

SHARPS REDMORE

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Report

**Aldi, Bath Road, Calcot,
Reading**

**Environmental Noise
Assessment of a proposal to
extend store delivery hours**

Prepared by

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Project No 2120569

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Disclaimer

This report has been prepared with all reasonable skill, care and diligence commensurate with an acoustic consultancy practice under the terms and brief agreed with our client at that time. Sharps Redmore provides no duty or responsibility whatsoever to any third party who relies upon its content, recommendations or conclusions.

1.0 Introduction

- 1.1 Deliveries to the Aldi store at Bath Road, Calcot, Reading are controlled by planning permission 16/01218/FULMJ, planning condition 3.

- 1.2 Planning condition 3 of consent 16/01218/FULMJ states:

“3 Delivery hours

No deliveries shall be taken at or dispatched from the site outside the hours of 7.00am to 10.00pm Monday to Saturday, and 9.00am to 6.00pm on Sundays. No delivery vehicles shall arrive early and wait at the premises before the permitted delivery hours on any given day. All delivery vehicles shall have left the premises before the end of the permitted delivery hours on any given day.

Reason: To safeguard the amenities of surrounding residents, in accordance with the National Planning Policy Framework, and Policy CS14 of the West Berkshire Core Strategy (2006-2026).

- 1.3 Sharps Redmore (SR) has been instructed to prepare a noise assessment report to determine whether deliveries times could be extended at the Aldi Bath Road, Calcot, Reading store.
- 1.4 A recent planning application, reference 21/00913/FULMAJ, sought extended delivery hours at the store, but was withdrawn prior to determination. The Environmental Health Officer at West Berkshire Council provided consultation comments as outlined in section 2 of this assessment. Planning application 21/00913/FULMAJ was not accompanied by a technical noise assessment report.
- 1.5 The Covid 19 pandemic lead to the UK Government temporarily lifting all delivery hour curfews imposed on food store operators between April 2020 and July 2021 through directed non-enforcement of planning conditions. This change, has resulted in deliveries being received at times that would not normally be permitted. Consequently, this situation enabled the impact of noise from ‘out of hours’ delivery activity to be directly determined.
- 1.6 Between April 2020 and July 2021 Aldi has regularly been taking deliveries during the early morning period. Most typically the store has regularly received a delivery from 0500 hours. It is understood that Aldi has not received any noise complaints in relation to early morning delivery activity during the Covid pandemic period.
- 1.7 The deliveries that Aldi has been receiving outside the permitted planning hours are not additional deliveries to the store rather existing deliveries spread out over a longer period.
- 1.8 The loading bay at Aldi Bath Road, Calcot, Reading, is located on the southern side of the store. This assessment considers delivery activity noise to the closest

residential properties to the south in Holmwood Avenue. A site location plan is presented at Appendix A.

- 1.9 This assessment considers the technical noise case for deliveries to be permitted from 0500 hours, to facilitate greater operational flexibility for Aldi.
- 1.10 Appropriate assessment methodology and criteria are detailed in Section 3 of this report, whilst details of a noise survey undertaken at the site are displayed in Section 4.
- 1.11 An assessment of noise from deliveries is presented in section 5; delivery activity noise reduction measures are discussed in section 6.
- 1.12 The assessment conclusions are presented in section 7, and a guide to the acoustic terminology used in this report is shown in Appendix C.

2.0 EHO consultation comments (PA reference 21/00913/FULMAJ)

2.1 Consultation comments relating to noise were made by Ms Steve Wilson (SW), Environmental Health Officer (EHO) at West Berkshire Council, in an email dated 30th April 2021.

2.2 SW wrote:

"It is indeed true that Environmental Health have received no complaints about noise from deliveries outside the currently permitted hours at the above premises. This doesn't mean there isn't a problem though..."

I recommend that an acoustician's report should be commissioned and submitted to quantify the noise caused by deliveries being made outside the currently permitted hours, and that report should reference indoor sound limits in BS8233:2014.

The agent has stated that lorries dock against a seal which contains some of the noise of roll cages being pushed in and out. It would be helpful if the acoustician's report includes readings taken with lorries fully docked, and incompletely docked. A gap of a couple of inches makes a big difference.

The report should also examine how noisy deliveries are from "non Aldi" vehicles, which probably don't dock against the loading bay, but use tail lifts and roll cages outside in the yard."

2.3 SR response:

Whilst it is acknowledged that the absence of noise complaints is not a definitive indication that delivery noise is not causing disturbance to local residents, given that early morning deliveries were regularly received from 0500 hours for a period of almost 18 months, it is still reasonable to suggest that noise from this activity is unlikely to be disturbing residents.

I agree that the most appropriate noise assessment methodology would be consideration of indoor guideline noise values, such as those in BS 8233:2014. In addition I would strongly suggest that delivery activity noise is also considered in the context of the World Health Organisation (WHO) internal guideline noise values in respect of peak noise, that can be linked to sleep disturbance criteria. This is discussed further at section 3.

It is agreed that a BS 4142 type assessment would not be most appropriate in this instance since the difference between an external background noise level during the early morning and rated delivery activity noise is of limited use to assess noise to inside properties where residents could be expected to be sleeping.

