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NOISE ASSESSMENT

STONE QUARRY AT HARLEY WAY

CHURCHFIELD STONE LIMITED

JANUARY 2012

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1. INTRODUCTION

It is proposed to extract limestone from a quarry located to the east of Churchfield Farm, Harley Way. Around 40% of the mineral will be used for walling stone with the remainder being crushed on-site and exported as aggregate. The walling stone will be removed from site without processing. Larger pieces of stone will be cut with an hydraulic cropper. It is proposed that there will be two hydraulic croppers on site. They will be situated in the floor of the quarry within mobile enclosures and will follow the advance of the extraction phases.

The extraction area will be sub-divided into a series of 5 phases or cuts. Cuts 1 and 2 will be operated at the same time in order to establish the quarry with respect to mineral extraction, site set up and also establishment of enough room within the base of the quarry to allow for operations to be undertaken. Cuts 1 and 2 will be considered as the first phase of quarry working. Once the mineral within phase 1 nears exhaustion then preparatory work will be started on phase 2 (cut 3). Quarrying will take place in the east of the site and advance westwards as the recoverable mineral reserve is exhausted in each cut.

Restoration will occur in line with the advancement of the quarry phases. As each phase nears completion in terms of the extraction of the recoverable mineral the next phase will be stripped in preparation for mineral extraction. Overburden, waste stone and imported inert material will be placed into the void and topped with top soil. This will allow for the restoration of the worked out areas to occur concurrently with the site processes.

Extraction and infill operations will be carried out during normal working hours: 7.30 to 17.00 Monday to Friday and 7.30 to 13.00 on Saturday, with no working on Sundays or Bank Holidays.

The methodology and criteria used for this assessment are outlined in the following Section. Section 3 contains the results of the baseline noise survey. The principal sources of noise impact are identified and the likely noise levels from them assessed in Section 4. Section 5 discusses the noise mitigation measures to be incorporated into the development. The conclusions of the assessment are given in Section 6.

2. METHODOLOGY AND CRITERIA

2.1 Appropriate Standards

The principal planning guidance on noise is PPG 24 [1]. PPG 24 advises that *Much of the development which is necessary for the creation of jobs and the construction and improvement of essential infrastructure will generate noise. The planning system should not place unjustifiable obstacles in the way of such development. Nevertheless, local planning authorities must ensure that development does not cause an unacceptable degree of disturbance.*

PPG 24 advises that *guidance on the control of noise from surface mineral workings can be found in MPG 11 [2].* MPG 11 was replaced by Annex 2 of Minerals Policy Statement 2 (MPS2) [3] in 2003.

Annex 2 of Minerals Policy Statement 2 (MPS2) contains guidance and advice upon noise from minerals extraction and similar activities. MPS2 draws attention to the World Health Organisation Guidelines' [4] advice that for daytime noise:

- few people are seriously annoyed by activities with L_{Aeq} levels below 55 dB(A); and
- few people are moderately annoyed by activities with L_{Aeq} levels below 50 dB(A).

With regard to setting limits during normal daytime hours (07:00 – 19:00), Annex 2 of MPS 2 advises setting a noise limit at noise-sensitive properties of not more than 10 dB above the background noise level subject to a maximum of 55 dB $L_{Aeq, 1 \text{ hour}}$. Annex 2 of MPS 2 recognises that it will be difficult to achieve background + 10 dB in many circumstances without imposing unreasonable burdens on the operator, in which case the limit set should be as near to background + 10 dB as practicable and should not exceed 55 dB $L_{Aeq, 1 \text{ hour}}$.

MPS 2 advises that virtually all extraction operations will have some particularly noisy short-term activities that cannot meet the limits set for normal operations. Examples are given which 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. MPS 2 suggests that increased temporary daytime noise limits of up to 70dB(A) $L_{Aeq, 1 \text{ hour}}$ are appropriate for periods of up to 8 weeks in a year at specified noise-sensitive properties to facilitate essential site preparation and restoration work 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 8 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. MPS 2 also advises that the party carrying out the works should seek ways of minimising noisier activities and the noise emissions from them when designing the layout and sequencing of temporary operations, and should liaise with local residents prior to such operations taking place.

With regard to night-time noise MPS 2 advises that night-time limits should not exceed 42 dB L_{Aeq} . The World Health Organisation Guidelines advise that, in order to achieve appropriate standards of internal noise at night (with windows open) external levels

should not exceed 45 dB L_{Aeq} at the facades of dwellings (equivalent to 42 dB L_{Aeq} 'free-field' i.e. away from the reflection effects of facades).

