



Domino's, Havant
Noise Impact Assessment

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prepared for

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1.0 Introduction

1.1 An existing Domino's Pizza outlet at 39 West Street, Havant PO9 1LA, has applied to extend their current opening hours from 2300 to 0300. As part of this application, an assessment of noise emissions from the associated mechanical services installation and delivery operations is required.

1.2 A noise survey has been undertaken at the site to determine the existing noise climate at the nearest noise sensitive receptors for the extended opening period. The survey results have been used to set plant noise limits in line with standard guidance and are set out herein.

1.3 This report details an assessment of noise emissions from the proposed plant strategy and delivery vehicle movements to the nearest noise sensitive receptors. Where necessary, mitigation measures have been set out with performance requirements for the various elements specified.

2.0 Site Description

2.1 This site is located at 39 West Street Havant and is situated on the corner of West Street and Park Road South, a busy road running through the middle of Havant. The unit currently operates until 0000 Friday and Saturday and until 2300 Sunday to Thursday. The neighbouring units comprise mixed use office and retail use.

2.2 Opposite the unit, to the north on West Street are offices, a café and residences. To the east on Park Road South is a McDonalds which operates a delivery service using the parking bays on West Street. To the southwest on Brockhampton Lane is a tyre and servicing garage, a ex-serviceman's club and a delivery area servicing a retail park. To the west are residences on Brockhampton Lane.

3.0 Planning Context

Mechanical Services Noise

3.1 For the previous assessment of the site, outlined in the Cole Jarman Report (Ref: 18/0455/R1) an Environmental Health Department representative outlined the following with regards to plant:

"We would expect BS 4142:2014 to be employed to ensure no adverse impact on nearby residential occupants of new & existing flats. In this instance we would expect to see NOAEL achieved or not exceeding existing background levels."

3.2 On this basis the noise limit had been set to equal to minimum background noise levels. This approach had been previously accepted and will be adopted for this assessment.

3.3 Full details of the BS 4142:2014 + A1:2019 methodology can be found in Appendix B at the end of this document.

Delivery Noise

3.4 The guidance set out within BS 4142:2014 makes it clear that the standard is appropriate for the assessment of noise associated with delivery operations and vehicles within the site bounds.

3.5 However, the limitations set out within Section 1.3 of the document clearly state that it is not appropriate to assess noise from vehicles on public highways using the guidance set out within the standard.

3.6 In light of the above, when considering noise from vehicles on public roads the assessment of delivery noise will be undertaken in terms of changes in noise level due to delivery movements associated with the operation of the site in the context of DMRB guidance¹ for short term changes in noise levels.

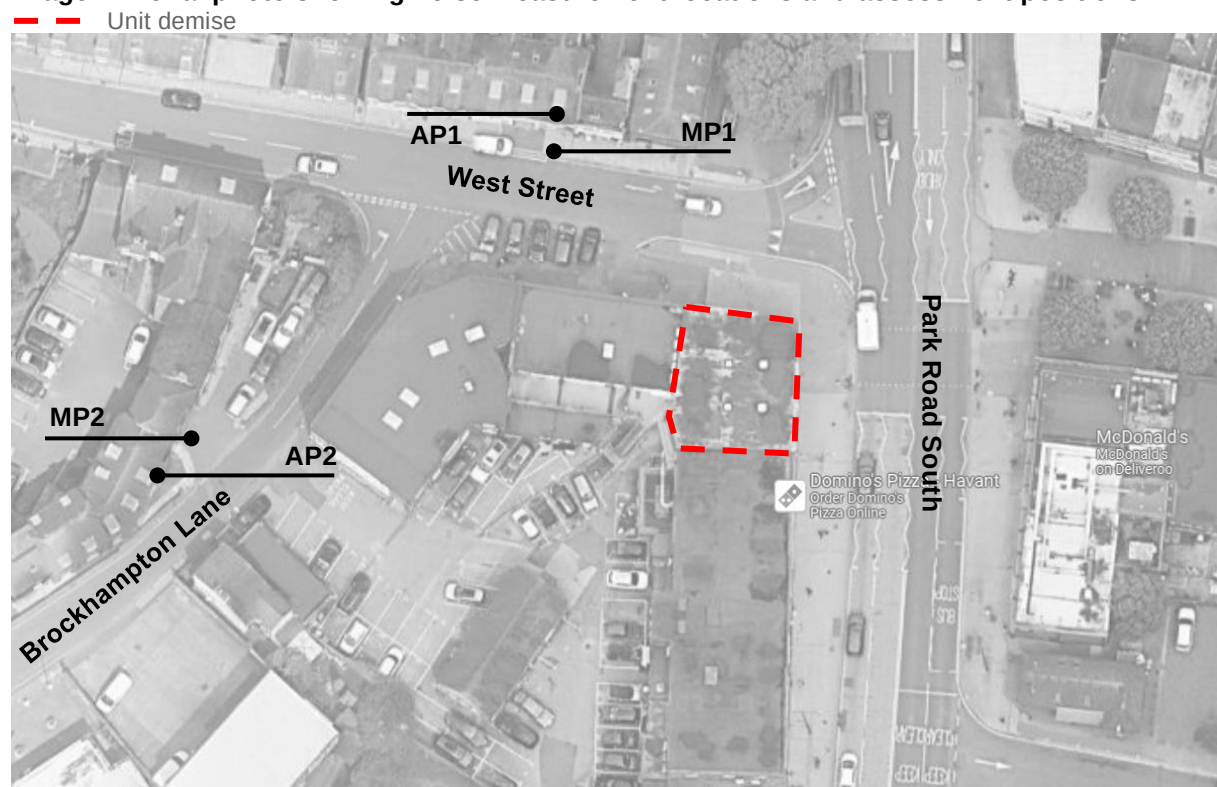
3.7 The changes in noise level due to the new activities would be regarding the existing ambient noise levels (L_{Aeq}) at the site and should be limited to a 'Minor' impact in accordance with the impact descriptors set out within the DMRB guidance.

