

Murfitts Aylesford

Noise Impact Assessment of Tyre Baling Equipment at Stapletons Tyre Services Ltd, Aylesford, ME20 6XS

Report ref.

CJA4815/23332/Rev 0

Issued to

Murfitts Industries Limited

Prepared by

Chris Anderson BSc (Hons) MIOA
Director

Version	Remarks	Date
Rev 0	Issued for comment	27/10/23



SECTION	TITLE	PAGE
1.	INTRODUCTION	3
2.	SITE LOCATION.....	3
3.	OUTLINE DESCRIPTION OF PROCESS	4
4.	SITE OPERATING TIMES.....	5
5.	PROPOSED ASSESSMENT METHODOLOGY	6
6.	SITE VISIT AND NOISE SURVEYS.....	7
6.1	SOUND POWER LEVEL SURVEY OF BALING EQUIPMENT	7
6.2	AMBIENT NOISE SURVEY AT NEAREST NOISE SENSITIVE RECEPTOR	10
7.	CALCULATION OF BALER ACTIVITY SOUND POWER LEVEL.....	11
8.	ENVIRONMENTAL NOISE MODEL OF THE AYLESFORD SITE	12
9.	BS4142 ASSESSMENT OF NOISE IMPACT FROM PROPOSED DEVELOPMENT ...	13
9.1	BS4142 ASSESSMENT FOR AVERY DRIVE (NSR-1):	13
9.2	BS4142 ASSESSMENT FOR SHELDON WAY (NSR-2):	14
9.3	BS4142 ASSESSMENT FOR BELL LANE (NSR-3):	14
10.	CONCLUSIONS	15

APPENDIX A: Predicted noise contours

APPENDIX B: Relevant sections of BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*

1. INTRODUCTION

Murfitts Industries Ltd have instructed Spectrum Acoustic Consultants Ltd to undertake a noise impact assessment of their tyre baling operations at Stapletons Tyre Services Ltd, Aylesford Logistic Centre, Bellingham Way, Aylesford, ME20 6XS.

There is currently 1 baling machine operating at the site and a second unit is proposed.

Spectrum undertook a site noise survey with one machine operating on 24/10/23, during which time the weather was calm and dry.

For the Aylesford site, this assessment concludes that the noise impact associated with the baling equipment is not expected to be significant at the nearest noise sensitive receptors (NSR) with either 1 or 2 baling machines operating.

2. SITE LOCATION

The site location relative to other commercial buildings and residential areas is shown below.

