1
10:00 – 10:15	47.5	56.0	38.4
10:15 – 10:30	45.8	57.1	36.4
10:30 – 10:45	44.0	58.2	36.1
10:45 – 11:00	47.5	55.7	38.1
11:00 – 11:15	45.3	54.1	35.6
Average	**46**	**-**	**37**

Table 3.1 Results of Noise Monitoring at Brickyard Farm

The Bungalow

3.2.8. The measurements taken at this location were made in the rear garden of the property, thus screened from traffic travelling along Pincet Lane. The noise levels monitored at this position were representative of this dwelling and Sparrows Cottage to the south.

3.2.9. Noise levels at this location were principally influenced by traffic travelling along Pincet Lane, with regular HGV movements. Traffic was generally audible throughout the measurement period.

3.2.10. Four measurements, each of 15 minute duration, were obtained at this location, with the results obtained presented in Table 3.2 below.

Time	Measured Noise Levels [dB]		
	L_{Aeq}	$L_{Amax,F}$	L_{A90}
10:25 – 10:40	48.3	61.6	39.3
10:40 – 10:55	48.7	66.5	40.5
10:55 – 11:10	49.9	63.0	42.0
11:10 – 11:25	46.5	59.8	39.2
Average	**48**	**-**	**40**

Table 3.2 Results of Noise Monitoring at The Bungalow

New Pincet Lodge

3.2.11. This property has recently been constructed and is positioned to the east of Pincet Lane and the former farmhouse. Noise levels monitored at this position were also considered to be representative of the environment at Bosworth Grange Farm.

3.2.12. Noise levels monitored at this location were principally influenced by traffic travelling along Pincet Lane, which was generally audible throughout the monitoring period.

3.2.13. Four measurements, each of 15 minute duration, were obtained at this location, with the results obtained presented in Table 3.3 below.

Time	Measured Noise Levels [dB]		
	L_{Aeq}	$L_{Amax,F}$	L_{A90}
09:15 – 09:30	51.6	66.3	39.5
09:30 – 09:45	53.4	72.5	42.7
09:45 – 10:00	55.4	69.8	43.4
10:00 – 10:15	52.9	66.4	42.4
Average	**53**	**-**	**42**

Table 3.3 Results of Noise Monitoring at New Pincet Lodge

4. Calculations and Assessment

4.1. Proposed Operations

4.1.1. The quarry would be worked progressively from north to south, with small areas opened up at any one time for extraction, and progressively restored.

4.1.2. The indicative working scheme is presented on Figure 2.

4.1.3. A mineral processing area would be established within the northern part of the quarry at the commencement of operations. Within this area there would be a static processing plant, with a capacity to process around 150 tonnes per hour. A loading shovel would work in this area, both servicing the plant and loading the HGVs.

4.1.4. Extraction would be carried out on a campaign basis, using a single excavator and two articulated dump trucks to transport the material to the processing area. This plant would also be used for the soil stripping and restoration activities.

4.1.5. It is anticipated that 6 loads per hour would be taken from the site, with a proportion of the vehicles entering the site loaded with inert material to assist with the restoration of the site. On this basis, it is not anticipated that there would be more than 12 HGV movements per hour accessing the quarry

4.1.6. The operational hours for the quarry would be within the standard daytime hours for quarries, i.e. between 07:00 – 19:00 hours weekdays and 07:00 – 13:00 hours on Saturdays, with no working on Sundays and Bank Holidays.

4.1.7. It is anticipated that HGVs may need to leave the site from 06:00 hours in the morning. If necessary, these vehicles would have been loaded the previous day and would simply start and depart from the quarry along the access.

4.2. Source Term Information

4.2.1. Source term noise information for plant to be used on the site have been obtained either from measurements made adjacent to similar plant currently operating within Mick George quarries, or from measurements made at similar facilities.

4.2.2. As indicated above, the plant requirements would be low, thus ensuring noise levels were minimised.

4.2.3. Based on the above information, the noise source terms which have been assumed for this assessment are provided in Table 4.1.

Source	SEL at 10m	L_{Aeq} at 10m	Number	% On-Time
HGV / Dump Truck Movement Within Quarry	80.0	-	24 per hour	-
Excavator Working and Loading Dump Truck	-	75.7	1	100
Processing plant	-	80.9	1	100
Loading Shovel	-	72.0	1	100
HGV on Access (Laden)	77.8	-	6 per hour	-
HGV on Access (Unladen)	78.1	-	6 per hour	-

Table 4.1 Source Term Noise Levels

4.3. Criteria to be Adopted for the Assessment

4.3.1. Based upon the results of the baseline noise monitoring, the following freefield normal daytime working limits have therefore been adopted for this assessment, in accordance with the requirements of the planning guidance:

Location	Typical Freefield Background Noise Level [dB L_{A90}]	Proposed Freefield Normal Working Limit [dB $L_{Aeq, 1\ hour}$]
Brickyard Farm	37	47
Tophouse Farm	37	47
Bosworth Grange Farm	42	52
The Bungalow	40	50
New Pincet Lodge	42	52
Sparrows Cottage	40	50

Table 4.2 Proposed Normal Working Limits

4.3.2. For any temporary operations, which would include soils stripping and the construction or removal of storage mounds, carried out over a duration of not more than 8 weeks per year, a temporary noise working limit of 70 dB $L_{Aeq, 1\ hour}$ would be adopted in accordance with the current planning guidance.

4.4. Calculation Methodology

4.4.1. The calculations of the noise levels from the quarry and processing operations at the closest properties have been made using the methodology contained within BS 5228-1 [3]. Where barrier corrections have been calculated, the algorithm used within a Calculation of Road Traffic Noise [4] has been used.

4.4.2. Calculations have been made at positions representative of the likely closest operations to the properties. For the purposes of the calculations, it has been generally assumed that all plant would be working at the same distance from the properties. This approach would provide a likely worst case assessment of the noise levels during each phase.

4.4.3. The details of the calculations are provided in Appendix B.

4.5. Assessment of Noise Levels at Brickyard Farm

4.5.1. This property is located to the west of the quarry and is the closest dwelling to the proposed mineral processing area.

