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Acoustic Assessment of Proposed New Field Stockpile and Sheepcotes Temporary Water Storage Lagoon

at

Bradwell Quarry, Rivenhall Airfield, Essex



Report Prepared by:

Lee Dursley BSc (Hons), MIOA, MInstP
Senior Acoustician

Report Reviewed by:

Thomas S Leach BSc (Hons), MSc, AMIOA
Acoustic Consultant

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1.0 Introduction

- 1.1 Belair Research Limited (BRL) trading as Acoustical Control Consultants (ACC) is an independent acoustic consultancy company. All of our acoustic consultants are qualified and experienced practitioners and are either Associate or Corporate members of the Institute of Acoustics. Acoustical Control Engineers Limited is our associated company specialising in engineered solutions to acoustic problems.
- 1.2 ACC has been appointed by Honace Limited on behalf of Blackwater Aggregates to provide a supporting statement for their proposals at Bradwell Quarry.
- 1.3 This supporting statement considers the potential impacts of the proposals to construct a temporary stockpile across New Field, together with the creation of a temporary water storage lagoon. Potential impacts will be considered in terms of individual sound levels and cumulative sound levels taking into account the concurrent operations in Sites A3 and A4.
- 1.4 The author has been involved in environmental noise measurement and assessment at Bradwell Quarry since 2004 and has a good understanding of how operations are undertaken and how they integrate into the wider acoustic environment.

2.0 Site Description

- 2.1 Bradwell Quarry is an operational quarry that extracts sand and gravels and processes minerals through an existing on-site washing and screening plant located within the site.
- 2.2 Bradwell Quarry is located within the boundary of the disused Rivenhall Airfield between the villages of Bradwell to the north and Silver End to the southwest. Quarrying operations began in 2002 under the planning permission; reference ESS/07/98/BTE. Subsequent planning applications have resulted in consent to extract minerals across Rivenhall Airfield and surrounding land. Quarrying operations are presently progressing in a phased and systematic manner by Blackwater Aggregates within Sites A3 and A4 under planning permission ESS/24/14/BTE. The conditions relating to noise emissions from the site have remained unchanged throughout the various applications.
- 2.3 A dedicated haul road was constructed as part of the original planning application and links the quarry directly with the A120 to the north. Quarry traffic is restricted to this route only. Excavated materials are transported to the quarry processing plant to the north of the existing operational quarry by articulated dump truck, where a loading shovel is used to feed the material into the processing plant.

- 2.4 Current quarrying operations are very well screened by virtue of carefully constructed screening bunds, which are completed prior to quarrying operations commencing. This proven approach will be utilised during the proposed Newfield stockpile and Sheepcotes Lagoon works.
- 2.5 The area surrounding Bradwell Quarry is generally rural in character with several farms, small villages and the local road network. The busy A120 runs in a west east direction to the north of the Site.
- 2.6 The Minerals Working and Active Landfills Environmental Award Scheme is operated by Essex County Council to benchmark and assess the environmental standards achieved by operational sites. Since commencing quarrying operations on Rivenhall Airfield in 2000, Blackwater Aggregates has won the Gold Award, the highest score achieved, reflecting a good standard in all aspects surveyed in respect of compliance with planning control and the commitment to minimising the potential environmental impact of the operations at the Site.
- 2.7 The purpose of the works is to integrate the proposed excavation of previously restored overburden materials from within the footprint of the site of the permitted Integrated Waste Management Facility (IWWMF). Excavation operations within the footprint of the Site A2 quarry will progress to a ground level of 35mAOD. Material from the excavations will be transported in dump trucks to the New Field Stockpile area where material will be placed in a phased and systematic manner. The Sheepcotes Lagoon will be formed within the former Site A2 area of the site to provide water to the ongoing quarrying operations and proposed IWWMF.
- 2.8 Figure 2.1 shows the site, approximate operational areas and closest residential receptors. The IWWMF site is shown in purple, Site A4 – Phase 1 is in yellow and the New Field Stockpile and Sheepcotes Lagoon are shown in brown and blue respectively.

