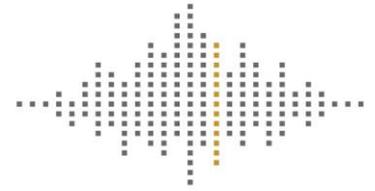


SHARPS REDMORE

ACOUSTIC CONSULTANTS ▪ Established 1990



Report

Proposed Mixed Use Development at Site M11, Masham

BS 4142:2014

Acoustic Report

Prepared by

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1.0 Introduction

- 1.1 Sharps Redmore has been instructed by Planning Potential on behalf of G & C Jameson to carry out a BS 4142:2014 noise assessment to accompany our previous environmental noise assessment (reference: R1-2.3.17-Proposed Mixed Use Site M11, Masham-1716665-JRT), which was supporting a planning application for a new residential development on site M11 in Masham, North Yorkshire. The site is being proposed for a mixed use development of residential housing to the south and small commercial units to the north.
- 1.2 Our earlier noise assessment was declared as inadequate by the environmental health department of Harrogate Borough Council, which did not provide sufficient information in regards to BS 4142:2014. The objective of the previous report was to consider the noise impact from the nearby corn mill, owned and operated by G & C Jameson, on the proposed residential development and establish if a compliant noise environment could be achieved. Based on the nationally recognised methodology and criteria within the report, it concluded that with sufficient noise mitigation a compliant acoustic environment could be created for the dwellings.
- 1.3 The objective of this assessment is to determine the impact of the existing corn mill on the proposed residential development. To determine this impact the assessment is based on the British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound'.
- 1.4 This study considers the noise levels against BS 4142:2014 and utilises the recommendations made using noise mitigation measures highlighted in the previous report to ensure acceptable noise environment for future residents against present other international and national guidelines.
- 1.5 The corn mill itself produces animal feed and is an industrial type noise. The plant and equipment used in this facility includes grain dryers, grinders, presses, hoppers, front end loaders and HGV movements, among others. This facility forms the main emphasis of the noise impact to the proposed new residential dwellings and each significant mill operation will be assessed for its impact.
- 1.6 The site is to the west of The Oaks in Masham, with current access off Foxholme Lane.
- 1.7 Section 2.0 of this report contains a discussion of the available methodology and assessment criteria. Section 3.0 contains details of the environmental noise survey. Section 4.0 considers the BS 4142 assessment.
- 1.8 A guide to acoustic terminology used within this report is included in Appendix A and the BS 4142 calculations are in Appendix B. Appendix C shows survey details in a graphic form.

2.0 Methodology and criteria

National Policy

2.1 The National Planning Policy Framework (NPPF) sets out the Government's economic, environmental and social planning policies for England and "these policies articulate the Government's vision of sustainable development." In respect of noise, Paragraph 123 of the NPPF states the following:

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 condition;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason

2.2 The NPPF reinforces the March 2010 DEFRA publication, "Noise Policy Statement for England" (NPSE), which states three policy aims, as follows:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life."*

2.3 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

"... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."

2.4 Following the revocation of Planning Policy PPG 24: Planning and Noise, the above documents contain the national and local policies aims in relation to noise and planning.

- 2.5 These do not contain technical advice; however, there is the existence of technical design standards contained within the World Health Organisation Guideline Values and British Standard (BS) 8233:2014. These documents support the current national policy guidance contained within the NPPF and Noise Policy Statement for England 2010 (the WHO guidelines are specifically referenced in the Noise Policy Statement for England.)
- 2.6 Both the above documents focus on the achievement of acceptable living standards for future developments when the development is complete, rather than the PPG 24 approach that concentrated only on the open site external noise environment before development and before any mitigation measures are introduced.
- 2.7 The WHO guideline values are appropriate to what are termed “critical health effects”. This means that the limits are at the lowest noise level that would result in any psychological, physiological or sociological effect. They are, as defined by the NPSE, set at the Lowest Observed Adverse Effect Level (LOAEL), but do not define the Significant Observed Adverse Effect Level (SOAEL). Compliance with the LOAEL should therefore, be seen as a robust aim.
- 2.8 The World Health Organisation LOAEL guideline values and BS 8233: 2014 are summarised in the following table:

Table 1: Guideline values

Document	Level	Guidance
World Health Organisation “Community Noise 2000”	$L_{AeqT} = 55$ dB	Serious annoyance, daytime and evening. (Continuous noise, outdoor living areas)
	$L_{AeqT} = 50$ dB	Moderate annoyance, daytime and evening. (Continuous noise, outdoor living areas)
	$L_{AeqT} = 35$ dB	Moderate annoyance, daytime and evening. (Continuous noise, dwellings, indoors)
	$L_{AeqT} = 30$ dB	Sleep disturbance, night-time (indoors)
	$L_{AMAX} = 60$ dB	Sleep disturbance, windows open at night. (Noise peaks outside bedrooms, external level)
	$L_{AMAX} = 45$ dB	Sleep disturbance at night (Noise peaks inside bedrooms, internal level)
BS 8233:2014 “Sound Insulation and noise reduction for buildings”	$L_{AeqT} = 55$ dB	Upper limit for external steady noise. (gardens and patios)
	$L_{AeqT} = 50$ dB	Desirable limit for external steady noise. (gardens and patios)
	$L_{Aeq\ 16\ hours} = 35$ dB	Resting, living room day. (Internal – steady noise)
	$L_{Aeq\ 16\ hours} = 40$ dB	Dining, dining room day. (Internal – steady noise)
	$L_{Aeq\ 16\ hour} = 35$ dB	Sleeping, bedroom day (Internal – steady noise)
	$L_{Aeq\ 8\ hours} = 30$ dB	Sleeping, bedroom night (Internal – steady noise)