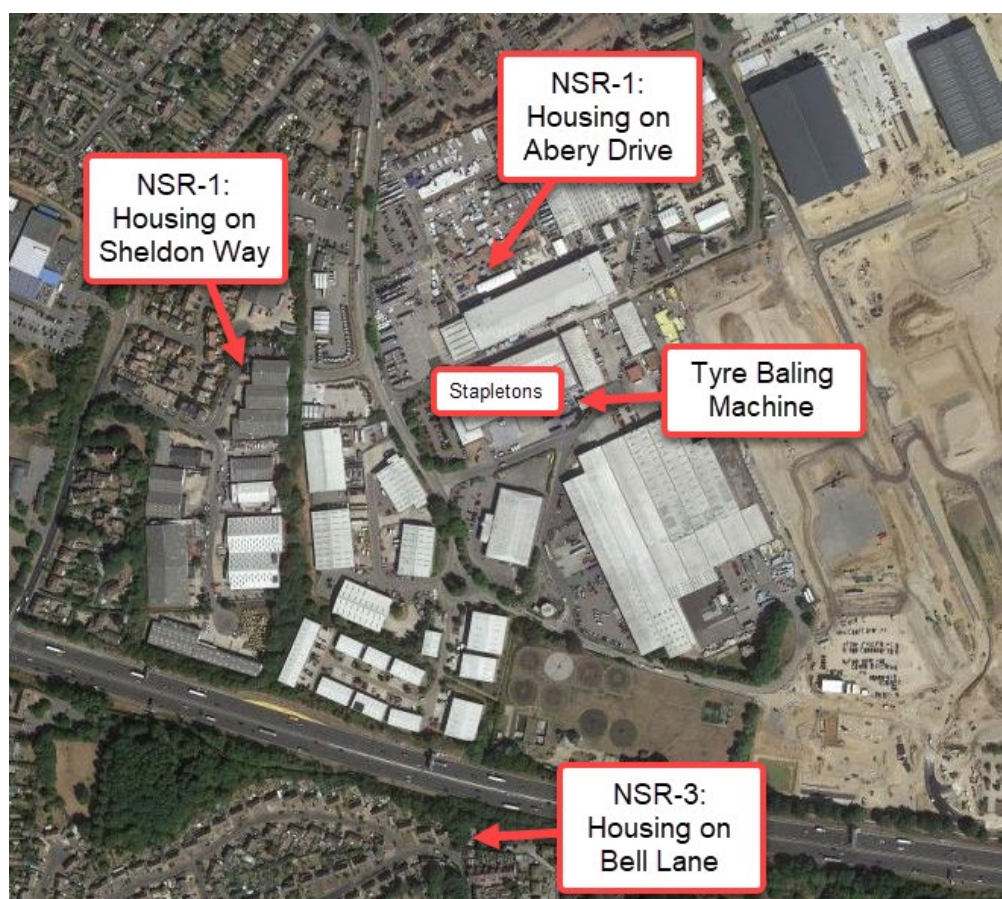


Figure 2.1: Location of tyre baling equipment

3. OUTLINE DESCRIPTION OF PROCESS

End of life tyres are delivered by van to the site, which is located to the South of the Stapletons warehouse.



Figure 3.1: End of life tyres being delivered

The tyres are then loaded by hand into the baler (green equipment shown below) which compresses them before restraining wires are tied around them to maintain their shape.



Figure 3.2: 2 Baling machine at Stapleton's Aylesford site (green)

The square tyre bales are then removed by forklift truck and loaded onto an articulated lorry for removal.



Figure 3.3: Forklift truck loads the tyre bales onto an articulated lorry for removal

4. SITE OPERATING TIMES

Operating times are:

- Mon-Fri 6am until 7pm Mon-Fri
- Saturday 7am-2pm
- Sundays and Bank Holidays Closed



5. PROPOSED ASSESSMENT METHODOLOGY

[EA guidance](#) provides the following guidelines for new sites:

New sites or items of plant

In some cases, where you have not yet built or commissioned a site or new item of plant, modelling may help assess a new proposal. Where you have used a noise model, it should comply with the calculation requirements of 'ISO 9613 Acoustics – attenuation of sound during propagation outdoors'.

You may need to do some validation monitoring to provide confidence in the model outputs. Depending on the level of impact and potential environmental risk, this may take place following commissioning activities, or as part of a routine monitoring programme.

However, for most new proposals the best evidence is likely to come from comparable sites that are carrying out the operation proposed without problems. When looking at comparable sites, you should consider the uncertainty, and how comparable the reference sites are. In particular consider:

- the reference site may have different weather and dispersion conditions (including topography)
- noise pollution can differ in frequency, level, duration or offensiveness due to different operating conditions or site specific engineering differences
- the quality of monitoring data at the reference site
- that the community near the new site may be more or less sensitive than at the reference location

In view of the above, Spectrum were instructed to undertake the following activities in order to complete this noise impact assessment:

- Undertake a sound power level survey of the baling equipment and establish the characteristics of the noise generated.
- Identify noise sensitive receptors around the site and undertake an ambient noise survey at representative locations.
- Develop an environmental noise model of the site in line with ISO 9613¹.
- Assess the noise impact of the site using measured background noise levels and predicted operational noise levels in line with BS4142² and Environment Agency guidelines.

The following sections detail the above activities. Relevant sections of BS4142 are included in Appendix B for reference.

¹ ISO 9613-1:1993 *Acoustics – Attenuation of sound during propagation outdoors e*

² BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*



6. SITE VISIT AND NOISE SURVEYS

Spectrum visited the Stapleton's site on 24/10/23 and undertook the following surveys:

- I. **Sound power level survey of baling equipment:** Measurements were taken on site at 25m from the baling equipment in order to enable calculation of the equipment sound power levels. The sound power levels can then be used to calculate noise levels generated in the environment (e.g. at nearest housing), where it may be difficult to measure the noise from the balers directly due to the influence of other noise sources (e.g. traffic or other industrial noise).
- II. **Ambient noise survey at the nearest noise sensitive receptors:** Measurements were taken close to the nearest noise sensitive receptors (NSR 1-3) in order to establish background noise levels at each location. These are used in assessing the impact of the baler noise at the nearest noise sensitive receptors (NSR 1-3).