The point Mr Wilson raises with regard to the loading bay dock seal is an interesting one. Historical assessment work undertaken by SR (maybe 15 years ago) suggests that delivery unloading noise levels can be reduced by 2 or 3 dB when the delivery

wagon is well sealed to the loading bay door (either by an inflatable seal, or compression type seal system). However, more recent experience (in the past 5 years, particularly at Aldi sites) has shown that in fact that as much noise escapes through the non-acoustic 'curtain wall' side of a delivery vehicle than through any gap where the vehicle is docked at the loading bay.

Hence it is concluded that there is little material difference in overall unloading noise levels between a delivery wagon that is well sealed to the store, and one where there is a gap, due to the acoustic transparency of the side curtain walls of the wagons.

It is understood that most deliveries from Aldi and third party suppliers use the dock leveller system at this store, as such the use of tailgate lifts would be minimal, and was not witnessed when SR visited this store.

Whilst the character, and particularly the duration, of a delivery event can vary where a tailgate lift is used (compared to a dock leveller system) overall noise levels are similar. Hence it is considered that this noise assessment based on dock leveller type deliveries is robust.

3.0 Assessment methodology and criteria

- 3.1 The National Planning Policy Framework (NPPF), July 2021, sets out the Government's planning policies for England and "these policies articulate the Government's vision of sustainable development." In respect of noise, Paragraph 185 of the NPPF states the following:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation".*

- 3.2 Guidance on the interpretation of the policy aims contained within the NPPF is contained within National Planning Policy Guidance (NPPG). The NPPG introduces the concept of a noise exposure hierarchy based on likely average response. The guidance contained in the NPPG is summarised in the table below:

TABLE 1: Noise Exposure Hierarchy

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not noticeable	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

- 3.3 The NPPF and NPPG reinforce the March 2010 DEFRA publication, “Noise Policy Statement for England” (NPSE), which states three policy aims, as follows:

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

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

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

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

- 3.5 Taking an overview of national policy aims and guidance it is clear that when considering the impact of noise that the fact can be heard and causes impact, is not reason to refusal an application as consideration should also be given to the significance of the impact and the mitigation measures available.

- 3.6 It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:

- i) The effect may be determined by reference to guideline noise values, such as those contained in the World Health Organisation (WHO) “*Guidelines for Community Noise*”.
- ii) Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect. This is the method that is suited to, for example, the assessment of noise from road traffic because it is capable of displaying impact to all properties adjacent to a road link irrespective of their distance from the road.
- iii) Another method is described within BS 4142:2014 to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the newly revised standard is intended to assess are sound from industrial and manufacturing processes, sound from fixed plant installations, sound from loading and unloading of goods at industrial

and/or commercial premises and the sound from mobile plant and vehicles, such as forklift, train or ship movements.

- 3.7 The assessment methodology preferred in this assessment is based on the WHO guideline noise value approach. The only reason for the divergence from the EHO's suggested use of BS 8233 guideline values, which are materially the same as the WHO guidelines, is that the 2014 version of BS 8233 no longer contains peak noise guideline values.
- 3.8 This assessment is to consider noise from deliveries that could take place in the night time period. For deliveries that may occur during the night time periods the WHO Guidelines for Community Noise offer the most relevant assessment criteria. This is because for noise that occurs at night it is the absolute level of noise that is the critical factor in relation to recognised sleep disturbance criteria. During the night time period generally, people are inside their properties. Therefore, the outcome of a BS 4142 assessment, which assesses the difference between the external background noise level at the receptor and the external rating level of the specific noise source under consideration, does not reflect the true nature of the noise impact at the receptors. This point is confirmed in the scope of BS4142:2014+A1:2019, which states *"the methodology set out in Clauses 7, 8, and 9 of this standard is not intended to be used to assess the extent of the impact at indoor locations"*.
- 3.9 The WHO "Community Noise Guidelines" (CNG) values are appropriate to what are termed "critical health effects". This means that the limits are at the lowest noise level that would result in any psychological or physiological effect. They are, as defined by NPSE, set at the Lowest Observed Adverse Effect Level (LOAEL), but do not define the level above which effects are significant (the SOAEL). Compliance with the LOAEL should, therefore, be seen as a robust aim.

- 3.10 The relevant World Health Organisation (CNG) noise values are summarised in the following table:

TABLE 2: WHO CNG values

Document	Level	Guidance
World Health Organisation "Community Noise 2000"	$L_{AeqT} = 55 \text{ dB}$	Serious annoyance, daytime and evening. (Continuous noise, outdoor living areas)
	$L_{AeqT} = 50 \text{ dB}$	Moderate annoyance, daytime and evening. (Continuous noise, outdoor living areas).
	$L_{AeqT} = 35 \text{ dB}$	Moderate annoyance, daytime and evening. (Continuous noise, dwellings, indoors)
	$L_{AeqT} = 30 \text{ dB}$	Sleep disturbance, night-time (indoors)
	$L_{Amax} = 60 \text{ dB}$	Sleep disturbance, windows open at night. (Noise peaks outside bedrooms, external level).
	$L_{Amax} = 45 \text{ dB}$	Sleep disturbance at night (Noise peaks inside bedrooms, internal level)

- 3.11 For L_{AeqT} criteria the time base (T) given in the documents is 16 hours for daytime limits and 8 hours for night time limits. When assessing impact, this has the tendency to smooth out the hourly variations in noise level. As such, our calculations are carried out to a 1 hour time base, which is a more stringent assessment than is given in WHO Guidelines for Community Noise.
- 3.12 The internal CNG values can be converted to an external value by the addition of the attenuation provided by a partially open window of 15 dB.