2.9 Combining the two sets of guidance would give the following design targets for new dwellings, which would represent compliance with the robust LOAEL:

Gardens	L_{AeqT}	=	55 dB
Living rooms	L_{AeqT}	=	35 dB
Bedrooms	L_{AeqT}	=	30 dB
	L_{AMAX}	=	45 dB

2.10 This is considered a robust but balanced view in the context of current policy towards supporting residential development. These criteria have been discussed with a number of local authorities and have been considered robust design targets. Where a development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal targets may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

2.11 BS 8223:2014 considers outdoor areas and external amenity areas (gardens and patios) and the revision recognises that where design standards cannot be achieved for these traditional amenity spaces then the 'lowest practical levels' should be achieved. A robust aim would be to achieve the WHO guidelines for daytime outdoor living areas, although in some developments these absolute limits may not be achievable.

Assessment using BS 4142:2014

2.12 As outlined, this British Standard enables the significance of sound impact to be determined in relation to industrial and commercial sources. The significance of sound impact is to be determined according to the following summary process:

- i. Determine the background sound levels, in terms of L_{A90} , at the receptor locations of interest.
- ii. Determine the specific sound level of the source being assessed, in terms of L_{AeqT} level ($T = 1$ hour for day or 15 minutes at night), at the receptor locations.
- iii. Apply a rating level acoustic feature correction if the source sound has tonal, impulsive, intermittent or other characteristic which attract attention.
- iv. Compare the rating sound level against the background noise level; the greater the difference between the two, the higher the likelihood of adverse impact.
- v. Differences (rating – background) of around +10 dB are likely to be an indication of significant adverse impact (SOAEL) depending on context; a difference of +5 dB is likely to be an indication of adverse impact, depending on context. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon context.
- vi. The general intent of the planning system is to ensure that a development avoids significant adverse noise impact. BS 4142:2014 considers that the threshold of significant adverse impact is "*a difference around +10 dB or more... depending upon the context*".

2.13 BS 4142:2014 is a radical departure from the assessment methodology of the former 1997 Edition. There are a number of key changes to BS 4142:2014 that are worthy of consideration in the 'context' of this noise assessment; these are:

- Sound and noise;
- Title/Scope;
- Context;
- Acoustic feature corrections;
- Uncertainty.

Sound and noise

2.14 Throughout the 2014 version of BS 4142, great care is taken to use the word 'sound' as opposed to 'noise'. The foreword to the new version explains that *"Response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact, for example, can depend on such factors as the margin by which a sound exceeds the background sound level, its absolute level, time of day and change in the acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood. This edition of the standard recognizes the importance of the context in which a sound occurs. Great care has, therefore, been taken in the use of the words 'sound' and 'noise'. Sound can be measured by a sound level meter or other measuring system. Noise is related to a human response and is routinely described as unwanted sound, or sound that is considered undesirable or disruptive."*

Title/Scope

2.15 The 2014 edition of BS 4142 is entitled *"Methods for rating and assessing industrial and commercial sound"*; this is different to the former 1997 version of BS 4142 which was entitled *"Method for Rating industrial noise affecting mixed residential and industrial areas"*.

2.16 The scope to the 1997 edition limited the standard to the rating of noise from factories, or industrial premises, or fixed installations, or sources of an industrial nature in commercial premises to determine the likelihood of complaint. The scope of BS 4142:2014 has been broadened to provide a method for rating and assessing sound of an industrial and or commercial nature. The scope now specifically includes sound from industrial and manufacturing processes, sound from fixed plant, sound from loading and unloading of goods at industrial and commercial sites and mobile plant forming an intrinsic part of the overall sound from a premises or process.

Context

2.17 BS 4142:2014 introduces the concept of 'context' to the process of identifying noise impact. Section 11 of BS 4142:2014 explains *"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs"* (my emphasis). *"An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context"* (my emphasis).

2.18 There are many context points to consider when undertaking an assessment of sound impact including:

- The absolute level of sound;
- The character and level of the specific sound in the context of the existing noise climate; for example is the sound to occur in a location already characterised by similar activities as those proposed?
- The sensitivity of the receptors;
- The time and duration that the specific sound is to occur;
- The conclusions of assessments undertaken using alternative assessment methods, for example WHO guidelines noise values or change in noise level;
- The ability to mitigate the specific sound through various methods, for example by screening, the selection of quiet plant equipment, the use of attenuators and louvres, through the imposition of noise management plans and good practice, façade design and layout/orientation;
- The form and scale of a development. For example, does the proposed development involve a new industrial or commercial premises being built or is the proposal the installation of new plant or an extension to an existing premises?

2.19 It is therefore entirely possible that whilst the numerical outcome of a BS 4142 assessment is indicative of adverse or significant adverse impact, when the proposal is considered in context the significance of the impact is reduced to an acceptable level.

Acoustic feature corrections

2.20 The revised BS 4142:2014 offers an overhaul to the way in which previous editions of the Standard applied a rating penalty for acoustic character. Until the release of the 2014 version, the BS 4142 assessment methodology allowed for the addition of a single 5 dB rating level correction to the specific sound for acoustic features such as tonality, impulsiveness or if the noise was irregular enough to attract attention.