Instrumentation used to measure sound levels included the following items. All equipment is calibrated in accordance with manufacturers requirements, using equipment referenced to the British Calibration Service and the National Physical Laboratory:-

- Bruel & Kjaer Type 2250 Sound Level Meter s/n 3027942
- Bruel & Kjaer Type 4189 Microphone s/n 3196081
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 2229957
- Skywatch Meteos hand-held anemometer for measuring wind speed during measurements

Whilst a range of noise level descriptors were measured by the instrumentation used for the survey, the following main parameters are reported for describing the baseline ambient sound environment.

- $L_{Aeq,T}$ the equivalent continuous sound level;
- $L_{A90,T}$ percentile level exceeded for 90% of the time; and
- L_{AMAX} the maximum sound level.

Briefly, $L_{Aeq,T}$ the equivalent continuous sound level is used as the measure of total ambient sound, or sound from a specific source, over the reference time period T . $L_{A90,T}$ is defined in BS 4142 as the measure of background sound, when it is applied to the residual sound level (the sound level in the absence of the specific sound being assessed). L_{AMAX} represents the maximum A-weighted sound pressure level over the sample period T .

6.1 SOUND POWER LEVEL SURVEY OF BALING EQUIPMENT

The sound power level of the baling equipment was measured by monitoring the sound pressure level generated at a distance of 25m over a reference time interval of 1 hr, then correcting the measurement for distance and reflections.

Measurements were taken at 25m from the baler with the noise meter at 1.5m above ground level, as shown below.

The measurements were taken between 11:20 and 12:20 hrs, during which time the baler was in operation along with the fork-lift truck.

There was a steel freight container behind the noise meter and so measurement data is reduced by 3 dB to account for reflections when calculating the equipment sound power level.

The wind was calm throughout the measurements (0.0m/s)



Figure 6.1.1: Noise meter with vans, baler, forklift and lorry

A 100ms trace (Figure 6.1.2) and a 5 min period trace (Figure 6.1.3) are shown below for the measurement period, with the results for $L_{Aeq,T}$, $L_{A90,T}$ and L_{Amax} shown in Table 6.1.1.

The 100ms trace indicates that the character of the noise is typically impulsive rather than constant in nature.

The 5 min period trace shows that the $L_{Aeq,T}$ stays reasonably stable over consecutive 5 min periods at around 66 dB $L_{Aeq,T}$, indicating that the period of the operational cycle of the equipment is covered adequately by the 1 hour measurement period. This is also supported by observation that the operational cycle is of the order of minutes and was effectively continuous over the measurement period.

Values for the $L_{Aeq,T}$ (with octave bands), $L_{A90,T}$ and L_{Amax} over a period of 1 hour are given in Table 6.1.1.