4.5.2. Screening is proposed along the western and southern boundaries of the processing area, to a height of 5 metres, to effectively screen the plant from the dwelling. In addition, bunding would also be provided along the western boundary of the extraction area. The proposed mitigation is indicated on Figure 2.

4.5.3. Noise levels associated with the processing operations with the mitigation in place are anticipated to be 43 dB L_{Aeq}.

4.5.4. Works within the extraction area would commence with the soils stripping within the northern part of the site and the creation of the perimeter bunds. Noise levels during these works, which would be temporary, lasting only a few weeks, would be up to 57 dB L_{Aeq}. Noise levels would remain substantially below the temporary working limit of 70 dB L_{Aeq}.

4.5.5. Noise levels associated with the extraction and restoration operations would be at a maximum whilst the plant was working close to the property and existing ground surface, with noise levels reducing as the extraction progresses deeper and further from the property.

4.5.6. At the commencement of extraction, noise levels associated with the extraction and processing operations is anticipated to be 47 dB L_{Aeq}, reducing to 45 dB L_{Aeq} as the operations progress beyond 200 metres from the dwelling.

4.5.7. During the period when operations are being undertaken within 200 metres of the dwelling, there would be the potential for the noise levels to marginally exceed the proposed 47 dB L_{Aeq} noise limit at this location. Any potential impact could be mitigated by increasing the height of the bunding directly adjacent to the property to a height of 5 metres whilst working this small area, would provide an overall reduction in noise levels of 1.5 dB(A). However, the overall noise levels would remain low and below a level which would be likely to give rise to particular disturbance, when considering absolute noise limits and it is considered that the potential additional disturbance associated with the construction of the additional bunding for the small benefit may offset any potential benefits. Additionally, it is also likely that any extraction within the 200 metre radius of the property may be completed within an 8 week duration and the temporary working limit could apply to these works.

4.5.8. Once extraction progresses beyond 200 metres of the dwelling, noise levels would be reduced to a level below the proposed 47 dB $L_{Aeq,\ 1\ hour}$ normal working limit and would therefore remain within acceptable limits.

4.5.9. With consideration of the above, the operation of the quarry would therefore generate acceptable levels of noise at this property.

4.6. Assessment of Noise Levels at Tophouse Farm

4.6.1. This property is located to the north west of the proposed quarry, approximately 450 metres from the mineral processing area.

4.6.2. Noise associated with the operation of the quarry will principally be attributable to the operation of the processing plant at this location, with the noise levels associated with the extraction and restoration, located over 400 metres from the property, having minimal influence on the overall site noise levels.

4.6.3. Noise levels at this dwelling are anticipated to be at a maximum during the initial earthworks to create the mineral processing area and are anticipated to be at a level of 45 dB L_{Aeq} during this period. Noise levels during these temporary works are not anticipated to exceed the normal working limit of 47 dB L_{Aeq} at this property.

4.6.4. Noise levels associated with the operation of the plant within the processing area are anticipated to be 42 dB L_{Aeq}, with the extraction operations having no influence on the overall site noise levels.

4.6.5. Noise levels associated with the general daytime operation of the quarry would therefore remain below the proposed normal working limit of 47 dB $L_{Aeq,\ 1\ hour}$ and would thus be acceptable.

4.7. Assessment of Noise Levels at Bosworth Grange Farm

4.7.1. This property is located to the east of the proposed mineral processing area, approximately 300 metres from the site boundary.

4.7.2. Noise levels at this property will be at a maximum during the initial temporary works to create the site, with levels of 43 dB L_{Aeq} calculated at this time.

4.7.3. Noise associated with the general operation of the site would be principally influenced by the plant within the processing area, with levels of 42 dB L_{Aeq} calculated. The calculations indicate that the general extraction and restoration operations, carried out within the southern part of the site, would have minimal influence on the noise levels at this location.

4.7.4. Noise levels associated with the general daytime operation of the quarry would remain substantially below the proposed normal working limit of 52 dB $L_{Aeq,\ 1\ hour}$ at this location and would thus be acceptable.

4.8. Assessment of Noise Levels at New Pincet Lodge

4.8.1. This property is located approximately 150 metres from the easternmost extraction areas and 500 metres from the processing area to the north.

4.8.2. The highest noise levels at this location are anticipated during the soils stripping of the land closest to the dwelling to form the screening mounds, with a level of 48 dB L_{Aeq} calculated from this operation.

4.8.3. The operation of the processing plant would give rise to a level of 39 dB L_{Aeq} at this dwelling, with overall levels associated with the normal operation of the quarry likely to be a maximum during the periods of extraction along the eastern boundary, closest to the dwelling. Noise levels during this period are anticipated to be 42 dB L_{Aeq}, associated with both the processing and extraction.

4.8.4. Noise levels associated with the general daytime operation of the quarry would remain substantially below the proposed normal working limit of 52 dB $L_{Aeq,\ 1\ hour}$ at this location and would thus be acceptable.

4.9. Assessment of Noise Levels at The Bungalow

4.9.1. This property is located adjacent to the eastern boundary of the mineral extraction area and approximately 500 metres from the processing area.

4.9.2. Noise associated with the operation of the processing plant at this property would be low, with noise levels of 40 dB L_{Aeq} calculated.

4.9.3. Noise levels would be at a maximum during the stripping of the soils adjacent to the property, to form the perimeter bunding. These works would be temporary, lasting 1 – 2 weeks and hence the temporary working limit of 70 dB L_{Aeq} would apply. Noise levels associated with this operation would be 66 dB L_{Aeq}, whilst the plant was working directly adjacent to the dwelling and would thus remain within the limit.

4.9.4. With the bunding constructed, the main extraction operations would be fully screened from the dwelling. The highest noise levels are expected during the periods when the plant is working close to the surface and dwelling. On this basis, with the extraction or restoration operations being carried out at a distance of 100 metres from the dwelling, noise levels of 47 dB L_{Aeq} have been calculated, which would reduce to 43 dB L_{Aeq}, once the plant was 200 metres from the property.