2.21 BS 4142:2014 extensively changes the way in which a rating level correction is to be applied. The new Standard allows up to 6 dB to be added to the specific sound level for tonality, with a rating correction of up to 9 dB to be added depending on the degree of impulsivity; both of these rating level corrections can be added together in linear fashion if required. Where the source is neither tonal nor impulsive but that a feature characteristic is present that makes the sound source readily distinctive a correction of 3 dB can be added. Finally a correction of 3 dB can be applied for intermittency.

2.22 Hence under the methodology of BS 4142:2014 noise sources that would formerly have only been corrected by up to 5 dB (using BS 4142:1997), may now be corrected by up to 15 dB which could significantly influence the outcome of the assessment. It is for reasons such as this that the context of an assessment is extremely important.

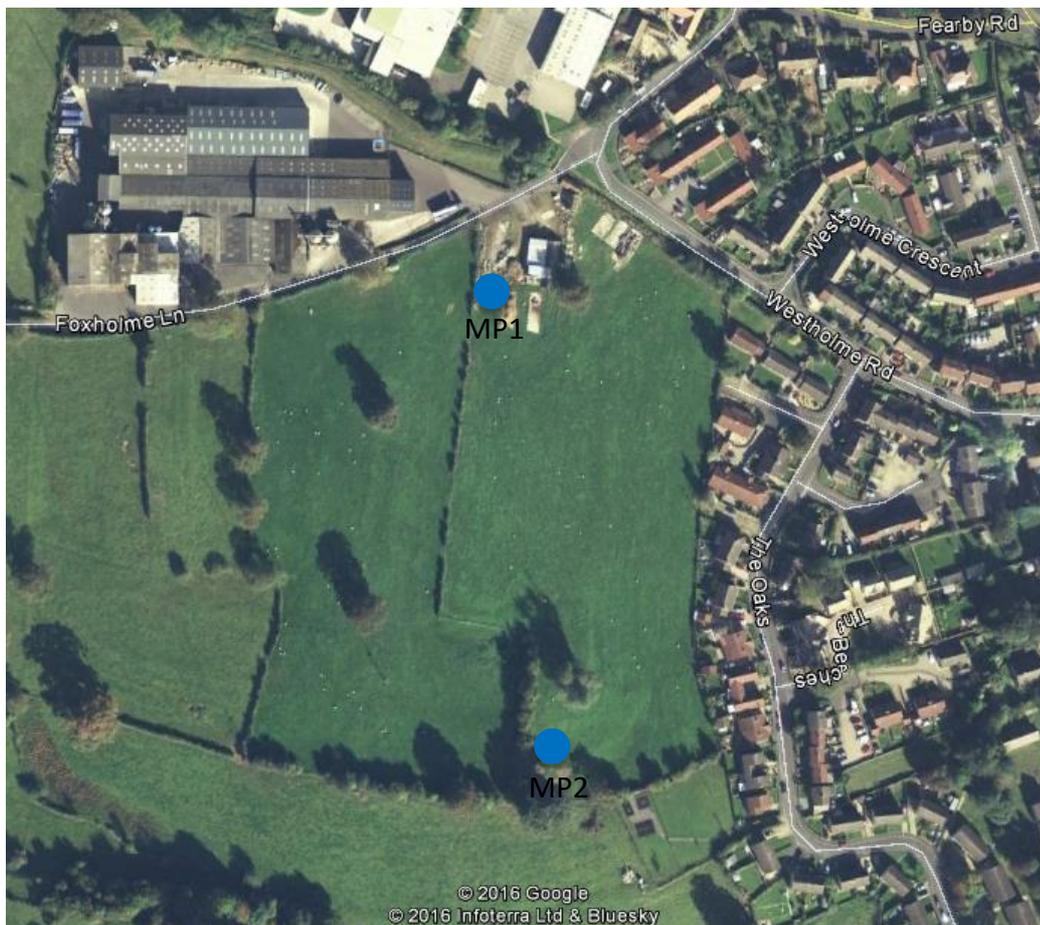
Uncertainty

- 2.23 The assessment methodology now includes for the issue of uncertainty to be taken into consideration. The Standard explains how to reduce the element of uncertainty through good practice. The new examples in Annex A of the Standard show how uncertainty is to be included in the calculation, however the examples are unclear on how one defines a numerical value to place on uncertainty.

3.0 Noise survey

3.1 An environmental noise survey was carried out on the 25th to 26th of January 2017. Fixed locations were set up at the positions shown in Figure 1 below. The measurement locations MP1 and MP2 were chosen to be representative of the residential developments. MP1 was considered to be representative of the closest residential facades to the mill. MP2 was considered representative of the housing development to the rear of the site, less affected by noise from the mill.

Figure 1: Monitoring Locations



3.2 Numerous handheld measurements were also recorded of the typical activities that occur in and around the mill on the 25th January 2017, with particular focus on the noisiest activities. These were undertaken on the side of the mill where noise would potentially have the worst impact upon the proposed residential development.

3.3 The fixed position sound level measurements were carried out over a 24 hour period. The survey was undertaken using Norsonic 118 Type 1 precision sound level meters. The handheld measurements were undertaken using a B&K 2260 type 1 meter. The sound level meters were calibrated before and after the survey with no variation in accuracy noted. The weather conditions during the survey were dry, with light winds (<5 m/s). 15 minute samples were continuously logged over the survey periods. The equipment used, and the measurement procedures employed, complied with the requirements of BS 4124:2014.