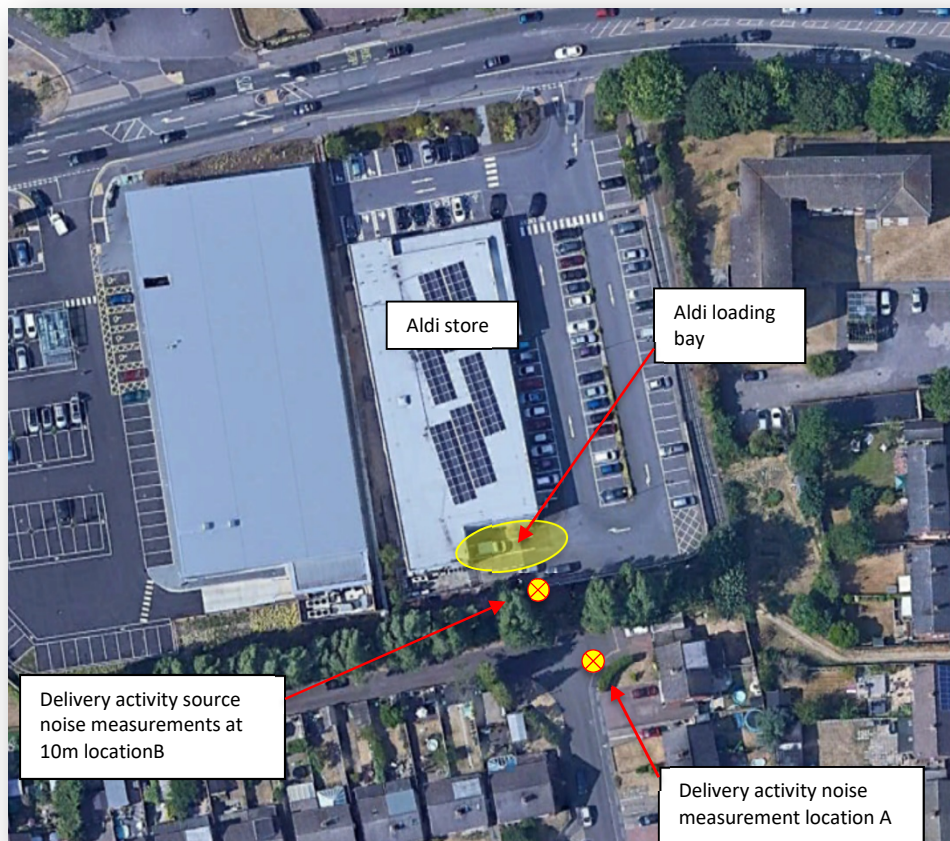
4.0 Noise survey details

- 4.1 The noise survey undertaken as part of this noise assessment report focused on the direct measurement of peak noise levels at a position of the closest residential properties in Homwood Avenue, for comparison to recognised sleep disturbance criteria.

Delivery activity source noise measurements

- 4.2 Figure 1 below indicates the noise measurement locations for the recent noise survey.

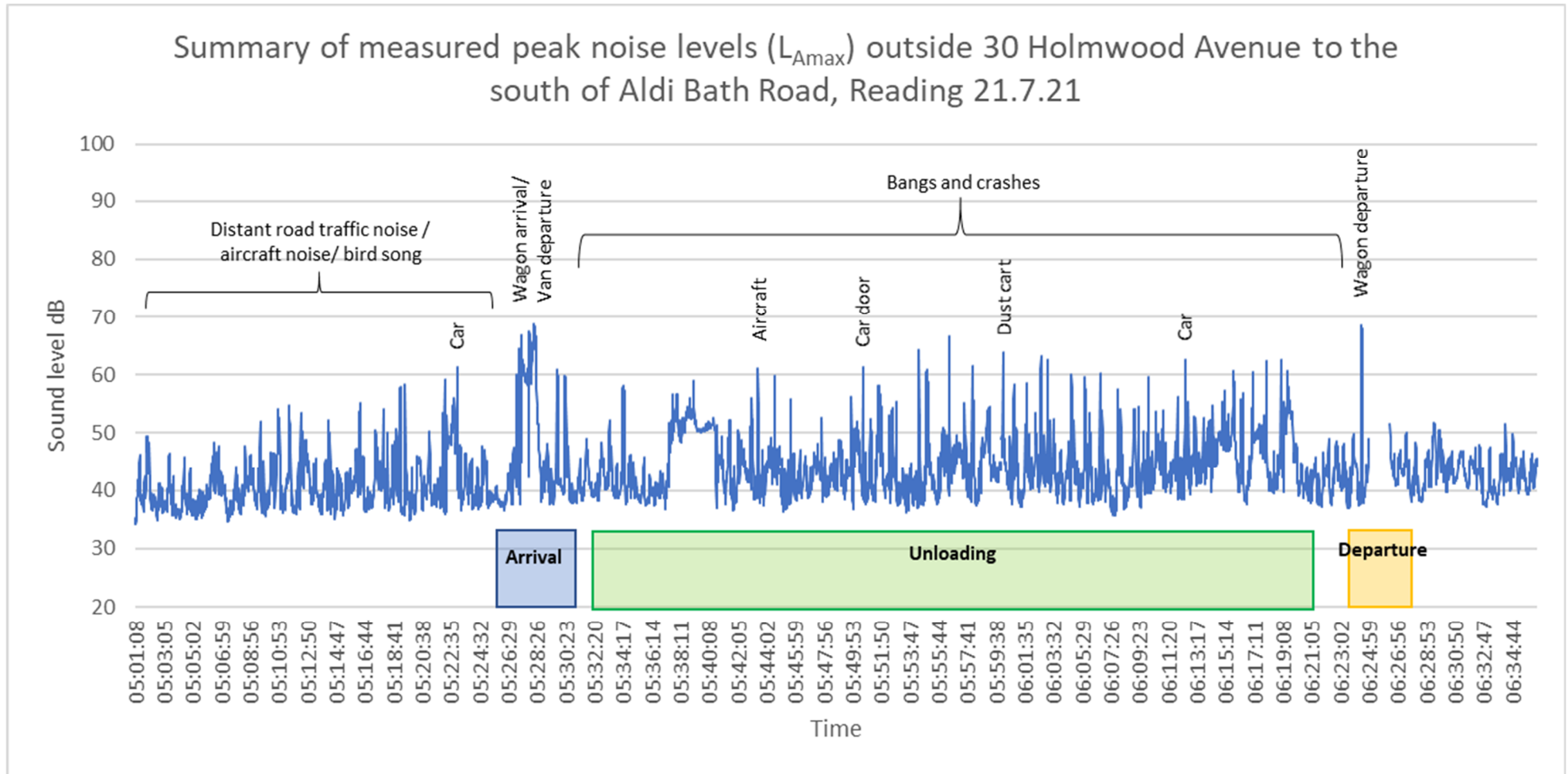
FIGURE 1: Noise survey measurement locations