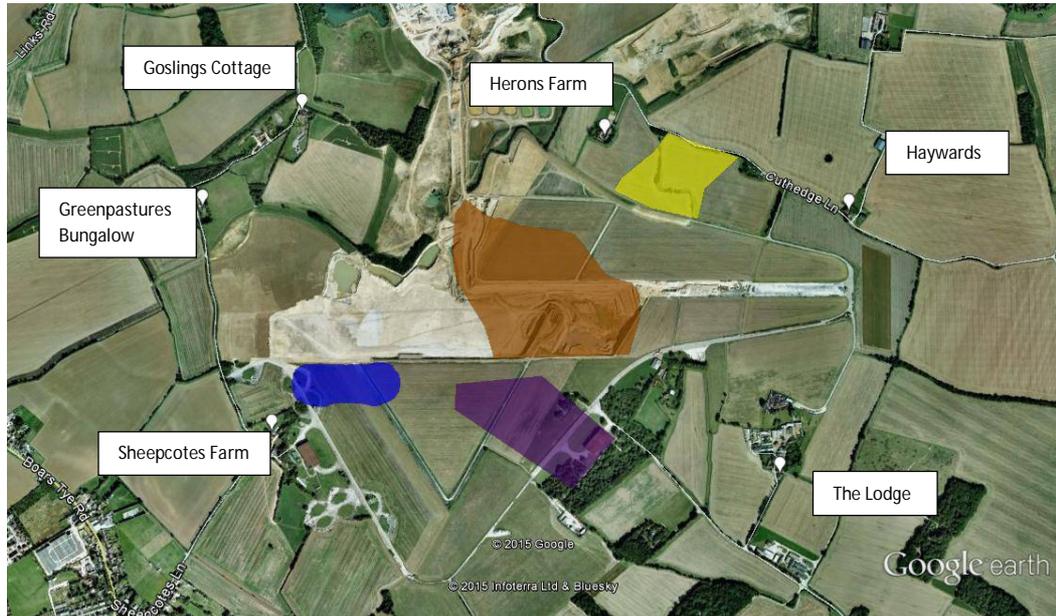


Figure 2.1 Site and closest residential receptors.

2.9 It is anticipated that the excavation and stockpiling works will take approximately five to six months to complete, the vast majority of the works will take place within the quarry void and below surrounding ground levels. Part of the New Field stockpile works will take place above surrounding ground level, however these operations will be for a short period towards the end of the works. Where appropriate these high level stockpiling operations will take place within carefully constructed perimeter bunds to minimise potential impacts when operations are above surrounding ground level.

2.10 The stockpiled material will, over time, be used in the restoration of Sites A3 and A4 as part of the permitted quarrying activities. Quarrying operations are currently taking place in Site A4, Phase 1 and are anticipated to continue eastwards for the duration of the proposed New Field stockpile and Sheepcotes Lagoon works.

3.0 Relevant Criteria

3.1 Noise emissions from the quarry are controlled by means of planning conditions. The conditions relating to noise have remained unchanged throughout the life of the quarry and the various planning applications associated with extensions to the works.

3.2 The most recent planning consent reference ESS/24/14/BTE, dated 26 March 2014 contains conditions relating to noise, numbered 21 to 22 inclusive. The relevant conditions are duplicated below.

21 *Except for temporary operations, the free field Equivalent Continuous Noise Level ($L_{Aeq,1hr}$) at noise sensitive premises adjoining the site, due to operations in the site, shall not exceed 1h, the L_{Aeq} levels as set out in the following table:*

Location	Criterion / dB L _{Aeq,1h}
Herons Farm	45
Deeks Cottage	45
Haywards	45
Allshot's Farm	47
The Lodge	49
Sheepcotes Farm	45
Greenpastures Bungalow	45
Gosling's Cottage	47
Keeper's Cottage	49
Bradwell Hall	54

Measurements shall be made no closer than 3.5m to the façade of properties or other reflective surface and shall have regard to the effects of extraneous noise and shall be corrected for any such effects.

Reason; in the interests of amenity and to comply with MLP policy MLP13 and BDLPR policies RLP 36 and RLP 62.