2.2 Calculation Methodology

Noise levels have been calculated on the basis of the methodology described in BS 5228: Part 1 [5], in accordance with the advice given in Annex 2 of MPS 2. Plant noise levels have principally been taken from ANV's database of plant noise levels which contains results of measurements carried out on many items of equipment during the course of assessments over recent years. Where necessary, additional source terms have been taken from Phase 3 of the DEFRA Update of noise database for the prediction of noise on construction and open sites [6].

3. BASELINE ASSESSMENT

3.1 Potentially Affected Noise-Sensitive Locations

It will be helpful to refer to Figure 1. There are only two potentially affected noise-sensitive receptors, Chesterfield Lodge and Churchfield Farmhouse.

3.2 Baseline Noise Levels

The measurement locations are shown in Figure 1.

Long-term noise monitors (Rion NL-52 Class 1 Sound Level Meters) were set up between Friday 12 and Wednesday 17 August 2011. The meters were set up to log:

- 5 minute L_{Aeq} , $L_{Amax, F}$ and statistical indices (including L_{A90}); and
- Continuous 100 msec sampled sound pressure level providing a the detailed time history over the entire measurement period.

Both meters were equipped with the Rion NX-42WR audio recording option which enables periodic audio recording and recording of events which exceed a user-defined trigger level. The meters were calibrated before and after the measurement exercise with a Rion NC-74 Class 1 Acoustic Calibrator. There was no drift.

The Chesterfield Lodge meter was set up at the edge of the existing void in a free-field position approximately 50 metres west of the dwelling. Restoration of a previously worked stone quarry is currently taking place. This entails occasional tipping of inert waste by road-going vehicles and management of these materials with an excavator. This will have affected the noise measured noise levels at times at this location.

The second meter was set up in a free-field position approximately 25 metres north of Churchfield Farm House.

The full measurement results are shown in Figure 2. Figure 2 shows 4 graphs:-

- Graph 1 shows the detailed (100 msec sample) time history of the noise levels near Churchfield Farmhouse during the survey;
- Graph 2 shows the 5 minute $L_{Amax F}$ (red trace), L_{Aeq} (green trace) and L_{A90} (blue trace) noise levels measured near Churchfield Farmhouse during the survey (additional indices were measured but they have not been displayed for the sake of clarity);
- Graph 3 shows the detailed (100 msec sample) time history of the noise levels near Chesterfield Lodge during the survey;
- Graph 4 shows the 5 minute $L_{Amax F}$ (red trace), L_{Aeq} (green trace) and L_{A90} (blue trace) noise levels measured near Chesterfield Lodge during the survey (additional indices were measured but they have not been displayed for the sake of clarity);

The weather was dry with little or no wind throughout the survey except for Tuesday 16 August when it was blustery and wet at times.

Looking at Figure 2 (especially Graphs 3 and 4), it is clear that a steady source of noise began operating at around 08:00 on Sunday 14 August 2011 and remained in operation for the remainder of the measurement exercise. It is likely that this was the crop dryer at Churchfield Farm which was operating when the noise monitors were collected at the end of the monitoring exercise. Consequently the baseline analysis has been based upon the results for:

- The afternoon of Friday 12 August 2011 (but excluding the periods when noise from the restoration works affected the measured noise levels at Chesterfield Lodge); and
- The morning of Saturday 13 August 2011 (when no noise from restoration works affected the measured noise levels at Chesterfield Lodge).

The influence of noise from the restoration works was identified by reviewing both the measurement results and the audio recordings from the survey.

The results of these analyses can be seen in Appendix B and are summarised below.