4.9.5. Noise levels associated with the general daytime operation of the quarry would therefore remain below the proposed normal working limit of 50 dB $L_{Aeq, 1\ hour}$ at this location and would thus be acceptable.

4.10. Assessment of Noise Levels at Sparrows Cottage

4.10.1. This property is located approximately 200 metres to the south of the southernmost extent of the extraction area and over 800 metres from the processing area.

4.10.2. Noise levels associated with the operation of the quarry at this location would remain low, with the highest noise levels associated with the temporary works to construct the perimeter bunding, which are anticipated to be 48 dB L_{Aeq}.

4.10.3. Noise levels associated with the normal operation of the quarry would be at a maximum when the extraction was being undertaken close to the southern boundary, with levels of up to 41 dB L_{Aeq} calculated.

4.10.4. Noise levels associated with the general daytime operation of the quarry would remain substantially below the proposed normal working limit of 50 dB $L_{Aeq, 1\ hour}$ at this location and would thus be acceptable.

4.11. Assessment of Noise Associated with Early Morning Vehicle Departures

4.11.1. It is proposed that up to 10 HGVs may need to depart from the quarry between 06:00 – 07:00 hours. These vehicles would have been loaded during the previous day and would simply start up and drive along the access road onto Pincet Lane. There would be no loading or other operations carried out during this period.

4.11.2. The small addition number of vehicles using this road, in addition to the existing traffic would not result in any noticeable increases in noise levels at the properties along the lane.

4.11.3. The early morning vehicle movements would therefore not give rise to any potential adverse impact or disturbance to occupants of surrounding properties.

5. Requirement for Noise Monitoring, Additional Mitigation and Control Measures

5.1. The assessment within Section 4 indicates that noise levels associated with the working of the quarry would be acceptable with appropriate working methods and mitigation measures adopted within the quarry.

5.2. In addition to the mitigation measures incorporated into the design and working method for the quarry, appropriate noise control measures would be adopted to ensure noise associated with the operation of the quarry was minimised and would include:

- Ensuring all plant is kept well maintained;
- Ensuring silencers on plant are effective;
- Minimising drop heights when loading vehicles;
- Turning off plant when not in use; and
- Using alternative non tonal reversing signals on mobile plant, which are background noise tracking if permitted on health and safety grounds.

5.3. Vehicles travelling on the access and haul roads have potential to cause disturbance even at low noise levels. To ensure potential disturbance is minimised, the access roads should be inspected at regular intervals (at least once every week) to ensure that the surface remains in good condition. Where defects are identified, these should be rectified immediately. This action seeks to ensure that empty vehicles travelling on the haul roads and passing over the defect do not give rise to body slap, which is potentially disturbing. Furthermore, the speed limit on the access road should be well enforced, this measure also seeks to minimise the likelihood of body slap from empty vehicles.

5.4. The current planning guidance advises that noise monitoring should be carried out periodically to ensure that noise levels associated with site operations remain within acceptable limits.

5.5. It is recommended that noise monitoring be carried out at the properties closest to the quarry, to demonstrate compliance with the noise limits. It is recommended that exercises are undertaken at the commencement of site operations, once the processing plant is operational, following receipt of any justified complaints and periodically (at intervals of up to 12 months) thereafter. It is anticipated that a noise monitoring protocol would be prepared and implemented prior to any works commencing on site.

5.6. For any measurements made, a meter conforming to at least Class 2 standards should be used, which should be calibrated before and after the exercise. The meter should be positioned at a height of 1.2 metres above the ground and at a free-field location (i.e. at least 3.5 metres from a building facade or other reflecting surface other than the ground).

5.7. The results of the monitoring exercise should be compared to the proposed operating limits presented in Section 4.3. Should the results indicate that the limits are being exceeded, further mitigation measures should be considered and implemented, where appropriate.

6. Summary

6.1. LF Acoustics Limited have been appointed by Mick George Ltd to carry out a noise assessment to support a planning application for the extraction of sand and gravel and restoration at a proposed quarry on land adjacent to Pincet Lane, North Kilworth.

6.2. The quarry would be in two parts, a mineral processing area, which would contain the processing plant, located within the northern part of the quarry, and the main extraction area, which would be within the southern part of the quarry. It is proposed to work the site progressively from north to south. It is anticipated that the extraction would be carried out on a campaign basis, with the land progressively restored.

6.3. An assessment of the likely noise levels associated with the operation have been undertaken, which demonstrate that with appropriate control measures implemented, noise levels associated with the working and restoration of the quarry would be acceptable to ensure any potential disturbance to the occupants of surrounding properties is minimised.

6.4. The assessment indicates that noise levels associated with site operations would remain within the working limits derived from the technical guidance attached to the NPPF for both the temporary operations, such as soils stripping, and normal working of the quarry, thus ensuring that any potential adverse impacts or disturbance from noise were minimised.

References

1. Department for Communities and Local Government. The National Planning Policy Framework. March 2012.

2. Department for Communities and Local Government. Planning Practice Guidance. Assessing Environmental Impacts from Minerals Extraction. 6 March 2014.

3. British Standards Institute. Code of Practice for Noise and Vibration Control on Construction and Open Sites. Part 1:Noise. BS 5228-1+A1. 2014.

