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Proposed New Building Thorncliffe Farm Shop, 1 Westfield Lane, Emley Moor, HD8 9SZ

Noise Impact Assessment

**For:
Farrar Bamworth Architecture**

31st January 2024

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1 Introduction

1.1 Overview

Environmental Noise Solutions Ltd (ENS) has been commissioned by Farrar Bamworth Architecture to undertake a noise impact assessment for a proposed new pie production building at the existing farm shop at Thorncliffe Farm, 1 Westfield Lane, Emley Moor, HD8 9SZ (hereafter referred to as 'the site').

Planning Permission for the development was granted by Kirklees Council in October 2023 (Application Ref: 2022/62/92872/E) subject to conditions. Condition 9 relates to the control of noise from the development as follows:

'9. *Before construction work commences a noise assessment report by a suitably competent person shall be submitted to and approved in writing by the Local Planning Authority. The report shall include:*

- a) an assessment of all of the noise emissions from the proposed development*
- b) details of existing background and predicted future noise levels at the boundary of nearby noise sensitive premises*
- c) a written scheme of how the occupants of the above-mentioned noise sensitive premises will be protected from noise from the proposed development including details of all necessary noise attenuation*

The development shall not be brought into use until all works comprised within the measures specified in the approved report have been carried out in full and such works shall be thereafter retained.'

The objectives of the noise impact assessment were therefore to:

- Determine the baseline noise levels at the site and its surrounding environs
- Assess the potential impact of the proposed development with reference to pertinent guidelines
- Provide recommendations for structural and management controls, as necessary, to protect the noise amenity of the nearest residential dwellings

This report details the methodology and results of the noise assessment. It has been prepared to aid in the discharge of Condition 9 of Planning Permission ref: 2022/62/92872/E.

The report has been prepared for Farrar Bamworth Architecture for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties referring to the report should consult Farrar Bamworth Architecture and ENS as to the extent to which the findings may be appropriate for their use.

A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

1.2 Site Description

The site (Thorncliffe Farm Shop) is located in a mixed-use setting on Jagger Lane/Westfield Lane to the south-east of Emley Moor.

The nearest noise sensitive receptors (NSRs) to the site are considered to be:

- No 44 Jagger Lane circa 40 metres to the east of the proposed building (NSR1)
- No 23 Jagger Lane circa 85 metres to the southeast of the proposed building (NSR2)

See Figure 1.1 for site boundary outlined in red and the locations of the nearest NSRs.

Figure 1.1: Location of Site and Nearest NSRs



The ambient and background noise climate at the site is formed by road traffic on the surrounding road network.

1.3 Development Proposals

Development proposals are for the construction of a permanent pie production building which will replace the existing container units the work is currently conducted within.

The building is to be used for pie production only, with all baking conducted within the existing main farm shop. It is understood the main concern of the council is from noise from plant impacting on the nearest residential neighbours to the development.

In order to meet the refrigeration requirements of the building, it is understood that 1 no. Danfoss OP-MSXMo68ML Condensing Unit is to be installed adjacent to the building at ground level. The unit has a noise level of **59 dB(A) at 1 metre**.

For reference, the NSRs will be screened from the proposed plant by an existing stone wall along the eastern site boundary.

The proposed layout plan is contained in Appendix 3 for reference.

2 Assessment Guidance

2.1 British Standard BS 4142:2014+A1:2019

BS 4142:2014+A1-2019 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS 4142)¹ describes methods for determining, at the outside of a building, noise levels from factories or industrial premises and a method for assessing whether the noise is likely to give rise to adverse impacts, and states:

'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. Typically, the greater this difference, the greater the magnitude of the impact. For example:

A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context

A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context

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'

The rating level is described as the specific sound level (the equivalent continuous A-weighted sound pressure level at the assessment position (NSR) produced by the specific sound source over the given reference time interval) plus any adjustment for the characteristic features of the sound. The character correction relates to whether and to what degree the specific sound is assessed to have an element of tonality, impulsivity and/or characteristics that are readily distinctive against the residual acoustic environment.