4.0 Noise Survey

4.1 An attended noise survey was undertaken at the site between 2300 on Monday 9th January until 0300 Tuesday 10th January 2022. Full details of the noise survey can be found in Appendix A at the end of this document.

4.2 Noise measurements were taken at two locations chosen to be representative of the neighbouring residences to north and west of the site most affected by the proposed plant items and delivery vehicle routing. These positions can be seen in the following image and attended noise measurements were taken at a position representative of these locations.

Image 1: Aerial photo showing noise measurement locations and assessment positions



Aerial imagery courtesy Google Maps

4.3 Position MP1 was located on West Street to the north of the site, outside the nearest residence. MP2 was located to the rear (west) of the site located outside the nearest residence. Both noise measurement positions were roughly 1.5 metres above local ground level.

¹ Design Manual for Roads and Bridges

4.4 Noise emissions from the proposed plant installation and delivery vehicle routings have been considered to the nearest noise sensitive receivers at AP1 – AP2, as discussed later in this report. Measurements of the existing plant were taken in situ to inform the plant noise assessment.

4.5 The noise levels captured over the proposed extension hours at both of the above measurement positions are set out within the following table.

Table 1 Measured noise levels during the attended noise survey

Position	Time Period	$L_{Aeq,15min}$	$L_{Amax,f}$	$L_{A90,15min}$
MP1	2325 - 2340	55	73	44
	0023 - 0038	52	70	42
	0123 - 0138	52	74	39
	0229 - 0244	50	71	41
MP2	2341 - 2356	43	57	40
	0039 - 0054	42	50	39
	0143 - 0158	41	53	37
	0244 - 0259	45	59	40

4.6 The existing noise climate at the north and south of the site was dominated by road traffic noise along Park Road South and distant road traffic from the A27 some 350m to the south.

Plant Noise Limits

4.7 Based on the guidance set out within BS 4142:2014 and historically accepted criteria, the following plant noise emission limits (in terms of rating levels) to apply at the assessment positions shown previously in Image 1 have been set out in the following table.

Table 2 Plant noise limits

Location	Noise Emission Limit, dB $L_{Ar,Tr}$
	Extended Operating Period (0000 - 0300)
AP1: Residences along West Street	39
AP2: Residences along Brockhampton Lane	37

4.8 These limits are to apply to all plant items running simultaneously when running at full design duty and are to apply at 1 metre 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

5.1 Existing Installation

5.2 The following table outlines the plant items currently installed.

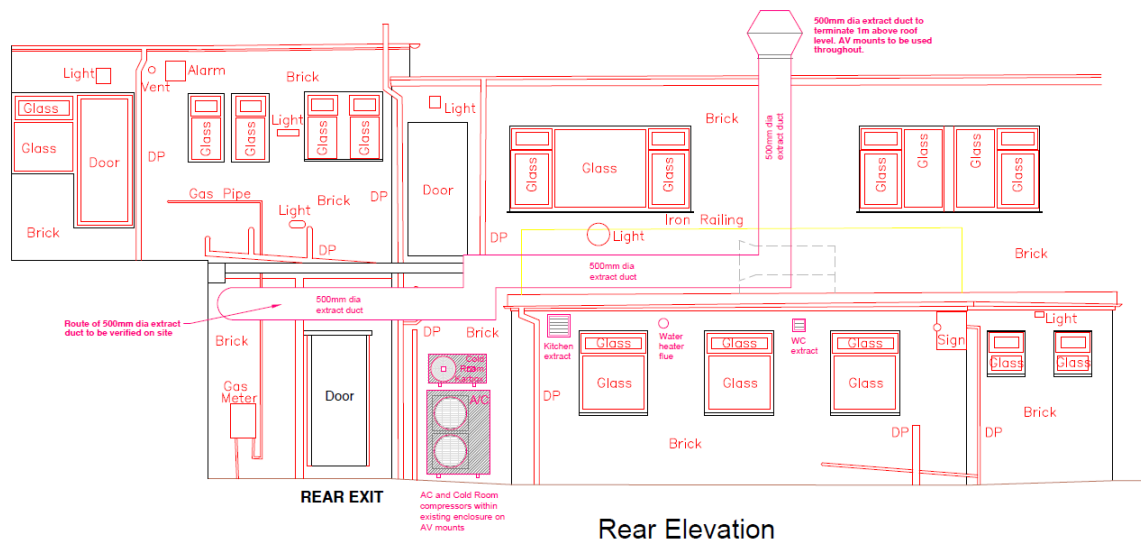
Table 3 Proposed mechanical plant to be used at the site