Period	L_{Aeq}	$L_{Amax, F}$	L_{A90}
Friday 12 August	45.9	76.0	37.3
Saturday 13 August	46.4	69.9	39.1

Table 3.1 Baseline Noise Levels at Chesterfield Lodge (Current Restoration works Excluded)

Period	L_{Aeq}	$L_{Amax, F}$	L_{A90}
Friday 12 August	45.0	75.2	34.4
Saturday 13 August	47.9	82.1	39.7

Table 3.2 Baseline Noise Levels at Churchfield Farm House

3.3 Appropriate Noise Limits

For routine works, MPS 2 advises setting a noise limit at noise-sensitive properties of not more than 10 dB above the background noise level subject to a maximum of 55 dB $L_{Aeq, 1 \text{ hour}}$. However, Annex 2 of MPS 2 recognises that it will be difficult to achieve background + 10 dB in many circumstances without imposing unreasonable burdens on the operator, in which case the limit set should be as near to background + 10 dB as practicable and should not exceed 55 dB $L_{Aeq, 1 \text{ hour}}$. This advice is further qualified in MPS 2 by the quotation of the World Health Organisation Guidelines' advice that for daytime noise:

- few people are seriously annoyed by activities with L_{Aeq} levels below 55 dB(A); and
- few people are moderately annoyed by activities with L_{Aeq} levels below 50 dB(A).

Consequently, although the survey results indicate that the background noise levels at Chesterfield Lodge and Churchfield Farmhouse are below 40 dB L_{A90} , it would be

unreasonable to expect the operator to achieve noise limits significantly below 50 - 55 dB $L_{Aeq, 1 \text{ hour}}$ during routine works.

MPS 2 recognises that there can be quarrying activities which cannot be carried out within the noise limits applied to routine works. MPS 2 is clear that a limit of 70 dB $L_{Aeq, 1 \text{ hour}}$ can be applied to facilitate such works for periods of up to 8 weeks in a year where such works will bring environmental benefits.

4. NOISE LEVELS FROM PROPOSED OPERATIONS

4.1 Potential Sources of Impact

Typical noise levels for the activities and indicative items of plant which are currently anticipated are shown in Tables 4.1 - 4.3.

Source	SEL at 10m	L _{Aeq} at 10m	Number (or Number per hour for intermittent events)	% On-Time
Cat 235 Excavator Working	-	74.5	1	100
Crusher Bucket	-	83.3	1	50
Loading Shovel	-	75.5	1	50
Stone Cropper	-	56.2	2	50
Generator (for stone cropper)	-	68.9	1	100
Lorry arriving, idling then departing	85.0	-	4	-

Table 4.1: Source Levels for Soil Stripping and Construction and Removal of Bunds and Settlement Lagoons

Source	SEL at 10m	L _{Aeq} at 10m	Number (or Number per hour for intermittent events)	% On-Time
Cat 235 Excavator Working	-	74.5	1	100
Crusher Bucket	-	83.3	1	50
Loading Shovel	-	75.5	1	50
Stone Cropper	-	56.2	2	50
Generator (for stone cropper)	-	68.9	1	100
Lorry arriving, idling then departing	85.0	-	4	-

Table 4.2: Source Levels for Extraction

Source	SEL at 10m	L _{Aeq} at 10m	Number (or Number per hour for intermittent events)	% On-Time
Cat 235 Excavator Working	-	74.5	1	100
Truck Tipping Inert Waste	95.4	-	4	-
HGV Slow Drive Past	85.0	-	4	-

Table 4.3: Source Levels for Infilling and Restoration Operations

4.2 Estimated Noise Levels at the Potentially Most Affected Receptors

Calculations have been carried out on the basis of the methodology set out in BS 5228: Part 1.

It has been assumed that the landscaped overburden bund of minimum height of 6 metres will be constructed prior to commencement of works upon Phases 4 and 5 along the western boundary as shown on Figure 1.

The calculations have been carried out for the shortest distances between the dwellings and each of the elements of the operation for which calculations have been carried out.

Some example calculations are shown in Appendix C.

The results are summarised in Tables 4.4 – 4.6.

Dwelling	Bund along Harley Way	Settlement Lagoons	Bund Along Western Boundary	Topsoil Mound
Chesterfield Lodge	46.9	52.0	43.4	44.2
Churchfield Farmhouse	46.9	38.6	50.2	47.2

Table 4.4: Estimated Worst Case L_{Aeq} Noise Levels from Construction and Removal of Bunds and Settlement Lagoons

Activity/Location	Compound	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Soil Stripping	50.8	50.0	48.9	47.9	46.6	45.7
Extraction	-	53.9	52.9	51.9	50.6	49.7
Infilling	47.7	46.9	45.9	44.9	43.6	42.7
Combined Extraction & Infilling of Previous Phase	-	-	53.9	52.9	51.9	50.6

