



Domino's, High Street, Southampton

Plant Noise Assessment

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prepared for

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1.0 Introduction

- 1.1 It is proposed that an existing retail unit be occupied by a Domino's at 56 High Street, Southampton SO30 3DR.
- 1.2 A noise survey has been undertaken on site to determine the existing noise climate at the nearest noise sensitive receptors. The survey results have been used to set plant noise limits in line with Local Authority requirements and are set out herein.
- 1.3 This report details an assessment of noise emissions from the proposed plant strategy to the nearest noise sensitive receptors.

2.0 Site Description

- 2.1 The site, located at 56 High Street, Southampton SO30 3DR, is a two-storey unit located in West End, Southampton. The site and its surrounds can be seen on Image 1 below, with the approximate site boundary shown as a red line.
- 2.2 The site is located on the corner between the B3035 (High Street) and Upper New Road. The B3035 sees frequent traffic and consists mainly of commercial property. Upper New Road is a quiet residential road. Residential property on Upper New Road overlooks the site to the rear.
- 2.3 The Ageas Bowl cricket ground is located approximately 800 m to the southeast of the site. The site is within the jurisdiction of the Borough of Eastleigh.

Image 1

Site plan outlining the site and surrounding area



Aerial imagery courtesy of Google Maps.

3.0 Planning Context

Local Authority Guidance

3.1 The proposed store falls within the jurisdiction of the Borough of Eastleigh. Policy DM8 of the Eastleigh Borough Local Plan 2016-2036 which was adopted in April 2022 states the following in relation to noise from a proposed development:

“Development will not be permitted if it is likely to cause loss of amenity or impact on public health or other unacceptable environmental impacts through:

...

c. noise or vibration;

...”

3.2 Noise emission limits for fixed mechanical services are not provided within the Local Plan therefore guidance has been used from BS 4142¹ to set noise emission limits.

BS 4142:2014+A1:2019

3.3 When considering noise emission from fixed mechanical services, it is normal to follow guidance in BS 4142:2014+A1:2019.

3.4 The British standard describes methods for rating and assessing sound of an industrial and/or commercial nature.

3.5 The methodology in the standard compares the measured or calculated rating level of the noise from the sources and compares it to the representative existing measured L_{A90} background noise level for the day and night time periods.

3.6 The higher the excess of rating level over background noise level, the greater the likelihood of an adverse noise impact. Full details of BS 4142:2014+A1:2019 methodology can be found in **Appendix B** of this document.

3.7 In the case of mechanical services noise, this is a constant noise source operating for much of the day and night and mechanical services plant is also inherently amenable to noise control. It is therefore recommended that plant noise at existing residences should be designed to a rating level of 5 dB below the existing representative L_{A90} background noise levels recorded during the relevant time periods.

4.0 Noise Survey

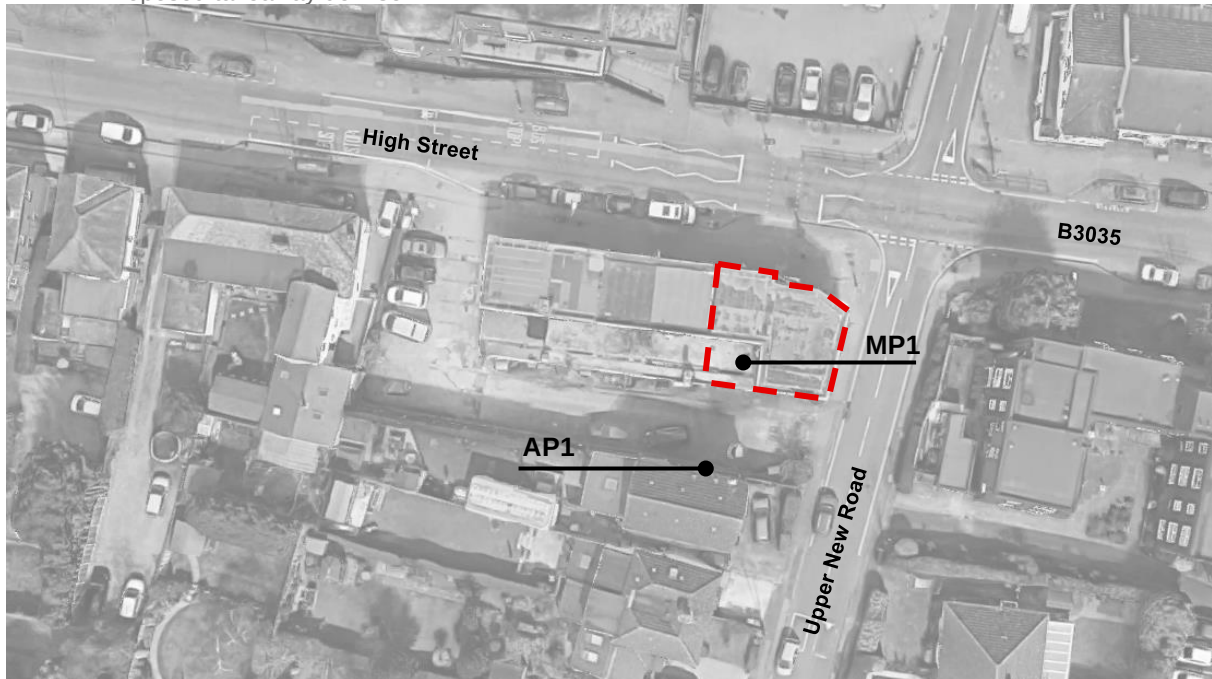
4.1 An unattended noise survey was undertaken to the rear of the site between 1045 hours on Tuesday 25th April to 1045 hours on Wednesday 26th April 2023. Full details of the noise survey can be seen in **Appendix A** at the end of this document.