- 22 *For temporary operations, the free field Equivalent Continuous Noise Level (L_{Aeq,1hr}) at noise sensitive properties as listed in condition 21 shall not exceed 70dB_{L_{Aeq,1h}}. Measurement shall be made no closer than 3.5m from the façade of properties or other reflective surface and shall be corrected for extraneous noise.*

Temporary operations shall not exceed a total of eight weeks in any continuous 12 month duration. Five days written notice shall be given to the Mineral Planning Authority in advance of the commencement of a temporary operation. Temporary operations shall include site preparation bund formation and removal, site stripping and restoration and any other temporary activity that has been approved in writing by the Mineral Planning Authority in advance of such a temporary activity taking place.

Reason; in the interests of amenity and to comply with MLP policy MLP13 and BDLPR policies RLP 36 and RLP 62.

4.0 Analysis

4.1 In general, the level of sound in the local environments that arises from a development site will depend on a number of factors. The more significant of which include:

- The sound emissions of the plant or equipment used on site;
- The periods of operation of the plant on site;

- The distance between the source noise and the receiving position;
 - The presence or absence of screening effects due to barriers or bunds, or ground absorption; and
 - Any reflection effects due to the facades of buildings etc.
- 4.2 The prediction method used in this study is based upon that outlined within BS5228-1 2014 Code of practice for noise and vibration control on construction and open sites, Part 1: Noise.
- 4.3 In order to consider the most reasonable worst case situation in the acoustic assessment the plant is positioned at its realistic closest approach to closest residential properties and at the highest working level.
- 4.4 The plant that is likely to be used for the proposed operations will be similar to that already operating on site, the most significant of which is likely to include excavators, dump trucks and bulldozers. Plant sound power levels from manufacturers data or site experience include operations under load and where applicable the use of broadband reversing alarms. The broadband reversing alarm is both directional and localizable; concentrating the sound within the immediate danger zone behind the vehicle and are significantly less intrusive than older, tonal systems.
- 4.5 All predictions have been calculated with the combinations of plant working at the realistic closest point to the prediction location. They therefore represent the most reasonable worst case scenarios which may be of relatively short duration. However, they indicate the sound level that a particular property or group of properties may be exposed to during the works. By definition, the worst case situation will occur only intermittently over the duration of the works, thus longer term noise levels would normally be lower.
- 4.6 Substantial screening bunds will remain in place around Sheepcotes Farm and to the rear of Greenpastures Bungalow and Goslings Cottage throughout the duration of the works.
- 4.7 Water pumps will be used across the site as required, these have, in the past, been screened with straw bales or localised screening bunds. Alternatively, lift over screens will be used. These will provide in the region of 10dBA to 15dBA attenuation. Resultant sound levels at 150m from the screened pumps will be around 30dBA, which is insignificant in the context of the residual soundscape.
- 4.8 Anticipated sound levels during the operations are presented in Table 4.1. The full calculation spreadsheet is present in Appendix 1.

Location	Anticipated Sound Level During New Field and Sheepcotes Lagoon Works / dBA
Sheepcotes Farm	38
Greenpastures Bungalow	39
Goslings Cottage	37
Hérons Farm	44
Haywards	39
The Lodge	43

Table 4.1 Anticipated worst case sound levels

- 4.9 Quarrying operations will be taking place in Site A4 during the proposed works. Therefore it is necessary to consider both the individual and cumulative impacts of the works.
- 4.10 Quarrying operations are currently in Phase 1 of Site A4 and are moving eastward away from the closest property, Herons Farm. The acoustic assessment that accompanied the application for the development of Sites A3 and A4 (also undertaken by ACC, Belair Research Ltd) noted that the maximum anticipated sound levels would occur at Herons Farm when operations were around 150m from the property and just below existing ground level. At this separation distance the anticipated sound level was equal to the planning condition limit of 45dBL_{Aeq,1h}.
- 4.11 Operations in Site A4 are progressing away from Herons Farm and the depth of the excavation is increasing therefore the anticipated sound level from the works will reduce over time.
- 4.12 The most reasonable cumulative sound level is in the region of 47dBL_{Aeq,1h}. This is 2dBA above the planning condition limit at Herons Farm; however this assumes operations in Site A4 are near the surface and at 150m from Herons Farm and works on the New Field Stockpile are nearing completion, above surrounding ground level
- 4.13 It is important to note that an excess of 2dBA is audiological insignificant in terms of absolute sound levels. In addition, the scenario considered above is somewhat unrealistic, as operations move away from Herons Farm and deeper into Site A4 the sound levels will correspondingly reduce which will offset the sound level produced by the New Field stockpile operations. Therefore, the cumulative sound level from both quarrying and the proposed New Field Stockpiling works will comply with the normal operations noise limit at Herons Farm.
- 4.14 At all other properties the cumulative most reasonable case sound level from both quarrying and the proposed works complies with the planning condition limits.