- 3.4 Survey results are summarised below in Tables 2 and 3 and at Appendix C in graphic form. (Full survey data is available). MP1 is closest to the mill and the northern end of the site and MP2 is representative of the proposed residential development to the southern end of the site.

Table 2: Daytime Levels: 25th -26th January 2017

dB	L _{Aeqt}	L _{Amax}	L _{Amin}	L _{A10}	L _{A90}
MP1					
Range	34-56	45-71	28-48	36-58	30-52
MP2					
Range	37-49	45-75	30-41	39-52	34-44

Table 3: Night time Levels: 25th -26th January 2017

dB	L _{Aeqt}	L _{Amax}	L _{Amin}	L _{A10}	L _{A90}
MP2					
Range	37-46	42-62	32-38	39-49	34-40

- 3.5 The results of the handheld noise measurements are given in Table 4 below.

Table 4: Handheld measurement results of typical operations at mill

File Number	Noise Level dB	Comments	Level at Site M11
0002	73 L _{Aeq}	Corn Treatment at 5m (runs for 2mins / off for 2 mins approx.)	48 dB
0003	83 L _{Aeq}	Inside main mill building (with pellet presses and grinders)	--
0004	94 L _{Amax}	Pallet dropped in main building at 15m (1m outside main doors)	68 dB
0005	78 L _{Aeq}	1m outside main doors (4m x 13m opening)	--
0006	72 L _{Aeq}	10m outside main doors	49 dB
0007	67 L _{Aeq}	20m outside main doors	50 dB
0008	81 L _{Aeq}	Tractor movement at 3m on weighbridge	50 dB
0009	105 L _{Amax}	Lorry horn at 4m (beeps to communicate with loader to start, then beeps again to stop at desired weight). Current technique used	74 dB
0010	71 L _{Aeq}	Squeaking plant on corn treatment lift (no corn)	--
0011	72 L _{Aeq}	Corn treatment at 20m with corn lift operating (with corn)	59 dB
0012	75 L _{Aeq}	Front loader operating at 5m	50 dB
0013	79 L _{Aeq}	Corn Treatment at 8m with corn lift operating (with corn)	58 dB
0014	94 L _{Aeq}	Corn dryers at 10m (other side of site)	--
0015	50 L _{Aeq}	Field site boundary closest to mill - Dryers ON	50 dB
0016	49 L _{Aeq}	Field site boundary closest to mill - Dryers OFF	49 dB
0017	88 L _{Amax}	Front loader reversing alarm at 5m - in barn store closest to site	57 dB
0018	70 L _{Aeq}	Front loader at 5m from shed main door - barn store closest to site	45 dB

- 3.6 These handheld measurements cover all the noisy activities that are expected to occur at the mill. This included running up equipment that only operates at set times in the year (such as the corn dryers at file 0014) to enable a complete snap shot of all operations at the mill that could impact upon the proposed residential development.
- 3.7 Most measurements were undertaken on the Foxholme Lane side of the mill, as this is the closest side to the proposed development site. The only exception was the corn dryer, which is located to the west of the site. The dryer was noted as the noisiest plant on the site when running. However, due to site positioning the corn dryers had no impact on the development site (see file numbers 0015 and 0016).
- 3.8 Table 4 also shows the predicted level at the boundary of site M11. As it can be seen the typical noise levels from most activities is 50 dB, which was also measured at the boundary (file number 0016). Some activities, such as the corn treatment process at the front of the site (incorporating the two large corn storage bins) exceed this level with a predicted site boundary level of 59 dB.
- 3.9 There were three prominent L_{Amax} levels recorded during the survey. These occurred from lorry horns, the dropping of wood pallets and reversing alarms. These were predicted to be 74 dB, 68 dB and 57 dB, respectively, at the boundary of site M11.
- 3.10 More generally it was noted the noises that subjectively caused the most disturbance were the reversing alarms on the front end loaders and forklift trucks, which were intermittently in operation over most of the day. By their very nature these alarms draw attention to themselves and are known to cause nuisance within residential areas.
- 3.11 It was noted that on the far south of the development site noise from the other animal feed mill, l'Anson Bros Ltd, could be heard, although at a low level compared to ambient.
- 3.12 These results will be used in this assessment of the site.

4.0 BS 4142:2014 Assessment

- 4.1 The individual items of noise producing plant have been measured. From this the loudest activities were established and their relative operation duration and frequency over the course of a worst case one hour period.
- 4.2 W E Jameson & Son Ltd is in operation typically between 6am to 6pm, with occasional days where they operate until 9pm. During this time any number of activities can occur, as listed above.
- 4.3 Most of the equipment is expected to operate during the daytime. Where equipment may operate between 6am to 7am, this has been assessed as a night time activity.
- 4.4 With regard to the assessment of industrial noise sources, BS 4142:2014 enables the resultant noise from equipment to be compared to the existing background noise level (L_{A90}) of an area to assess the likelihood of complaints.
- 4.5 The closest noise sensitive properties on the proposed development in relation to the Mill are at the top left hand corner. The assessment will be made to this closest location. It should be noted that properties further into the development and at a greater distance would have less of an impact from plant at the Mill.
- 4.6 BS 4142:2014 requires that a representative background noise level should be used for the period being assessed. It is assumed that the mill will operate continuously during the operation period. Therefore using the background noise level measured the representative level has been determined to be the lowest recorded 32 dB $L_{A90,1hr}$ during the day and 32 dB $L_{A90,15min}$ during the night time period.
- 4.7 The following table 5 shows the selected noisiest activities from the mill to form the BS 4142:2014 assessment and shows the distance attenuation to the closest proposed dwelling.

