Ref 4727

For CEMEX UK Operations Limited
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CEMEX Wangford Quarry
Proposed Lime Kiln Farm Extension
Noise Assessment Report

Date 25 June 2018

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The Author

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WBM

WBM (the trading name of The Walker Beak Mason Partnership) is an established independent acoustic consultancy specialising in architectural & building acoustics, environmental noise, planning issues and expert work. WBM is a member of the Association of Noise Consultants and is also a Corporate Member of the Institute of Environmental Management & Assessment. The consultants are Members or Fellows of the Institute of Acoustics.
## 1 Introduction

CEMEX proposes an extension to their existing quarry at Wangford in Suffolk for the extraction of an estimated 920,000 tonnes of sand and gravel over an 10.5 year period (12.5 years including pre-development works and completion of restoration) with the mineral being excavated and screened in the extension area, processed at their existing plant site then exported by road going HGVs or stockpiled for later export.

The location of the proposed extension to Wangford quarry is to the east of the current excavation areas and plant site.

The existing site noise limits for locations close to the proposed extension area have been reviewed based on the results of noise surveys conducted in February 2018 to obtain up to date baseline noise data.

This report sets out the calculated noise levels arising from the workings and compares these calculated noise levels with the existing and suggested site noise limits at the nearest dwellings to the proposed extension area.

The calculated site noise levels in this assessment include the existing processing plant and the haul route between the plant site and the proposed extension area to consider the cumulative impact of the proposals.

The noise limits are based on current advice from the government contained in the web document “Planning Practice Guidance”, dated March 2014, which was published to complement the National Planning Policy Framework (NPPF), dated March 2012.

To aid comprehension, a glossary of acoustic terms is presented in Appendix A.

## 2 Assessment Methodology

The various relevant noise guidance documents used in this assessment are detailed below.
2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in March 2012 with immediate effect and sets out the Government’s planning policies for England. At the heart of the National Planning Policy Framework is a presumption in favour of sustainable development.

The NPPF revoked and replaced a number of Planning Policy Statements (PPS), Planning Policy Guidance (PPG) and other guidance documents, including Planning Policy Guidance 24: Planning and Noise.

With regard to noise there are various aims, including that noise from a new development should avoid giving rise to significant adverse impacts on health and quality of life, and that other adverse impacts should be mitigated and reduced to a minimum including through the use of conditions.

Section 11 of the NPPF (Conserving and enhancing the natural environment) refers specifically to noise in the following paragraphs:

“109. The planning system should contribute to and enhance the natural and local environment by…preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability…”

“123. Planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;

- 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 (subject to the provisions of the Environmental Protection Act 1990 and other relevant law); 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.”
Technical guidance on noise was provided in more detail in the accompanying document “Technical Guidance to the National Planning Policy Framework”, dated March 2012, which was superseded in March 2014 by the Planning Practice Guidance.

Paragraphs 19 to 22 inclusive of the “Minerals” chapter of the Planning Practice Guidance are under the heading “Noise emissions” within the section “Assessing environmental impacts from mineral extraction”.

Paragraph 19 states:

“How should minerals operators seek to control noise emissions?

Those making mineral development proposals, including those for related similar processes such as aggregates recycling and disposal of construction waste, should carry out a noise impact assessment, which should identify all sources of noise and, for each source, take account of the noise emission, its characteristics, the proposed operating locations, procedures, schedules and duration of work for the life of the operation, and its likely impact on the surrounding neighbourhood.

Proposals for the control or mitigation of noise emissions should:

- consider the main characteristics of the production process and its environs, including the location of noise-sensitive properties and sensitive environmental sites;
- assess the existing acoustic environment around the site of the proposed operations, including background noise levels at nearby noise-sensitive properties;
- estimate the likely future noise from the development and its impact on the neighbourhood of the proposed operations;
- identify proposals to minimise, mitigate or remove noise emissions at source;
- monitor the resulting noise to check compliance with any proposed or imposed conditions.”
Paragraph 20 states:

“How should mineral planning authorities determine the impact of noise?

Mineral planning authorities should take account of the prevailing acoustic environment and in doing so consider whether or not noise from the proposed operations would:

- give rise to a significant adverse effect;
- give rise to an adverse effect; and
- enable a good standard of amenity to be achieved.

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure would be above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy.”

Paragraph 21 of the Planning Practice Guidance states:

“What are the appropriate noise standards for mineral operators 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 (LA90,1h) 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) LAeq, 1h (free field). For operations during the evening (1900-2200) the noise limits should not exceed the background noise level (LA90,1h) by more than 10dB(A) and should not exceed 55dB(A) LAeq, 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) LAeq, 1h (free field) at a noise sensitive property.
Where the site noise has a significant tonal element, it may be appropriate to set specific limits to control this aspect. Peak or impulsive noise, which may include some reversing bleepers, may also require separate limits that are independent of background noise (e.g. $L_{\text{max}}$ in specific octave or third-octave frequency bands – and that should not be allowed to occur regularly at night.)

Care should be taken, however, to avoid any of these suggested values being implemented as fixed thresholds as specific circumstances may justify some small variation being allowed.

Paragraph 22 of the Planning Practice Guidance states:

“What type of operations may give rise to particularly noisy short-term activities and what noise limits may be appropriate?

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) $L_{\text{Aeq}}$ 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) $L_{\text{Aeq}}$ 1h (free field) limit referred to above should be regarded as the normal maximum.

2.2 Local Authority

The proposed extension to Wangford Quarry falls under the jurisdiction of Suffolk County Council.