Table 4.5: Estimated Worst Case L_{Aeq} Noise Levels at Chesterfield Lodge

Activity/Location	Compound	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Soil Stripping	37.1	38.8	40.2	41.9	38.3	34.6
Extraction	-	42.8	44.2	45.9	44.2	40.1
Infilling	40.0	41.5	42.3	43.7	44.1	39.7
Combined Extraction & Infilling of Previous Phase	-	-	42.8	44.2	45.9	44.2

Table 4.6: Estimated Worst Case L_{Aeq} Noise Levels at Churchfield Farmhouse

It can be seen from Tables 4.4 - 4.6 that it is estimated that noise levels from the proposed works will never exceed 55 dB L_{Aeq} at either of the two potentially most affected properties. A 55 dB L_{Aeq} limit is generally applied to routine minerals works and higher temporary limits are often granted for activities such as soil stripping and bund construction. At this site all works should be able to be carried out within the 55 dB L_{Aeq} limit due to the separation distances and mitigation incorporated into the scheme (especially the bund along the western site boundary).

5. MITIGATION

5.1 Physical Measures

Only modern, well-maintained plant (fitted with noise-reduction kits where available) will be used on the site.

Tonal audible warning signals can cause disturbance even though they are unlikely to contribute substantially to the overall noise level. Mobile plant will be fitted with modern reversing safety systems which are much less detectable outside the immediate proximity of the plant. This will greatly reduce the potential adverse effect of this source of noise.

5.2 Liaison

The operators will maintain an ongoing dialogue with the occupants of Chesterfield Lodge and Churchfield Farmhouse. This will include:

- providing the occupants with a telephone number which would normally be manned during operating hours; and
- a traceable procedure for expeditiously recording, reacting to and dealing with complaints.

5.3 Conditions

The minerals planning authority could ensure that the noise effects of the proposed development are minimised in accordance with the principles set out in MPS 2 through imposition of conditions along the following lines.

Condition 1

- a) All plant, equipment and machinery used on site, including vehicles, shall be designed and maintained to reduce noise levels to a minimum and shall be operated in accordance with manufacturers' instructions.*
- b) All plant, equipment and machinery used on site, including vehicles, capable of being fitted with silencers, baffles, cladding or rubber linings shall be so fitted and maintained.*
- c) The site shall be worked in accordance with the measures set out in Part 1, Section 8 of the British Standard 5228: 2009 "Noise and Vibration Control on Construction and Open Sites". The free field equivalent sound level (L_{Aeq}), established in accordance with paragraph 2.22 of Annex 2 of MPS 2, over any 1 hour time period, shall not exceed 55 dBA ($1hrL_{Aeq}$) at Chesterfield Lodge or Churchfield Farmhouse.*

Condition 2

Monitoring of noise from the development shall be undertaken at Chesterfield Lodge and/or Churchfield Farmhouse following notification of this requirement in writing by the Mineral Planning Authority for a period of 1 hour. The noise level at the dwelling shall be determined in accordance with paragraph 2.22 of Annex 2 of MPS2.

Condition 3

The results of the noise monitoring shall be submitted to the Mineral Planning Authority when required and shall include the following information:

- a) The measured L_{Aeq} (free field) level in dB(A)*
- b) The L_{Aeq} (free-field) attributable to operations on the development site*
- c) Date and time of measurement*
- d) Description of site activity*
- e) Details of measuring equipment*
- f) Weather conditions, including wind speed and direction*

Condition 4

In the event that credible complaints regarding noise are received by the Mineral Planning Authority from any sensitive receptor, and thereafter notified to the operator, an immediate assessment of the complaint shall be undertaken. A report on the findings, with proposals for rectifying and a program for the implementation of remedial measures to be undertaken, shall be submitted to the Mineral Planning Authority no later than 10 working days from the receipt of the complaint.

6. SUMMARY AND CONCLUSIONS

It is proposed to extract limestone from a quarry located to the east of Churchfield Farm, Harley Way. Around 40% of the mineral will be used for walling stone with the remainder being crushed on-site and exported as aggregate. The walling stone will be removed from site without processing. Larger pieces of stone will be cut with an hydraulic cropper. It is proposed that there will be two hydraulic croppers on site. They will be situated in the floor of the quarry within mobile enclosures and will follow the advance of the extraction phases.

The extraction area will be sub-divided into a series of 5 phases or cuts. Quarrying will take place in the east of the site and advance westwards as the recoverable mineral reserve is exhausted in each cut.