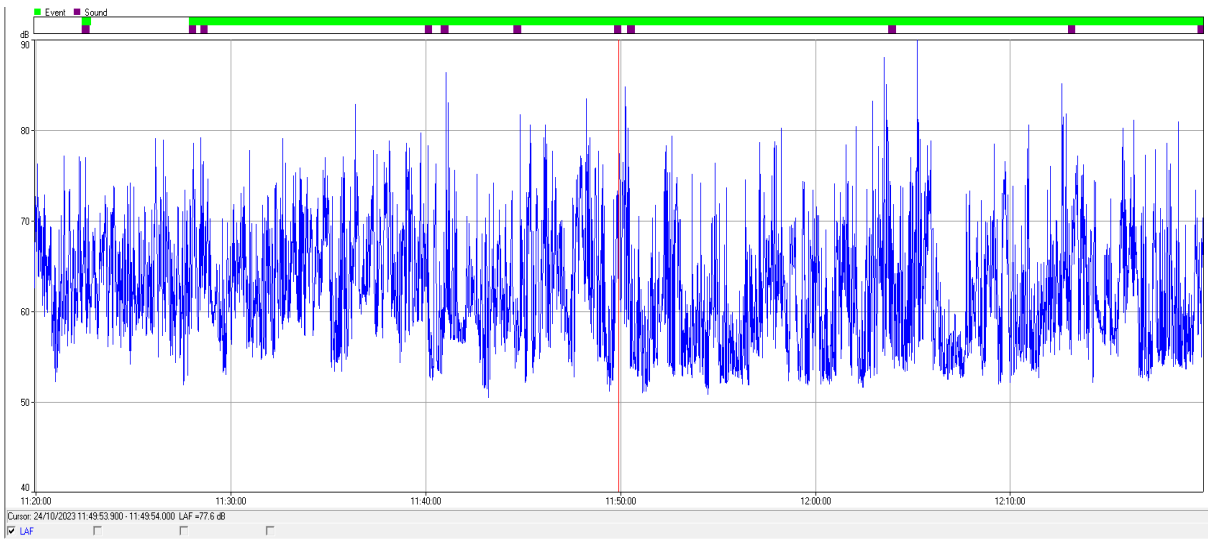


Figure 6.1.2: 100ms trace of noise from baler and associated activities at 25m over 1 hour

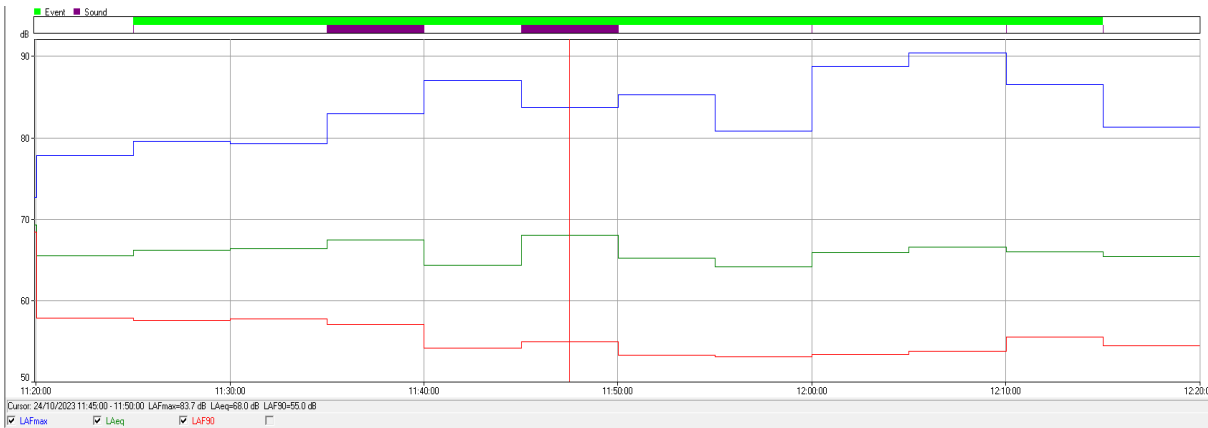


Figure 6.1.3: 5 min period trace of noise from balers over 1 hour

	Name	Start time	LAF90 [dB]	LAFmax [dB]	LAeq [dB]	LZeq 31.5Hz [dB]	LZeq 63Hz [dB]	LZeq 125Hz [dB]	LZeq 250Hz [dB]	LZeq 500Hz [dB]	LZeq 1kHz [dB]	LZeq 2kHz [dB]	LZeq 4kHz [dB]	LZeq 8kHz [dB]
1	Total	24/10/2023 11:20:00	54.3	90.3	66.0	68.1	66.9	62.6	60.0	59.5	61.0	60.9	55.5	48.2

Table 6.1.1: Measured sound pressure levels over 1 hour at 25m from baler ($L_{Aeq,T}=66$ dB)

6.2 AMBIENT NOISE SURVEY AT NEAREST NOISE SENSITIVE RECEPTOR

The closest noise sensitive receptors were identified as Aberly drive (NSR-1, 320m North), Sheldon Way (NSR-2, 350m East) and Bell Lane (NSR-3, 450m South), as shown in Figure 6.2.1.