4.2 Noise measurements were taken at a single location, chosen to be representative of residences most affected by the proposed plant items. This position can be seen in **Image 2** and was occupied by an unattended noise logger running throughout the survey duration.

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

Image 2: Noise measurement and assessment positions.

— Proposed takeaway demise



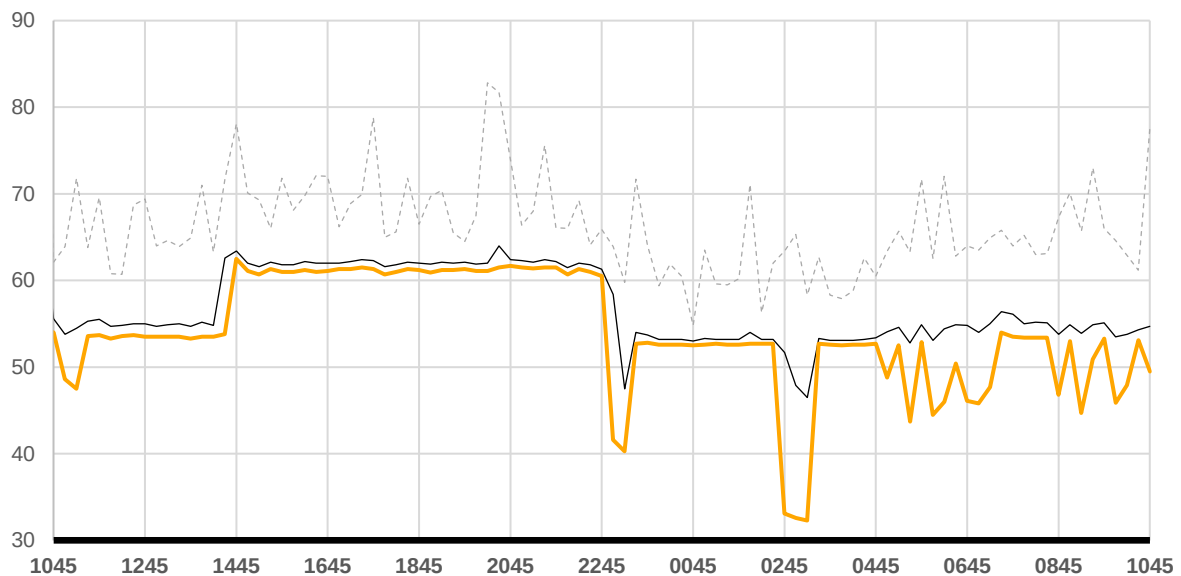
Aerial image courtesy of Google Maps.

4.3 Noise emissions from the proposed plant installation have been considered to the nearest noise sensitive receiver at AP1, as discussed later in this report.

4.4 The following noise levels were measured at position MP1 over the duration of the noise survey.

Noise Measurement Results at Position MP1

■ $L_{Aeq,15min}$, ■ $L_{Amax,f}$, and ■ $L_{A90,15min}$ in terms of sound pressure (dB, x-axis) against time (hhmm, y-axis).



4.5 The background noise levels used within the assessment over the relevant periods are set out within 4.9Table 1 below.

4.6 The existing noise climate was controlled by plant items at a neighbouring hot food takeaway with some contributions from the surrounding road network.