Table 5: Mill Noise at Receptor

Mill Noise Activity	Noise Levels		
	Noise level at mill	Attenuation	Noise at closest dwelling
A: The main Mill building	72 dB @ 10m	$20\log(10/140)$ = -23	49 dB
B: Front Loader in closest barn	70 dB @ 5m	$20\log(5/92)$ = -25	45 dB
C: Corn treatment bins	73 dB @ 5m	$20\log(5/92)$ = -25	48 dB
D: Corn treatment using grain lift	72 @ 20m	$20\log(20/92)$ = -13	59 dB
E: Lorry Horn used during loading	104 dB @ 4m	$20\log(4/130)$ = -30	74 dB

- 4.8 Noise levels recorded on the proposed development site at the location of the closest dwelling were 49 dB with the mill operating. This confirms that the above calculated noise levels are correct.

4.9 Using the above calculated levels an assessment of mill related noise levels using the methodology in BS 4142:2014 has been completed and are presented in Appendices B1 to B5. An assessment of the above five impacts in table 5, A to E, at the closest proposed dwelling during the daytime (0700 – 2300 hrs) period and night time period (2300 – 0700) in provided; where such an activity would be expected to occur during the night time period. Background noise levels used in the assessment are based on para. 4.6 above. Table 6 below summarises the rating level of mill noise before any noise mitigation is considered.

Table 6 – BS 4142:2014 Assessment Results (without mitigation)

Noise Source	Rating Level at dwelling	BS 4142 guidance
A: Main mill – Daytime	+17	significant adverse impact subject to context
A: Main mill – Night Time	+17	significant adverse impact subject to context
B: Front loader – Daytime	+8	likely adverse impact subject to context
B: Front loader – Night Time	+14	significant adverse impact subject to context
C: Corn treatment bins – Daytime	+16	significant adverse impact subject to context
C: Corn treatment bins – Night Time	+16	significant adverse impact subject to context
D: Corn treatment grain lift– Daytime	+27	significant adverse impact subject to context
E: Lorry Horn during loading– Daytime	+40	significant adverse impact subject to context

4.10 The guidance in BS 4142:2014, Section 11, states:

- a) Typically, the greater this difference, the greater the magnitude of the impact.*
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- d) The lower the rating level is relative to the measured background sound level; the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context”.*

4.11 The conclusions of the previous environmental report recommended that a 2.1 metre fence is constructed on the boundary to provide approximately 10 dB of attenuation to ground floor spaces (e.g. the garden). Including this noise mitigation in to the assessment provides the following updated results in Table 7 for daytime periods.

Table 7 – BS 4142:2014 Assessment Results with mitigation (daytime)

Noise Source	Rating Level at dwelling	BS 4142 guidance
A: Main mill – Daytime	+7	likely adverse impact subject to context
B: Front loader – Daytime	-2	low impact subject to context
C: Corn treatment bins – Daytime	+6	likely adverse impact subject to context
D: Corn treatment grain lift– Daytime	+17	significant adverse impact subject to context
E: Lorry Horn during loading– Daytime	+30	significant adverse impact subject to context

- 4.12 As explained in section 2.0 of this report, Section 11 of BS 4142:2014 explains “The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs.”
- 4.13 The BS 4142 assessment at Appendices B1 to B5 summarises the key contextual considerations in this instance. The first is how the mill activity noise levels compare to the WHO guideline noise values; Table 8 below shows this comparison.

Table 8: Comparison of mill noise levels with the WHO guideline noise values

Mill Noise Activity	Noise Levels			
	Noise at closest dwelling Daytime	Noise at closest dwelling Night Time	WHO guideline value Daytime	WHO guideline value Night Time
A: The main Mill building	39 dB	49 dB	≤55 dB L _{Aeq16hr}	≤45 dB L _{Aeq8hr}
B: Front Loader in closest barn	35 dB	45 dB		
C: Corn treatment bins	38 dB	48 dB		
D: Corn treatment using grain lift	49 dB	n/a		
E: Lorry Horn used during loading	64 dB	n/a	n/a	≤60 dB L _{Amax}

- 4.14 The calculated daytime noise levels from mill activities are below the WHO daytime guideline values. Therefore mill activities during the daytime would not cause disturbance or significant impact to local residents.

