

SHARPS REDMORE

ACOUSTIC CONSULTANTS ▪ Established 1990



Report

**ALDI Stores Limited,
Hostmoor Avenue, March**

Environmental Noise Report

Prepared by

Gary King MIOA

Date 11 May 2021

Project No 2019649

Head Office

Sharps Redmore

The White House, London Road,
Copdock, Ipswich, IP8 3JH

T 01473 730073

E contact@sharpsredmore.co.uk

W sharpsredmore.co.uk

Regional Locations

South England (Head Office),
North England, Wales, Scotland

Sharps Redmore Partnership Limited

Registered in England No. 2593855

Directors

RD Sullivan BA(Hons), PhD, CEng, MIOA, MAAS, MASA;

DE Barke MSc, MIOA;

KJ Metcalfe BSc(Hons), MIOA

Company Consultant

TL Redmore BEng, MSc, PhD, MIOA



sponsoring
organisation



Contents

- 1.0 Introduction
- 2.0 Assessment Methodology and Criteria
- 3.0 Survey Details
- 4.0 Mechanical Services Plant
- 5.0 Car Park activity
- 6.0 Service Yard activity
- 7.0 Summary and Conclusion

Appendices

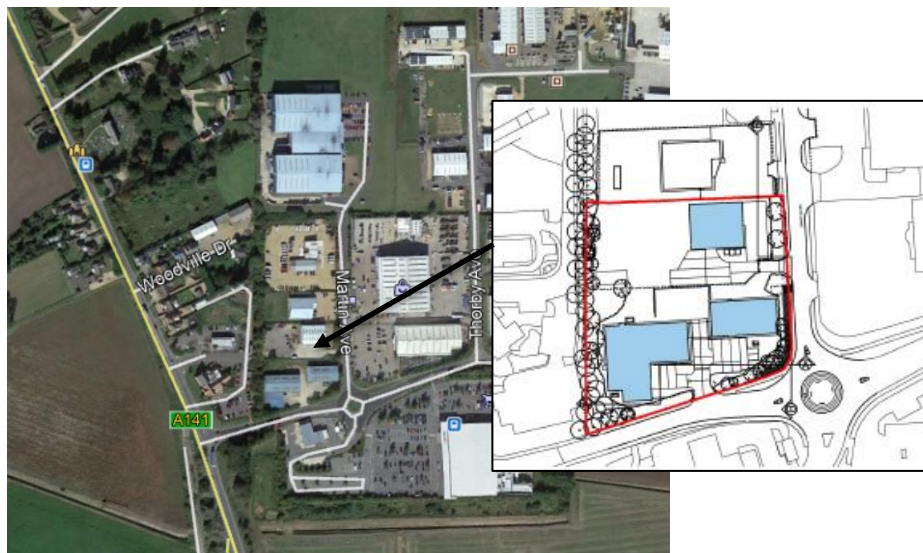
- A. Site Layout
- B. Survey Results
- C. ALDI noise source data
- D. Delivery Calculations
- E. BS 4142:2014 Assessment
- F. Acoustic Terminology

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 Sharps Redmore (SR) has been instructed by ALDI Stores Ltd to undertake a noise assessment for a new store at Hostmoor Avenue, March. The site location is shown in Figure 1 below:

Figure 1: Site Location



- 1.2 The site currently consists of three industrial building within an area known as the March Trading Estate. This area accommodates a combination of commercial and employment uses, most notably a Tesco Superstore with associated Petrol Filling Station (which is located on Hostmoor Avenue), a Health Centre (Alpine Health Centre, accessed off Martin Avenue to the north), a B & M store located to the east. To the west of the site is the Cobblestones Public House and KFC drive-thru restaurant. Planning permission has recently been granted by Fenland District Council for redevelopment of the land to the west on the opposite side of the A141 for a 13-unit retail park. The nearest noise sensitive properties are the residential properties in Wisbeach Road to the north west of the site.
- 1.3 Planning permission is being sought for a new ALDI store on the eastern part of the site. The nearest noise sensitive property to the proposed store are the residential properties in Wisbeach Road to the north-west of the site. The site layout is shown in Appendix A.
- 1.4 The purpose of this assessment is to assess the impact of proposed redevelopment of the site on surrounding noise sensitive properties by reference to both national and local policy aims. Based on experience of similar retail developments the following main impacts have been identified.
- Noise from mechanical services plant e.g. refrigeration units;
 - Noise from car parking activity;
 - Noise from servicing;
- 1.5 Section 2.0 contains a discussion of the available methods of assessment and assessment criteria.

- 1.6 Section 3.0 of this report contains details of the environmental noise survey.
- 1.7 Sections 4.0 and 6.0 of the report contain an assessment of the impact of noise from the development of the surrounding residential properties.
- 1.8 A guide to the acoustic terminology used within the report is included in Appendix D.

2.0 Assessment methodology and criteria

National Policy

- 2.1 The National Planning Policy Framework (NPPF), February 2019, 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 180 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".*

- 2.2 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

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed	

Perception	Examples of Outcomes	Increasing Effect Level	Action
		Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

- 2.3 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.”*

- 2.4 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.”

Local Policy

- 2.5 With regard to local policy regard is had to the Fenland Local Plan 2014 Policy LP 16 ‘Delivering and Protecting High Quality Environment across District’ which in terms of noise states that a “high quality environment will be delivered and protected throughout the district.” Proposals for new developments will only be permitted which “(e) does not adversely impact on the amenity of neighbouring users such as noise.”
- 2.6 Neither national or local policy provide any objective guidance on noise however 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. British Standard (BS) 8233:2014 and World Health Organisation (WHO) *"Guidelines for Community Noise"* contain such guidelines.
- 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.

Guideline noise values

- 2.7 There are a number of guidance documents that contain recommended guideline noise values. These are discussed below.
- 2.8 British Standard 8233:2014 is principally intended to assist in the design of new dwellings; however, the Standard does state that it may be used in the assessment of noise from new sources being brought to existing dwellings.
- 2.9 The WHO advice is the most useful, comprehensive, and pertinent advice in this case, because it is not specific to the circumstances of the assessment. Instead, it provides guidance on acceptable limits in, for example, schools, dwellings and offices from noise occurring within the community.
- 2.10 The WHO guideline 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.
- 2.11 The National Physical Laboratory document *"Health Effect based noise assessment methods; a review and feasibility study"*, (September 1998) contains an "interpretation" of the WHO guidelines (then in draft form) for the DETR. The summary of this section of the NPL report states *"In essence, the WHO guidelines represent a consensus view of international expert opinion on the lowest threshold noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached"* (paragraph 5.4).
- 2.12 The World Health Organisation/BS 8233 guideline noise values are summarised in the Table 2 below:

TABLE 2: WHO/BS 8233 guideline noise 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)
BS 8233:2014 “Sound Insulation and noise reduction for buildings”	$L_{AeqT} = 55 \text{ dB}$	Upper limit for external steady noise. (gardens and patios).
	$L_{AeqT} = 50 \text{ dB}$	Desirable limit for external steady noise. (gardens and patios).
	$L_{Aeq \text{ 16 hours}} = 35 \text{ dB}$	Resting, living room day. (Internal – steady noise)
	$L_{Aeq \text{ 16 hours}} = 40 \text{ dB}$	Dining, dining room day. (Internal – steady noise)
	$L_{Aeq \text{ 16 hour}} = 35 \text{ dB}$	Sleeping, bedroom day (Internal – steady noise)
	$L_{Aeq \text{ 8 hours}} = 30 \text{ dB}$	Sleeping, bedroom night (Internal – steady noise)

- 2.13 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.