4.7 To ensure a robust assessment, the noise levels selected have been determined considering noise sensitive periods of the day and periods with reduced plant activity.

4.8 The open period noise level has been selected based on the measured reduction in the existing plant noise that occurred at approximately 1100 hours.

4.9 The night time noise level has been selected from the measurement period at 2315. As highlighted within BS 4142 and detailed within Appendix B, this is considered to be a sensitive period of the day when people tend to be falling asleep and coincides with a reduction of noise from the existing plant.

Table 1 Measured background noise levels.

Location	Measured Background Noise Level, $L_{A90,T}$ dB	
	Open Period (1100-2300)	Closed Period (2300-1100)
MP1 – Rear of site	48	40

Plant Noise Limits

4.10 Based on the guidance set out within BS 4142:2014+A1:2019, the following plant noise emission limits (in terms of rating levels) to apply at the nearest noise sensitive receptor have been set out in Table 2.

Table 2 Plant noise emission limits.

Location	Noise Emission Limit, $L_{Ar,Tf}$ dB	
	Open Period (1100-2300)	Closed Period (2300-1100)
Nearest noise sensitive premises	43	35

4.11 These limits are to apply to all plant items running simultaneously in the representative time periods when running at full design duty and are to apply at 1 m from the outside of the nearest noise sensitive receptors to the proposed plant. Any plant with a tonal component or other distinctive feature out of character with the existing environment would be subject to a further penalty.

5.0 Plant Noise Assessment

Proposed Installation

5.1 Table 3 outlines the proposed plant items to be installed.

Table 3 Proposed mechanical plant to be used at the site.

Item	Manufacturer	Type
Air Conditioning Unit	Mitsubishi	FDC100VNX
Cold Store Condenser	Glendon	Karbox 2464
Fresh Air Intake	Air Vent Technology	Model 5
Oven Extract	Vent-Axia	BSC500/4

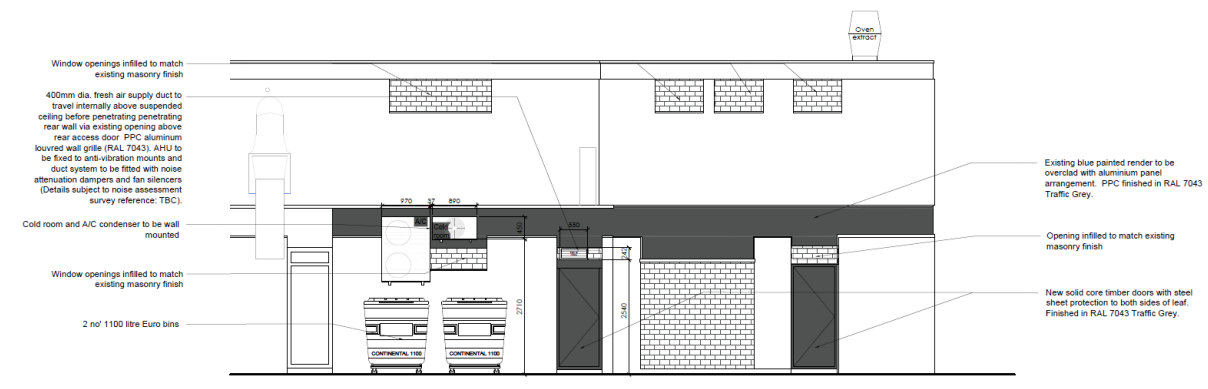
5.2 The oven extract and fresh air intake fans are to be housed within the unit's demise. The oven extract fan is to be ducted to outside with a termination to atmosphere at approximately 1 m above roof level. The fresh air intake is to terminate to atmosphere through a grille to the building's rear façade at 2.5 m above local ground level.

5.3 The condensing units are to be mounted directly to the building's rear façade, at approximately 3 m above local ground level.

5.4 The plant positions can be seen on the *AEW Architects* proposed drawing (ref: 13239-AEW-Pi005340-XX-DR-0004, dated March 2023). An excerpt from this can be seen in Image 3 below.

Image 3: Rear elevation of proposed Domino's.

Drawing produced by AEW Architects.



5.5 All units are expected to run in line with the premises' opening hours of 1100-2300 hours daily with the exception of the cold Room condenser, which will run on a 24-hour basis. The installation will be assessed against the relevant time periods on this basis.

Assessment Methodology

5.6 The assessment has been based on manufacturer's noise data for each plant item. This noise data and the expected operational regime of the plant suggests that no acoustic character corrections need be applied.