The background noise level is the A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 percent of a given time interval, T, measured using time weighting 'F' and quoted to the nearest whole number of decibels.

The reference time interval of the specific sound is 1 hour during the daytime and 15 minutes during the night-time.

1 British Standard 4142:2014+A1-2019 Methods for rating and assessing industrial and commercial sound, BSI (2014)

3 Noise Survey

3.1 Overview

In order to establish ambient and background noise levels in the vicinity of site, baseline noise measurements were undertaken on Tuesday 19th December through to Wednesday 20th December 2023.

For the purpose of the assessment, a single noise monitoring position (MP1) was adopted at the site (see Appendix 2 for the approximate monitoring position).

Noise measurements were undertaken at 1.5 metres above ground level using an NTi XL3 Type 1 integrating sound level meter. The meter was connected to a windshield covered microphone positioned at the location detailed above.

The measurement system calibration was verified immediately before and after the survey period using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration levels greater than 0.5 dB was noted. Weather conditions throughout the daytime survey were appropriate for monitoring, with dry conditions and wind speeds of < 5 m/s. Whilst wind speeds increased into the night-time, this does not appear to have adversely affected the noise measurements.

Measurements consisted of A-weighted broadband parameters including L_{Aeq} and L_{A90} , together with linear 1/3rd octave band data.

3.2 Baseline Summary

Table 3.1 below presents a summary of the noise data for each measurement session, rounded to the nearest decibel.

Table 3.1: Summary of Noise Measurement Data

Date	Time	$L_{Aeq, T}$ (dB)	$L_{A90, T}$ (dB)
19/12/2023	1345–1400	56	49
	1400–1500	54	50
	1500–1600	55	50
	1600–1700	55	51
	1700–1800	55	50
	1800–1900	55	50
	1900–2000	55	49
	2000–2100	53	47
	2100–2200	53	43
	2200–2300	55	43
	2300–0000	57	44
20/12/2023	0000–0100	58	43
	0100–0200	55	41
	0200–0300	56	42
	0300–0400	59	43
	0400–0500	57	41
	0500–0600	55	40
	0600–0700	54	40
	0700–0800	58	45
	0800–0900	58	47
	0900–0917	57	47

3.3 Analysis

The ambient noise climate in the vicinity of the neighbouring dwellings is due to local road traffic on the road network.

Typical background noise levels at MP1 were measured at circa **48 dB L_{A90, T}** during the daytime and **42 dB L_{A90, T}** during the night-time.

These levels are adopted for the assessment of noise at the nearest NSRs.

4 Noise Assessment

4.1 Plant Noise Propagation

In order to assess the propagation of plant noise to the nearest receptors, noise level predictions have been performed using iNoise acoustic modelling software. This is a software program specifically developed for the prediction and assessment of environmental noise.

The model calculates noise levels on horizontal and vertical grids with a user defined spacing of receiver points. From these levels, calculated at thousands of points, contour lines of constant noise levels are generated and printed as noise maps. All scaling was based on direct import from Google Earth, with absorption coefficients based on the iNoise default for brick-built structures.

The following assumptions were used in the model:

- Meteorological conditions: Temp. 20 °C, Relative Humidity 60%
- Foliage/woodland areas not considered to provide any reduction
- Ground absorption set to $G = 0.5$ (mixed)

A noise level contour map is contained in Appendix 4. The predicted resultant plant noise levels at the nearest receptors are contained in Table 4.1.

Table 4.1: Resultant Plant Noise Levels at the Nearest Receptors

Receptor	Resultant Plant Noise Level
NSR1 (Patio)	22 dB $L_{Aeq, T}$
NSR1 (House)	13 dB $L_{Aeq, T}$
NSR2	6 dB $L_{Aeq, T}$

4.2 Plant Noise Assessment

BS 4142 requires that an adjustment can be made for the characteristic features of the sound. Whilst plant noise may contain particular characteristics in close proximity, the absolute levels of the noise are significantly (at least 20 dB) below the night-time background noise levels at the NSRs. Inaudibility is a subjective matter, but it is commonly accepted that it is approached when the source noise level is at least 10 dB below the background noise level. As noise from the plant is likely to be subjectively inaudible at the nearest receptors, no character penalty is warranted.