Changes in noise level

- 2.14 Changes in noise levels of less than 3 dBA are not perceptible under normal conditions and changes of 10 dBA are equivalent to a doubling of loudness. This guidance has been accepted by inspectors, at inquiry, to encompass changes in noise levels in the index L_{AeqT} .
- 2.15 Table 3 below shows the response to changes in noise (known as a semantic scale); this table has been developed from general consensus opinion of acousticians.

TABLE 3: Change in noise level

Change in noise level L_{AeqT} dB	Response	Impact
<3	Imperceptible	None
3 – 5	Perceptible	Slight/moderate
6 – 10	Up to a doubling	Moderate/significant
11 – 15	More than a doubling	Substantial
>15	-	Severe

- 2.16 Where the existing ambient noise level is already above the criteria developed from the various guidance documents, it may be considered unreasonable to adopt such criteria. It would be reasonable, however, given the above statement, to consider criteria which do not exceed the existing noise climate, thus giving rise to an overall 3 dB increase i.e. the minimum perceptible. If it is less than the minimum perceptible it cannot be described as disturbing or to affect the amenity of residents.

Assessment using BS 4142:2014+A1:2019

- 2.17 BS 4142:2014 describes a method for rating and assessing sound of industrial and/or commercial nature, including unloading of goods, according to the following summary process:
- i) Carry out a numerical assessment by comparing the rating level of sound from deliveries (specific sound plus feature correction) against the existing background noise level. The greater the difference between the two the greater the impact. Differences (rating – background) of around +10 dB is likely to be an indication of significant adverse impact (SOAEL) depending on context; a difference of +5 dB is likely to be an indication of adverse impact, depending on context. 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 upon context.
 - ii) Consider the impact of noise from deliveries against the context of the site in which it is placed. There are many contextual points to consider when determine the impact of the sound including the following:
 - The absolute level of sound;
 - The character and level of the specific sound compared to the existing noise climate;
 - The sensitivity of the receptors;
 - The time and duration that the specific sound occurs;
 - The conclusions of assessments undertaken using alternative assessment methods, for example WHO guideline noise values or change in noise level;
 - The ability to mitigate the specific sound through various methods.

- 2.18 It is therefore entirely possible that whilst the numerical outcome of a BS 4142 assessment is indicative of adverse or even significant adverse impact, when the proposal is considered in context the significance of the impact is reduced to an acceptable level.

3.0 Noise Survey Details

- 3.1 A noise survey was undertaken at the site between Friday 5th and Monday 8th June 2020 to obtain measurements of the existing noise climate. Measurements were taken at location in the north western corner of the site as shown in Figure 2 below.

FIGURE 2: Monitoring Location



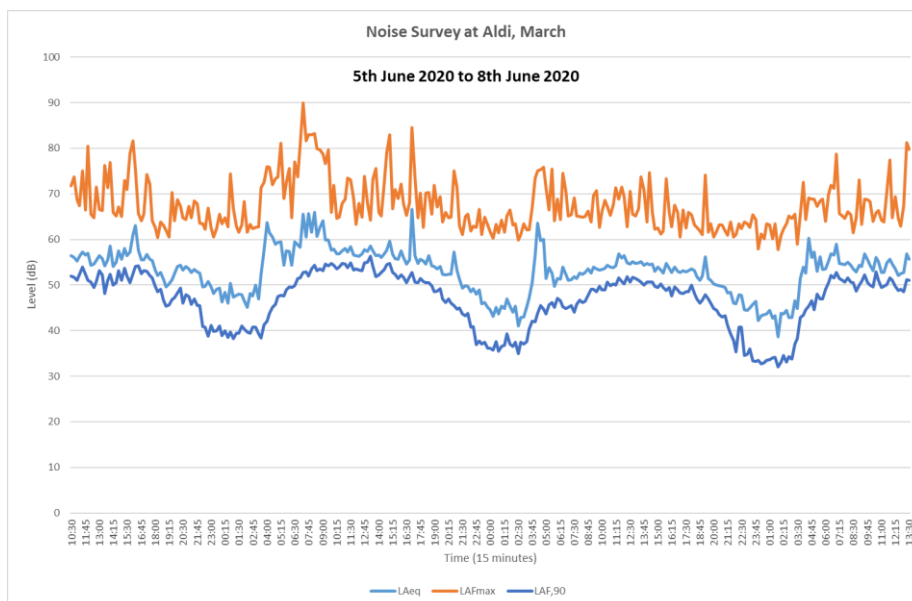
- 3.2 The monitoring location was chosen to be representative of the closest residential properties to the proposed store. The sound level meter was set up to continually record noise levels during the survey. The measurement period was chosen to include weekend and night time periods as these are the most sensitive times that the store may trade or receive deliveries.
- 3.3 Noise measurements were taken using Norsonic type 1 sound level meter which was calibrated at the start and end of the survey and no variation in level was noted. The sound level measurements were taken over 15-minute sample periods in free field conditions.
- 3.4 The weather conditions during the survey were noted from site observations and from online information. With the exception of Saturday (9th) June morning weather conditions were generally dry, with a light northerly breeze. Weather conditions were in accordance with the guidance in BS 4142 and suitable for taking noise measurements.
- 3.5 A summary of the survey results are shown in Table 4 and Figures 3 below. Full survey results are included in Appendix B.

TABLE 4: Survey Results

Date	Day Time (0700 – 2300 hrs)		Night Time (2300 – 0700hrs)		
	L _{Aeq15min}	L _{A90,15min}	L _{Aeq15min}	L _{A90,15min}	L _{Amax}
5.6.20	50 – 63 dB ¹	39 – 54 dB ¹	45 – 64 dB	38 – 52 dB	61 – 81 dB
6.6.20	48 – 67 dB	37 – 56 dB	41 – 64 dB	35 – 47 dB	60 – 76 dB
7.6.20	45 – 57 dB	35 – 52 dB	39 – 60 dB	32 – 52 dB	58 – 73 dB
8.6.20	52 – 59 dB ²	49 – 53 dB ²	--	--	--