- 4.15 The calculated night time noise levels from mill activities are generally just over the WHO night time guideline values. It should be noted that night time values are calculated at first floor height, hence the loss of the screening affect provided by the 2.1m fence. However, it is the internal noise levels that are more appropriate at this time. If the windows were left open for ventilation, there is approximately a 15 dB reduction from external to internal levels. Hence the internal noise levels in a worst case bedroom would be between 30 dB and 34 dB, where WHO night time criteria suggests the Lowest Observed Adverse Effect Level is 30 dB. This is not far in excess of the LOAEL.
- 4.16 Additionally, it should be noted that the recommended internal night time noise levels are based on 8 hour average levels, hence a fluctuation between this level would be expected over the duration of the 8 hour period. The mill would only operate for the last 1 hour of the nigh time period and so the average 8 hour would be far less in reality. To assess and compare the last hour as representative for the whole night is beyond recognised practices, but does show a worst case snapshot of the night. Therefore, with consideration it is considered that mill activities during the night time will not cause disturbance or significant impact to local residents.
- 4.17 The second contextual consideration is the impact on the existing noise climate. The mill is currently operating and forms the basis of the noise environment in the localised area, including to the long established residential area of Masham. The mill is a long established and well known business in the local area and is not known for creating a noise nuisance to the general population. Occupants of the proposed residential development would be aware of the facility and subsequent noise production, and with the noise mitigation as recommended the noise level would not be excessive when compared with guidance documents.
- 4.18 It should also be reminded that this assessment has been made to the worst case dwelling. Noise levels would decrease with distance and screening offered by the houses themselves.
- 4.19 BS 4142:2014 requires that areas of uncertainty in the assessment are considered and the impact on the assessment results reported. The noises measured from the mill were recreated to be worst case examples of the typical activities that occur. In general use these activities or events would only occur occasionally or seasonally. The general noise of the mill itself would be the main contributor of noise and would in fact mask out many of the other activities that are at a similar noise level to the mill.
- 4.20 Therefore having assessed the impact of the mill using the three main noise assessment methods available it is concluded that the noise impact on the proposed residential development would be reasonable considering the context of existing mill, the mitigation proposed in our previous report and the assessment to recognised guidance noise levels.

5.0 Conclusions

- 5.1 An assessment has been undertaken in line with BS 4142:2014. The assessment includes the finding of our previous noise report, including mitigation measures and comparing to other recognised guidance documents, to provide further detail in the acoustic assessment of the proposed residential development site.
- 5.2 Taking into account the above assessment and having reviewed the main noise impacts from the mill against national standards, and taking into account the existing noise climate, it is concluded that the site can be developed as a residential development without causing significant impact or disturbance to new local residents as advised by the National Planning Policy Framework.
- 5.3 This assessment is in accordance with the policy aims of the National Planning Policy Framework (para 123), Noise Policy statement for England, World Health Organisation Guidelines for Community Noise 1999, BS 8233:2014 and local aims.

APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

Appendix A: Guide to Acoustic Terminology

Ambient noise:

The totally encompassing sound in a given situation at a given time. Most often described in terms of the index L_{AeqT} .

A-weighting:

A frequency weighting which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Units may be denoted as dB(A) or as sound pressure levels L_{pA} in dB. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound.

Background noise:

See L_{A90} .

Decibel (dB):

A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 μ Pa, the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.

Façade noise level:

The noise level adjacent to the façade of a building, usually at a distance of 1 metre.

Free-field noise level:

The noise level away from the façade of a building or other structure.

Hertz (Hz):

Unit of frequency, equal to one cycle per second. Frequency is related to the pitch of a sound.

Parameters:

L_{A10T} : The A weighted level of noise exceeded for 10% of the specified measurement period, T. It gives an indication of the upper limit of fluctuating noise such as that from road traffic. $L_{A10,18hr}$ is the arithmetic average of the 18 hourly $L_{A10,1hr}$ values from 0600 hrs to 2400 hrs.

L_{A90T} : The A weighted noise level exceeded for 90% of the specified time period, T. In BS 4142:2014 it is used to define background noise level.

L_{AeqT} : The equivalent continuous sound level - the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period, T. This period is taken to be 16 hours (0700 hrs to 2300 hrs) and 8 hours (2300 to 0700 hrs) to describe day and night, in the former PPG 24 L_{AeqT} is used to describe many types of noise and can be measured directly with an integrating sound level meter.

SEL or L_{AE} : The sound exposure level is the A-weighted sound energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. This allows for comparisons to be made between different noise events which occur for different lengths of time.

APPENDIX B

BS 4142:2014 ASSESSMENT

Appendix B1

Main Mill Noise Assessment

Results	Time period		Relevant clause	Commentary
	Daytime	Night time		
Receptor	Closest dwelling on proposed development			
Background sound level dB (L_{A90})	32 dB	32 dB	8.1, 8.1.3	For night time (2300 to 0700 hours) background sound level is the lowest 15 minute L_{A90} sample in the hour; for daytime the background sound level is the $L_{A90\ 1hour}$ value
Specific sound level - predicted event noise level	49 dB	49 dB		Predicted mill noise level is $L_{Aeq\ 15\ minutes}$ for night time and $L_{Aeq\ 1\ hour}$ for daytime.
Acoustic feature correction	+0 dB	+0 dB	9.2	The main noise of the mill is not tonal, impulsive or intermittent. As such no correction is applied to the level.
Rating level	49 dB	49 dB	9.2	
Background sound level	32 dB	32 dB	8.1 8.1.3	
Excess of rating level over background level	+17	+17	11	
Assessment indicates a likelihood of significant adverse impact.	<p>Relevant clause 11</p> <p>The context is:</p> <ol style="list-style-type: none"> 1. Predicted delivery event noise levels ($L_{Aeq\ 1\ hour}$) are below the WHO daytime guideline values 2. The mill noise levels are well above the background noise level in the area. However, the existing noise environment is created by the mill. It is not a new source of noise. 3. This is the assessment before any noise mitigation has been considered. 			