The plant site including the processing plant and the access road are permitted under the current planning permission for the site.
Conditions 11 and 12 of the permission Ref. W/09/0273/CCC dated 03 June 2009 relate to noise as follows:

"11. Maximum noise limit (operations)

Noise from operations within the site (excluding bund formation and other temporary operations such as soil stripping, restoration works etc) shall not exceed the following 1 hour LAeq values:

46 dB(A) free field representative of Lime Kiln Cottages
51 dB(A) free field representative of Lime Kiln Farm
51 dB(A) free field representative of Mardle House
48 dB(A) free field representative of Hill Farm
50 dB(A) free field representative of Nova Scotia

In the event of complaint noise may be measured 1 metre from the facade and 1.2 metres above ground level at either of the above properties whereby the above limit would be increased by 3 DB(A) in each case to take into account reflective effects.

12. Maximum noise limit (temporary operations)

Noise from soil and overburden stripping, bund formation and restoration shall not exceed the following 1 hour LAeq values:

70 dB(A) free field representative of Lime Kiln Cottages, Lime Kiln Farm, Mardle House, Hill Farm, Nova Scotia Cottages between the hours of 0800 and 1700 (Mon-Fri), 08.00 to 13.00 (Saturdays),

and work shall be restricted to a maximum of eight weeks/year."

3 Site Description

The proposed extension to Wangford Quarry is to the east of the existing plant site and current extraction area.

It is proposed that the mineral will be excavated by means of a loading shovel, screened in the extension area and loaded into a dump truck for transport on a new internal haul route back to the existing plant site for processing.

The rate of extraction will be about 90,000 tonnes per annum over the course of 10.5 years following completion of the current extraction area.
The nearest residential properties to the proposed extension area are located to the north-west, south and north-east of the site.

There are other residential properties to the north-west and west of the extension area, which are nearer to the processing plant site, namely Hill Farm and Nova Scotia Cottages.

The properties to the north-west of the site include Wangford Farm (previously known as Mardle House and referred to as such in the current planning permission for the site), which includes 3 holiday cottages (South Barn being the closest to the proposed extension), Toad Hall and Reydon Grange. For the purposes of this assessment the nearest properties to the extension area have been considered, namely Wangford Farm/South Barn as the other properties will be at a greater distance from the site operations.

To the south of the site is Lime Kiln Farm, Cave Cottages and Lime Kiln Cottages. Lime Kiln Farm is the closest to the extension area and is therefore the chosen assessment location in that direction.

Properties to the north-east of the site are Wexford House and Reydon Hall, with Wexford House the nearer of the properties to the proposed extension. Wexford House has therefore been used as the main assessment location to the north-east of the site.

The currently permitted operating hours of the site are Monday to Friday 07:30 to 18:00 hours and Saturdays from 07:30 to 13:00 hours with no site activity outside these hours and on Sundays, Bank Holidays or National Holidays other than environmental monitoring.

4 Baseline Noise Measurements (February 2018)

The dwellings at which the baseline noise measurements were undertaken in February 2018 were selected as being representative of the nearest properties to the proposed extension area and processing plant and these including those properties listed in Condition 11 of the current planning permission for the site.

Baseline noise surveys were conducted on two consecutive days at five locations representative of the selected dwellings. Seventeen sample measurements were made over the two surveys which took place on Wednesday 07 February 2018 and Thursday 08 February 2018.
The measurements were undertaken between about 15:15 and 16:15 hours on Wednesday 07 February 2018 and between about 09:45 and 15:35 hours on Thursday 08 February 2018.

The surveys were undertaken with south-westerly wind.

The measurements were taken at a microphone height of approximately 1.4 metres above local ground level away from reflecting surfaces other than the ground, with a wind shield used throughout each measurement. The sample measurements were of 15 minute duration.

The parameters reported are the statistical indices $L_{A10,T}$ and the Background Noise Level, $L_{A90,T}$ as well as the Equivalent Continuous Noise Level, $L_{Aeq,T}$. An explanation of the noise units presented is given in Appendix A.

Site plans showing the survey locations and the phasing plan are presented in Appendix B.

The survey, instrumentation and calibration details for the sample measurements undertaken in November 2017 are shown in Appendix C with the detailed results of the sample measurements set out in Appendix D.

Noise levels were generally controlled by distant road traffic noise, birdsong, breeze in the trees, aircraft movements and local activity. Processing plant operations were audible at Hill Farm.

5 Existing and Suggested Site Noise Limits

Site noise limits at five locations are stipulated in the current planning permission for Wangford Quarry (Ref. W/09/0273/CCC) dated 03 June 2009.

These noise limits include locations close to the proposed extension area.

A plan showing the baseline noise survey locations is presented in Appendix B.

The existing site noise limits have been reviewed and site noise limits based on the baseline measurements undertaken in February 2018 have been suggested for locations at which no limit is already in place.
<table>
<thead>
<tr>
<th>Location</th>
<th>Average Measured dB $L_{Aeq}$, 15 min free field</th>
<th>Average Measured dB $L_{A90}$, 15 min free field</th>
<th>Existing Site Noise Limit dB $L_{Aeq}$, 1 hour free field</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Lime Kiln Farm</td>
<td>47</td>
<td>41</td>
<td>51</td>
</tr>
<tr>
<td>B. Hill Farm</td>
<td>50</td>
<td>45</td>
<td>48</td>
</tr>
<tr>
<td>C. Wangford Farm(*)</td>
<td>48</td>
<td>39</td>
<td>51</td>
</tr>
<tr>
<td>D. Wexford House</td>
<td>44</td>
<td>37</td>
<td>N/A</td>
</tr>
<tr>
<td>E. Nova Scotia Cottages</td>
<td>44</td>
<td>38</td>
<td>50</td>
</tr>
</tbody>
</table>

(*) previously known as Mardle House

Observations during the baseline noise surveys conducted in February 2018 indicate that current site activity is audible at Hill Farm with processing plant noise noted and only barely audible at Nova Scotia Cottages.