Item	Manufacturer	Type
Air Conditioning Unit 1	Samsung	R140
Air Conditioning Unit 2	Samsung	R140
Cold Store Condenser	Wintsys	-
Extract Fan ²	Flaktwoods	50JM
Fresh Air Fan	Air Vent Tech	Model 5

5.3 The fresh air fan terminates on the northern façade of the unit at high level. The extract fan ductwork runs across the rear of the unit and up to roof level, terminating at 1m above the eaves. The AC and cold stores are located to the rear by the rear exit of the building. The plant positions can be seen in the drawing *DB447-EL05*, separate to this report, with only one of the AC units omitted but known to be in the same position as the AC and cold store visible on the drawing. An excerpt of this drawing can be seen below.

Domino's, Havant Rear elevation

Drawing produced by Delta Bravo Limited



5.4 All units are expected to run during the extended operating hours 2300-0300. The existing plant will be assessed against the relevant time periods on this basis.

Assessment Methodology

5.5 The assessment has been based on measured noise data for each plant item. This noise data and the expected operational regime of the plant suggests that no character corrections need be applied. Full details of the measured noise levels can be found in Appendix A at the end of this document.

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

² Understood to be installed, could not be accessed on site

- AP1: Residential window to the North on West Street
- AP2: Residential window to the south on Brockhampton Lane

5.7 Levels of plant noise have been calculated at the assessment positions by correcting for screening, distance, directivity, façade reflections and other acoustic factors as appropriate. Calculations sheets are not included here for the sake of brevity but can be provided on request.

Required Mitigation Measures

Plant Specific Mitigation

5.8 It will be necessary mitigate noise from the extract fan to meet the noise limits at the assessment positions.

5.9 The extract will require an atmospheric side, in-duct attenuator. The acoustic performance of this must meet the insertion losses outlined in the table below in each octave band, as a minimum.

Table 4 Required mitigation insertion losses

Mitigation Type	Equipment	Minimum Required Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
In-duct	Extract	1	2	7	10	11	9	8	7

5.10 To provide guidance on selecting and allowing for such mitigation, we would expect a silencer 600 mm long and with 50% open area to be suitable to achieve the required losses for the extract. It is again noted that the insertion losses set out above are the requirement, not the example sizes or free areas.

5.11 In-duct silencers should be mounted internally, to avoid break out noise from the silencer casing, and as close to the fan as practicable. All fans should be mounted on anti-vibration mounts and have flexible duct work to control structure-borne sound transmission.

5.1.1 Any pressure drops from the attenuators or the atmospheric duct termination grilles should be limited to 40 Pa to avoid regenerated noise.

Results

5.12 With the outlined mitigation measure in place, the following plant noise levels are predicted at the nearest noise sensitive receptor position.

Table 5 Noise emission levels at the nearest noise sensitive receivers

Location	Assessed Rating Noise Level $L_{Ar,Tr}$ dB (limit)
	Extended Operating Period (0000 - 0300)
AP1: Residences along West Street	39 (39)
AP2: Residences along Brockhampton Lane	33 (37)

5.13 It can be seen that with the proposed in-duct silencer for the extract fan in place and the remaining installation operating as measured, the noise limits set out within this report are not expected to be exceeded during operational periods.

6.0 Delivery Noise Assessment

Description of Operation

6.1 The premises' proposed extended operating hours are to be 2300-0300. Deliveries and customer collections could occur at any point within these times. Deliveries are expected to be undertaken by a mixture of cars and mopeds to the rear of the building, while all assessed customer collections are assumed to be completed by car on West Street. Delivery drivers will be instructed to park to the rear of the store.

6.2 Hourly delivery and collection forecasts for the proposed extension hours based on similar outlets to the proposed site have been supplied to us by the client to form the basis of our assessment. These are as set out in the following table.