Appendix B2

Front loader operating within barn closest to proposed development

Results	Time period		Relevant clause	Commentary
	Daytime	Night time		
Receptor	Closest dwelling on proposed development			
Background sound level dB (L_{A90})	32 dB	32 dB	8.1, 8.1.3	For night time (2300 to 0700 hours) background sound level is the lowest 15 minute L_{A90} sample in the hour; for daytime the background sound level is the L_{A90} 1hour value
On time correction	$L_{Aeq,1hr} = 10\lg(600/3600) = -8$	$L_{Aeq,1hr} = 10\lg(600/900) = -2$	7.3.14	The front loader is intermittent in operation and only operates on occasions when needed. This occurred for no longer than 10 minutes at a time. Correction as per equation (4).
Specific sound level - predicted event noise level	37 dB	43 dB		Predicted front loader noise level is $L_{Aeq 15\text{ minutes}}$ for night time and $L_{Aeq 1\text{ hour}}$ for daytime.
Acoustic feature correction	+3 dB	+3 dB	9.2	The front loader is intermittent. As such a correction is applied to the level.
Rating level	40 dB	46 dB	9.2	
Background sound level	32 dB	32 dB	8.1, 8.1.3	
Excess of rating level over background level	+8	+14	11	
Assessment indicates a likely adverse impact.	<p>Relevant clause 11</p> <p>The context is:</p> <ol style="list-style-type: none"> 1. Predicted front loader event noise levels ($L_{Aeq 1\text{ hour}}$) are below the WHO daytime guideline values and ($L_{Aeq 15\text{ minutes}}$) for night time values. 2. The front loader noise levels are above the background noise level in the area. However, the existing noise environment created by the mill would mask over the noise of the front loader. 3. The front loader will not be in operation constantly and would be used intermittently. 4. This is the assessment before any noise mitigation has been considered. 			

Appendix B3

Corn Treatment Bins

Results	Time period		Relevant clause	Commentary
	Daytime	Night time		
Receptor	Closest dwelling on proposed development			
Background sound level dB (L_{A90})	32 dB	32 dB	8.1, 8.1.3	For night time (2300 to 0700 hours) background sound level is the lowest 15 minute L_{A90} sample in the hour; for daytime the background sound level is the L_{A90} 1hour value
On time correction	$L_{Aeq,1hr} = 10\lg(1800/3600) = -3$	$L_{Aeq,1hr} = 10\lg(450/900) = -3$	7.3.14	The corn treatment unit is intermittent in operation and operates with a period of 2 minutes on 2 minutes off. Correction as per equation (4).
Specific sound level - predicted event noise level	45 dB	45 dB		Predicted corn treatment noise level is $L_{Aeq, 15\text{ minutes}}$ for night time and $L_{Aeq, 1\text{ hour}}$ for daytime.
Acoustic feature correction	+3 dB	+3 dB	9.2	The corn treatment unit is intermittent. As such a correction is applied to the level.
Rating level	48 dB	48 dB	9.2	
Background sound level	32 dB	32 dB	8.1, 8.1.3	
Excess of rating level over background level	+16	+16	11	
Assessment indicates a likelihood of significant adverse impact.	<p>Relevant clause 11</p> <p>The context is:</p> <ol style="list-style-type: none"> 1. Predicted corn treatment noise levels ($L_{Aeq, 1\text{ hour}}$) are below the WHO daytime guideline values and meets it ($L_{Aeq, 15\text{ minutes}}$) for night time values. 2. The corn treatment noise levels are well above the background noise level in the area. However, the existing noise environment created by the mill would mask over the noise of the corn treatment bins. 3. The corn treatment bins will not be in operation constantly and would be used intermittently. 4. This is the assessment before any noise mitigation has been considered. 			

Appendix B4

Corn Treatment Bins being filled using grain lift

Results	Time period		Relevant clause	Commentary
	Daytime	Night time		
Receptor	Closest dwelling on proposed development			
Background sound level dB (L _{A90})	32 dB		8.1, 8.1.3	For night time (2300 to 0700 hours) background sound level is the lowest 15 minute L _{A90} sample in the hour; for daytime the background sound level is the L _{A90 1hour} value
On time correction	L _{Aeq,1hr} = 10lg(1800/3600) = -3		7.3.14	The corn treatment grain lift is intermittent in operation and operates for approximately 30 mins at a time, although is only operated at set times of the year. Correction as per equation (4).
Specific sound level - predicted event noise level	56 dB			Predicted activity noise levels L _{Aeq 1 hour} for daytime. This activity would not occur during the night time period.
Acoustic feature correction	+3 dB		9.2	The corn treatment unit is intermittent. As such a correction is applied to the level.
Rating level	59 dB		9.2	
Background sound level	32 dB		8.1, 8.1.3	
Excess of rating level over background level	+27		11	
Assessment indicates a likelihood of significant adverse impact.	<p>Relevant clause 11</p> <p>The context is:</p> <ol style="list-style-type: none"> 1. Predicted delivery event noise levels (L_{Aeq 1 hour}) are exceeding the WHO daytime guideline values 2. The corn treatment grain lift noise levels are well above the background noise level in the area. However, the existing noise environment created by the mill would mask some of the noise although it would be noticeable. 3. This operation does not occur often and only for a limited time when it does. 			