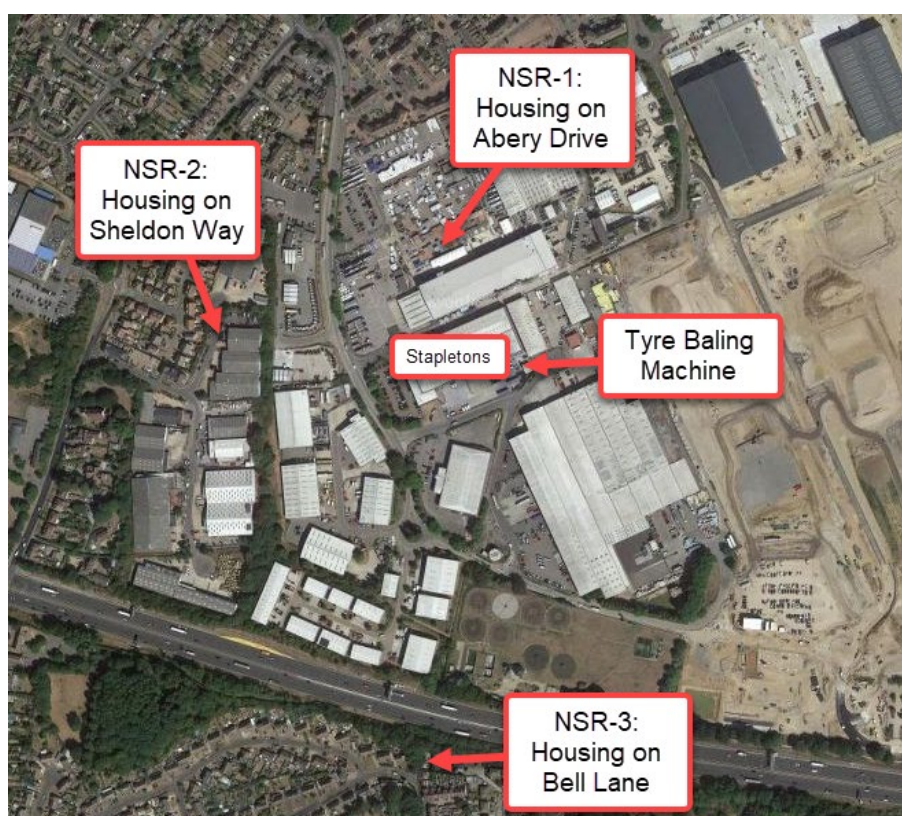


Figure 6.2.1: Nearest noise sensitive receptors (NSR 1-3) to the baling equipment

Daytime background noise measurements were taken at each position over 15 min as shown below.

Ambient noise measurement Position	OS Grid Ref.	Position Description
Avery Drive (NSR-1)	570797 East 159517 North	Residential area adjacent to industrial estate. Noise sources are distant traffic and industrial noise. Stapletons baling equipment is acoustically screened by industrial buildings.
Sheldon Way (NSR-2)	570581 East 159286 North	Residential road adjacent to industrial estate. Noise sources are distant traffic and industrial noise. Stapletons baling equipment is acoustically screened by industrial buildings.
Bell Lane (NSR-3)	570842 East 158828 North	Residential road adjacent to M20 motorway. Noise sources are motorway traffic and local traffic. Stapletons baling equipment is acoustically screened by industrial buildings.

Table 6.2.1: Measurement position used for monitoring Ambient noise levels.

The results for $L_{Aeq,T}$, $L_{A90,T}$ and L_{Amax} shown in Table 7.1.1 for each location over a 15 min measurement period.

Location	Time	$L_{A90,T}$	$L_{Aeq,T}$	L_{Amax}	Comment
Avery Drive (NSR-1)	12:45-13:00	49	55	78	Baling equipment noise not audible. Dominant sources distant traffic and industrial noise.
Sheldon Way (NSR-2)	13:15-13:30	51	55	74	Baling equipment noise not audible. Dominant sources distant traffic and industrial noise.
Bell Lane (NSR-3)	13:50-14:04	60	62	69	Baling equipment noise not audible. Dominant source traffic from nearby M20 Motorway.

Table 6.2.2: Measured ambient noise levels near to NSR 1-3 over 20 min

Table 6.2.2 shows how the measured ambient noise levels at NSR-1 and NSR-2 are similar, but that those at NSR-3 are significantly higher due to the proximity of the M20 Motorway.