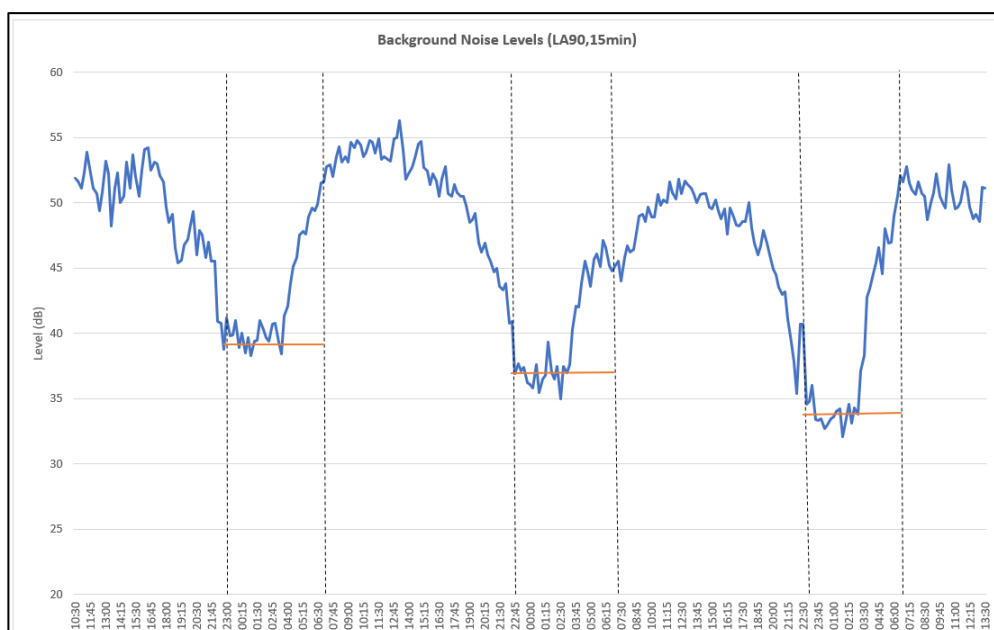
¹Based on period 1030 – 2300 hrs ²Based on period 0700 – 1330 hrs

FIGURE 3: Survey Results ML1



- 3.6 Typical background noise levels have been determined by considering the background noise levels ($L_{A90,15min}$) measured during these periods as shown in Figure 4 below:

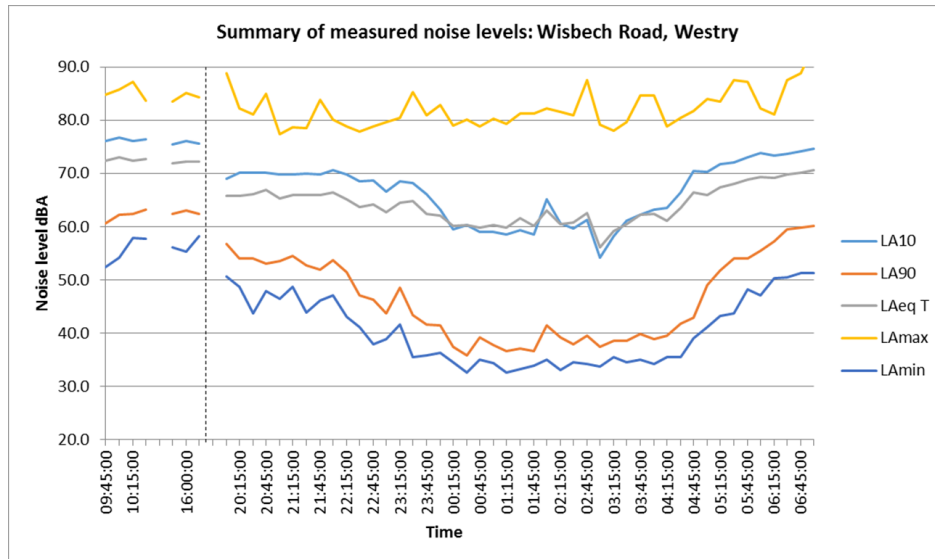
FIGURE 4: Background Noise Levels



- 3.7 Based on the noise levels on Sunday 7th June representative background noise levels are 45 dB during the evening and 34 dB during the night-time period.
- 3.8 Existing noise levels are dominated by road traffic on Wisbeach Road which is a busy route in and out of March carrying a high volume of traffic, and noise from the existing commercial/industrial premises in the area. It was noted that due to the travel restrictions in place as a result of the Covid-19 crisis traffic on Wisbeach Road was lower than expected and the adjacent restaurants/public house were closed. Both these factors will have affected the existing baseline noise levels. Therefore, in accordance with the guidance issued by the Association of Noise Consultants (ANC) and Institute of Acoustics (IOA) consideration has also been given to previous survey carried out SR in 2015.

- 3.9 The survey was carried out in relation to the development of 13 retail units on the opposite side of Wisbeach Road. Similar to the proposed Aldi store the nearest properties were those in Wisbeach Road. A survey was carried out at a location representative of these properties. The results of the survey are shown below:

FIGURE 5: Noise Levels 13th – 14th October 2015



- 3.10 As noted during the recent survey existing noise levels are dominated by road traffic on Wisbeach Road, typical background noise levels were approximately 5 dB higher during the night time and daytime periods. This is in part due to the reduction in traffic and also to the distance from the Wisbeach Road.

4.0 Noise from mechanical services plant

- 4.1 The precise details of the mechanical services plant and refrigeration equipment (type and noise signature) are not known at this stage. However, the fixed plant will include refrigeration and condenser units which will be located on the northern side of the store adjacent to the loading bay. The nearest residential property is 317 Wisbeach Road which is approximately 105m to the north west however this property is screened from the plant area by the Alpine Health Club building. The nearest property with a direct line of sight to the plant area is Papworth, Wisbeach Road
- 4.2 With regard to the assessment of industrial noise sources in commercial premises (i.e. fixed mechanical plant associated with the supermarket) BS 4142:2014 enables the resultant noise from new equipment to be compared to the existing background noise level (L_{A90}) of an area to assess the significance of impact.
- 4.3 To prevent significant adverse impacts on the health and quality of life of existing noise sensitive receptors, the "rating noise level" (the predicted noise level plus any penalty for character), should not exceed the typical measured daytime and night time background noise level by more than 10 dB and to prevent adverse harm by around 5 dB depending on context. Noise levels below existing background noise levels, L_{A90} , would be indication of low impact subject to context. It is recommended that noise from plant should not exceed background noise levels i.e. 45 dB during the day and 34 dB during the night-time period.
- 4.4 The following planning condition is recommended to secure the above criteria:

"No fixed plant and/or machinery shall come into operation until details of the fixed plant and machinery serving the development hereby permitted, and any mitigation measures to achieve this condition, are submitted to and approved in writing by the local planning authority. The rating level of the sound emitted from the site shall not exceed 45 dBA between 0700 and 2300 hours and 34 dBA at all other times. The sound levels shall be determined by measurement or calculation at the nearest noise sensitive premises. The measurements and assessment shall be made according to BS 4142:2014."

- 4.5 SR has carried out Sharps Redmore has carried out numerous noise assessments for Aldi and standard plant includes a Gas Cooler and Compressor Pack. Based on manufacturer's data the combined noise level from the 'standard' plant pack is 45 dB when measured at a distance of 10m (Compressor – 42 dB plus Gas Cooler 42 dB). Table 5 shows the predicted noise from plant at Papworth, Wisbeach Road, March.

TABLE 5: Aldi plant – Noise calculations

	Noise Level dB
Source Level – Gas Cooler and Compressor Pack	45 dB at 10m
Distance attenuation 20log (10/40)	-22 dB
Predicted level at Receptor	23 dB

- 4.6 Based on experience of similar sites the character of the plant does have any tonal or feature corrections that will attract attenuation and therefore it is consider that noise from plant will meet the suggested plant criteria.