Table 6 Proposed hourly delivery and collection numbers per vehicle

Time Period	Collections	Deliveries		
	Car	Car	Moped	E-bikes
2300 – 0000	4	3	4	0
0000 – 0100	0	1	6	0
0100 – 0200	0	1	3	0
0200 – 0300	0	1	2	0

6.3 The assessment positions adopted for the plant noise assessment also serve as the nearest noise sensitive receptors to the proposed delivery and collection movements and have therefore been used within this assessment.

6.4 Full details of the delivery noise assessment methodology are set out within Appendix C of this document.

Noise Impact Assessment

6.5 In order to calculate noise levels from delivery and collection activities at the assessment positions, the noise levels detailed within the attached Appendix C have been corrected to take account of the quantity of deliveries, location of vehicle parking and exit and return routes. The corrections have taken account of distance, angle of view, screening and façade reflections where appropriate.

Noise Emissions from Deliveries from Rear Car Park

6.6 Due to the screening to position AP1 provided by the mixed use building connected to the site and running east-west along West Street, the noise emissions from delivery operations within the site's rear car park have been calculated to position AP2 only. An absolute noise limit of 48 dB $L_{Ar,1hour}$, applying at 1 metre from the nearest facades of receptors affected by delivery activity on

the rear yard has been adopted. This is based on guidance set out within BS 4142³ and BS 8233⁴, and is discussed in more detail in Appendix B.

6.7 Noise emissions from the rear yard have been quantified in terms of rating levels in line with BS 4142:2014 guidance. A 3 dB character correction for the intermittency of all noise sources applied and a further 3 dB impulsivity penalty have been applied to noise contributions from car door slams only.

6.8 The predicted noise contributions at the nearest assessment position (AP2) resulting from activity on the rear yard are shown in the following table.

Table 7 Predicted short-term noise impacts associated with vehicle operations at AP2

Time Period	Operation Rating Level at Position AP2 (dB $L_{A,r,1hr}$)	Noise Limit at Position AP2 (dB $L_{A,r,1hr}$)	Level Difference (dB)
2300 – 0000	43.2	48.0	-4.8
0000 – 0100	40.1	48.0	-9.1
0100 – 0200	37.4	48.0	-10.6
0200 – 0300	36.7	48.0	-11.3

6.9 Noise from the forecasted delivery operations is calculated to fall below 48 dB $L_{A,r,1hr}$, and is therefore not expected to give rise to a significant adverse effect. As a result, it is considered that noise from the forecasted delivery operations taking place within the site's car park is acceptable during all operational hours.

Noise Emissions from Deliveries from West Street

6.10 Where delivery drivers use public roads as a route to the rear yard through West Street and Brockhampton Lane it is not appropriate to use the same assessment methodology as used for activity on the rear yard (BS 4142 specifically states that when apply the guidance in the standard, '*sound of an industrial and/or commercial nature does not include sound from the passage of vehicles on public roads and railway system*').

6.11 Instead, an appropriate assessment methodology and criteria have been developed based on guidance set out within DMRB and published by IEMA. These are discussed in more detail in Appendix B.

6.12 The predicted noise effects at position AP1 and AP2 along with the proposed noise impact descriptors are shown in the following tables. The assessment has covered each of the proposed extended hours.

³ British Standard BS 4142:2014+A1:2019 - Methods for rating and assessing industrial and commercial sound

⁴ British Standard BS 8233:2014 - Guidance on sound insulation and noise reduction for buildings

Table 8 Predicted short-term noise impacts associated with vehicle operations at AP1⁵

Time Period	Position AP1				Impact
	Ambient Noise Level (dB $L_{Aeq,1hr}$)	Calculated Delivery Noise Level (dB $L_{Aeq,1hr}$)	Sum (dB $L_{Aeq,1hr}$)	Increase in Noise Level (dB)	
2300 – 0000	54.8	52.7	56.9	2.1	Minor
0000 – 0100	51.9	47.9	53.4	1.5	Minor
0100 – 0200	51.7	46.1	52.8	1.1	Minor
0200 – 0300	50.1	45.4	51.4	1.3	Minor

Table 9 Predicted short-term noise impacts associated with vehicle operations at AP2⁵

Time Period	Position AP2				Impact
	Ambient Noise Level (dB $L_{Aeq,1hr}$)	Calculated Delivery Noise Level (dB $L_{Aeq,1hr}$)	Sum (dB $L_{Aeq,1hr}$)	Increase in Noise Level (dB)	
2300 – 0000	43.1	42.2	45.7	2.6	Minor
0000 – 0100	41.6	40.6	44.1	2.5	Minor
0100 – 0200	40.8	38.8	42.9	2.1	Minor
0200 – 0300	44.9	38.1	45.7	0.8	Negligible

6.13 It can be seen that noise from the forecasted delivery operations will result in a Minor impact at worst, taking into account the proposed assessment criteria during the extended operational hours, and as such is considered acceptable at all times.