7. CALCULATION OF BALER ACTIVITY SOUND POWER LEVEL

The baler operation sound power level has been calculated from the following equation:

$$\text{Sound power level } L_{WA} = L_{pA}(r) + 20\log(r) + 11 - DI - A_{misc}$$

Where:

L_{WA} =Sound power level of 2 balers in operation, including fork-lift noise

r =distance from balers (in this case 25m)

DI =directivity index (in this case 3 dB as hard ground)

A_{misc} =corrections due to other miscellaneous factors (e.g. screening, ground effects, reflections from surfaces or objects)



	dB(A)	Octave Band Centre Frequency (Hz)								
		31	63	125	250	500	1k	2k	4k	8k
Measured sound pressure level at 25m from baler	66	68	67	63	60	60	61	61	56	48
Correction for distance to 25m =20log(r)+11 = +28+11		+39	+39	+39	+39	+39	+39	+39	+39	+39
- Correction for directivity (3dB)		-3	-3	-3	-3	-3	-3	-3	-3	-3
- Correction for reflections (3dB)		-3	-3	-3	-3	-3	-3	-3	-3	-3
Overall Plant Sound Power Level (current)	99	101	100	96	93	93	94	94	89	81
Overall Plant Sound Power Level (with additional Baler)	102	104	103	99	96	96	97	97	92	84

Table 7.1: Calculated overall baler equipment sound power level (dB re 10⁻¹² Pa)

The above calculated sound power level will be used to predict environmental noise levels at the nearest noise sensitive receptors, with 3 dB added to account for increased noise if a 2nd Baler machine is installed (see section 8 below).

8. ENVIRONMENTAL NOISE MODEL OF THE AYLESFORD SITE

An environmental noise model of the Aylesford site has been prepared in line with ISO 9613:1993 *Acoustics – Attenuation of sound during propagation outdoors*.

The particular prediction model that has been used for this analysis is the Softnoise 'Predictor' software. This acoustic model implements the procedures set out in ISO 9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation to determine noise levels", and is Quality Assured to all parts of ISO 17534:2015 "Acoustics – Software for the calculation of sound outdoors". The Predictor model takes account of the following features in its calculation procedure:

- Source sound power level (for point, line and area sources)
- Reflection from nearby structures and source directivity
- Distance from noise source (geometric spreading)
- Atmospheric absorption
- Acoustic screening of intervening structures and topography
- Ground absorption
- Ground effects (which includes the height of ground relative to the noise source)



The numerical results are summarised below and predicted noise contours are included in Appendix A..

Noise sensitive receptor (NSR)	Predicted Specific Noise Level generated by the balers $L_{Aeq,T}$ (dB(A))
Avery Drive (NSR-1)	27
Sheldon Way (NSR-2)	21
Bell Lane (NSR-3)	40

Table 8.1: Predicted specific noise level generated by the balers at NSRs at 1.5m height

9. BS4142 ASSESSMENT OF NOISE IMPACT FROM PROPOSED DEVELOPMENT

The impact of noise from the balers at NSR 1-3 has been assessed in accordance with BS4142, and the results are given below.

9.1 BS4142 ASSESSMENT FOR AVERY DRIVE (NSR-1):

Results		Relevant clause from BS4142	Commentary
Background sound level	$L_{A90,15min} = 49$ dB	8.1.2	From Table 6.2.2 of this report
Specific sound level (calculated)	$L_{Aeq,T} = 27$ dB	7.3.5	From Table 8.1 of this report
Acoustic feature correction	3 dB	9.2	Some impact noise
Rating level	$27+3 = 30$ dB	9.2	
Excess of rating level over background sound level	$(30-49) = -19$	11	Assessment indicates low impact as rating level is below background sound level
Uncertainty	Not significant	10	The assessment based on detailed measurements taken close to equipment and the rating level is below background noise level.

Table 9.1: BS4142 assessment of baler noise at Avery Drive (NSR-1)



9.2 BS4142 ASSESSMENT FOR SHELDON WAY (NSR-2):

Results		Relevant clause from BS4142	Commentary
Background sound level	$L_{A90,15min} = 51$ dB	8.1.2	From Table 6.2.2 of this report
Specific sound level (calculated)	$L_{Aeq,T} = 21$ dB	7.3.5	From Table 8.1 of this report
Acoustic feature correction	3 dB	9.2	Some impact noise
Rating level	$21+3 = 24$ dB	9.2	
Excess of rating level over background sound level	$(24-51) = -27$	11	Assessment indicates low impact as rating level is below background sound level
Uncertainty	Not significant	10	The assessment based on detailed measurements taken close to equipment and the rating level is below background noise level.