4. Calculation of Road Traffic Noise (CRTN). Department of Transport. 1988.

Figures

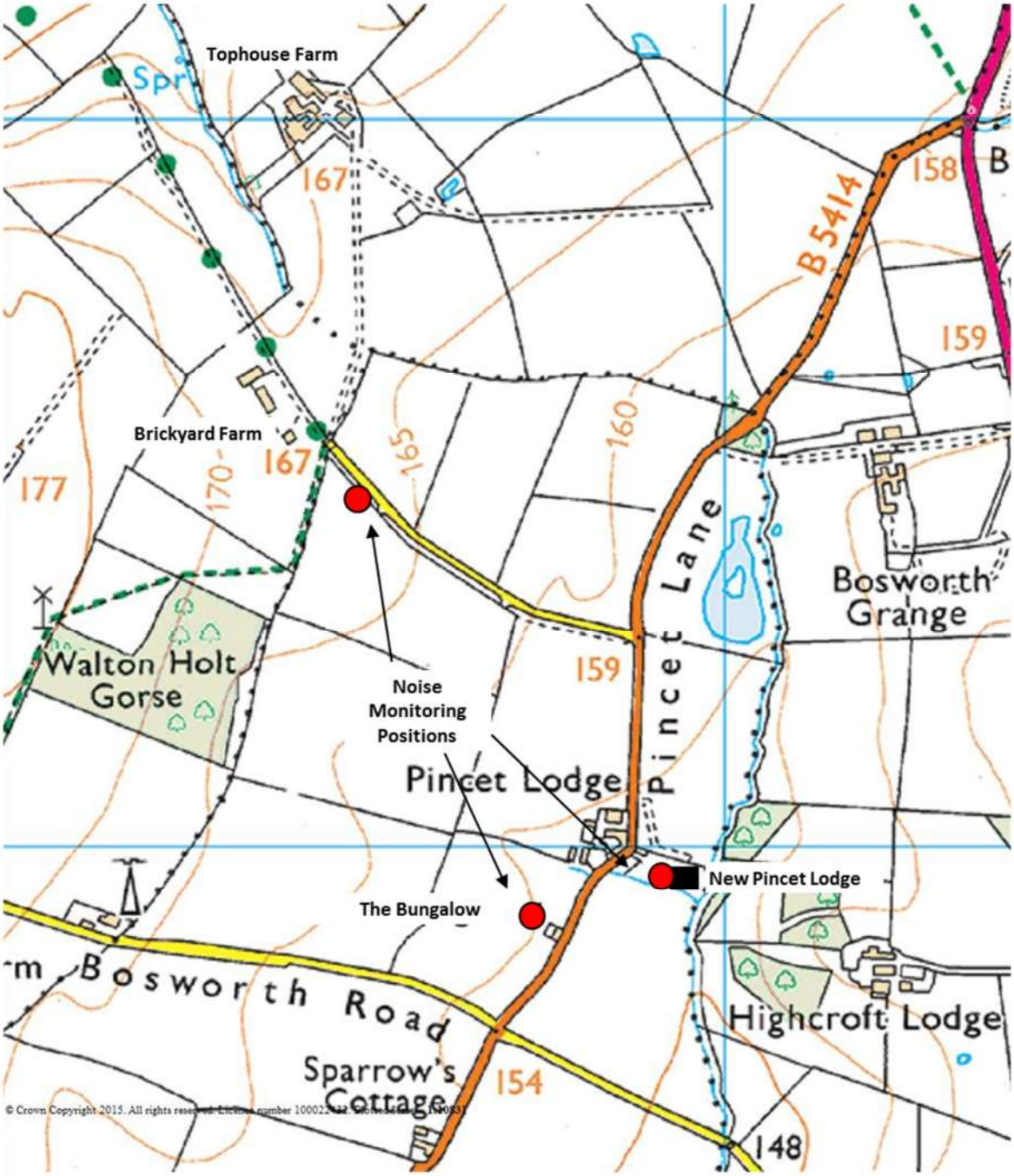


Figure 1 : Site Plan and Noise Monitoring Locations

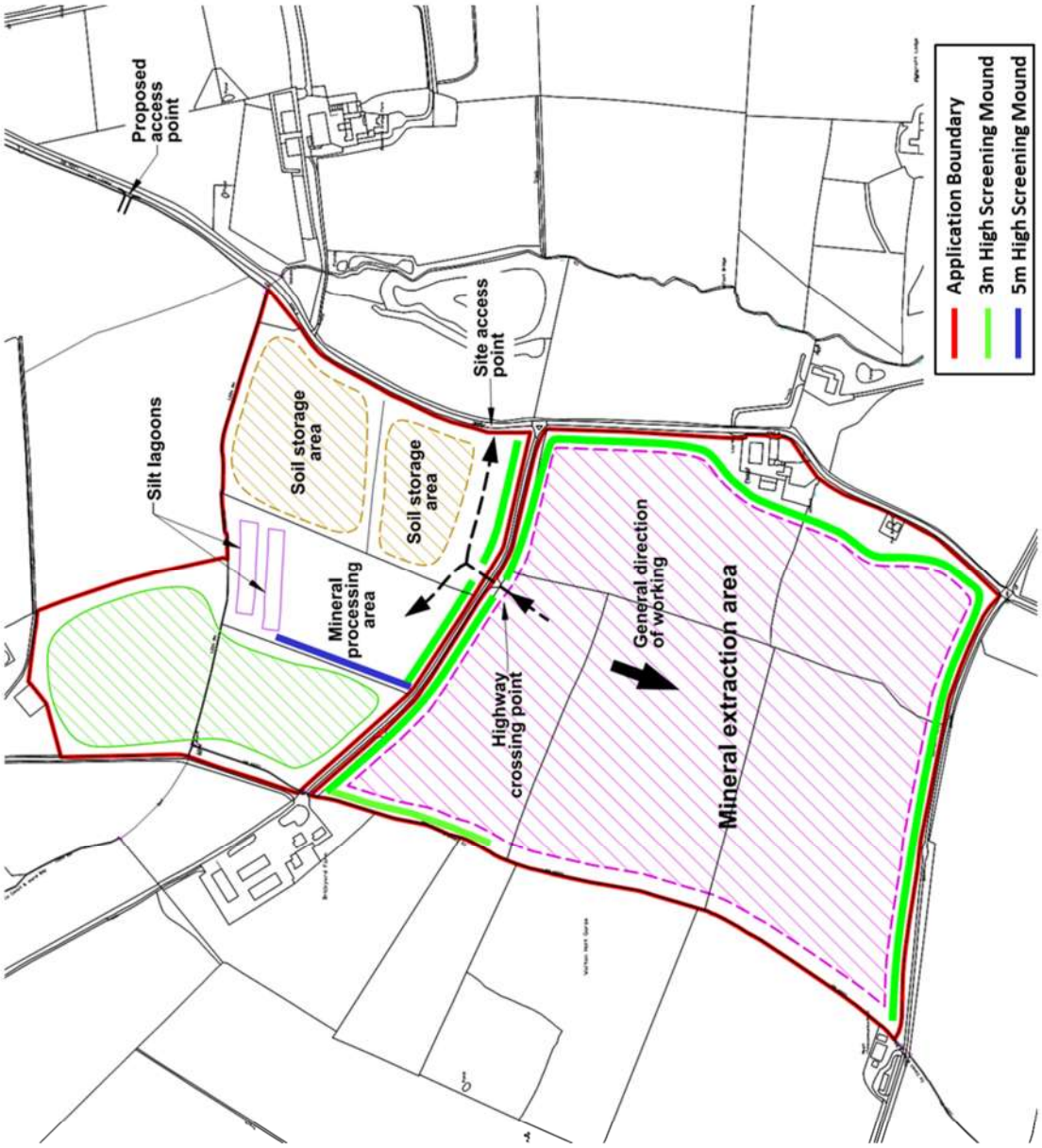


Figure 2 : Indicative Working Scheme

Appendix A
Noise Units

Decibels (dB)

Noise can be considered as 'unwanted sound'. Sound in air can be considered as the propagation of energy through the air in the form of oscillatory changes in pressure. The size of the pressure changes in acoustic waves is quantified on a logarithmic decibel (dB) scale firstly because the range of audible sound pressures is very great, and secondly because the loudness function of the human auditory system is approximately logarithmic.

The dynamic range of the auditory system is generally taken to be 0 dB to 140 dB. Generally, the addition of noise from two sources producing the same sound pressure level will lead to an increase in sound pressure level of 3 dB. A 3 dB noise change is generally considered to be just noticeable, a 5 dB change is generally considered to be clearly discernible and a 10 dB change is generally accepted as leading to the subjective impression of a doubling or halving of loudness.

A-Weighting

The bandwidth of the frequency response of the ear is usually taken to be from about 18 Hz to 18,000 Hz. The auditory system is not equally sensitive throughout this frequency range. This is taken into account when making acoustic measurements by the use of A-weighting, a filter circuit that has a frequency response similar to the human auditory system. All the measurement results referred to in this report are A-weighted.

Units Used to Describe Time-Varying Noise Sources (L_{Aeq}, L_{Amax}, L_{A10}, and L_{A90})

Instantaneous A-weighted sound pressure level is not generally considered as an adequate indicator of subjective response to noise because levels of noise usually vary with time.

For many types of noise the Equivalent Continuous A-Weighted Sound Pressure Level ($L_{Aeq,T}$) is used as the basis of determining community response. The $L_{Aeq,T}$ is defined as the A-weighted sound pressure level of the steady sound which contains the same acoustic energy as the noise being assessed over a specific time period, T.

The L_{Amax} is the maximum value that the A-weighted sound pressure level reaches during a measurement period. $L_{Amax\ F}$, or Fast, is averaged over 0.125 of a second and $L_{Amax\ S}$, or Slow, is averaged over 1 second. All L_{Amax} values referred to in this report are Fast.