- 4.3 Peak noise level measurements of delivery activity were undertaken at measurement location A, during the early morning of Wednesday 21st July 2021, over 1 second time intervals to obtain a level recording of delivery activity that could be analysed and annotated to assist identifying the likely magnitude of any noise impact.
- 4.4 The delivery activity noise measurements were carried using a Norsonic 118 sound level meter. The sound level meter was calibrated at the start and end of the measurements and no drift in level was noted.

- 4.5 The sound level meter microphone was positioned approximately 2.5 metres above local ground level, in free field conditions outside 30 Holmwood Avenue.
- 4.6 Weather conditions during the survey were dry, clear and warm 17°C; winds were observed to be calm. Weather conditions are not considered to have affected the noise measurements.
- 4.7 The existing noise climate, at the time of the delivery, was contributed to be delivery activity, by birdsong and distant road traffic noise.
- 4.8 Delivery activity noise levels are presented at Figure 2 below:

FIGURE 2: Aldi Bath Road, Calcot, Reading, delivery activity peak noise levels at 30 Holmwood Avenue



- 4.9 From the graph at Figure 2 and from site observations, typical peak noise levels associated with delivery unloading activity (from the movement of palletized goods) was observed to be 58 to 63 dB L_{Amax} . The highest peak noise level from unloading activity was 66 dB L_{Amax} .
- 4.10 There is currently no acoustic screening along the southern boundary of the Aldi site to reduce Aldi delivery noise to the properties in Holmwood Avenue.
- 4.11 Due to extraneous noise it was not possible to obtain a direct delivery activity $L_{Aeq T}$ noise level at the receptor location. Therefore, a second sound level meter (Norsonic 140) was used to measure delivery activity at a distance of 10 metres from the middle of the delivery wagon during unloading (1.5m above the ground). This SLM was calibrated before and after the measurements and no drift in signal observed.
- 4.12 The following source delivery activity noise levels were measured at Aldi Bath Road, Calcot, Reading at a distance of 10 metres

TABLE 3: Delivery activity source noise levels

Measured delivery event source noise Level (at 10 metres)						Peak noise dB L _{Amax}
Arrival		Unloading		Departure		
Duration (mins)	L _{Aeq T} (dB)	Duration (mins)	L _{Aeq T} (dB)	Duration (mins)	L _{Aeq T} (dB)	
1.5	69	50	56	0.5	67	75-78

5.0 Noise from delivery activity

- 5.1 This section of the noise report provides an assessment of delivery activity in the context of guideline noise values, based on the source levels measured at this Aldi site.
- 5.2 The closest residential properties to the Aldi delivery area are in Holmwood Avenue, to the south of the Aldi store.
- 5.3 The following source noise levels and event durations are to be used in this assessment:

TABLE 4: Delivery activity - baseline source noise levels (free field)

Measured delivery event source noise Level (at 10 metres)						Peak noise dB L _{Amax}
Arrival		Unloading		Departure		
Duration (mins)	L _{Aeq T} (dB)	Duration (mins)	L _{Aeq T} (dB)	Duration (mins)	L _{Aeq T} (dB)	
1.5	69	50	56	0.5	67	
						75-78

- 5.4 Table 5 below shows the predicted ambient ($L_{Aeq T}$) and peak (L_{Amax}) delivery activity noise levels at the closest properties in Holmwood Avenue (full delivery event activity noise predictions are included at Appendix B).
- 5.5 Since the measured peak noise levels at Figure 2 indicate a number of peak noise events above the WHO peak noise criterion of 60 dB L_{Amax} , the predicted noise levels in Table 5 below are based on the screening provided by a proposed 3.5 metre high acoustic grade fence (relative to car park/loading area FFL, finished floor level, which is approximately 1 metre above local ground level at Homwood Avenue) on the southern boundary of the car park (as indicated at Appendix A).