Following the review of the baseline noise survey data, it is proposed that the existing site noise limits for Lime Kiln Farm, Hill Farm and Nova Scotia Cottages remain in place for the proposed extension.

A new site noise limit is suggested for the new location of Wexford House. The suggested limit is 47 dB $L_{Aeq}$, 1 hour free field. A revised noise limit is also suggested for Wangford Farm (previously known as Mardle House) of 49 dB $L_{Aeq}$, 1 hour free field.

The suggested site noise limit of 49 dB $L_{Aeq}$, 1 hour free field for Wangford Farm would also apply to the adjacent South Barn. It should however, be noted that as South Barn is a holiday cottage, it will not be in permanent occupation.

These limits are based on the background noise levels measured at those locations in February 2018 and the advice contained in Planning Practice Guidance.

The existing site noise limits for temporary operations of no more than 8 weeks duration in any calendar year of 70 dB $L_{Aeq}$, 1 hour free field that are in place for the current operation should also be valid for the proposed extension area.
6 Calculated Site Noise Levels

The Equivalent Continuous Noise Level, $L_{Aeq, T}$, is the preferred unit for assessing noise sources. It is the value of a continuous level that would have equivalent energy to the continuously varying noise over the specified period "T". This unit is recommended internationally for the description of environmental noise and is in general use. It is the chosen unit of BS 5228 for Construction and Open site noise; Planning Practice Guidance to the National Planning Policy Framework and BS 7445 for the Description and Measurement of Environmental noise.

The noise levels likely to arise at dwellings depend on the method of working and the sound power levels of the plant chosen to work at the site, as much as on the distance to the properties and the effects of intervening ground. Proper allowance can be made for these variables in order to calculate site noise levels.

6.1 Noise Calculation Methodology

The Planning Practice Guidance for the NPPF in paragraph 19 states those making development proposals should “estimate the likely future noise from the development and its impact on the neighbourhood of the proposed operations”.

The Planning Practice Guidance published in March 2014 does not contain details of noise prediction methods and in the absence of detailed guidance in the NPPF, the calculations in this report are based on the methods contained in BS5228-1: 2009 + A1: 2014 “Code of practice for noise and vibration control on construction and open sites – Part 1: Noise”.

Further details of the calculation methods are set out in Appendix E to this report. Summary site noise calculation sheets for one of the five locations considered, Lime Kiln Farm, is also included in Appendix E showing calculated levels from extraction at the nearest location to the dwelling including the proposed soil storage bund. This location is the closest noise sensitive receptor to the extension area.

For the purposes of examining a reasonable worst case, various plant items have been assumed to operate at the closest practical position of the proposed operating areas to each receiver location. These plant items and the corresponding Sound Power Levels ($L_{WA}$) are listed in Section 6.2 and it has also been assumed that the plant items work 100% of each hour, again representing a worst case scenario.
6.2 Noise Sources and Sound Power Levels

The plant items proposed to work at the site are listed below. This plant data is used in the acoustic model and is shown in the calculation sheets presented in Appendix E.: 

<table>
<thead>
<tr>
<th>Plant Item</th>
<th>dB LWA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Routine Extraction Operations</strong></td>
<td></td>
</tr>
<tr>
<td>Loading Shovel in Extraction Area</td>
<td>106</td>
</tr>
<tr>
<td>Articulated Dump Truck on Haul Route</td>
<td>106</td>
</tr>
<tr>
<td>Mobile Screen in Extraction Area</td>
<td>110</td>
</tr>
<tr>
<td><strong>Processing Operations</strong></td>
<td></td>
</tr>
<tr>
<td>Processing Plant</td>
<td>110</td>
</tr>
<tr>
<td>Loading Shovel at Processing Plant</td>
<td>106</td>
</tr>
<tr>
<td><strong>Temporary Operations</strong></td>
<td></td>
</tr>
<tr>
<td>Excavator on overburden/soils/bund formation</td>
<td>105</td>
</tr>
<tr>
<td>Dump trucks on overburden/soils/bund formation</td>
<td>106</td>
</tr>
<tr>
<td>Dozer for garding</td>
<td>108</td>
</tr>
</tbody>
</table>

Temporary operations are calculated based on the use of an excavator, a dozer and dump trucks.

The plant noise data used is based on data for similar plant items on the WBM plant noise database including measurements of the mobile screen used at Wangford Quarry in June 2010, which are presented in the sample noise calculation sheets in Appendix E. Sound Power Levels of each selected plant item, and distances from the selected dwelling are also shown.

6.3 Site Operation Assumptions

The calculations assume that all plant on site for extraction in the proposed extension is operating simultaneously in the closest likely working areas of the extension to each receiver location. No barrier attenuation is included apart from that due to the proposed bunding around the extension area to a height of 15 metres AOD (as shown in Plan B2 in Appendix B) and the farm buildings between the dwelling at Hill Farm and the processing plant site.
The ground between the site and the assessment locations is assumed to be 90% soft apart from at Lime Kiln Farm where it is assumed to be between 50% (nearest point of extraction) and 75% (screen in centre of phase) soft depending on the activity.