The L_{A90} is the noise level exceeded for 90% of the measurement period. It is generally used to quantify the background noise level, the underlying level of noise that is present even during the quieter parts of measurement period.

Appendix B
Calculation Details

Mick George Ltd - Pincet Lane, North Kilworth
Calculated Noise Levels from Site Operations

02-Aug-2015

Receptor: Brickyard Farm — Uses BS5228
Height 170 m

Predicted Freefield Noise Levels

	Ref LAeq @10m	Ref Dist (m)	No. (/hr)	% On Time	Source Ht	Dist S-R	Barrier Ht	Dist S-B	Distance Attenuation Hard	Distance Attenuation Soft	CRTN Barrier Attenuation	Max Attenuation	LAeq [dB]		Activity LAeq [dB]	Overall	
Mineral Processing Area																	
Processing Plant	80.9	10.0	1	100	165	250	170	50	-28.0	-33.0	-10.8	-38.7	**42.2**	16525.384			
Excavator	73.0	10.0	1	100	165	250	170	50	-28.0	-33.0	-10.8	-38.7	**34.3**	2680.1035			
Loading Shovel	72.0	10.0	1	100	165	250	170	50	-28.0	-33.0	-10.8	-38.7	**33.3**	2128.8819			
ADT Movements	45.3	10.0	20	-	165	250	170	50	-28.0	-33.0	-10.8	-38.7	**19.6**	91.807691			
HGV Movements (Laden)	42.2	10.0	10	-	165	250	170	50	-28.0	-33.0	-10.8	-38.7	**13.5**	22.482731			
HGV Movements (Unladen)	42.5	10.0	10	-	165	250	170	50	-28.0	-33.0	-10.8	-38.7	**13.8**	24.090681	**43.3**		
						(5m high bunding around processing area)											
Initial Soil Strip and Formation of Storage Mound Closest to Property																	
Excavator	75.7	10.0	1	100	169	70			-16.9	-19.1	0.0	-19.1	**56.6**	454092.28			
ADT Movements	44.4	10.0	24	-	169	70			-16.9	-19.1	0.0	-19.1	**39.1**	8148.0346	**56.6**		
Extraction & Progressive Restoration Close to Surface - Position A																	
Excavator	75.7	10.0	1	100	167	100	172	40	-20.0	-23.0	-11.7	-31.7	**44.0**	24870.007			
ADT Movements	44.4	10.0	24	-	167	100	172	40	-20.0	-23.0	-11.7	-31.7	**26.5**	446.2566	**44.0**	**46.7**	Increase to 5m (1.5 dB benefit)
						(3m perimeter bunding)											
Extraction & Progressive Restoration Close to Surface - Position B																	
Excavator	75.7	10.0	1	100	166	200	172	140	-26.0	-30.5	-9.7	-35.7	**40.0**	9905.1629			
ADT Movements	44.4	10.0	24	-	166	200	172	140	-26.0	-30.5	-9.7	-35.7	**22.5**	177.73394	**40.0**	**45.0**	
						(3m perimeter bunding)											
Extraction & Progressive Restoration Close to Surface - Position C																	
Excavator	75.7	10.0	1	100	166	200	172	100	-26.0	-30.5	-10.3	-36.3	**39.4**	8721.6893			
ADT Movements	44.4	10.0	24	-	166	200	172	100	-26.0	-30.5	-10.3	-36.3	**21.9**	156.4982	**39.5**	**44.8**	
						(3m perimeter bunding)											