Restoration will occur in line with the advancement of the quarry phases. As each phase nears completion in terms of the extraction of the recoverable mineral the next phase will be stripped in preparation for mineral extraction. Overburden, waste stone and imported inert material will be placed into the void and topped with top soil. This will allow for the restoration of the worked out areas to occur concurrently with the site processes.

Extraction and infill operations will be carried out during normal working hours: 7.30 to 17.00 Monday to Friday and 7.30 to 13.00 on Saturday, with no working on Sundays or Bank Holidays.

There are two potentially affected noise sensitive receptors, Chesterfield Lodge and Churchfield Farm.

Noise from minerals-related schemes such as this are controlled through the provisions set out in Annex 2 of MPS 2. Under MPS 2 it is common practice for routine works to be subject to a 55 dB L_{Aeq} noise limit with provision for increased noise limits of up to 70 dB $L_{Aeq, 1 \text{ hour}}$ for periods of up to 8 weeks in a year.

A longterm noise survey has been carried out to evaluate the baseline noise environment at Chesterfield Lodge and Churchfield Farmhouse. Calculations have been carried out to estimate the noise levels that will arise at these dwellings due to the proposed activities.

It is estimated that all the works at this site can be carried out without breaching the 55 dB L_{Aeq} noise limit for routine works. It is suggested, therefore, that a condition is imposed upon the proposals limiting noise from the works to 55 dB $L_{Aeq, 1 \text{ hour}}$ at the two potentially affected dwellings. Additional conditions are also suggested to ensure that the works are carried out in accordance with current best practice to minimise the effects of noise in order to ensure that the amenity of the residents is sufficiently protected in this regard.

References

1. Department of the Environment. Planning Policy Guidance PPG 24, Planning and Noise. 1994. HMSO.
2. Department of the Environment. Minerals Planning Guidance: The Control of Noise at Surface Mineral Workings. MPG 11. 1993.
3. Minerals Policy Statement 2. Controlling and mitigating the environmental effects of mineral extraction in England. Annex 2: Noise. Office of the Deputy Prime Minister. March 2003.
4. Guidelines for Community Noise. The World Health Organisation, Geneva. 2000.
5. British Standards Institute. Code of Practice for Noise and Vibration Control on Construction and Open Sites. BS 5228: Part 1. 2009.
6. Update of Noise Database for Prediction of Noise on Construction and Open Sites. Phase 3: Noise measurement data for construction plant used on quarries. DEFRA. July 2006.

APPENDIX A: NOISE TERMINOLOGY

Decibels (dB)

Noise can be defined 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 which 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_{A10} , L_{A90} and L_{Amax})

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 Single Event Level (SEL) is the equivalent A-weighted sound pressure level of a sound of 1 second duration which contains the same acoustic energy as the intermittent noise event being assessed. It is used to calculate the $L_{Aeq,T}$ due to a number of intermittent noise events.

The L_{A10} is the noise level exceeded for 10% of the measurement period. It has been used in the UK for the assessment of road traffic noise.

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 which is present even during the quietest part of the measurement period.

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.

APPENDIX B: BASELINE CALCULATIONS

Chesterfield Lodge Friday 12 August 2011



Graph2

Start Date 12/08/2011
 Start Time 14:45:01.0
 Stop Date 12/08/2011
 Stop Time 16:55:01.0

LAeq 45.9

LAE 83.7

LAFmax 76.0

LAFmin 28.0

L1 51.9

L10 46.4

L50 40.7

L90 37.3

L99 34.8

Excluded Interval Yes

Over No

Under No

Chesterfield Lodge Saturday 13 August 2011

Graph2

Start Date 13/08/2011
 Start Time 07:25:01.0
 Stop Date 13/08/2011
 Stop Time 12:55:01.0

LAeq 46.4

LAE 89.4

LAFmax 69.9

LAFmin 32.4

L1 53.4

L10 47.7

L50 42.4

L90 39.1

L99 37.5

Excluded Interval No

Over No

Under No

Churchfield Farm House 12 August 2011

Graph4

Start Date 12/08/2011
Start Time 14:45:00.0
Stop Date 12/08/2011
Stop Time 17:00:00.0

LAeq 45.0

LAE 84.3

LAFmax 75.2

LAFmin 28.0

L1 53.2

L10 46.4

L50 39.0

L90 34.4

L99 32.2

Excluded Interval No

Over No

Under No

Churchfield Farmhouse 13 August 2011

Graph4

Start Date 13/08/2011
Start Time 07:30:00.0
Stop Date 13/08/2011
Stop Time 13:00:00.0