Calculations for Wangford Farm (previously known as Mardle House) have been based on distances to the nearest dwelling to the proposed extension area at that location, i.e. South Barn, the holiday cottage immediately south-east of the main Wangford Farm residence.

Based on the observations during the baseline noise surveys conducted in February 2018, noise from activities at the processing plant site is generally inaudible at all the assessment locations apart from Hill Farm which is closest to the plant site and was barely audible during one measurement at Nova Scotia Cottages.

Movement of material from the extraction area to the existing processing plant site is to be by means of dump truck along a haul route through the extraction area, which has been input at a height of 10 metres AOD to represent the highest elevation of the road.

A working height of 10 metres AOD has been assumed for the highest level of extraction operations based on the topographic data provided. Again, this is very much a worst case scenario as the plant will be at a lower level for much of the time.

### 6.4 Effects on Assessment Locations

**Routine Extraction Operations**

The existing site noise limits have been reviewed and additional/revised limits suggested, in line with the advice contained in the web document “Planning Practice Guidance” to the National Planning Policy Framework, based on the average background noise level plus 10 dB(A) and not to exceed 55 dB $L_{Aeq, 1 hour, free field}$ at the nearest noise sensitive premises during routine daytime operations on site.

Site noise calculations have been undertaken for the five receiver locations corresponding to the locations that are closest to the proposed extension area and the processing plant site.
A comparison of the calculated daytime site noise levels at the receiver locations and the existing/suggested site noise limits is shown in the following table, with the example calculation sheets for Lime Kiln Farm presented in Appendix E. The calculated site noise levels and the existing/suggested site noise limits in the table below are all in terms of $\text{dB L}_{\text{Aeq, 1 hour, free field}}$.

Calculated daytime site noise levels are presented for all expected plant operations in the proposed extension area including the processing plant site.

<table>
<thead>
<tr>
<th>Site Noise Calculation Receiver Location</th>
<th>Calculated Site Noise Level $\text{dB L}_{\text{Aeq, 1 hour, free field}}$ (Mineral Extraction &amp; Processing)</th>
<th>Existing or Suggested Site Noise Limit $\text{dB L}_{\text{Aeq, 1 hr free field}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Lime Kiln Farm</td>
<td>54</td>
<td>51</td>
</tr>
<tr>
<td>B. Hill Farm</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>C. Wangford Farm(*)/South Barn</td>
<td>46</td>
<td>49</td>
</tr>
<tr>
<td>D. Wexford House/Reydon Hall</td>
<td>43</td>
<td>47</td>
</tr>
<tr>
<td>E. Nova Scotia Cottages</td>
<td>45</td>
<td>50</td>
</tr>
</tbody>
</table>

(*) previously known as Mardle House

The calculated site noise levels due to operations in the proposed southern extension comply with the existing/suggested site noise limits at four of the five chosen assessment locations.

The calculated site noise level at Lime Kiln Farm does not comply with the existing site noise limit for that location and therefore mitigation measures have been investigated.

Temporary Operations

The operations of topsoil and overburden stripping, bund formation and the final restoration processes are often noisier than extraction, as noted in Paragraph 22 of the “Noise emissions” part of the “Minerals” section of the Planning Practice Guidance to the NPPF, as they tend to be closer and are usually unscreened. They are relatively short duration operations that are capable of completion in a total period of no more than eight weeks in any twelve month period.
The construction of a bund is a brief operation taking typically a matter of two or three weeks to complete. For each dwelling the highest noise level that is calculated for storage bund formation would be reached only on a few days.

Temporary operations are exempted from the nominal daytime noise limit in the “Noise emissions” part of the “Minerals” section of the Planning Practice Guidance to NPPF but should conform with a site noise limit of 70 dB $L_{Aeq, 1 \text{ hour, free field}}$ at dwellings.

Operations with noise levels exceeding the corresponding daytime noise limit for routine operations should not exceed a total of eight weeks duration at any noise sensitive properties in any twelve month period.

The highest $L_{Aeq,T}$ noise levels expected from the closest temporary operations in the proposed extension, with one set of equipment as set out in the calculation sheet in Appendix E, are shown in the following table.

<table>
<thead>
<tr>
<th>Site Noise Calculation Receiver Location</th>
<th>Calculated Site Noise Level $dB \ L_{Aeq, 1 \text{ hour, free field}}$ (Temporary Operations)</th>
<th>Site Noise Limit (Temporary Operations) $dB \ L_{Aeq, 1 \text{ hr free field}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Lime Kiln Farm</td>
<td>64</td>
<td>70</td>
</tr>
<tr>
<td>B. Hill Farm</td>
<td>48</td>
<td>70</td>
</tr>
<tr>
<td>C. Wangford Farm (*) South Barn</td>
<td>49</td>
<td>70</td>
</tr>
<tr>
<td>D. Wexford House/Reydon Hall</td>
<td>43</td>
<td>70</td>
</tr>
<tr>
<td>E. Nova Scotia Cottages</td>
<td>45</td>
<td>70</td>
</tr>
</tbody>
</table>

(*) previously known as Mardle House

The proposals comply with a 70 dB $L_{Aeq, 1 \text{ hour, free field}}$ noise limit for temporary works in line with current Government guidance.