5.0 Noise from car parking

- 5.1 Customer car parking will be provided to the west of the store with access to the car park via an entrance off Hostmoor Avenue. The nearest spaces will be approx. 90 metres from the properties in Wisbeach Road.
- 5.2 Surveys of noise levels at the boundaries of retail store car parks have shown that levels range from $L_{Aeq,1hr} = 43$ dB to 48 dB at a distance of 10 metres. The baseline noise value of $L_{Aeq\ 1\ hour} = 48$ dB is considered a robust (worse case) baseline maxima to apply to peak trading hours, whilst the lower value of 43 dB $L_{Aeq\ 1\ hour}$ is appropriate to use to assess off peak trading conditions. The peak level, dictated by car door or boot slams is typically $L_{Amax} = 66$ dB at the same distance.
- 5.3 This baseline noise source data is considered to be robust for use in assessing car parking noise as it includes all sources of noise including cars pulling into the car park, manoeuvring into parking spaces, customer activity in the car park, loading of shopping, door slams and vehicle departures.
- 5.4 Taking into account the distance attenuation the predicted noise levels from car parking has been calculated in Table 6 below.

TABLE 6: Car Park Activity

	Day Time (0700 – 2300)	Night time (2300 – 0700)	
	Peak	Off-peak	Door Slams
Baseline at 10 metres	48 L_{Aeq1hr}	43 L_{Aeq1hr}	66 L_{Amax}
Distance correction (90m)	-19 dB	-19 dB	-19 dB
Resultant Noise Level	29 dB L_{Aeq1hr}	24 dB L_{Aeq1hr}	47 dB L_{Aeq1hr}
WHO Guideline Value ($L_{Aeq16hr}$)	50 – 55 dB $L_{Aeq16hr}$	45 dB L_{Aeq8hr}	60 dB L_{Amax}

- 5.5 Predicted car park noise is significantly within the WHO night time and daytime guideline values and also will be below the existing ambient noise levels. Therefore, considering the above, the impact of noise from car parking will not have a significant adverse effect on the health and quality of life of nearby noise sensitive receptors.
- 5.6 Whilst is unlikely that Aldi would trade 24 hours a day, the above shows that there is no technical reason to restrict trading hours of the store.

6.0 Noise from service yard activity

- 6.1 Service vehicles will enter the site from Hostmoor Avenue drive through the car park and then manoeuvre onto the loading bay which is located on the northern side of the store.
- 6.2 Goods will be unloaded directly into the warehouse via a level docking system. In terms of noise the following measures are relevant:
- All goods are delivered on pallets. There is no noise from empty cages being reloaded into the back of yard.
 - ALDI vehicle trailers are rigid rather than curtained.
 - As goods are loaded directly into the warehouse, there is no movement of goods outside within the service bay.
- 6.3 Noise levels of the different components of service activity have been measured at similar ALDI stores (See Appendix C) and the following maximum levels have been recorded. All measurements are normalised to 10 metres.

TABLE 7 – Service yard noise levels (10m)

Event Noise Level						
Arrival		Unloading		Departure		Overall
Duration (Mins)	L _{AeqT} (dB)	Duration (Mins)	L _{AeqT} (dB)	Duration (Mins)	L _{AeqT} (dB)	L _{AMAX} (dB) Arrival-departure/Unloading
2	67	40	58	0.5	69	75 /79

- 6.4 The nearest noise sensitive properties to the loading bay are 317 Wisbeach Road (R1) and 'Papworth', Wisbeach Road (R2).
- 6.5 The following Table 8 shows the calculated specific noise levels of service activity including arrival, unloading and departure at the nearest noise sensitive properties identified above. Full details of the calculations are shown in Appendix D.

TABLE 8: Predicted noise levels

Noise Receptor	Overall Predicted Service Yard Noise Level dB		
	Day time	Night Time	
	L _{Aeq,1hr}	L _{Aeq1hr} / L _{Aeq15min} *	L _{Amix} arrival & departure/unloading
R1	35	35/39	56/58
R2	36	36/40	55/56

*Where T = 1 hour for comparison with WHO guidelines and daytime BS 4142 assessment, and 15 minutes for BS 4142 night time assessment

- 6.6 Using the above calculations an assessment of delivery activity noise levels using methodology in BS 4142:2014 has been carried out. The results are shown in Table 9 below.

TABLE 9: BS 4142:2014 Assessment

Receptor	Period	Weekday/Saturday			Sunday		
		Rating Level ¹	Background Level (L _{A90})	Difference	Rating Level ¹	Background Level (L _{A90})	Difference
R1	1900 – 2000	38	46	-8	38	46	-8
	2000 – 2100	38	48	-10	38	44	-6
	2100 – 2200	38	46	-8	38	40	-2
	2200 – 2300	38	42	-4	38	38	0
	2300 – 0000	42	40	+2	42	34	+6
	0000 – 0100	42	39	+3	42	33	+9
	0100 - 0200	42	39	+3	42	33	+9
	0200 - 0300	42	40	+2	42	33	+9
	0300 – 0400	42	39	+3	42	38	+4
	0400 – 0500	42	44	-2	42	45	-3
	0500 – 0600	42	48	-6	42	45	-3
	0600 - 0700	42	50	-8	42	46	-4
	0700 - 0800	38	52	-14	38	45	-7
R2	1900 – 2000	39	46	-7	39	46	-7
	2000 – 2100	39	48	-9	39	44	-5
	2100 – 2200	39	46	-7	39	40	-1
	2200 – 2300	39	42	-3	39	38	+1
	2300 – 0000	43	40	+3	43	34	+7
	0000 – 0100	43	39	+4	43	33	+10
	0100 – 0200	43	39	+4	43	33	+10
	0200 - 0300	43	40	+3	43	33	+10
	0300 – 0400	43	39	+4	43	38	+5
	0400 – 0500	43	44	-1	43	45	-2
	0500 – 0600	43	48	-5	43	45	-2
	0600 - 0700	43	50	-7	43	46	-3
	0700 - 0800	39	52	-13	39	45	-6

¹Specific level $L_{Aeq1hr(day)}/L_{Aeq15min(night)} + 3dB$ feature correction for impulsivity during unloading and 3dB for any other feature for arrival/departure

- 6.7 Based on the above assessment noise from delivery activity will be below the background noise level between 0400 and 2300 hours. Noise from deliveries during the period 2300 and 0400 hours will potentially cause an adverse or significant adverse impact subject to context.

Uncertainty

- 6.8 Uncertainty in the above assessment has been minimised by using background data measured over several days, including a weekend period. Source data is based on measurements at numerous Aldi stores and has been accepted by many local authorities. As advised in section 3.0 of this report the survey was carried out whilst Covid-19 restrictions were in place. As shown it is likely that existing background noise levels would

be slightly higher than those used in the assessment which will reduce the potential impact of delivery activity.

Contextual considerations

- 6.9 The first contextual consideration is how the predicted delivery activity noise levels compared to the WHO guideline noise values; Table 10 below shows this comparison.