Calculation Points

LFAcoustics consulting engineers

Mick George Ltd - Pincet Lane, North Kilworth
Calculated Noise Levels from Site Operations

02-Aug-2015

Receptor: Tophouse Farm — Uses BS5228
Height 167 m

Predicted Freefield Noise Levels

	Ref LAeq @10m	Ref Dist (m)	No. (/hr)	% On Time	Source Ht	Dist S-R	Barrier Ht	Dist S-B	Distance Attenuation Hard	Distance Attenuation Soft	CRTN Barrier Attenuation	Max Attenuation	LAeq [dB]		Activity LAeq [dB]	Overall
Mineral Processing Area																
Processing Plant	80.9	10.0	1	100	165	500			-34.0	-40.5	0.0	-40.5	**40.4**	11029.766		
Excavator	73.0	10.0	1	100	165	500			-34.0	-40.5	0.0	-40.5	**32.5**	1788.8186		
Loading Shovel	72.0	10.0	1	100	165	500			-34.0	-40.5	0.0	-40.5	**31.5**	1420.9091		
ADT Movements	45.3	10.0	20	-	165	500			-34.0	-40.5	0.0	-40.5	**17.9**	61.276478		
HGV Movements (Laden)	42.2	10.0	10	-	165	500			-34.0	-40.5	0.0	-40.5	**11.8**	15.005961		
HGV Movements (Unladen)	42.5	10.0	10	-	165	500			-34.0	-40.5	0.0	-40.5	**12.1**	16.079177	**41.6**	
Initial Soil Strip and Formation of Storage Mound Closest to Property																
Excavator	75.7	10.0	1	100	169	200			-26.0	-30.5	0.0	-30.5	**45.2**	32913.247		
ADT Movements	44.4	10.0	24	-	169	200			-26.0	-30.5	0.0	-30.5	**27.7**	590.581	**45.3**	
Extraction & Progressive Restoration Close to Surface - Position A																
Excavator	75.7	10.0	1	100	167	500	172	40	-34.0	-40.5	-12.1	-46.0	**29.7**	925.57856		
ADT Movements	44.4	10.0	24	-	167	500	172	40	-34.0	-40.5	-12.1	-46.0	**12.2**	16.608179	**29.7**	**41.8**
						(3m perimeter bunding)										
Extraction & Progressive Restoration Close to Surface - Position B																
Excavator	75.7	10.0	1	100	166	600	172	140	-35.6	-42.5	-10.2	-45.8	**29.9**	984.26329		
ADT Movements	44.4	10.0	24	-	166	600	172	140	-35.6	-42.5	-10.2	-45.8	**12.5**	17.661193	**30.0**	**41.9**
						(3m perimeter bunding)										
Extraction & Progressive Restoration Close to Surface - Position C																
Excavator	75.7	10.0	1	100	166	600	172	100	-35.6	-42.5	-10.8	-46.4	**29.3**	856.45726		
ADT Movements	44.4	10.0	24	-	166	600	172	100	-35.6	-42.5	-10.8	-46.4	**11.9**	15.367897	**29.4**	**41.8**
						(3m perimeter bunding)										

Calculation Points

LFAcoustics consulting engineers

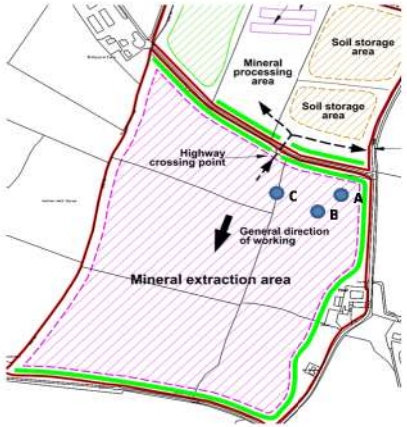
Mick George Ltd - Pincet Lane, North Kilworth
Calculated Noise Levels from Site Operations

02-Aug-2015

Receptor: Bosworth Grange Farm — Uses BS5228
Height 164 m

Predicted Freefield Noise Levels

	Ref LAeq @10m	Ref Dist (m)	No. (/hr)	% On Time	Source Ht	Dist S-R	Barrier Ht	Dist S-B	Distance Attenuation Hard	Distance Attenuation Soft	CRTN Barrier Attenuation	Max Attenuation	LAeq [dB]		Activity LAeq [dB]	Overall
Mineral Processing Area																
Processing Plant	80.9	10.0	1	100	165	500			-34.0	-40.5	0.0	-40.5	**40.4**	11029.932		
Excavator	73.0	10.0	1	100	165	500			-34.0	-40.5	0.0	-40.5	**32.5**	1788.8454		
Loading Shovel	72.0	10.0	1	100	165	500			-34.0	-40.5	0.0	-40.5	**31.5**	1420.9304		
ADT Movements	45.3	10.0	20	-	165	500			-34.0	-40.5	0.0	-40.5	**17.9**	61.277398		
HGV Movements (Laden)	42.2	10.0	10	-	165	500			-34.0	-40.5	0.0	-40.5	**11.8**	15.006186		
HGV Movements (Unladen)	42.5	10.0	10	-	165	500			-34.0	-40.5	0.0	-40.5	**12.1**	16.079418	**41.6**	
Initial Soil Strip and Formation of Storage Mound Closest to Property																
Excavator	75.7	10.0	1	100	158	250			-28.0	-33.0	0.0	-33.0	**42.7**	18829.439		
ADT Movements	44.4	10.0	24	-	158	250			-28.0	-33.0	0.0	-33.0	**25.3**	337.86727	**42.8**	
Extraction & Progressive Restoration Close to Surface - Position A																
Excavator	75.7	10.0	1	100	159	450	163	50	-33.1	-39.3	-9.9	-43.0	**32.7**	1879.0303		
ADT Movements	44.4	10.0	24	-	159	450	163	50	-33.1	-39.3	-9.9	-43.0	**15.3**	33.716502	**32.8**	**42.1**
						(3m perimeter bunding)										
Extraction & Progressive Restoration Close to Surface - Position B																
Excavator	75.7	10.0	1	100	159	500	163	100	-34.0	-40.5	-8.4	-42.4	**33.3**	2150.2432		
ADT Movements	44.4	10.0	24	-	159	500	163	100	-34.0	-40.5	-8.4	-42.4	**15.9**	38.58303	**33.4**	**42.2**
						(3m perimeter bunding)										
Extraction & Progressive Restoration Close to Surface - Position C																
Excavator	75.7	10.0	1	100	160	550	163	100	-34.8	-41.5	-7.6	-42.4	**33.3**	2123.105		
ADT Movements	44.4	10.0	24	-	160	550	163	100	-34.8	-41.5	-7.6	-42.4	**15.8**	38.096073	**33.3**	**42.2**
						(3m perimeter bunding)										