Appendix B5

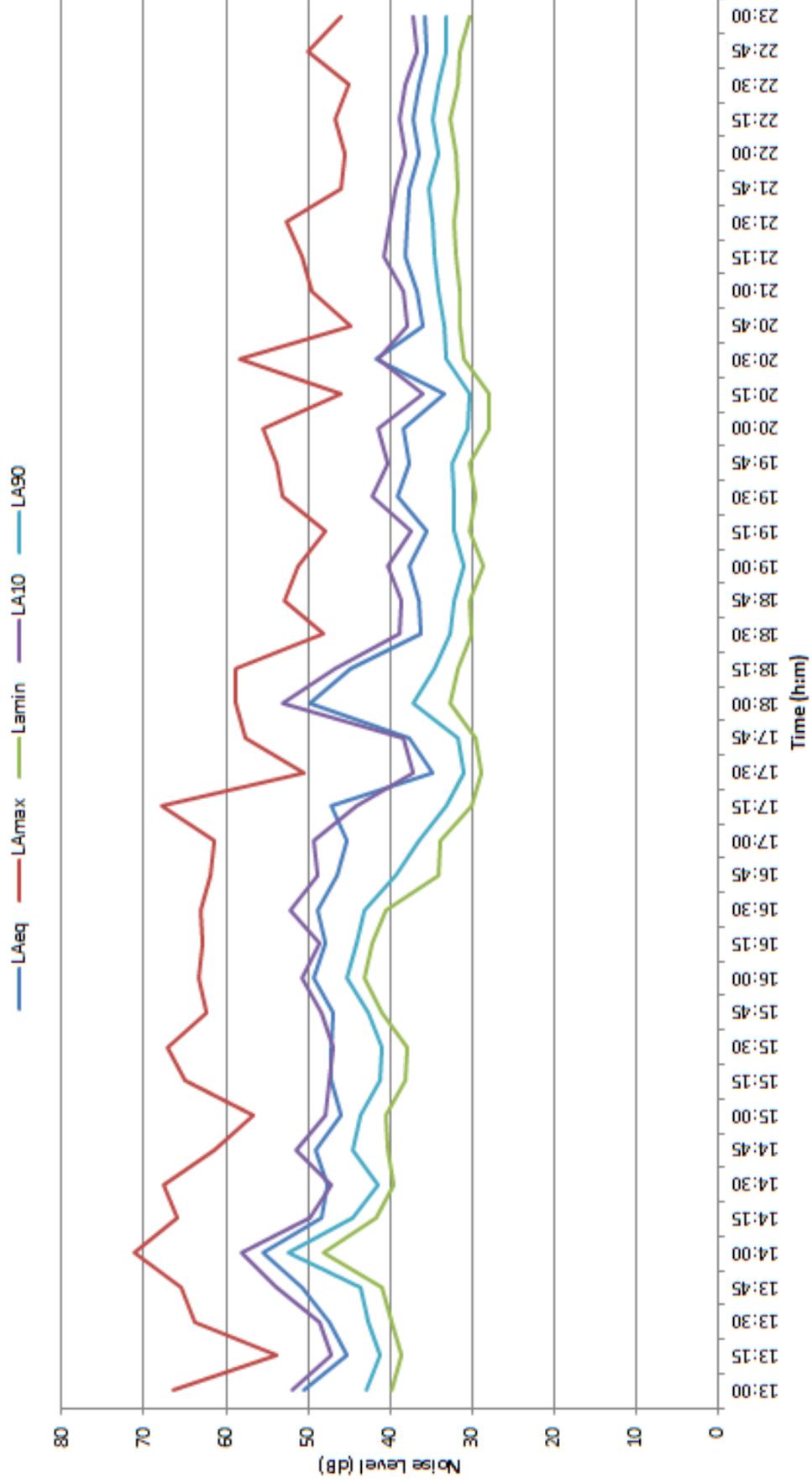
Lorry Horn used during loading

Results	Time period		Relevant clause	Commentary
	Daytime	Night time		
Receptor	Closest dwelling on proposed development			
Background sound level dB (L_{A90})	32 dB		8.1, 8.1.3	For night time (2300 to 0700 hours) background sound level is the lowest 15 minute L_{A90} sample in the hour; for daytime the background sound level is the $L_{A90 \text{ 1hour}}$ value
On time correction	$L_{Aeq,1hr} = 10\lg(40/3600) = -20$		7.3.14	The lorry horn operates for approximately 1 second at a time. This could occur up to 40 times at worst case, typically much less. Correction as per equation (4).
Specific sound level - predicted event noise level	54 dB			Predicted activity noise levels $L_{Aeq \text{ 1 hour}}$ for daytime. This activity would not occur during the night time period.
Acoustic feature correction	+18 dB		9.2	The lorry horn is very tonal, very impulsive and is intermittent. As such a correction is applied to the level.
Rating level	72 dB		9.2	
Background sound level	32 dB		8.1, 8.1.3	
Excess of rating level over background level	+40		11	
Assessment indicates a likelihood of significant adverse impact.	<p>Relevant clause 11</p> <p>The context is:</p> <ol style="list-style-type: none"> 1. Predicted lorry horn noise levels ($L_{Aeq \text{ 1 hour}}$) are below the WHO daytime guideline values 2. The predicted delivery event noise levels are well above the existing ambient noise climate. Due to the tonality and impulsiveness of the horn, it would be clearly audible over the noise environment. 3. The horn only sounds for 1 second, potentially up to 10 times in a 1 hour period. At other times there may be no horn use at all. 			

APPENDIX C

GRAPHICAL REPRESENTATION OF NOISE SURVEYS

**Survey Results of Noise Measurements
Recorded at Site M11 position MP1
25th - 26th January 2017**



Survey Results of Noise Measurements Recorded at Site M11 position MP2 25th - 26th January 2017