5.7 Noise emissions from the proposed plant installation have been considered to the nearest noise sensitive receivers, as described below.

- AP1: First floor window at 4 Upper New Road overlooking the site.

5.8 Levels of plant noise have been calculated at the assessment positions by correcting for radiation, screening and distance losses where appropriate. Calculation sheets are not included for the sake of brevity but can be provided upon request.

Mitigation Measures

5.9 It is recommended that in-duct atmospheric side attenuators are installed to the extract and fresh air fans ducting and an acoustic enclosure is installed to the cold store condenser. The acoustic performance of these attenuators and enclosure should meet the insertion losses outlined in Table 4 in each octave band, as a minimum.

Table 4 Required mitigation insertion losses.

Mitigation Type	Equipment	Minimum Required Insertion Loss (dB) at octave band centred frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
In-duct Attenuator	Fresh Air Intake	4	8	14	21	27	27	21	16
In-duct Attenuator	Oven Extract	3	6	8	8	10	6	3	2
Enclosure	Cold Store	3	3	4	7	9	10	10	10

5.10 It is expected that a silencer 900 mm long with an open area of 35% will be suitable to meet the required losses for the fresh air intake. It is expected that a melinex faced silencer 600 mm long with an open area of 50% will be suitable to meet the required losses for the oven extract. It is noted that the insertion losses set out above are the requirement, not the example sizes or free areas.

5.11 In-duct attenuators should be mounted internally as close to the fans as possible to avoid break out noise from the attenuator casing or ducting.

5.12 Any pressure drops from the attenuators or the atmospheric duct termination grilles should be limited to 40 Pa to avoid regenerative noise. The fresh air intake discharge louvre should be sized at a face velocity of not more than 2 m/s.

5.13 Companies such as *Environ*², *EEC*³ or *Sound Planning*⁴ can provide specialist acoustic enclosures such as this which should meet the necessary requirements. The enclosure must be sized to allow for sufficient airflow to the cold store condenser.

5.14 All plant items should be mounted on anti-vibration mounts and fans should have flexible ductwork to control structure-borne sound transmission.

Results

5.15 With the outline mitigation measures in place, the following plant noise levels are predicted at the nearest noise sensitive receptor.

Table 5 Noise emission levels at the nearest noise sensitive receivers.

Location	Assessed Rating Noise Level, $L_{A,r,Tr}$ dB (limit)	
	Open Period (1100-2300)	Closed Period (2300-1100)
AP1 – 4 Upper New Road	42 (43)	34 (35)

² <https://www.environ.co.uk/>

³ <http://eec.co.uk/>

⁴ <https://www.soundplanning.co.uk/>

6.0 Conclusions

- 6.1 It is proposed that an existing retail unit be occupied by a Domino's at 56 High Street, Southampton SO30 3DR.
- 6.2 Mitigation is recommended for the fresh air intake and oven extract fans in the form of in-duct atmospheric side attenuators and to the cold store condenser in the form of an acoustic enclosure.
- 6.3 The mitigation specified will enable the plant noise limits to be met.



Appendix A: Noise Survey

Details and results of the environmental noise survey

An unattended noise survey was undertaken to the rear of the site between 1045 hours on Tuesday 25th April to 1045 hours on Wednesday 26th April 2023.