TABLE 5: Predicted delivery activity noise levels

Receptor	Predicted noise level dB	
	L_{Aeq} 1 hour	$L_{Amax}^{[1]}$
30 Holmwood Avenue	37	57/57/56
2 Holmwood Avenue	34	52/55/51
6 Holmwood Avenue	34	51/55/50

[1] Arrival-unloading-departure event noise peak noise levels

- 5.6 The table below shows the comparison between the predicted noise levels and the WHO guideline noise values.

TABLE 6: Comparison of predicted delivery event noise levels with the WHO CNG values

Noise level	Parameter					
	L _{Aeq T}	L _{Amax}	L _{Aeq T}	L _{Amax}	L _{Aeq T}	L _{Amax}
Receptor	30 Holmwood Avenue		2 Holmwood Avenue		6 Holmwood Avenue	
Predicted delivery event noise level night ^[1]	37	57/57/56 ^[3]	34	52/55/51 ^[3]	34	51/55/50 ^[3]
WHO guideline night time noise value ^[2]	45	60	45	60	45	60
Comply with WHO night time guidelines	YES	YES	YES	YES	YES	YES

Notes

[1] Where L_{Aeq T} = 1 hour

[2] Where L_{Aeq T} = 8 hour night time

[3] Arrival/Unloading/Departure

- 5.7 The comparison in Table 6 indicates that the inclusion of a 3.5 metre high acoustic barrier along the southern boundary of the Aldi site can reduce delivery event noise levels such that they do not exceed the WHO CNG night time value in respect of ambient and peak noise. This proposed noise barrier would reduce noise from all deliveries to the store.
- 5.8 In accordance with the most relevant assessment method, namely comparison with guideline noise values (as proposed by the EHO at WBC), this assessment objectively demonstrates that deliveries could be made in the additional period, between 0500 and 0600 hours, without associated noise giving rise to significant adverse impact; which is the test under paragraph 185 of the NPPF.

6.0 Delivery activity noise reduction measures

6.1 It is recommended that the following noise minimisation measures shall be implemented at all times to reduce noise levels from delivery activity:

Instructions for store colleagues

- Ensure that the loading bay is clear of obstructions so vehicles can move easily
- Ensure staff do not communicate by shouting or whistling
- Colleagues will take extra care when transferring goods internal, being careful not to bump into walls / doors etc.

Instructions for drivers

- As you approach the site and manoeuvre in to position, remain aware of the effect that noise levels can have on local residents
- Engines should be switched off immediately when not manoeuvring
- Refrigeration equipment should be switched off once the vehicle is stationary and in the unloading position
- Switch the radio off before opening the vehicle doors
- Minimise the frequency of opening and closing vehicle doors and do so quietly
- No slamming doors
- Lower flaps on tail lifts quietly and carefully
- Do not whistle or shout to get the attention of store employees
- When working in the vehicle load space avoid banging pallets into the vehicle walls
- When finishing unloading/loading, close up the vehicle quietly
- Drivers should avoid over revving and seek to accelerate gently until the vehicle is a reasonable distance from the store, minimising excessive air brake noise
- Where possible, drivers should refrain from starting up vehicle refrigeration units until the vehicle is away from the store and residential properties.