### 6.5 Recommended Mitigation Measures

The calculated site noise level at Lime Kiln Farm does not comply with the existing site noise limit for that location and therefore mitigation measures have been investigated.

The proposed bunding around the southern boundary of Phases 1 and 2, the closest to Lime Kiln Farm, was included in the calculations to a height of 15 metres AOD as indicated on the plans provided by the applicant.
It is recommended that the bunding in this area is increased in height to 17 metres AOD, i.e. a 3 metre high bund rather than the 1 metre high bund proposed.

This increase in the bunding will result in the calculated site noise level at Lime Kiln Farm being reduced to 51 dB L\_Aeq, 1 hour free field which complies with the existing site noise limit at that location.

7 Cumulative Impact and Health Impact

Cumulative Impact

The assessment has considered the cumulative impact of the processing plant, associated haul route and the proposed extension area as the extracted mineral will be transported to the plant site for processing and export.

The operations at the processing plant site are not expected to alter from the current situation.

It is understood that the landfilling operation that is taking place alongside the current works on site will be completed prior to the expiration of the current permission and the commencement of works in the proposed extension area. Landfilling operations have therefore not been included in the assessment.

WBM are not aware of any other ongoing or permitted developments in the area that would require consideration as part of the cumulative impact of the proposals.

Health Impact

For the purpose of the protection of human health and the environment, it is recommended that a Noise Management Plan including noise monitoring procedures is completed prior to the commencement of operations in the proposed extension area.

The aim of the Noise Management Plan would be to ensure that:

- Noise is primarily controlled by good operational practices including noise mitigation measures and management controls;
- All reasonable measures are taken to reduce noise emissions from the site;
- Procedures are in place should complaints be received or excessive noise is generated.
The Noise Management Plan would be created to address the potential impact of noise and to outline the control measures employed to minimise the likelihood of complaints from nearby noise sensitive properties.

8 Summary and Conclusions

As part of a planning application for a proposed extension to the existing sand and gravel quarry at Wangford in Suffolk, a noise assessment has been conducted to establish baseline noise levels, review and suggest new site noise limits where appropriate and to test compliance with the noise limits to examine the potential noise impact of the proposals.

Based on the observations during baseline noise surveys conducted in February 2018, noise from activities at the processing plant site are generally inaudible at all the assessment locations apart from Hill Farm which is closest to the plant site.

Noise surveys were conducted in February 2018 to obtain additional information regarding the existing noise environment to inform a review of the existing site noise limits and new limits to protect the amenity of any new locations.

Site noise calculations have been undertaken for the proposed extension to the quarry.

The extraction and processing operations have been described and set out in terms of the equipment proposed to be used and typical noise output of the various plant items to be used.

The comparison of calculated worst case noise levels arising from the operation with the existing and suggested noise criteria indicates that it is possible to work the proposed Lime Kiln Farm extension fully whilst complying with suggested site noise limits assuming that the recommended mitigation measures are implemented.

Dr Robert Storey PhD BEng MIOA
Consultant

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Appendix A – Glossary of Acoustic Terms

General Noise and Acoustics
The following section describes some of the parameters that are used to quantify noise.

Decibels dB

Noise levels are measured in decibels. The decibel is the logarithmic ratio of the sound pressure to a reference pressure (2x10^−5 Pascals). The decibel scale gives a reasonable approximation to the human perception of relative loudness. In terms of human hearing, audible sounds range from the threshold of hearing (0 dB) to the threshold of pain (140 dB).

A-weighted Decibels dB(A)

The ‘A’-weighting filter emulates human hearing response for low levels of sound. The filter network is incorporated electronically into sound level meters. Sound pressure levels measured using an ‘A’-weighting filter have units of dB(A) which is a single figure value to represent the overall noise level for the entire frequency range.

A change of 3 dB(A) is the smallest change in noise level that is perceptible under normal listening conditions. A change of 10 dB(A) corresponds to a doubling or halving of loudness of the sound. The background noise level in a quiet bedroom may be around 20 –30 dB(A); normal speech conversation around 60 dB(A) at 1 m; noise from a very busy road around 70-80 dB(A) at 10m; the level near a pneumatic drill around 100 dB(A).

Façade Noise Level

Façade noise measurements are those undertaken near to reflective surfaces such as walls, usually at a distance of 1m from the surface. Façade noise levels at 1m from a reflective surface are normally around 3 dB greater than those obtained under freefield conditions.

Freefield Noise Level

Freefield noise measurements are those undertaken away from any reflective surfaces other than the ground.

Frequency Hz

The frequency of a noise is the number of pressure variations per second, and relates to the “pitch” of the sound. Hertz (Hz) is the unit of frequency and is the same as cycles per second. Normal, healthy human hearing can detect sounds from around 20 Hz to 20 kHz.

Octave and Third-Octave Bands

Two frequencies are said to be an octave apart if the frequency of one is twice the frequency of the other. The octave bandwidth increases as the centre frequency increases. Each bandwidth is 70% of the band centre frequency.

Two frequencies are said to be a third-octave apart if the frequency of one is 1.26 times the other. The third octave bandwidth is 23% of the band centre frequency.

There are recognised octave band and third octave band centre frequencies. The octave or third-octave band sound pressure level is determined from the energy of the sound which falls within the boundaries of that particular octave of third octave band.
Appendix A (continued)

Equivalent Continuous Sound Pressure Level $L_{A_{eq,T}}$

The ‘A’-weighted equivalent continuous sound pressure level $L_{A_{eq,T}}$, is a notional steady level which has the same acoustic energy as the actual fluctuating noise over the same time period $T$. The $L_{A_{eq,T}}$ unit is dominated by higher noise levels, for example, the $L_{A_{eq,T}}$ average of two equal time periods at, for example, 70 dB(A) and 50 dB(A) is not 60 dB(A) but 67 dB(A).