TABLE 10: Comparison of predicted delivery event noise levels with the WHO guideline noise values

Receptor	Daytime (0700 - 2300 hrs)		Night-time (2300 – 0700 hrs)			
	Predicted noise level	WHO Guideline	Predicted noise level		WHO Guideline	
	L _{Aeq} 1hr	L _{Aeq} 16hr	L _{Aeq} 1hr	L _{Aeq} 8hr	L _{Amax}	L _{Amax}
R1	35 dB	50 dB	35 dB	56/58 dB	45 dB	60 dB
R2	36 dB	50 dB	36 dB	55/56 dB	45 dB	60 dB

- 6.10 Predicted noise levels from delivery activity will be within the daytime and night time WHO guideline ambient values. As described in section 2.0 of this report the WHO guideline 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, physiological or sociological effect. They are, as defined by NPSE, set at the Lowest Observed Adverse Effect Level (LOAEL) and therefore compliance with the guidelines should be considered a robust aim.
- 6.11 The second contextual consideration is how the noise affects the existing noise climate and character of the area. Table 11 below shows the comparison of predicted noise levels against existing ambient and maximum noise levels measured during the survey.
- 6.12 The predicted noise levels are below the existing ambient noise levels measured during the survey. Noise from delivery activity will not be out of character with the existing noise climate. As described in section 1.0 of this report the site is a predominantly commercial/industrial area. SR are not aware of any restrictions on delivery activity associated with the existing permitted use of the site, and the adjacent commercial premises including the KFC and Cobblestones Public House.
- 6.13 The final contextual consideration is the mitigation measures that can be included to reduce noise impact from delivery activity. During periods when the store is closed all deliveries will be carried out in accordance with a noise management plan. Such plans have been used at many Aldi stores to reduce noise levels and include the following measures:
- No movement of goods pallets or roll cages on open areas of the service yard;
 - No audible reversing beepers;
 - Refrigeration units should be switched off when vehicles enter the service yard;
 - No more than 1 delivery vehicle in service yard at a time.

- 6.14 Based on the above assessment and the mitigation measures available to reduce any noise it is concluded that the store can receive deliveries at any time without causing impact in line with national and local policy aims.

7.0 Summary and Conclusions

7.1 Sharps Redmore has undertaken an environmental noise assessment for redevelopment of the existing ALDI store, Hostmoor Avenue, March. The following activities have been assessed.

- Fixed mechanical plant (section 4.0)
- Car Park noise (section 5.0)
- Service Yard noise(section 6.0)

7.2 Surveys have been carried out at a location representative of the closest residential properties to the site.

7.3 In terms of noise the following matters are relevant.

- The impact of noise from car parking activity will be below the day time and night time WHO Guidelines Values and the same as the existing store. Therefore there is no technical reason to restrict trading hours.
- Plant noise will be controlled by condition ensuring that the rating level of plant does not exceed the existing background noise levels.
- The impact of deliveries has been assessed against national standards and it is concluded that deliveries could be received without restrictions.

7.4 Taking into account the above and having assessed the main noise impacts from the development against national standards, the existing noise climate and extant use of the site, it is concluded that the ALDI store can be developed as outlined within the report without causing significant impact or disturbance to local residents as advised by the National Planning Policy Framework.

APPENDIX A

SITE LAYOUT



SITE AREA	8,652m ² / 2.138 ACRES
-----------	-----------------------------------



Proposed Foodstore March Trading Park March

Client: Aldi Stores Limited
Date: 11/12/19
Job/Dwg: 2909-CHE-V010B-Existing Site Plan
Scale 1:1000@A3

THE HARRIS PARTNERSHIP
ARCHITECTS

2 St Johns North,
Wakefield, WF1 3QA
T: 01924 291 800
F: 01924 290 072

www.harrispartnership.com

THE
HARRIS
PARTNERSHIP



SITE AREA	8,652m ² / 2.138 ACRES
CAR SPACES (2.5 X 4.8m)	109 TOTAL SPACES (INC. 6 DDA & 10 P&C, 2 EV & 4 PASSIVE EV)
GROSS INTERNAL AREA	1,804m ²
GROSS EXTERNAL AREA	1,881 m ²
CAR PARK AREA	6,791m ²

DELIVERY VEHICLE ROUTE

— IN
— OUT

ALDI FOODSTORE

RETAIL AREA	1,315m ²
INC LOBBY	18m ²
AMENITY BLOCK (INCLUDING PLANT ROOM)	121m ²
WAREHOUSE (INCLUDING EXTENSION)	341m ²
INTERNAL WALL AREA	9m ²
SUSPENDED CEILING HEIGHT	3.5m