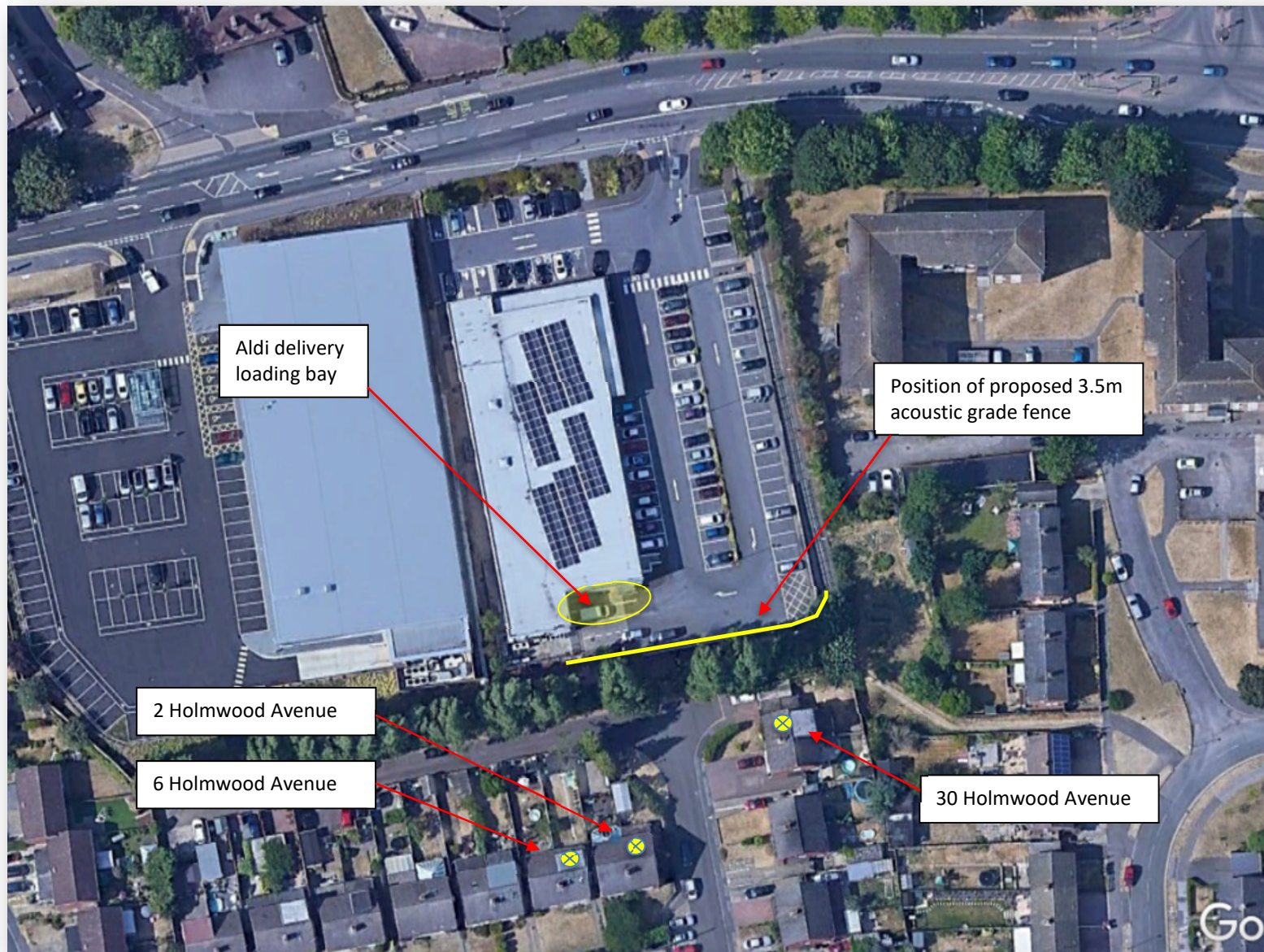
7.0 Assessment conclusions

- 7.1 Sharps Redmore (SR) has undertaken an environmental noise assessment to consider whether deliveries could be made to the Aldi store at Bath Road, Calcot, Reading from 0500 hours.
- 7.2 During the Covid-19 pandemic period the Bath Road, Calcot store has been receiving deliveries outside of the permitted planning permission hours. This had been occurring between April 2020 and July 2021. Aldi is not aware of any noise complaints relating to delivery activity at this store during this period.
- 7.3 This assessment has objectively demonstrated in the context of nationally recognised standards and planning guidance that measured/predicted noise levels from delivery activity during the night time period (from 0500 hours) would not give rise to significant adverse impact and hence would comply with the requirements of the NPPF.

APPENDIX A

SITE LAYOUT PLAN

APPENDIX B: Site layout plan: Aldi Calcot, Reading



APPENDIX B

PREDICTED DELIVERY EVENT NOISE LEVELS

Appendix B: Predicted delivery activity noise levels

APPENDIX B1.1

Assessment project: Bath Road, Reading	Delivery component		
	Arrival	Unloading	Departure
Delivery noise activity - predicted ambient noise levels (L _{Aeq T}) *			
Closest residential property address:	30 Holmwood Avenue		
Source noise level at 10 metres L _{Aeq T}	69	56	67
Time - minutes	1.5	50	0.5
Distance between noise source and residential property in metres	29	39	29
Screening attenuation dB	10	9	10
Convert to 1 hour - dB	-16.0	-0.8	-20.8
Distance attenuation correction - dB	-9.2	-11.8	-9.2
Activity L _{Aeq 1 hr}	33.7 dB	34.4 dB	27.0 dB
Overall delivery activity noise (arrival, unloading, departure) L _{Aeq 1 hr}	37 dB		
Delivery noise activity - predicted peak noise levels (L _{Amax})			
Source noise level at 10 metres L _{Amax}	76	78	75
Distance between noise source and residential property in metres	29	39	29
Screening attenuation dB	10	9	10
Distance attenuation correction - dB	-9.2	-11.8	-9.2
Peak noise level L _{Amax}	57 dB	57 dB	56 dB

APPENDIX B1.2

Assessment project: Bath Road, Reading	Delivery component		
	Arrival	Unloading	Departure
Delivery noise activity - predicted ambient noise levels ($L_{Aeq\ T}$) *			
Closest residential property address:	2 Holmwood Avenue		
Source noise level at 10 metres $L_{Aeq\ T}$	69	56	67
Time - minutes	1.5	50	0.5
Distance between noise source and residential property in metres	42	39	42
Screening attenuation dB	12	11	12
Convert to 1 hour - dB	-16.0	-0.8	-20.8
Distance attenuation correction - dB	-12.5	-11.8	-12.5
Activity $L_{Aeq\ 1\ hr}$	28.5 dB	32.4 dB	21.7 dB
Overall delivery activity noise (arrival, unloading, departure) $L_{Aeq\ 1\ hr}$	34 dB		
Delivery noise activity - predicted peak noise levels (L_{Amax})			
Source noise level at 10 metres L_{amax}	76	78	75
Distance between noise source and residential property in metres	42	39	42
Screening attenuation dB	12	11	12
Distance attenuation correction - dB	-12.5	-11.8	-12.5
Peak noise level L_{Amax}	52 dB	55 dB	51 dB