The $L_{A_{eq}}$ is the chosen unit of BS 7445-1:2003 “Description and Measurement of Environmental noise”.

Maximum Sound Pressure Level $L_{A_{max}}$

The $L_{A_{max}}$ value describes the overall maximum ‘A’-weighted sound pressure level over the measurement interval. Maximum levels are measured with either a fast or slow time weighted, denoted as $L_{A_{max,f}}$ or $L_{A_{max,s}}$ respectively.

Noise Rating NR

The noise rating level is a single figure index obtained from an octave band analysis of a noise. The NR level is obtained by comparing the octave band sound pressure levels to a set of reference curves and the highest NR curve that is intersected by the sound pressure levels gives the NR level.

Sound Exposure Level $L_{AE}$ or SEL

The sound exposure level is a notional level which contains the same acoustic energy in 1 second as a varying ‘A’-weighted noise level over a given period of time. It is normally used to quantify short duration noise events such as aircraft flyover or train passes.

Statistical Parameters $L_N$

In order to cover the time variability aspects, noise can be analysed into various statistical parameters, i.e. the sound level which is exceeded for N% of the time. The most commonly used are the $L_{A_{01,T}}$, $L_{A_{10,T}}$ and the $L_{A_{90,T}}$.

$L_{A_{01,T}}$ is the ‘A’-weighted level exceeded for 1% of the time interval $T$ and is often used to gives an indication of the upper maximum level of a fluctuating noise signal.

$L_{A_{10,T}}$ is the ‘A’-weighted level exceeded for 10% of the time interval $T$ and is often used to describe road traffic noise. It gives an indication of the upper level of a fluctuating noise signal. For high volumes of continuous traffic, the $L_{A_{10,T}}$ unit is typically 2–3 dB(A) above the $L_{A_{eq,T}}$ value over the same period.

$L_{A_{90,T}}$ is the ‘A’-weighted level exceeded for 90% of the time interval $T$, and is often used to describe the underlying background noise level.
Appendix B – Site Location Plans

Plan B1: Noise Survey Locations/Assessment Locations

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Lime Kiln Farm</td>
<td>Garden of Lime Kiln Farm to west of dwelling</td>
</tr>
<tr>
<td>B. Hill Farm</td>
<td>South East of dwellings near entrance to farm</td>
</tr>
<tr>
<td>C. Wangford Farm(*)</td>
<td>Side of Mardle Road, in clearing to south of Wangford Farm</td>
</tr>
<tr>
<td>D. Wexford House</td>
<td>South east corner of Wexford House</td>
</tr>
<tr>
<td>E. Nova Scotia Cottages</td>
<td>On entrance track from A12 to north west of dwellings. (*) previously known as Mardle House</td>
</tr>
</tbody>
</table>
Appendix B (continued)

Plan B2: Phasing plan
Appendix C – Instrumentation and Calibration Details

Date and Locations of Survey
Wednesday 07 February 2018
Thursday 08 February 2018
Noise measurements locations as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Lime Kiln Farm</td>
<td>Garden of Lime Kiln Farm to west of dwelling</td>
</tr>
<tr>
<td>B. Hill Farm</td>
<td>South East of dwellings near entrance to farm</td>
</tr>
<tr>
<td>C. Wangford Farm</td>
<td>Side of Mardle Road, in clearing to south of Wangford Farm</td>
</tr>
<tr>
<td>D. Wexford House</td>
<td>South east corner of Wexford House</td>
</tr>
<tr>
<td>E. Nova Scotia Cottages</td>
<td>On entrance track from A12 to north west of dwellings.</td>
</tr>
</tbody>
</table>

Surveys carried out by
Richard Lyons

Weather Conditions

<table>
<thead>
<tr>
<th>Date</th>
<th>Weather Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wednesday 07 February 2018</td>
<td>Dry, sunny, cold 4°C, cloud cover ~50%, winds 1-2 m/s SW direction</td>
</tr>
<tr>
<td>Thursday 08 February 2018</td>
<td>Dry, sunny, cold 0.5°C increasing to 4°C, cloud cover ~20%, winds variable 1-4 m/s SW direction</td>
</tr>
</tbody>
</table>

Instrumentation used (Serial Number)

<table>
<thead>
<tr>
<th>Date</th>
<th>Instrumentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wednesday 07 February 2018 &amp; Thursday 08 February 2018</td>
<td>Norsonic 140 Sound Level Meter (1403138)</td>
</tr>
<tr>
<td></td>
<td>Norsonic 1251 Calibrator (31991)</td>
</tr>
</tbody>
</table>

Calibration

The sensitivity of the meter was verified on site immediately before and after the surveys. The measured calibration levels were as follows:

<table>
<thead>
<tr>
<th>Survey Date</th>
<th>Start Cal</th>
<th>End Cal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wednesday 07 February 2018</td>
<td>113.9 dB(A)</td>
<td>113.8 dB(A)</td>
</tr>
<tr>
<td>Thursday 08 February 2018</td>
<td>113.9 dB(A)</td>
<td>114.0 dB(A)</td>
</tr>
</tbody>
</table>

The meter and calibrator are tested monthly against a Brüel and Kjær Pistonphone, type 4220 (serial number 375806) and a Norsonic Calibrator, type 1253 (serial number 22906) with UKAS approved laboratory certificate of calibration.