Calculation Points

LFAcoustics consulting engineers

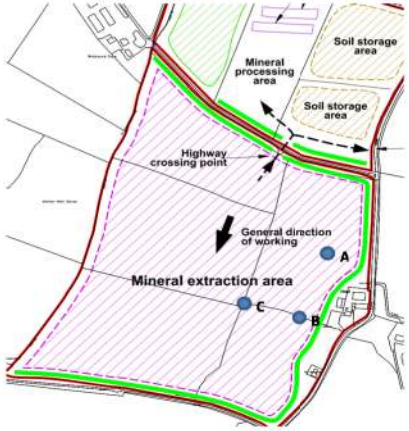
Mick George Ltd - Pincet Lane, North Kilworth
Calculated Noise Levels from Site Operations

02-Aug-2015

Receptor: New House to East — Uses BS5228
Height 154 m

Predicted Freefield Noise Levels

	Ref LAeq @10m	Ref Dist (m)	No. (/hr)	% On Time	Source Ht	Dist S-R	Barrier Ht	Dist S-B	Distance Attenuation Hard	Distance Attenuation Soft	CRTN Barrier Attenuation	Max Attenuation	LAeq [dB]		Activity LAeq [dB]	Overall
Mineral Processing Area																
Processing Plant	80.9	10.0	1	100	165	600	164	175	-35.6	-42.5	-7.1	-42.7	**38.2**	6674.555		
Excavator	73.0	10.0	1	100	165	600	164	175	-35.6	-42.5	-7.1	-42.7	**30.3**	1082.4861		
Loading Shovel	72.0	10.0	1	100	165	600	164	175	-35.6	-42.5	-7.1	-42.7	**29.3**	859.84925		
ADT Movements	45.3	10.0	20	-	165	600	164	175	-35.6	-42.5	-7.1	-42.7	**15.7**	37.080861		
HGV Movements (Laden)	42.2	10.0	10	-	165	600	164	175	-35.6	-42.5	-7.1	-42.7	**9.6**	9.0807102		
HGV Movements (Unladen)	42.5	10.0	10	-	165	600	164	175	-35.6	-42.5	-7.1	-42.7	**9.9**	9.7301563	**39.4**	
Initial Soil Strip and Formation of Storage Mound Closest to Property																
Excavator	75.7	10.0	1	100	158	150			-23.5	-27.4	0.0	-27.4	**48.3**	67512.774		
ADT Movements	44.4	10.0	24	-	158	150			-23.5	-27.4	0.0	-27.4	**30.8**	1211.4199	**48.4**	
Extraction & Progressive Restoration Close to Surface - Position A																
Excavator	75.7	10.0	1	100	156	200	160	60	-26.0	-30.5	-11.3	-37.3	**38.4**	6876.5066		
ADT Movements	44.4	10.0	24	-	156	200	160	60	-26.0	-30.5	-11.3	-37.3	**20.9**	123.38905	**38.5**	**42.0**
						(3m perimeter bunding)										
Extraction & Progressive Restoration Close to Surface - Position B																
Excavator	75.7	10.0	1	100	156	180	160	40	-25.1	-29.4	-11.9	-37.0	**38.7**	7430.5182		
ADT Movements	44.4	10.0	24	-	156	180	160	40	-25.1	-29.4	-11.9	-37.0	**21.2**	133.32999	**38.8**	**42.1**
						(3m perimeter bunding)										
Extraction & Progressive Restoration Close to Surface - Position C																
Excavator	75.7	10.0	1	100	156	300	160	150	-29.5	-34.9	-10.4	-39.9	**35.8**	3798.9821		
ADT Movements	44.4	10.0	24	-	156	300	160	150	-29.5	-34.9	-10.4	-39.9	**18.3**	68.167284	**35.9**	**41.0**
						(3m perimeter bunding)										



Calculation Points

LFAcoustics consulting engineers

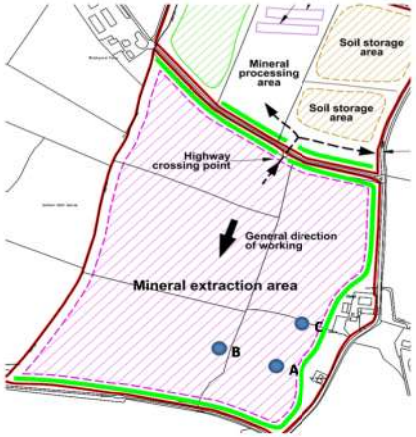
Mick George Ltd - Pincet Lane, North Kilworth
Calculated Noise Levels from Site Operations