APPENDIX B1.3

Assessment project: Bath Road, Reading	Delivery component		
	Arrival	Unloading	Departure
Delivery noise activity - predicted ambient noise levels ($L_{Aeq\ T}$) *			
Closest residential property address:	6 Holmwood Avenue		
Source noise level at 10 metres $L_{Aeq\ T}$	69	56	67
Time - minutes	1.5	50	0.5
Distance between noise source and residential property in metres	48	41	48
Screening attenuation dB	11	11	11
Convert to 1 hour - dB	-16.0	-0.8	-20.8
Distance attenuation correction - dB	-13.6	-12.3	-13.6
Activity $L_{Aeq\ 1\ hr}$	28.4 dB	32.0 dB	21.6 dB
Overall delivery activity noise (arrival, unloading, departure) $L_{Aeq\ 1\ hr}$	34 dB		
Delivery noise activity - predicted peak noise levels (L_{Amax})			
Source noise level at 10 metres L_{amax}	76	78	75
Distance between noise source and residential property in metres	48	41	48
Screening attenuation dB	11	11	11
Distance attenuation correction - dB	-13.6	-12.3	-13.6
Peak noise level L_{Amax}	51 dB	55 dB	50 dB

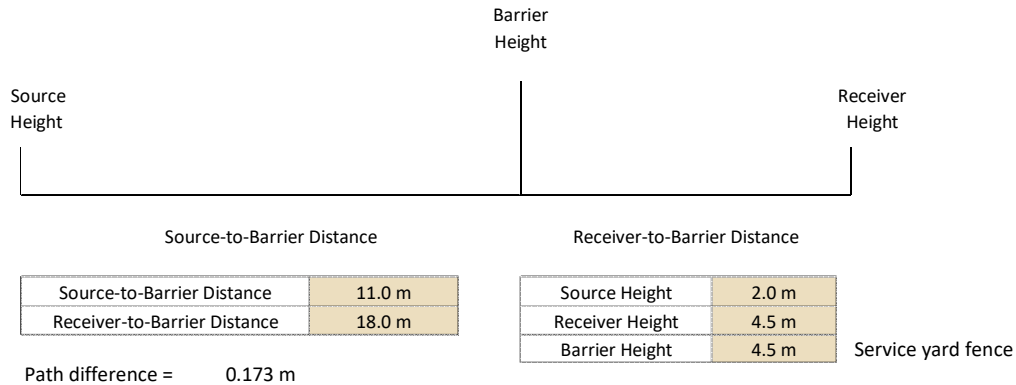
Appendix B2.1**BASIC BARRIER ATTENUATION**

(based on Maekawa or CRTN)

Receptor: **30 Holmwood Avenue**
 Project: **Aldi Bath Road, Reading**

Source: **Delivery activity:
arrival/departure**

Receiver: **30 Holmwood Avenue**



Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	6.3	7.4	9.1	11.2	13.6	16.4	19.2	22.2	10.4 dBA

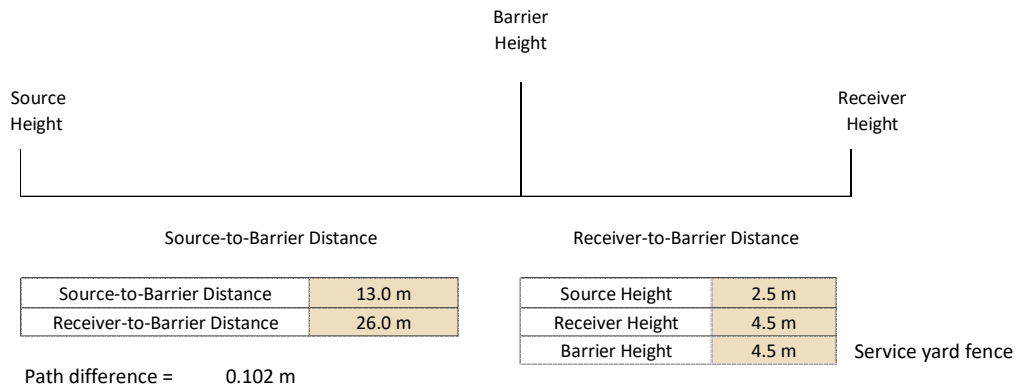
Appendix B2.2**BASIC BARRIER ATTENUATION**

(based on Maekawa or CRTN)

Receptor: **30 Holmwood Avenue**
 Project: **Aldi Bath Road, Reading**

Source: **Delivery activity:
unloading**

Receiver: **30 Holmwood Avenue**



Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	5.7	6.5	7.8	9.5	11.7	14.3	17.0	19.9	9.4 dBA

Appendix B2.3

BASIC BARRIER ATTENUATION

(based on Maekawa or CRTN)

Receptor: 2 Holmwood Avenue
Project: Aldi Bath Road, Reading

Source: Delivery activity:
arrival/departure

Receiver: 2 Holmwood Avenue

Barrier
Height

Source
Height

Receiver
Height

Source-to-Barrier Distance

Receiver-to-Barrier Distance

Source-to-Barrier Distance	8.0 m
Receiver-to-Barrier Distance	34.0 m

Source Height	2.0 m
Receiver Height	4.5 m
Barrier Height	4.5 m

Service yard fence

Path difference = 0.307 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	7.2	8.7	10.8	13.2	15.9	18.7	21.7	24.6	11.8 dBA

Appendix B2.4

BASIC BARRIER ATTENUATION

(based on Maekawa or CRTN)