7.0 Conclusion

7.1 An existing Domino's at 39 West Street, Havant PO9 1LA, has applied to extend their current opening hours from 2300 to 0300. As part of this application, an assessment of noise emissions from the associated mechanical services installation and delivery operations is required.

7.2 Following an assessment of atmospheric noise emissions from the proposed plant installation of associated vehicle movements for the site, it has been concluded that it is possible to achieve the relevant noise criteria and therefore the requirements of the local authority.



⁵ Presented to 1 decimal place to allow for comparison with the relevant criteria, not as a reflection of calculation accuracy.

Appendix A: Noise Survey

Details and results of the environmental noise survey

An attended noise survey was undertaken at two positions representative of the nearest residential receivers between 2300 on 9th January and 0300 on 10th January 2023. Further noise measurements were taken of the existing plant items between 0800-1100 on 10th January 2023.

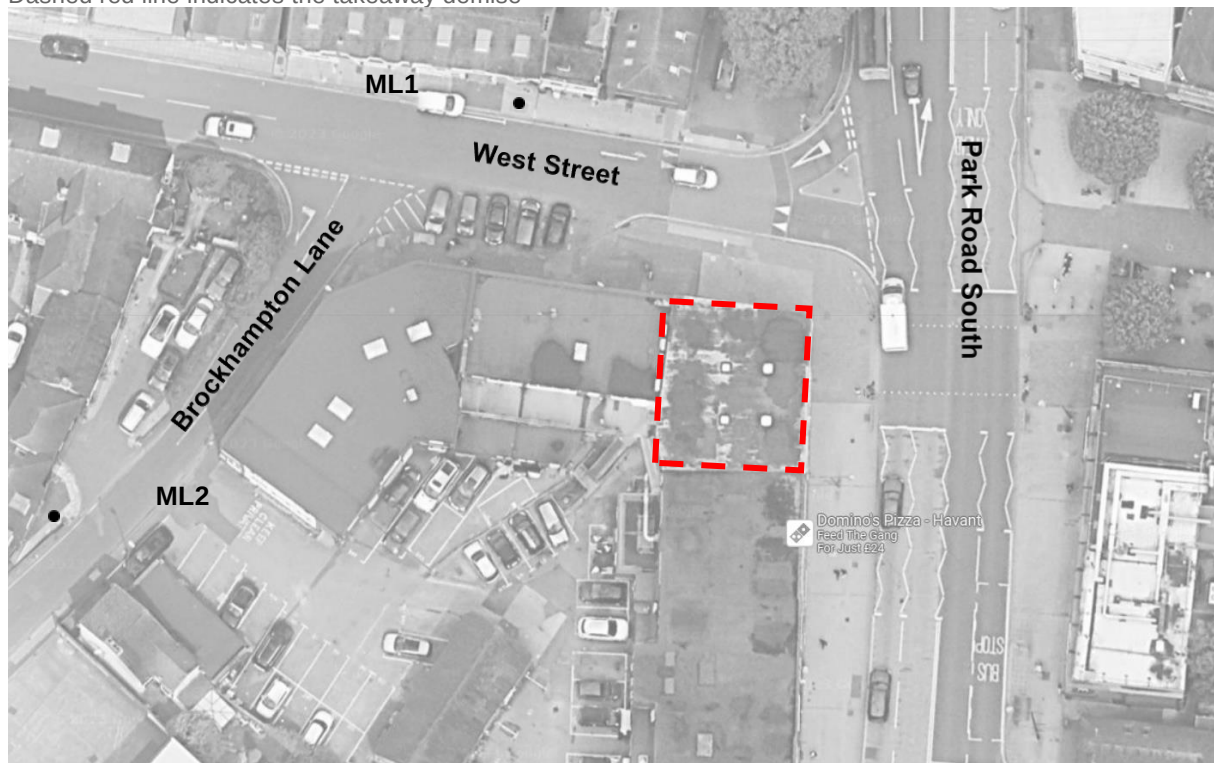
Measurements of the L_{Aeq} , L_{Amax} and L_{A90} indices were recorded over consecutive 15-minute periods for the duration of the unattended survey.

Table 10 Measurement location

Location	Detail
ML1	Microphone at 1.5 m above ground level, on West Street. Measurements were attended. The noise climate was dominated by passing vehicles on local roads and neighbouring plant items.
ML2	Microphone at 1.5 m above ground level, on Brockhampton Lane. Measurements were attended. The noise climate was dominated by passing vehicles on local roads and neighbouring plant items.