LAeq 47.9

LAE 91.0

LAFmax 82.1

LAFmin 29.8

L1 55.0

L10 48.9

L50 43.5

L90 39.7

L99 37.6

Excluded Interval No

Over No

Under No

APPENDIX C: EXAMPLE CALCULATIONS

CLIENT		Churchfield Stone Limited																		
PROJECT		Harley Way Quarry																		
Phase		Extraction																		
08-Dec-2011																				
Churchfield Farm																				
Location of Works				Phase 5										Distance						
Receptor Details				Equipment Details										Attenuation						
Ground Ht	Rec Ht	Rec Ht	Dist S-R	Ref LAeq	No.	%	Existing	Excavated	Source	Source Ht	0, 1 or 2	% Soft	Hard	Soft	Barrier 1	Barrier 2	Combined	Max		
aod	aod	aod		@10m		On Time	Ground Ht	Depth	Posn.	aod	Barriers	Ground			Attenuation	Attenuation	Barrier Attenuation	Attenuation	LAeq	
																			[dB]	
50.36	1.5	51.86	416.12	CAT 235D	74.5	1	100	49.0	1.5	1.50	49.0	1	0	-32.4	-32.4	-12.4	0.0	-12.4	-44.8	29.7
50.36	1.5	51.86	416.12	Crusher Bucket (on Ground)	83.3	1	40	49.0	1.5	0.50	48.0	1	0	-32.4	-32.4	-13.3	0.0	-13.3	-45.7	33.7
50.36	1.5	51.86	416.12	Crusher Bucket (Hi Elevation)	83.3	1	10	49.0	1.5	4.50	52.0	1	0	-32.4	-32.4	-9.5	0.0	-9.5	-41.9	31.4
50.36	1.5	51.86	416.12	Loading Shovel (Daewoo Mega 200)	75.5	1	50	49.0	1.5	2.80	50.3	1	0	-32.4	-32.4	-11.3	0.0	-11.3	-43.7	28.8
50.36	1.5	51.86	416.12	Stone Cropper	56.2	2	50	49.0	1.5	2.80	50.3	1	0	-32.4	-32.4	3.8	0.0	1.5	-32.4	23.8
50.36	1.5	51.86	416.12	Generator	68.9	1	100	49.0	1.5	2.80	50.3	1	0	-32.4	-32.4	3.8	0.0	1.5	-32.4	36.5
				SEL																
				No/hr																
				10 m LAeq																
50.36	1.5	51.86	416.12	Lorry arriving, idling then departing	85.0	4	55.5	49.0	0.0	2.00	51.0	1	0	-32.4	-32.4	-10.6	0.0	-10.6	-43.0	12.5
																				40.1

CLIENT		Churchfield Stone Limited																		
PROJECT		Harley Way Quarry																		
Phase		Extraction																		
08-Dec-2011																				
Chesterfield Lodge																				
Location of Works				Phase 1										Distance						
Receptor Details				Equipment Details										Attenuation						
Ground Ht	Rec Ht	Rec Ht	Dist S-R	Ref LAeq	No.	%	Existing	Excavated	Source	Source Ht	0, 1 or 2	% Soft	Hard	Soft	Barrier 1	Barrier 2	Combined	Max		
aod	aod	aod		@10m		On Time	Ground Ht	Depth	Posn.	aod	Barriers	Ground			Attenuation	Attenuation	Barrier Attenuation	Attenuation	LAeq	
																			[dB]	
50.36	1.5	51.86	228.66	CAT 235D	74.5	1	100	49.0	1.5	2.80	50.3	0	20	-27.2	-28.1					
50.36	1.5	51.86	228.66	Crusher Bucket (on Ground)	83.3	1	40	49.0	1.5	0.50	48.0	0	20	-27.2	-28.1					
50.36	1.5	51.86	228.66	Crusher Bucket (Hi Elevation)	83.3	1	10	49.0	1.5	4.50	52.0	0	20	-27.2	-28.1					
50.36	1.5	51.86	228.66	Loading Shovel (Daewoo Mega 200)	75.5	1	50	49.0	1.5	2.80	50.3	0	20	-27.2	-28.1					
50.36	1.5	51.86	228.66	Stone Cropper	56.2	2	50	49.0	1.5	2.80	50.3	0	20	-27.2	-28.1					
50.36	1.5	51.86	228.66	Generator	68.9	1	100	49.0	1.5	2.80	50.3	0	20	-27.2	-28.1					
				SEL																
				No/hr																
				10 m LAeq																
50.36	1.5	51.86	228.66	Lorry arriving, idling then departing	85.0	4	55.5	49.0	0.0	2.00	51.0	0	20	-27.2	-28.1					