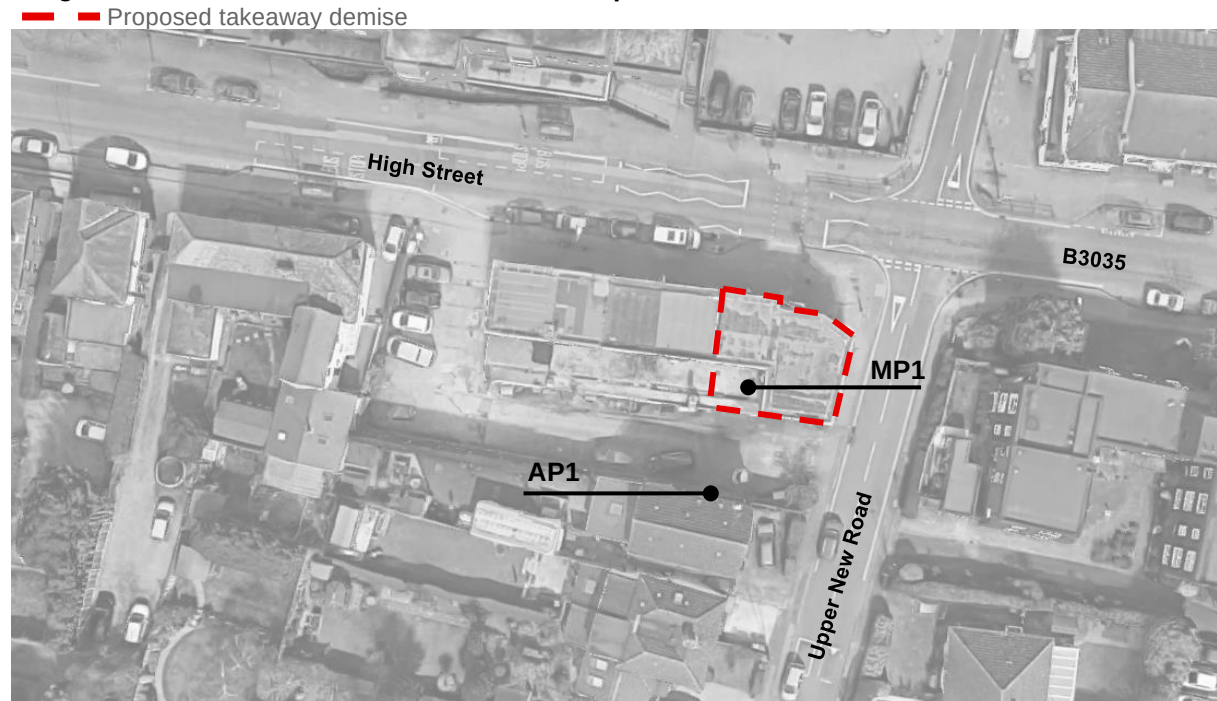
The measurements were taken at a position representative of the nearest noise sensitive receiver to the proposed hot food takeaway.

Measurements of the L_{Aeq} , L_{Amax} and L_{A90} indices were recorded over consecutive 15-minute periods for the duration of the unattended survey.

Table 6 Measurement location.

Location	Detail
MP1	Microphone at approximately 1.5 m above first floor roof level, 1 m from the rear façade of the existing building. Measurements were unattended. The noise climate was impacted by nearby mechanical services and the local road network.

Image 2: Noise measurement and assessment positions.



Aerial image courtesy of Google Maps.

Noise measurements were made using equipment set out in the following table. The sound level analyser was calibrated before and after the survey to ensure any drift was within acceptable limits.

Table 7 Measurement equipment.

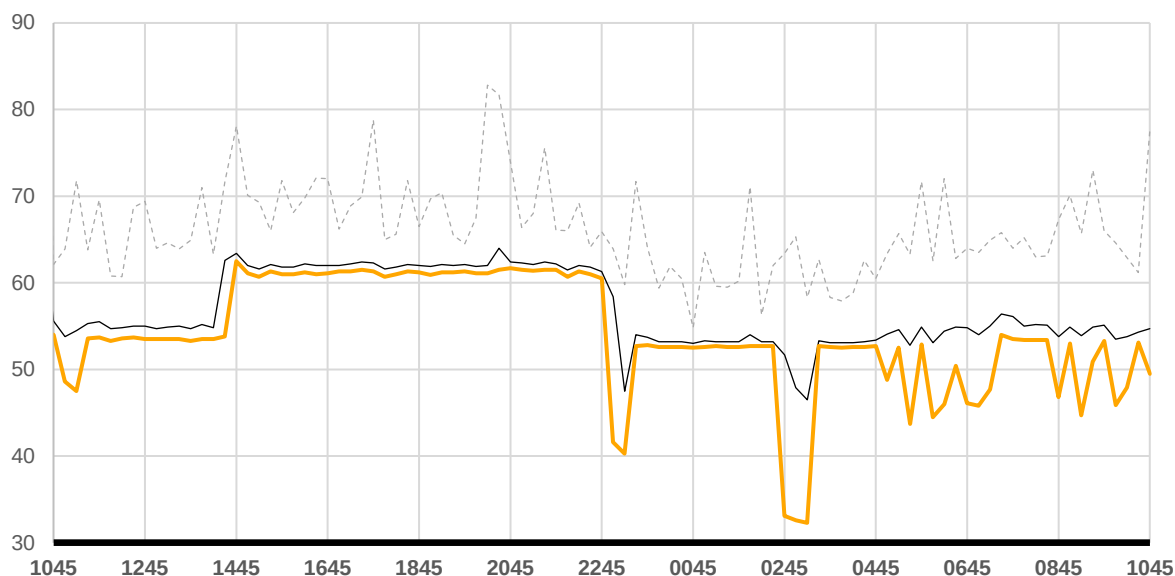
Location	Item	Detail
MP1	Sound level analyser	Norsonic 140
	Outdoor microphone kit	Norsonic 1255
	Acoustic calibrator	Norsonic 1216

During the set up and collection of the survey, the weather was cool and overcast with a light breeze. Historical weather data⁵ shows these conditions typically remained unchanged throughout the unattended survey period.