Aerial photo showing noise measurement location and assessment positions

Dashed red line indicates the takeaway demise



Aerial imagery courtesy 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 11 Noise measurement equipment

Location	Item	Detail
All measurement positions	Sound level analyser	Norsonic 140
	Acoustic calibrator	Norsonic 1255

During the attended noise surveys, the weather was cool and dry with no breeze. Towards the end of the morning attended survey there were light spots of rain.

The following table presents the measured noise levels throughout the full attended survey period.

Table 12 Measured noise levels during the attended noise survey

Position	Time Period	$L_{Aeq,15min}$	$L_{Amax,f}$	$L_{A90,15min}$
MP1	2325 - 2340	55	73	44
	0023 - 0038	52	70	42
	0123 - 0138	52	74	39
	0229 - 0244	50	71	41
MP2	2341 - 2356	43	57	40
	0039 - 0054	42	50	39
	0143 - 0158	41	53	37
	0244 - 0259	45	59	40



Appendix B - Planning Policy, Guidance and Criteria

Assessment of Noise Effects from On-site Activity

British Standard BS 4142 – Mechanical Services Noise

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.'*

Section 1.3 of the standard sets out its limitations in terms of how it should be used and states the following:

'The determination of noise amounting to a nuisance is beyond the scope of this British Standard.

Sound of an industrial and/or commercial nature does not include sound from the passage of vehicles on public roads and railway systems.'

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 ($L_{A,T}$) 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 (0700-2300) and night time (2300-0700). 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 0600 to 0700 and 2300 to 2400, 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.'

In situations where background sound levels are low, it is important to again consider context, rather than simply basing an assessment of impact on a difference in noise level, as suggested above. With regards to context in relation to absolute noise levels, the standard states the following:

'1) The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.'

British Standard BS 4142:2014 does not set out guidance for what constitutes low background noise levels. Instead, it can be inferred from the World Health Organisation Night Guidelines for Europe (2009) that a noise level of ≥ 30 dB $L_{\text{night, outside}}$ is not likely to give rise to any substantial observed noise effects.

Although the above criterion relates to an 8-hour period between 2300 and 0700 (i.e. the night time), the application of the criterion to any given 15 minute period during the night time (or one hour if applied to the daytime) effectively makes the criterion more stringent.

Taking into account the above therefore, it is suggested that noise limits for mechanical services plant equipment should be set with a lower threshold of 30 dB $L_{\text{Ar, Tr}}$. Noise levels equal to or below this threshold figure would not be expected to give rise to substantial observed effects (i.e. the impact would be low).

From the above, it can be inferred that ensuring noise emissions from a given site or activity do not exceed noise limits set at a level 5 dB above the representative background noise levels at a given receptor (or at the 30 dB $L_{\text{Ar, Tr}}$ threshold where background sound level are low) will provide an indication that noise adverse effect will not occur. For the purposes of this assessment, mechanical services noise limits have been established at a level equal to the prevailing background noise level in line with accepted historical planning submissions found on the local authority planning portal.

British Standard BS 4142 / BS 8223 – Noise from On-Site Vehicular Operation

For noise from mechanical services plant, the above approach is considered reasonable. For noise from other sources however, such as vehicular operation linked to commercial activity on the site, further consideration is needed.

In Section 11 of the BS 4142, it states that where the initial estimate of the impact needs to be modified due to the context, all relevant factors should be taken into consideration, including the following:

'1) The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night...

...2) The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it...

3) The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:

- i) Façade treatment;*
- ii) Ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid/or purge ventilation'*

It is clear, therefore, that it is necessary to consider proposed industrial noise/sources in the context of the setting that they are to be introduced.

In a high street setting, existing residents can be expected to already be exposed to noise from vehicle movements such as cars and mopeds. Therefore, the addition of a small number of such vehicles in any given hour is less likely to have an adverse effect on receptors than the introduction of a commercial noise source with totally different acoustics characteristics (i.e. industrial machinery or some mechanical services plant etc.). Therefore, a simple comparison of noise from vehicular activity against the background noise climate at a given receptor, is not likely to provide an appropriate indication of potential noise effects.

It can also be reasonably expected that dwellings in or near a high street setting could include reasonably good quality glazing and facade constructions which could be expected to control noise intrusion to some degree. However, it is also pertinent to consider that those same dwellings may also use open windows to provide thermal comfort and/or ventilation.

Table 4 within BS 8233⁶ provides appropriate criteria for absolute noise levels within dwellings. This is replicated below for ease of reference:

⁶ British Standard BS 8233:2014 - Guidance on sound insulation and noise reduction for buildings

Table 13 Table 4 of BS8233

Activity	Location	Internal Ambient Noise Level	
		Daytime (0700-2300)	Night time (2300-0700)
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

The criteria above relate to “anonymous noise” sources, with specific character, such as road traffic for example. In this this regard, Section 7.7.1 of the standard states:

‘This subclause applies to external noise as it affects the internal acoustic environment from sources without a specific character, previously termed “anonymous noise”. Occupants are usually more tolerant of noise without a specific character than, for example, that from neighbours which can trigger complex emotional reactions. For simplicity, only noise without character is considered in Table 4. For dwellings, the main considerations are:

- a) for bedrooms, the acoustic effect on sleep; and*
- b) for other rooms, the acoustic effect on resting, listening and communicating.*

NOTE Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate.’