In addition, the meter and calibrator undergo traceable calibration at an external laboratory every two years.

The start times of each sample are tabulated with the results in Appendix D.
## Appendix D – Baseline Survey Results

Results and Observations  
**Wednesday 07 February 2018, 15:15 to 17:15**  
Dry, sunny, cold 4°C, cloud cover ~50%, winds 1-2 m/s SW direction

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Time</th>
<th>Results dB (T = 15 minutes)</th>
<th>Comments / Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$L_{Aeq,T}$</td>
<td>$L_{A_{max,T}}$</td>
</tr>
<tr>
<td>A. Lime Kiln Farm</td>
<td>15:18</td>
<td>43</td>
<td>61</td>
</tr>
<tr>
<td>B. Hill Farm</td>
<td>15:55</td>
<td>48</td>
<td>65</td>
</tr>
<tr>
<td>C. Wangford Farm</td>
<td>16:31</td>
<td>42</td>
<td>61</td>
</tr>
<tr>
<td>D. Wexford House</td>
<td>16:54</td>
<td>47</td>
<td>65</td>
</tr>
</tbody>
</table>
### Results and Observations

**Thursday 08 February 2018, 09:45 to 15:35**

Dry, sunny, cold 0.5°C increasing to 4°C, cloud cover ~20%, winds variable 1-4 m/s SW direction

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Time</th>
<th>Results dB (T = 15 minutes)</th>
<th>Comments / Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$L_{A_{eq,T}}$</td>
<td>$L_{A_{max,T}}$</td>
</tr>
<tr>
<td>D. Wexford House</td>
<td>09:46</td>
<td>43</td>
<td>64</td>
</tr>
<tr>
<td>C. Wangford Farm</td>
<td>10:09</td>
<td>46</td>
<td>66</td>
</tr>
<tr>
<td>A. Lime Kiln Farm</td>
<td>10:31</td>
<td>48</td>
<td>63</td>
</tr>
<tr>
<td>C. Wangford Farm</td>
<td>10:52</td>
<td>52</td>
<td>80</td>
</tr>
<tr>
<td>B. Hill Farm</td>
<td>11:14</td>
<td>51</td>
<td>69</td>
</tr>
<tr>
<td>E. Nova Scotia Cottages</td>
<td>12:19</td>
<td>43</td>
<td>56</td>
</tr>
<tr>
<td>D. Wexford House</td>
<td>12:46</td>
<td>43</td>
<td>55</td>
</tr>
<tr>
<td>C. Wangford Farm</td>
<td>13:07</td>
<td>46</td>
<td>64</td>
</tr>
<tr>
<td>B. Hill Farm</td>
<td>13:28</td>
<td>50</td>
<td>68</td>
</tr>
</tbody>
</table>
Appendix D (continued)

Results and Observations
Thursday 08 February 2018, 09:45 to 15:35
Dry, sunny, cold 0.5°C increasing to 4°C, cloud cover ~20%, winds variable 1-4 m/s SW direction

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Time</th>
<th>Results dB (T = 15 minutes)</th>
<th>Comments / Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. Nova Scotia Cottages</td>
<td>13:51</td>
<td>L_{A_{eq},T} 44, L_{A_{max},f} 57, L_{A_{10},T} 47, L_{A_{90},T} 38</td>
<td>RT on A12 dominant source; birdsong; distant aircraft movements; bangs to west side of A12; geese noises; faint reversing alarm &amp; very low level plant noise in lulls of RT.</td>
</tr>
<tr>
<td>D. Wexford House</td>
<td>14:17</td>
<td>L_{A_{eq},T} 43, L_{A_{max},f} 57, L_{A_{10},T} 47, L_{A_{90},T} 38</td>
<td>Distant RT to S/SW direction; occasional dog barks; intermittent RT on Wangford Road (B1126); birdcalls; distant bangs from west direction; car at Reydon Hall.</td>
</tr>
<tr>
<td>A. Lime Kiln Farm</td>
<td>14:44</td>
<td>L_{A_{eq},T} 49, L_{A_{max},f} 65, L_{A_{10},T} 51, L_{A_{90},T} 43</td>
<td>Birdsong; distant RT (A12) to SW dominant; intermittent RT on Halesworth Road (A1095); Barn door rattle; excavation area plant just audible in RT lulls; bird scarer to west direction; car pass on adjacent track/road.</td>
</tr>
<tr>
<td>A. Lime Kiln Farm</td>
<td>15:18</td>
<td>L_{A_{eq},T} 48, L_{A_{max},f} 64, L_{A_{10},T} 51, L_{A_{90},T} 42</td>
<td>Birdsong; distant RT (A12) to SW dominant; intermittent RT on Halesworth Road (A1095); light aircraft movement; bangs from west direction.</td>
</tr>
</tbody>
</table>
Appendix E – Noise Calculation Method and Calculation Sheets

Specific noise levels are predicted or measured in terms of the Equivalent Continuous Noise Level, $L_{Aeq,T}$ over a given reference time interval, $T$. In the Planning Practice Guidance for the NPPF the time interval for daytime, evening and night the reference time interval is 1 hour.

The calculation method for any plant which is relatively fixed in location is that set out in BS 5228-1: 2009 + A1: 2014, Annex F, and is the “Method for activity $L_{Aeq}$” described in section F.2.2 or the “Method for plant sound power level” described in section F.2.3.