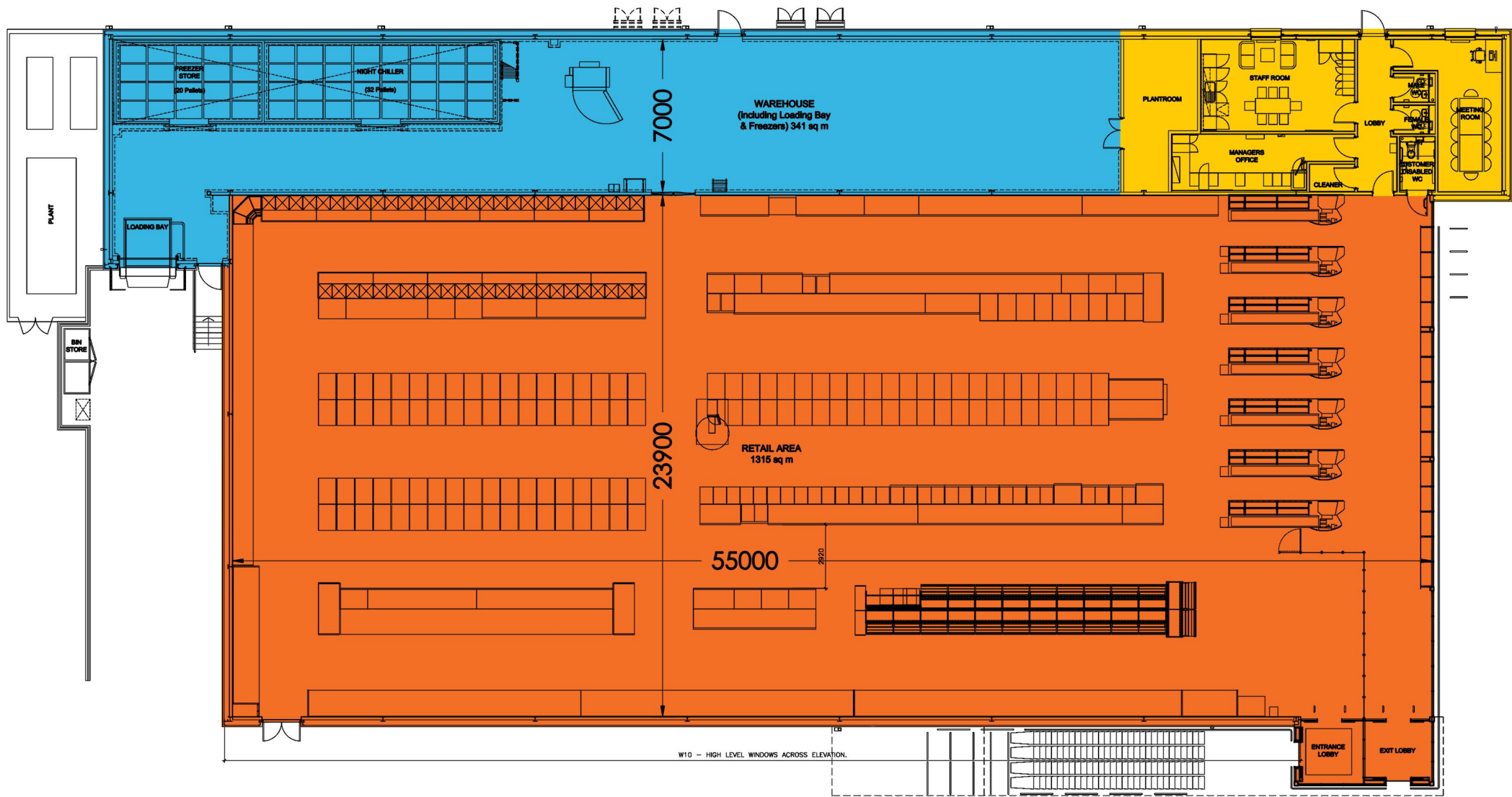


Proposed Foodstore
March Trading Park
March

Client: Aldi Stores Limited
Date: 11/12/19
Job/Dwg: 2909-CHE-V015C-Proposed Site Plan
Scale 1:1000@A3

THE HARRIS PARTNERSHIP
ARCHITECTS
2 St Johns North,
Wakefield, WF1 3QA
T: 01924 291 800
F: 01924 290 072
www.harrispartnership.com





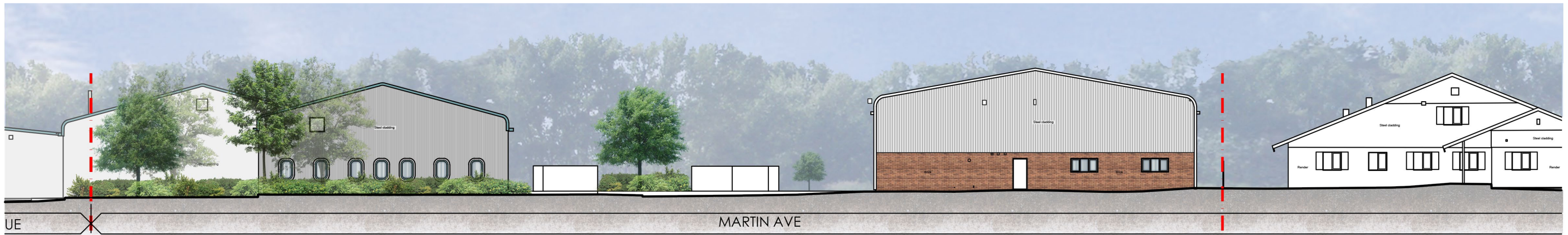
ALDI FOODSTORE	
RETAIL AREA	1,315m ²
INC LOBBY	18m ²
AMENITY BLOCK (INCLUDING PLANT ROOM)	121m ²
WAREHOUSE (INCLUDING EXTENSION)	341m ²
INTERNAL WALL AREA	9m ²
GROSS INTERNAL AREA	1,804m ²
SUSPENDED CEILING HEIGHT	3.5m

Proposed Foodstore
March Trading Park
March

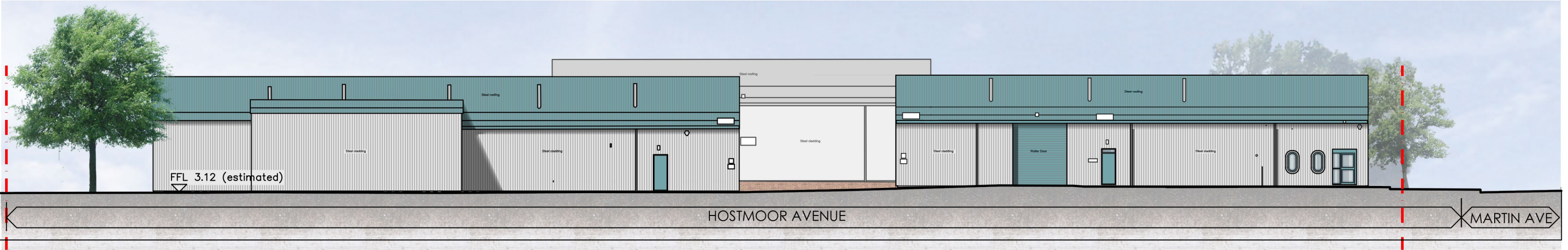
Client: Aldi Stores Limited
Date: 11/12/19
Job/Dwg: 2909-CHE-V016B-Proposed GA Plan
Scale 1:250@A3

THE HARRIS PARTNERSHIP
ARCHITECTS
2 St Johns North,
Wakefield, WF1 3QA
T: 01924 291 800
F: 01924 290 072
www.harrispartnership.com

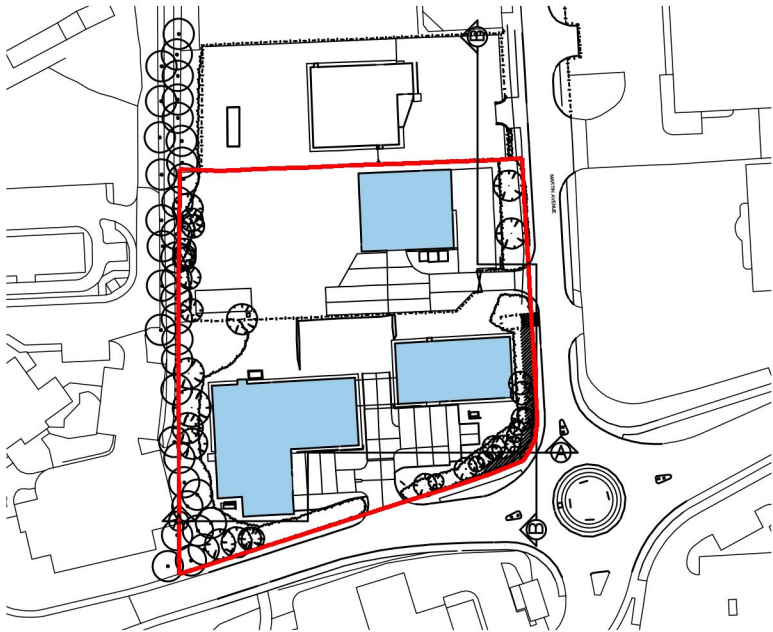




ELEVATION B



ELEVATION A



KEY PLAN 1:2000 @A3

Proposed Foodstore March Trading Park March

Client: Aldi Stores Limited
Date: 11/12/19
Job/Dwg: 2909-CHE-V011-Existing Elevations
Scale 1:250@A3