The guidance above, in particular the last paragraph, makes it clear that noise which has a specific character may require lower noise criteria than proposed for anonymous steady noise sources.

Applying the acoustic character corrections set out in BS 4142 to industrial noise when considering its effects to habitable areas within dwellings, and treating the criteria set out in BS 4142 as 1-hour and 15-minute rating levels for day and night time periods respectively, effectively applies lower internal noise limits in line with the above BS 8233 guidance.

This approach is reinforced by paragraph 6.5.2 of BS 8233 which states the following for residential developments in areas affected by industrial noise:

‘Where industrial noise affects residential or mixed residential areas, the methods for rating the noise in BS 4142 should be applied. BS 4142 describes methods for determining, at the outside of a building:

- a) noise levels from factories, industrial premises or fixed installations, or sources of an industrial nature in commercial premises’*

The quote above is explicit in stating that the methods for rating the noise in BS 4142 should be applied (i.e. deriving a rating level, L_{Ar}) and reinforces the approach set out above. It does not state that a full BS 4142 ‘assessment’ should be conducted. The reference to the background noise level relates only to a statement of the scope of BS 4142.

When considering the potential for noise intrusion into nearby **existing** dwellings, it is appropriate to assume they would have windows partially open for ventilation/cooling purposes, rather than to

assume windows would be closed. A 13 dB loss can be taken from a free-field external level to internal noise level, based on guidance set out in the ProPG⁷.

Using this loss and the guidance previously set out, daytime and night time external noise thresholds can be established, below which significant adverse noise effects/impacts would not be expected to occur. The following assessment criteria are proposed to apply when considering noise from commercial sources to the facades of **existing** residential noise sensitivities:

Table 14 Internal noise criteria for new dwellings when considering industrial noise sources

Assessment Location	External Noise Level	
	Daytime (0700-2300)	Night time (2300-0700)
1m from façade of receptors to proposed activity.	≤48 dB $L_{Ar,1hour}$	≤43 dB $L_{Ar,15minute}$

Assessment of Noise Effects from Off-site Activity

Some commercial developments can give rise to noise effects caused by changes in activities/operations beyond a site's boundary. For example, delivery vehicles associated with the operation of a hot food takeaway may influence the noise emissions from a public road. As previously noted, the assessment of noise effects from vehicle activity on public roads falls beyond the scope of BS 4142 and it is therefore necessary to consider other relevant guidance to inform an assessment approach.

Design Manual for Roads and Bridges

The *Design Manual for Roads and Bridges* (DMRB) includes current standards, advice notes and other documents relating to the design, assessment, and operation of trunk roads, including motorways.

Criteria for assessing the short-term impacts of changes in road traffic noise are set out within DMRB section LA111, Revision 2: Noise and vibration (May 2020). These criteria are of relevance in the context of considering the effects that a given development may have on receptors near to an existing road network.

The document sets out an assessment methodology which, at a given receptor, requires the comparison of expected noise levels with and without development, as well of the consideration of absolute noise emissions against specific thresholds (which may be modified if appropriate, depending on context).

Tables 3.54a and 3.55a of DMRB set out a means to quantitatively assess the short and long-term magnitude of impact relating to changes in noise level linked to changes in activity on a given road link. These tables are replicated as follows.

⁷ ProPG; Planning & Noise (2017), ANC, IOA and CIEA - Professional Practice Guidance on Planning & Noise: New Residential Development

DMRB Table 3.54a – Magnitude of change: short-term

Short term magnitude	Short-term noise change, (dB $L_{A10,18\text{hour}}$ or L_{night})
Major	Greater than or equal to 5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	less than 1.0

DMRB Table 3.55a – Magnitude of change: long-term

Long term magnitude	Long-term noise change (dB $L_{A10,18\text{hour}}$ or L_{night})
Major	Greater than or equal to 10.0
Moderate	5.0 to 9.9
Minor	3.0 to 4.9
Negligible	less than 3.0

Whilst the classifications above are useful, in the context of and activity which may vary significantly over the course of a 24-hour period, it is not appropriate to simply consider longer term average noise levels (i.e. $L_{A10,18h}$ or L_{night} , which are averages of noise levels over 18 and 8 hour periods respectively).