For the purpose of the assessment, plant noise is assumed to occur for 100 % of the assessment period.

On the basis of the above, daytime and night-time BS 4142 plant noise assessments at the nearest NSRs are set out in Tables 4.2 and 4.3 overleaf.

Table 4.2: BS 4142 Daytime Plant Noise Assessment

Results	Receptor			Comment
	NSR1 (Patio)	NSR1 (House)	NSR2	
Specific sound level	22 dB L_{Aeq} (1 hour)	13 dB L_{Aeq} (1 hour)	6 dB L_{Aeq} (1 hour)	Worst case predicted level at nearest NSR
Acoustic feature correction	0 dB	0 dB	0 dB	Plant likely to be inaudible
Rating level	22 dB L_{Ar} (1 hour)	13 dB L_{Ar} (1 hour)	6 dB L_{Ar} (1 hour)	Rating level at receptors
Background sound level	48 dB $L_{A90, T}$	48 dB $L_{A90, T}$	48 dB $L_{A90, T}$	Daytime background noise level at receptor
Excess of rating over background sound level	-26 dB	-35 dB	-42 dB	Indication of a low impact, subject to context

Table 4.3: BS 4142 Night-Time Plant Noise Assessment

Results	Receptor			Comment
	NSR1 (Patio)	NSR1 (House)	NSR2	
Specific sound level	22 dB L_{Aeq} (15 min)	13 dB L_{Aeq} (15 min)	6 dB L_{Aeq} (15 min)	Worst case predicted level at nearest NSR
Acoustic feature correction	0 dB	0 dB	0 dB	Plant likely to be inaudible
Rating level	22 dB L_{Ar} (15 min)	13 dB L_{Ar} (15 min)	6 dB L_{Ar} (15 min)	Rating level at receptors
Background sound level	42 dB L_{A90} (15 min)	42 dB L_{A90} (15 min)	42 dB L_{A90} (15 min)	Night-time background noise level at receptor
Excess of rating over background sound level	-20 dB	-29 dB	-36 dB	Indication of a low impact, subject to context

Plant rating levels are significantly below existing background noise levels at the nearest NSRs. In accordance with BS 4142, this is an indication of a low impact, subject to context.

In relation to context, the following should be noted:

- Noise rating levels of ≤ 22 dB L_{Ar} (15 min) are considered to be extremely low in absolute terms. For reference, BS 4142:1997 defines 35 dB L_{Ar} (15 min) as a 'very low' rating level, and WHO Night Noise Guidelines for Europe considers that below 40 dB L_{Aeq} (2300-0700) outside represents the Lowest Observed Adverse Effect Level.
- As the proposals represent an improvement to an existing commercial premises, and will not therefore change the acoustic character of the area.

In terms of the National Planning Policy Framework Planning Practice Guidelines on Noise, noise associated with the plant is considered to represent a No Observed Effect Level (NOEL). At such levels, the noise impact is considered to be negligible, with no specific mitigation measures required.

5 Summary and Conclusions

A noise survey and assessment has been performed for a proposed commercial redevelopment at Thorncliffe Farm Shop, 1 Westfield Lane, Emley Moor, HD8 9SZ.

Baseline noise monitoring was carried out on Tuesday 19th December through to Wednesday 20th December 2023 to determine prevailing background noise levels in the vicinity of the site.

When assessed in accordance with BS4142 the proposed development is considered to represent a low impact subject to context.

In relation to context, absolute noise levels from the site are considered to be 'very low' and the development should not change the acoustic character of the area.

The noise impact of the plant is considered to be negligible, with no specific mitigation measures required.

Appendix 1 – Abbreviations and Definitions

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 μPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 μPa).

A-weighting

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T, has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T. $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

$L_{AF \max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Single Event Level / Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, regardless of the event duration. This allows for comparison between different noise events which occur over different lengths of time.