THE HARRIS PARTNERSHIP
ARCHITECTS

2 St Johns North,
Wakefield, WF1 3QA
T: 01924 291 800
F: 01924 290 072

www.harrispartnership.com





Proposed Foodstore March Trading Park March

Client: Aldi Stores Limited
Date: 11/12/19
Job/Dwg: 2909-CHE-V017B-Proposed Elevations
Scale 1:500@A3

THE HARRIS PARTNERSHIP
ARCHITECTS

2 St Johns North,
Wakefield, WF1 3QA
T: 01924 291 800
F: 01924 290 072

www.harrispartnership.com

THE
HARRIS
PARTNERSHIP

APPENDIX B

NOISE SURVEY RESULTS

Appendix B: Survey Results

Date	Noise Level dB			
	LAeq15min	LAfMax	LAfmin	LAf,90,15min
(2020/06/05 10:29:59.00)	56.4	71.8	47.9	51.9
(2020/06/05 10:45:00.00)	56.1	73.7	46.9	51.7
(2020/06/05 11:00:00.00)	55.3	68.7	47	51.1
(2020/06/05 11:15:00.00)	56.3	67.4	48.1	52.3
(2020/06/05 11:30:00.00)	57.2	75	50.3	53.9
(2020/06/05 11:45:00.00)	56.6	66.5	47.7	52.3
(2020/06/05 12:00:00.00)	57	80.4	46.5	51.1
(2020/06/05 12:15:00.00)	54.3	65.6	46	50.7
(2020/06/05 12:30:00.00)	54.6	64.7	44.4	49.4
(2020/06/05 12:45:00.00)	55.4	71.5	44.7	50.8
(2020/06/05 13:00:00.00)	56.5	66.6	48	53.2
(2020/06/05 13:15:00.00)	55.8	66.3	48	52.2
(2020/06/05 13:30:00.00)	54.2	76.2	42.7	48.2
(2020/06/05 13:45:00.00)	55.5	71.4	46.4	51.1
(2020/06/05 14:00:00.00)	58.5	76.9	47.4	52.3
(2020/06/05 14:15:00.00)	54.1	66	45.1	50
(2020/06/05 14:30:00.00)	55	65.1	45.5	50.5
(2020/06/05 14:45:00.00)	57.5	67.1	48.4	53.1
(2020/06/05 15:00:00.00)	55.7	65	46.8	51.1
(2020/06/05 15:15:00.00)	58	73	49.3	53.7
(2020/06/05 15:30:00.00)	56.4	70.9	45.9	52
(2020/06/05 15:44:59.00)	57.3	78.9	46.8	50.5
(2020/06/05 16:00:00.00)	61	81.6	49	52.5
(2020/06/05 16:15:00.00)	63	75.5	48.1	54.1
(2020/06/05 16:30:00.00)	57.7	65.7	51.9	54.2
(2020/06/05 16:45:00.00)	55.5	64.1	49.5	52.5
(2020/06/05 17:00:00.00)	55.5	65.6	48.9	53.1
(2020/06/05 17:15:00.00)	56.7	74.3	49.5	53
(2020/06/05 17:30:00.00)	55.6	72.2	47.5	52.1
(2020/06/05 17:45:00.00)	55.4	64.1	47.8	51.6
(2020/06/05 18:00:00.00)	53.3	62.6	46	49.7
(2020/06/05 18:15:00.00)	52.1	60.4	45.2	48.5
(2020/06/05 18:30:00.00)	52.7	63.9	42	49.1
(2020/06/05 18:45:00.00)	51.2	63	41.7	46.6
(2020/06/05 19:00:00.00)	49.6	62	42.7	45.4
(2020/06/05 19:15:00.00)	50.3	60.6	42	45.6
(2020/06/05 19:30:00.00)	51.2	70.3	43.2	46.8
(2020/06/05 19:45:00.00)	52.5	64.1	42.3	47.2
(2020/06/05 20:00:00.00)	54.1	68.7	44.6	48.3
(2020/06/05 20:15:00.00)	54.3	67.2	44.8	49.3
(2020/06/05 20:30:00.00)	53.3	64.7	42.2	46
(2020/06/05 20:45:00.00)	54.1	64.4	42.9	47.9
(2020/06/05 21:00:00.00)	53.6	67.2	42.3	47.5

Date	Noise Level dB			
	L _{Aeq} 15min	L _{Af} Max	L _{Af} min	L _{Af} ,90,15min
(2020/06/05 21:15:00.00)	52.8	64.8	40.5	45.8
(2020/06/05 21:30:00.00)	53.4	68.5	42	47
(2020/06/05 21:44:59.00)	52.9	67.8	38.4	45.5
(2020/06/05 22:00:00.00)	52.6	63.6	38.3	45.5
(2020/06/05 22:14:59.00)	49.6	63.4	37	40.9
(2020/06/05 22:30:00.00)	49.7	62.2	36.6	40.8
(2020/06/05 22:45:00.00)	50.8	66.9	35.7	38.8
(2020/06/05 23:00:00.00)	49.6	62.5	37.5	41.2
(2020/06/05 23:15:00.00)	48.2	60.5	36	39.8
(2020/06/05 23:30:00.00)	49	62.4	36.1	39.9
(2020/06/05 23:45:00.00)	49.3	65.6	38.5	41
(2020/06/06 00:00:00.00)	46.3	63.5	36.7	38.9
(2020/06/06 00:15:00.00)	48.4	64.8	36.7	40
(2020/06/06 00:30:00.00)	46	62.8	35.9	38.5
(2020/06/06 00:45:00.00)	50.4	74.4	37.1	39.7
(2020/06/06 01:00:00.00)	47.4	66.7	35.3	38.3
(2020/06/06 01:15:00.00)	47.8	62.9	36.9	39.4
(2020/06/06 01:30:00.00)	48	61.6	37.5	39.5
(2020/06/06 01:45:00.00)	47.9	63.2	38.4	41
(2020/06/06 02:00:00.00)	46.5	68.3	38.5	40.3
(2020/06/06 02:14:59.00)	45.1	61.6	37.8	39.7
(2020/06/06 02:30:00.00)	48.1	63.3	36.6	39.4
(2020/06/06 02:45:00.00)	47.6	62.4	38.5	40.7
(2020/06/06 03:00:00.00)	50	62.6	37.7	40.8
(2020/06/06 03:15:00.00)	46.9	62.8	36.5	39.3
(2020/06/06 03:30:00.00)	52.4	71.3	34.1	38.4
(2020/06/06 03:45:00.00)	57.6	72.5	37.2	41.3
(2020/06/06 04:00:00.00)	63.7	76	39.4	42.1
(2020/06/06 04:15:00.00)	61.4	75.8	39.5	43.8
(2020/06/06 04:30:00.00)	60.6	72	40.4	45.1
(2020/06/06 04:45:00.00)	59	73.3	40.9	45.8
(2020/06/06 05:00:00.00)	59.4	73.7	41.8	47.5
(2020/06/06 05:15:00.00)	59.5	81.1	43.4	47.8
(2020/06/06 05:30:00.00)	54.3	69	43.2	47.6
(2020/06/06 05:45:00.00)	57.5	72.4	45.4	48.9
(2020/06/06 06:00:00.00)	57.4	75.6	44.4	49.6
(2020/06/06 06:15:00.00)	54.3	64.8	45.8	49.4
(2020/06/06 06:30:00.00)	59.5	77	45.7	49.9
(2020/06/06 06:44:59.00)	58.8	73.7	47.1	51.5
(2020/06/06 07:00:00.00)	58.3	80.6	47	51.6
(2020/06/06 07:15:00.00)	65.5	89.9	48.8	52.8
(2020/06/06 07:30:00.00)	60.5	81.6	49.1	52.9
(2020/06/06 07:45:00.00)	65.7	83	47.9	52
(2020/06/06 08:00:00.00)	61.6	83	49.9	53.5