5.0 Conclusion

- 5.1 The proposed operations will follow established principles of noise control to ensure that operations comply with the existing site noise limits.
- 5.2 This assessment has demonstrated that the realistic cumulative impact of the proposed and permitted quarrying operations can comply with the existing planning condition noise limits.



Appendix 1 Calculation Spreadsheet

Plant	LwA/dBA	% on time							
2 x 360 Excavator	108	70	105dBA each						
Bulldozer	106	80	106dBA each						
6 x Dumptruck	108		number per hour			20			
			speed km / h			24	15mph		
Excavations									
2 x 360 Excavator									
Location	Dist to site/m	Lp/dBA	inc % on time/dBA	Screen, S.G. /dBA	Resultant/dBA	Location			
Sheepcotes Farm	650	43.7	42.2	-10	32.2	Sheepcotes Farm			
Greenpastures Bungalow	940	40.5	39.0	-10	29.0	Greenpastures Bungalow			
Goslings Cottage	890	41.0	39.5	-10	29.5	Goslings Cottage			
Hérons Farm	690	43.2	41.7	-10	31.7	Hérons Farm			
Haywards	950	40.4	38.9	-6	32.9	Haywards			
The Lodge	460	46.7	45.2	-5	40.2	The Lodge			
Stockpile									
Bulldozer # 1					Bulldozer # 2				
Location	Dist to site/m	Lp/dBA	inc % on time/dBA	Dist to site/m	Lp/dBA	inc % on time/dBA	Screen/S.G./dBA	Resultant/dBA	Location
Sheepcotes Farm	700	41.1	40.1	890	39.0	38.0	-10	32.2	Sheepcotes Farm
Greenpastures Bungalow	770	40.3	39.3	1000	38.0	37.0	-10	31.3	Greenpastures Bungalow
Goslings Cottage	570	42.9	41.9	850	39.4	38.4	-10	33.5	Goslings Cottage
Hérons Farm	330	47.6	46.7	490	44.2	43.2	-5	43.3	Hérons Farm
Haywards	700	41.1	40.1	940	38.5	37.6	-6	36.0	Haywards
The Lodge	620	42.2	41.2	900	38.9	37.9	-5	37.9	The Lodge
Haul Route 1									
Location	Perpendicular Dist/m	Lp/dBA due to haulage/dBA	AoV/degrees	AoV/degrees correction /dBA	Screen/S.G./dBA	Resultant/dBA			
Sheepcotes Farm	425	47.9	40	-6.5	-10.0	31.4			
Greenpastures Bungalow	25	60.2	10	-12.6	-10.0	37.7			
Goslings Cottage	380	48.4	20	-9.5	-10.0	28.9			
Hérons Farm	880	44.8	40	-6.5	-10.0	28.2			
Haywards	1150	43.6	45	-6.0	-6.0	31.6			
The Lodge	420	48.0	20	-9.5	-6.0	32.4			
Haul Route 2									
Location	Perpendicular Dist/m	Lp/dBA due to haulage/dBA	AoV/degrees	AoV/degrees correction /dBA	Screen/S.G./dBA	Resultant/dBA			
Sheepcotes Farm	530	47.0	50	-5.6	-10.0	31.4			
Greenpastures Bungalow	750	45.5	45	-6.0	-10.0	29.4			
Goslings Cottage	450	47.7	30	-7.8	-10.0	29.9			
Hérons Farm	450	47.7	40	-6.5	-10.0	31.1			
Haywards	1180	43.5	40	-6.5	-6.0	31.0			
The Lodge	990	44.3	40	-6.5	-6.0	31.7			
Resultant/dBA									
Location	Resultant/dBA								
Sheepcotes Farm	38								
Greenpastures Bungalow	39								
Goslings Cottage	37								
Hérons Farm	44								
Haywards	39								
The Lodge	43								