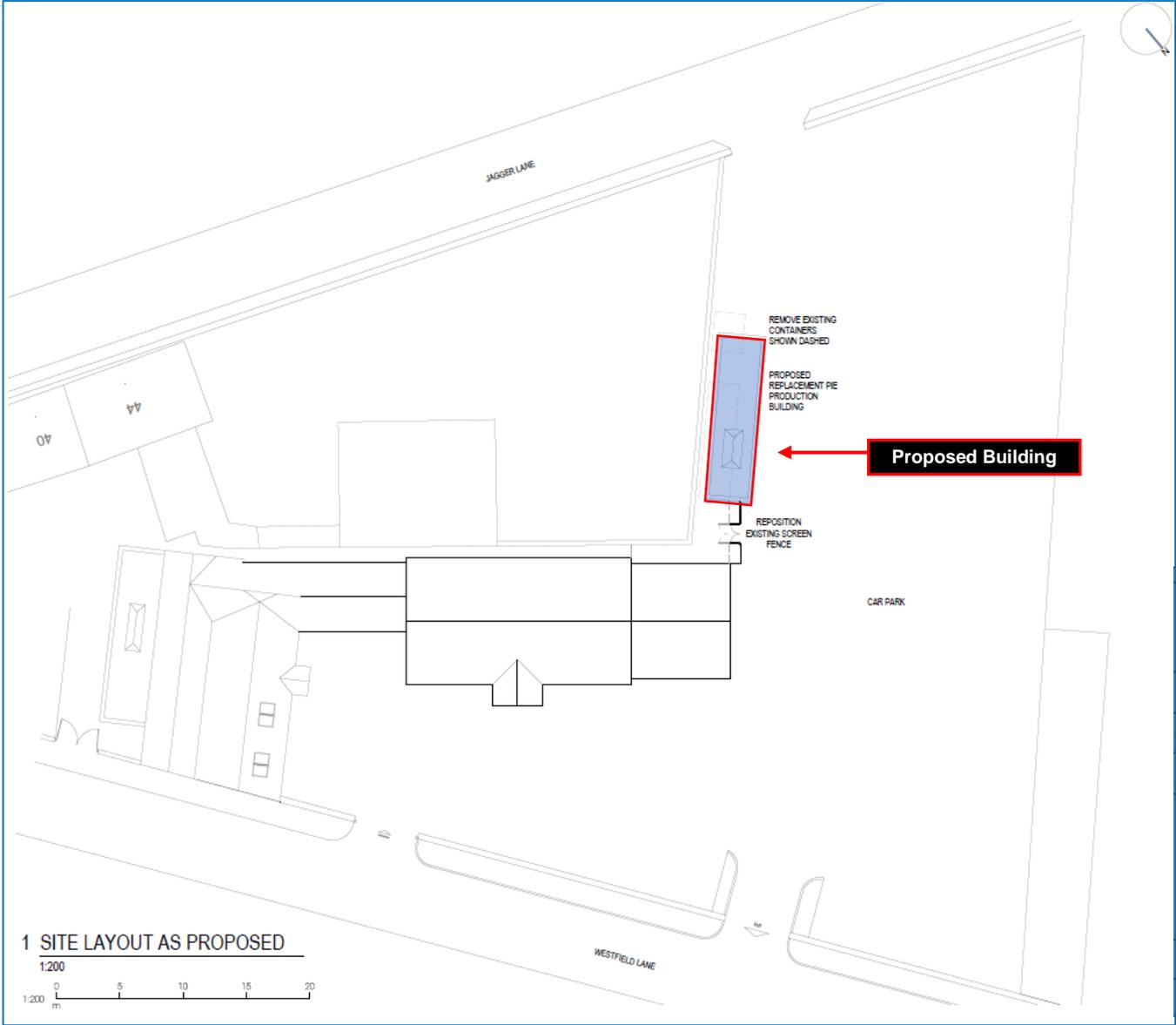
Weighted Sound Reduction Index (R_w)

Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_w is used to characterise the insulation of a material or product that has been measured in a laboratory).

Appendix 2 – Approximate Noise Measurement Position



Appendix 3 – Site Layout Plan



Appendix 4 – Plant Noise Contour Plot