02-Aug-2015

Receptor: The Bungalow — Uses BS5228
Height 157 m

Predicted Freefield Noise Levels

	Ref LAeq @10m	Ref Dist (m)	No. (/hr)	% On Time	Source Ht	Dist S-R	Barrier Ht	Dist S-B	Distance Attenuation Hard	Distance Attenuation Soft	CRTN Barrier Attenuation	Max Attenuation	LAeq [dB]		Activity LAeq [dB]	Overall	
Mineral Processing Area																	
Processing Plant	80.9	10.0	1	100	165	600	164	150	-35.6	-42.5	-5.6	-42.5	**38.4**	6990.7758			
Excavator	73.0	10.0	1	100	165	600	164	150	-35.6	-42.5	-5.6	-42.5	**30.5**	1133.7711			
Loading Shovel	72.0	10.0	1	100	165	600	164	150	-35.6	-42.5	-5.6	-42.5	**29.5**	900.58638			
ADT Movements	45.3	10.0	20	-	165	600	164	150	-35.6	-42.5	-5.6	-42.5	**15.9**	38.837643			
HGV Movements (Laden)	42.2	10.0	10	-	165	600	164	150	-35.6	-42.5	-5.6	-42.5	**9.8**	9.5109275			
HGV Movements (Unladen)	42.5	10.0	10	-	165	600	164	150	-35.6	-42.5	-5.6	-42.5	**10.1**	10.191142	**39.6**		
Initial Soil Strip and Formation of Storage Mound Closest to Property																	
Excavator	75.7	10.0	1	100	156	30			-9.5	-9.9	0.0	-9.9	**65.8**	3772193.9			
ADT Movements	44.4	10.0	24	-	156	30			-9.5	-9.9	0.0	-9.9	**48.3**	67686.608	**65.8**		
Extraction & Progressive Restoration Close to Surface - Position A																	
Excavator	75.7	10.0	1	100	155	100	159	60	-20.0	-23.0	-10.3	-30.3	**45.4**	34528.355			
ADT Movements	44.4	10.0	24	-	155	100	159	60	-20.0	-23.0	-10.3	-30.3	**27.9**	619.56179	**45.5**	**46.5**	5m Bund - 44.5dB LAeq
						(3m perimeter bunding)											
Extraction & Progressive Restoration Close to Surface - Position B																	
Excavator	75.7	10.0	1	100	155	200	159	160	-26.0	-30.5	-9.2	-35.2	**40.5**	11273.446			
ADT Movements	44.4	10.0	24	-	155	200	159	160	-26.0	-30.5	-9.2	-35.2	**23.1**	202.28581	**40.6**	**43.1**	
						(3m perimeter bunding)											
Extraction & Progressive Restoration Close to Surface - Position C																	
Excavator	75.7	10.0	1	100	156	100	159	60	-20.0	-23.0	-9.7	-29.7	**46.0**	39912.273			
ADT Movements	44.4	10.0	24	-	156	100	159	60	-20.0	-23.0	-9.7	-29.7	**28.6**	716.16848	**46.1**	**47.0**	
						(3m perimeter bunding)											



Calculation Points

LFAcoustics consulting engineers

Mick George Ltd - Pincet Lane, North Kilworth
Calculated Noise Levels from Site Operations

02-Aug-2015

Receptor: Sparrows Cottage — Uses BS5228
Height 157 m

Predicted Freefield Noise Levels

	Ref LAeq @10m	Ref Dist (m)	No. (/hr)	% On Time	Source Ht	Dist S-R	Barrier Ht	Dist S-B	Distance Attenuation Hard	Distance Attenuation Soft	CRTN Barrier Attenuation	Max Attenuation	LAeq [dB]		Activity LAeq [dB]	Overall
Mineral Processing Area																
Processing Plant	80.9	10.0	1	100	165	850	164	100	-38.6	-46.2	-5.0	-46.2	**34.7**	2926.8779		
Excavator	73.0	10.0	1	100	165	850	164	100	-38.6	-46.2	-5.0	-46.2	**26.8**	474.68401		
Loading Shovel	72.0	10.0	1	100	165	850	164	100	-38.6	-46.2	-5.0	-46.2	**25.8**	377.05491		
ADT Movements	45.3	10.0	20	-	165	850	164	100	-38.6	-46.2	-5.0	-46.2	**12.1**	16.260433		
HGV Movements (Laden)	42.2	10.0	10	-	165	850	164	100	-38.6	-46.2	-5.0	-46.2	**6.0**	3.9820077		
HGV Movements (Unladen)	42.5	10.0	10	-	165	850	164	100	-38.6	-46.2	-5.0	-46.2	**6.3**	4.2667982	**35.8**	
Initial Soil Strip and Formation of Storage Mound Closest to Property																
Excavator	75.7	10.0	1	100	158	150			-23.5	-27.4	0.0	-27.4	**48.3**	67569.036		
ADT Movements	44.4	10.0	24	-	158	150			-23.5	-27.4	0.0	-27.4	**30.8**	1212.4294	**48.4**	
Extraction & Progressive Restoration Close to Surface - Position A																
Excavator	75.7	10.0	1	100	155	200	159	40	-26.0	-30.5	-10.8	-36.8	**38.9**	7747.3793		
ADT Movements	44.4	10.0	24	-	155	200	159	40	-26.0	-30.5	-10.8	-36.8	**21.4**	139.01561	**39.0**	**40.7**
						(3m perimeter bunding)										
Extraction & Progressive Restoration Close to Surface - Position B																
Excavator	75.7	10.0	1	100	155	250	159	80	-28.0	-32.9	-9.4	-37.4	**38.3**	6803.1021		
ADT Movements	44.4	10.0	24	-	155	250	159	80	-28.0	-32.9	-9.4	-37.4	**20.9**	122.07191	**38.4**	**40.3**
						(3m perimeter bunding)										
Extraction & Progressive Restoration Close to Surface - Position C																
Excavator	75.7	10.0	1	100	156	300	159	100	-29.5	-34.9	-8.3	-37.9	**37.8**	6081.6971		
ADT Movements	44.4	10.0	24	-	156	300	159	100	-29.5	-34.9	-8.3	-37.9	**20.4**	109.12733	**37.9**	**40.0**
						(3m perimeter bunding)										

Calculation Points

LFAcoustics consulting engineers