The following time history graph presents the measured noise levels throughout the full survey period.

Noise Measurement Results at Position MP1

■ $L_{Aeq,15min}$, ■ $L_{Amax,f}$, and ■ $L_{A90,15min}$ in terms of sound pressure (dB, x-axis) against time (hhmm, y-axis).



The background noise levels used within the assessment over the relevant periods are set out within the table below.

Table 8 Representative measured background noise levels.

Location	Measured Background Noise Level, $L_{A90,T}$ dB	
	Open Period (1100-2300)	Closed Period (2300-1100)
MP1 – Rear of site	48	40

⁵ <https://www.wunderground.com/>

Appendix B: Planning Policy and Guidance

British Standard BS 4142

British Standard 4142:2014+A1:2019 (Methods for rating and assessing industrial and commercial sound) states in section 1.1:

“This British Standard describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

- a) sound from industrial and manufacturing processes;*
- b) sound from fixed installations which comprise mechanical and electrical plant and equipment;*
- c) sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and*
- d) sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from fork-lift trucks, or that from train or ship movements on or around an industrial and/or commercial site.*

The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.”

The standard states its applications as,

“This standard is applicable to the determination of the following levels at outdoor locations:

- a) rating levels for sources of sound of an industrial and/or commercial nature; and*
- b) ambient, background and residual sound levels,*

for the purposes of:

- 1) investigating complaints;*
- 2) assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and*
- 3) assessing sound at proposed new dwellings or premises used for residential purposes.”*

BS 4142 sets out a daytime assessment period of 1 hour and night time period of 15 minutes. The assessment methodology requires that a “specific level” from a given noise source is determined considering these time periods. Character corrections should be added if the noise has tonality, impulsivity, intermittency or other such characteristics; this gives the “rating level” of a given noise source. The level of the correction is based upon how the noise is perceived, as set out in the standard.

The rating level of noise, $L_{Ar, Tr}$, for the relevant assessment period is the calculated noise level at the nearest receiver location, adjusted to take into account the acoustic characteristic of the noise. Acoustic feature corrections can be made to account for tonality, impulsivity, intermittency and other characteristics present in the resultant sound at the receiver position. The magnitude or appropriateness of any correction will depend both on the type of noise source and the context in which it is perceived. Similarly, in accordance with BS 4142, the period of time for which an individual noise source is active during the relevant reference time period will also be considered in establishing the rating level.

It will also be necessary to consider the existing noise climate and what sound sources contribute to it. For example, where a noise generating activity is proposed adjacent to an existing similar noise generating site, the impact of the new noise source would be less than if it were to be planned in a location where its character and type is different to and more noticeable than any existing noise source nearby.

With regard to the background sound level against which the rating level is compared, the standard states the following:

“In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.”

The periods of interest over a 24 hour day are usually related to day time activities (07:00-23:00h) and night time (23:00-07:00h). However the standard makes the following statement:

“Among other considerations, diurnal patterns can have a major influence on background sound levels and, for example, the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes. Furthermore, in this general context it can also be necessary to separately assess weekends and weekday periods.”

Therefore, the periods of time which can be considered as ‘waking up’ and ‘falling asleep’ stages, for example 06:00h to 07:00h and 23:00h to 24:00h, may need to be considered independently. Alternative periods may also be identified where breakdown beyond the standard day and night time analysis will be necessary, for example where background sound levels are shown to be regularly elevated.

Once the rating level at each receptor has been calculated, reference can be made to the following commentary in BS 4142 in relation to conducting an initial assessment of the impact, based on the difference between the rating level of the noise source and the pre-existing background sound level.

“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), and consider the following.

NOTE 1 More than one assessment might be appropriate.

a) Typically, the greater this difference [between industrial site noise rating level and baseline background level], 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 include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."

From the above, it can be concluded that ensuring noise emissions from a given site or activity do not exceed noise limits set at a level 5 dB below the representative background noise levels at given receptors will provide an indication that noise adverse effect will **not** occur.