The calculation method for site mobile plant such as lorries and dump trucks is that set out in BS 5228-1: 2009 + A1: 2014, Annex F, and is the “Method for mobile plant using a regular well defined route (e.g. haul roads)” described in section F. 2.5.

Ground Absorption has been calculated using the technique set out in BS 5228-1: 2009 + A1: 2014, Annex F, assuming 50%, 75% or 90% soft ground between the extraction area and the receiver locations.

The method of assessing screening is that attributed to Maekawa as used in BS 5228-1: 2009 + A1: 2014, Annex F and various other Government published documents. This method uses the calculated path difference and octave band noise data for each noise source over the frequency range stated in BS 5228-1: 2009 + A1: 2014, Annex F.

The effects of ground absorption are not used in the calculations if screening has been assessed and offers a higher attenuation.

The nearest distances to the respective dwellings, from the various items of plant, have been used in an acoustic model for the site to calculate the reasonable worst case $L_{Aeq,T}$ site noise levels.

Summary site noise calculation sheets for one of the receiver locations are included below.
Appendix E (continued)
<table>
<thead>
<tr>
<th>Ref</th>
<th>Plant Item</th>
<th>Comments on Plant</th>
<th>Activity Power LWA dB LAeq, 1 hour</th>
<th>Source</th>
<th>1 hour</th>
<th>Capacity</th>
<th>Source Height</th>
<th>2 way/4 way</th>
<th>Speed</th>
<th>Plant Set back(m)</th>
<th>Resultant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Loading Shovel for Mineral Extraction/Loading</td>
<td>WBM/Plant Noise Database</td>
<td>78</td>
<td>106</td>
<td>100</td>
<td>2</td>
<td>0</td>
<td>-1.000</td>
<td>0</td>
<td>0</td>
<td>1 Activity</td>
</tr>
<tr>
<td>2</td>
<td>Mobile Screen in Extension Area</td>
<td>Measured on site 30.06.10</td>
<td>62</td>
<td>110</td>
<td>100</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>20 m back</td>
<td>1 Activity</td>
</tr>
<tr>
<td>3</td>
<td>Dump Truck Movements</td>
<td>WBM/Plant Noise Database</td>
<td>78</td>
<td>106</td>
<td>100</td>
<td>2</td>
<td>8</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>4 Heald Road</td>
</tr>
<tr>
<td>4</td>
<td>Processing Plant</td>
<td>WBM/Plant Noise Database</td>
<td>62</td>
<td>110</td>
<td>100</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 Activity</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Loading Shovel at Processing Plant</td>
<td>WBM/Plant Noise Database</td>
<td>78</td>
<td>106</td>
<td>100</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 Activity</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Plant item 6</td>
<td>-1027</td>
<td>-999</td>
<td>100</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 Activity</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Plant item 7</td>
<td>-1027</td>
<td>-999</td>
<td>100</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 Activity</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Plant item 8</td>
<td>-1027</td>
<td>-999</td>
<td>100</td>
<td>2</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>1 Activity</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Plant item 9</td>
<td>-1027</td>
<td>-999</td>
<td>100</td>
<td>2</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>1 Activity</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Plant item 10</td>
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<td>-999</td>
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<td></td>
</tr>
<tr>
<td>11</td>
<td>Plant item 11</td>
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<td>-999</td>
<td>100</td>
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<td>1 Activity</td>
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<tr>
<td>12</td>
<td>Plant item 12</td>
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<td>-999</td>
<td>100</td>
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<td>0</td>
<td>1 Activity</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Excavator for Temporary Works</td>
<td>WBM/Plant Noise Database</td>
<td>77</td>
<td>105</td>
<td>100</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 Activity</td>
</tr>
<tr>
<td>14</td>
<td>Dump Trucks for Temporary Works</td>
<td>WBM/Plant Noise Database</td>
<td>78</td>
<td>106</td>
<td>100</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 Activity</td>
</tr>
<tr>
<td>15</td>
<td>Dozer for Temporary Works</td>
<td>WBM/Plant Noise Database</td>
<td>60</td>
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<td>100</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 Activity</td>
</tr>
</tbody>
</table>

### Site Noise Level for Items 1 to 5

- **Receiver Height**: 1.5 m
- **Site Noise Limit**: 1 hour, free field

- **Plant Item 1**: 20 dB LAeq, 1 hour, free field
- **Plant Item 2**: 30.06.10
- **Plant Item 3**: 20 dB LAeq, 1 hour, free field

### Site Noise Limit for Items 13 to 15

- **Plant Item 13**: 20 dB LAeq, 1 hour, free field
- **Plant Item 14**: Defined Area
- **Plant Item 15**: 20 dB LAeq, 1 hour, free field

### Routine Operations

- **Plant Item 16**: 20 dB LAeq, 1 hour, free field
- **Plant Item 17**: Defined Area

### Temporary Operations

- **Plant Item 18**: 20 dB LAeq, 1 hour, free field
- **Plant Item 19**: Defined Area

### Plant Set back (m)

- **Plant Item 20**: 20 dB LAeq, 1 hour, free field
- **Plant Item 21**: Defined Area

### Resultant

- **Plant Item 22**: 20 dB LAeq, 1 hour, free field
- **Plant Item 23**: Defined Area

### Plant Item 24

- **Plant Item 25**: 20 dB LAeq, 1 hour, free field
- **Plant Item 26**: Defined Area

### Plant Item 27

- **Plant Item 28**: 20 dB LAeq, 1 hour, free field
- **Plant Item 29**: Defined Area