FIGURES

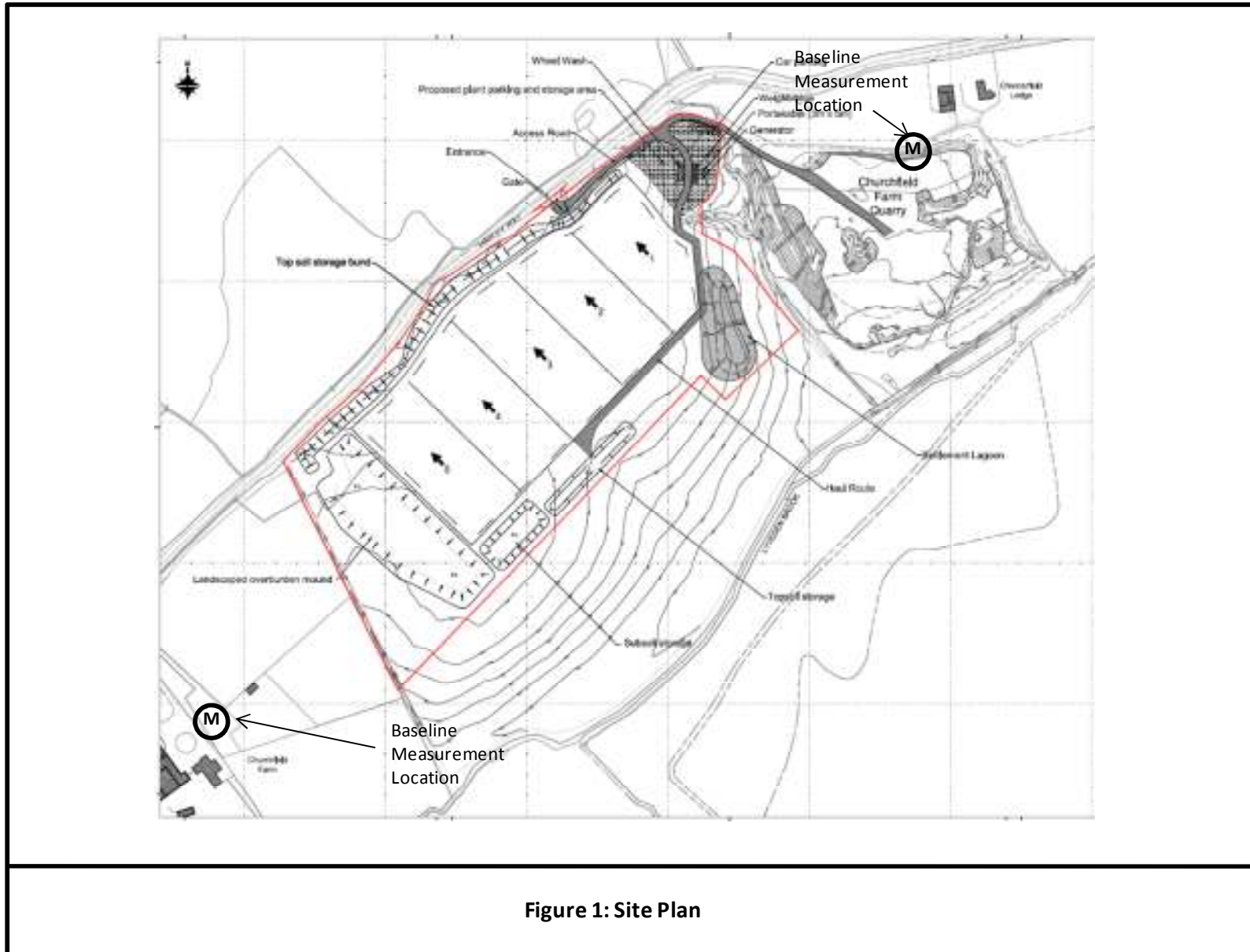


Figure 1: Site Plan

Figure 2: Long-Term Survey Results