Table 9.2: BS4142 assessment of baler noise at Sheldon Way (NSR-2)

9.3 BS4142 ASSESSMENT FOR BELL LANE (NSR-3):

Results		Relevant clause from BS4142	Commentary
Background sound level	$L_{A90,15min} = 60$ dB	8.1.2	From Table 6.2.2 of this report
Specific sound level (calculated)	$L_{Aeq,T} = 40$ dB	7.3.5	From Table 8.1 of this report
Acoustic feature correction	3 dB	9.2	Some impact noise
Rating level	$40+3 = 43$ dB	9.2	
Excess of rating level over background sound level	$(43-60) = -17$	11	Assessment indicates low impact as rating level is below background sound level
Uncertainty	Not significant	10	The assessment based on detailed measurements taken close to equipment and the rating level is below background noise level.

Table 9.3: BS4142 assessment of baler noise at Bell Lane (NSR-3)



10. CONCLUSIONS

A noise impact assessment has been undertaken for existing tyre baling machines at Stapletons Tyre Services Ltd, Aylesford Logistic Centre, Bellingham Way, Aylesford, ME20 6XS.

Background noise levels were measured at the nearest noise sensitive receptors (NSR 1-3) to the site

Since there are many industrial noise sources local to the area, noise levels were measured close to the equipment so that the impact at NSR 1-3 could be calculated and assessed against the background noise level in accordance with BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*, in line with Environment Agency requirements.

The assessments suggest that calculated rating noise levels are below the existing background noise levels at the nearest noise sensitive receptors and as such the noise impact of the balers is assessed to be low.



APPENDIX A

Predicted noise contours



initial model
27 Oct 2023, 16:38

Spectrum Acoustic Consultants Ltd, UK



APPENDIX B

Relevant clauses from BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*



From clause 6:

NOTE When measurements for distant sources are made at 1 m from a facade, then the measured level can be adjusted to an equivalent free-field level by subtracting a 3 dB correction factor. For sources that are relatively close or not perpendicular to the facade the correction may be 1 dB or 2 dB, in which case the reasons for not using a correction of 3 dB should be explained.

7.2 Reference time interval

Evaluate the specific sound over an appropriate reference time interval, T_r :

- a) 1 h during the day; and
- b) 15 min during the night.

NOTE 1 For the purposes of this standard, daytime is typically between 07:00 h and 23:00 h and accordingly night-time is between 23:00 h and 07:00 h.

- 7.3.5** Where it is not possible to determine the specific sound level by measurement of the ambient sound level and the residual sound level at the assessment location(s), for example, because the difference between the ambient sound level and the residual sound level is ≤ 3 dB, determine the specific sound level by a combination of measurement and calculation. Report the method of calculation in detail and give the reason for using it.

NOTE In some cases, measurements can be supplemented by calculations. Calculations are often more reliable than a single short-term measurement when long-term averages are to be determined and in other cases where it is impossible to carry out measurements because of high residual sound levels. In case of the latter, it is sometimes convenient to carry out the measurements closer to the source and then use a calculation method to estimate the specific sound level at the assessment location(s).

- 8.1.2** Where possible, measure the background sound level at the assessment location(s). If this is not possible measure at an alternative location where the residual sound is comparable to the assessment location(s). A detailed justification for considering this should be reported.

9 Rating level

9.1 General

Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level. This can be approached in three ways:

- a) subjective method;
- b) objective method for tonality;
- c) reference method.



From clause 9.2:

Impulsivity

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.

NOTE 2 $\overline{A_1}$ If characteristics likely to affect perception and response are present in the specific sound, within the same reference period, then the applicable corrections ought normally to be added arithmetically. However, if any single feature is dominant to the exclusion of the others then it might be appropriate to apply a reduced or even zero correction for the minor characteristics. $\overline{A_1}$

10 Uncertainty

10.1 General

Consider the level of uncertainty in the data and associated calculations. Where the level of uncertainty could affect the conclusion, take reasonably practicable steps to reduce the level of uncertainty. Report the level and potential effects of uncertainty.

11 Assessment of the impacts

COMMENTARY ON 11

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. 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.

Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause [8](#)) from the rating level (see Clause [9](#)).


NOTE 1 More than one assessment might be appropriate.

- 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.


NOTE 2 Adverse impacts may include but not be limited to annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

Head Office

Spectrum Acoustic Consultants Ltd
27-29 High Street
Biggleswade
Bedfordshire
SG18 0JE
UNITED KINGDOM

 +44 (0)1767 318871

 enquiries@spectrumacoustic.com

 www.spectrumacoustic.com