Guidelines for Environmental Noise Impact Assessment

The Institute of Environmental Management and Assessment (IEMA) *Guidelines for Environmental Noise Impact Assessment* (2014) discusses the applicability of time periods across which assessments are undertaken, noting specifically the potential drawback with using noise indices such as $L_{A10,18h}$ (as set out within the DMRB guidance) and $L_{Aeq,16h}$.

'Noise indices such as the $L_{A10,18h}$ and $L_{Aeq,16h}$ can be used to describe noise exposure over a period of time. However, if the noise change is confined to a period that is shorter than the adopted averaging period the change in the noise index is likely to be very small. The longer the averaging time period of the indicator; the more likely it is that a small change in it could be masking a larger and potentially substantial change that only occurs for a short period of the averaging period.'

Assessing noise effects on a 1-hourly basis across a 24-hour period (or over the expected operational hours of a given commercial outfit) is suggested as a balanced approach when considering variation in activity and taking into account the type of vehicle movement data that is typically available when undertaking such assessments.

It is appropriate to consider the commencement of operations of a commercial activity in the short term as on the day a business opens, it may immediately cause a noise effect, rather than introducing a gradual change in conditions over time. The following criteria are therefore proposed for the assessment of noise effects from off-site activity, drawing from the above sections:

Proposed Off-Site Activity Assessment Criteria

Magnitude of Effect	noise level change ⁸ , dB $L_{Aeq,1hour}$
Major	Greater than or equal to 5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	less than 1.0

'Negligible' and 'Minor' levels of noise impact are deemed to be acceptable, depending on the context of the operational noise within the environment which should always be considered alongside the calculated numerical impact.



⁸ Relative to ambient noise levels without activity, also in terms of $L_{Aeq,1hour}$

Appendix C: Delivery Noise Assessment Methodology

Assessment Basis

Typically, hot food takeaway deliveries are made by cars, mopeds or e-bikes (with different outlets utilising one, or a mixture of, these types). It is understood delivery drivers operate individually and therefore communication between operatives is expected to be non-existent externally of the store. It is common practice that delivery drivers are instructed to avoid interaction which could cause noise outside the store. Because of this, calculated noise levels are limited to the arrival and departure of individual customer collections and delivery vehicles.

The noise impacts resulting from delivery and collection operations are calculated between the forecasted hours of operation based on the anticipated location of each. For instance, it is typical for customer collections to occur within the front of house area, with associated vehicles arriving and departing from the front of the given store, with delivery drivers operating from the front or rear yard of a site.

Forecasts of delivery numbers per vehicle type and customer car collections are provided by the client and are based on similar sized local stores recorded footfall, with forecasts based on busiest evening periods often provided to allow for a robust assessment basis.

In order to quantify the impact of delivery operations and customer collections on a site's existing noise climate, the existing levels measured on site are compared to the predicted levels including the calculated delivery/collection noise.

Vehicle movements are likely to vary significantly over the course of the day and night-time periods, for example during rush hour or during busy periods of business operation. It is therefore appropriate to consider the assessment of noise levels based on periods other than $L_{Aeq,16hr}$ and $L_{Aeq,8hr}$ for full day and night-time periods respectively as these have the potential not to reflect the variable nature of road traffic on low-flow highways.

As a result, noise emissions produced by delivery/collection movements are assessed in terms of $L_{Aeq,1hr}$ for each of the store operating hours. The significance of the change in levels over a given period can then be quantified and compared against the criteria set out in Appendix B.

Assessment Methodology

Noise data used within calculations of delivery/collection movements are of similar operations at façade-incident positions and are drawn from *Suono's* internal database. These are set out within the following table.

Noise data, dB L_{AE} used in assessment calculations

Activity	Distance (m)	Measured Sound Level, dB L_{AE}
Car pass-by	5	72
Car start-up	5	70
Car door open/close	5	65
Moped pass-by	5	70
Moped start-up	5	73
E-bike pass-by	5	59
E-bike start-up	5	58
7.5 Tonne lorry pass-by	10	77
7.5 Tonne lorry start and go	10	75
7.5 Tonne lorry door slam	10	64
Lorry unloading by hand	10	72

In order to calculate noise levels from delivery and collection movement at a given assessment position, the noise levels detailed above are corrected to take account of the number of deliveries within an hour period in addition to the location of loading and exit & return routings.

The Calculation of Road Traffic Noise⁹ (CRTN) has been used as an assessment basis and all corrections take account of distance losses in addition to angle of view and screening losses where appropriate.

With regard to the assessment of operational noise impacts from sources within the site boundary, character corrections for intermittency, tonality, and impulsivity are taken as appropriate in order to calculate a given rating level in line with the guidance set out within BS 4142:2014.

Noise effects are then calculated and assessed in line with the impact criteria set out within the previous sections, taking account of the context of these effects in relation to the existing noise climate where appropriate.



⁹ Calculation of Road Traffic Noise (1988) – Department of Transport