Receptor: 2 Holmwood Avenue
Project: Aldi Bath Road, Reading

Source: Delivery activity:
unloading

Receiver: 2 Holmwood Avenue

Barrier
Height

Source
Height

Receiver
Height

Source-to-Barrier Distance

Receiver-to-Barrier Distance

Source-to-Barrier Distance	7.0 m
Receiver-to-Barrier Distance	33.0 m

Source Height	2.5 m
Receiver Height	4.5 m
Barrier Height	4.5 m

Service yard fence

Path difference = 0.230 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	6.7	8.0	9.9	12.2	14.7	17.5	20.4	23.4	11.1 dBA

Appendix B2.5

BASIC BARRIER ATTENUATION

(based on Maekawa or CRTN)

Receptor: 6 Holmwood Avenue
Project: Aldi Bath Road, Reading

Source: Delivery activity:
arrival/departure

Receiver: 6 Holmwood Avenue

Barrier
Height

Source
Height

Receiver
Height

Source-to-Barrier Distance

Receiver-to-Barrier Distance

Source-to-Barrier Distance	8.0 m
Receiver-to-Barrier Distance	40.0 m

Source Height	2.0 m
Receiver Height	6.5 m
Barrier Height	4.5 m

Service yard fence

Path difference = 0.221 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	6.7	7.9	9.8	12.0	14.6	17.4	20.3	23.2	11.0 dBA

Appendix B2.6

BASIC BARRIER ATTENUATION

(based on Maekawa or CRTN)

Receptor: 6 Holmwood Avenue
Project: Aldi Bath Road, Reading

Source: Delivery activity:
unloading

Receiver: 6 Holmwood Avenue

Barrier
Height

Source
Height

Receiver
Height

Source-to-Barrier Distance

Receiver-to-Barrier Distance

Source-to-Barrier Distance	6.0 m
Receiver-to-Barrier Distance	35.0 m

Source Height	2.5 m
Receiver Height	6.5 m
Barrier Height	4.5 m

Service yard fence

Path difference = 0.187 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	6.4	7.6	9.3	11.4	13.9	16.7	19.6	22.5	10.6 dBA

APPENDIX C

ACOUSTIC TERMINOLOGY

Acoustic Terminology

- C1 Noise, defined as unwanted sound, is measured in units of decibels, dB. The range of audible sounds is from 0 dB to 140 dB. Two equal sources of sound, if added together will result in an increase in level of 3 dB, i.e. 50 dB + 50 dB = 53 dB. Increases in continuous sound are perceived in the following manner:

1 dB increase - barely perceptible.

3 dB increase - just noticeable.

10 dB increase - perceived as twice as loud.

- C2 Frequency (or pitch) of sound is measured in units of Hertz. 1 Hertz (Hz) = 1 cycle/second. The range of frequencies audible to the human ear is around 20Hz to 18000Hz (or 18kHz). The capability of a person to hear higher frequencies will reduce with age. The ear is more sensitive to medium frequency than high or low frequencies.

- C3 To take account of the varying sensitivity of people to different frequencies a weighting scale has been universally adopted called "A-weighting". The measuring equipment has the ability automatically to weight (or filter) a sound to this A scale so that the sound level it measures best correlates to the subjective response of a person. The unit of measurement thus becomes dBA (decibel, A-weighted).

- C4 The second important characteristic of sound is amplitude or level. Two units are used to express level, a) sound power level - L_w and b) sound pressure level - L_p . Sound power level is an inherent property of a source whilst sound pressure level is dependent on surroundings/distance/directivity, etc. The sound level that is measured on a meter is the sound pressure level, L_p .

- C5 External sound levels are rarely steady but rise or fall in response to the activity in the area - cars, voices, planes, birdsong, etc. A person's subjective response to different noises has been found to vary dependent on the type and temporal distribution of a particular type of noise. A set of statistical indices have been developed for the subjective response to these different noise sources.

- C6 The main noise indices in use in the UK are:

L_{A90} : The sound level (in dBA) exceeded for 90% of the time. This level gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the "background sound level" of an area.

L_{Aeq} : The equivalent continuous sound level in dBA. This unit may be described as "the notional steady noise level that would provide, over a period, the same energy as the intermittent noise". In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as aircraft and trains.

L_{A10} : The sound level (in dBA) exceeded for 10% of the time. This level gives an indication of the sound level during the noisier periods of time in any given

sample. It has been used over many years to measure and assess road traffic noise.

L_{AMAX}: The maximum level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.

- C7 The sound energy of a transient event may be described by a term SEL - Sound Exposure Level. This is the L_{Aeq} level normalised to one second. That is the constant level in dBA which lasting for one second has the same amount of acoustic energy as a given A weighted noise event lasting for a period of time. The use of this unit allows the prediction of the L_{Aeq} level over any period and for any number of events using the equation;

$$L_{AeqT} = SEL + 10 \log n - 10 \log T \text{ dB.}$$

Where

n = Number of events in time period T.

T = Total sample period in seconds.

- C8 In the open, known as free field, sound attenuates at a rate of 6 dB per each doubling of distance. This is known as geometric spreading or sometimes referred to as the Inverse Square Law. As noise is measured on a Logarithmic scale, this attenuation in distance = 20 Log (ratio of distances), e.g. for a noise level of 60 dB at ten metres, the corresponding level at 160 metres is:

$$60 - 20 \log \frac{160}{10} = 60 - 24 = 36 \text{ dB.}$$