Date	Noise Level dB			
	L _{Aeq} 15min	L _{Af} Max	L _{Af} min	L _{Af} 90,15min
(2020/06/06 08:15:00.00)	66	83.2	48.8	54.3
(2020/06/06 08:30:00.00)	60.7	79.9	47.5	53.1
(2020/06/06 08:45:00.00)	62.7	79.6	49.5	53.5
(2020/06/06 09:00:00.00)	64.1	78.8	48.1	53.1
(2020/06/06 09:15:00.00)	59.9	76.6	51	54.6
(2020/06/06 09:29:59.00)	59.9	79.7	51.2	54.2
(2020/06/06 09:45:00.00)	57.7	66	50.9	54.8
(2020/06/06 10:00:00.00)	57.9	71.9	50.2	54.4
(2020/06/06 10:15:00.00)	56.8	64.6	49.2	53.5
(2020/06/06 10:30:00.00)	56.8	64.9	50.9	53.9
(2020/06/06 10:45:00.00)	57.5	67.9	50.2	54.8
(2020/06/06 11:00:00.00)	58	68.9	50.1	54.6
(2020/06/06 11:15:00.00)	57.2	73.4	50.6	53.8
(2020/06/06 11:30:00.00)	58.4	73.1	51.2	54.9
(2020/06/06 11:45:00.00)	56.6	69	47.9	53.3
(2020/06/06 12:00:00.00)	56.4	63.3	49.7	53.5
(2020/06/06 12:15:00.00)	56.3	67.9	49.5	53.3
(2020/06/06 12:30:00.00)	56.8	64.9	50.5	53.2
(2020/06/06 12:45:00.00)	57.8	73.9	51.1	54.9
(2020/06/06 13:00:00.00)	57.4	68.1	51.8	55
(2020/06/06 13:15:00.00)	58.5	64.2	52.9	56.3
(2020/06/06 13:30:00.00)	57.5	73.2	43.3	54.1
(2020/06/06 13:45:00.00)	56.4	75.6	47.7	51.8
(2020/06/06 14:00:00.00)	56.6	66	48.3	52.2
(2020/06/06 14:15:00.00)	56.1	65.1	47.5	52.7
(2020/06/06 14:30:00.00)	56.9	72.6	49.3	53.4
(2020/06/06 14:44:59.00)	57.6	79	49.8	54.5
(2020/06/06 15:00:00.00)	59.6	82.9	50.6	54.7
(2020/06/06 15:15:00.00)	56.7	66.8	48.9	52.7
(2020/06/06 15:30:00.00)	55.8	70.9	49.6	52.4
(2020/06/06 15:45:00.00)	55.6	69	38.3	51.4
(2020/06/06 16:00:00.00)	57.5	72.1	48.2	52.2
(2020/06/06 16:15:00.00)	56	67.8	46.5	51.7
(2020/06/06 16:30:00.00)	54.6	65.3	45.1	50.5
(2020/06/06 16:44:59.00)	55.5	68.1	48.1	51.8
(2020/06/06 16:59:59.00)	66.6	84.5	49.2	52.8
(2020/06/06 17:15:00.00)	56.4	73.7	46.5	50.7
(2020/06/06 17:30:00.00)	54.8	64.8	47.5	50.5
(2020/06/06 17:45:00.00)	55.7	70.2	47.5	51.4
(2020/06/06 18:00:00.00)	55.3	62.6	46.3	50.8
(2020/06/06 18:14:59.00)	54.6	70.1	47.1	50.5
(2020/06/06 18:30:00.00)	56.5	70.3	44	50.5
(2020/06/06 18:45:00.00)	54.2	65.6	45.6	49.8
(2020/06/06 19:00:00.00)	54.1	71.9	44	48.5

Date	Noise Level dB			
	L _{Aeq} 15min	L _{Af} Max	L _{Af} min	L _{Af} 90,15min
(2020/06/06 19:15:00.00)	53.5	67.1	44.7	48.7
(2020/06/06 19:30:00.00)	54.1	69.4	43.8	49.2
(2020/06/06 19:45:00.00)	52.4	63.9	41.9	46.9
(2020/06/06 20:00:00.00)	52.2	66	41	46.2
(2020/06/06 20:14:59.00)	52.3	64.8	40.4	46.9
(2020/06/06 20:29:59.00)	52.3	64.9	40.6	46
(2020/06/06 20:45:00.00)	57.2	75	41.1	45.5
(2020/06/06 21:00:00.00)	53.2	71.3	39	44.7
(2020/06/06 21:15:00.00)	51.3	63	39.3	45
(2020/06/06 21:30:00.00)	49.3	61.1	39.4	43.6
(2020/06/06 21:45:00.00)	49.9	65	39.9	43.3
(2020/06/06 22:00:00.00)	49.7	65.6	39.8	43.8
(2020/06/06 22:15:00.00)	48.5	61.9	37.4	40.8
(2020/06/06 22:30:00.00)	49.2	62.9	37.4	40.9
(2020/06/06 22:45:00.00)	48	62.6	32.2	36.9
(2020/06/06 23:00:00.00)	48.9	66.6	32.3	37.7
(2020/06/06 23:15:00.00)	45.9	61	33.1	37.1
(2020/06/06 23:30:00.00)	46.2	64.9	34.1	37.4
(2020/06/06 23:45:00.00)	45.1	63.2	32.7	36.2
(2020/06/07 00:00:00.00)	44.6	61.7	33.1	36.1
(2020/06/07 00:15:00.00)	43.1	60.3	33.8	35.8
(2020/06/07 00:29:59.00)	45.1	63.3	35	37.6
(2020/06/07 00:45:00.00)	43.6	61.4	33.4	35.5
(2020/06/07 01:00:00.00)	45.4	64.2	33.8	36.5
(2020/06/07 01:15:00.00)	44.8	61.6	34.3	36.8
(2020/06/07 01:30:00.00)	47	65.2	35.6	39.3
(2020/06/07 01:45:00.00)	45.4	66.5	33.7	37
(2020/06/07 02:00:00.00)	44.1	63.2	34.1	36.5
(2020/06/07 02:15:00.00)	45.4	63.4	34.6	37.5
(2020/06/07 02:30:00.00)	41	59.9	33	35
(2020/06/07 02:45:00.00)	42.9	61.1	35.2	37.5
(2020/06/07 03:00:00.00)	43	63.4	33.5	37
(2020/06/07 03:15:00.00)	45.2	62.1	34.2	37.6
(2020/06/07 03:30:00.00)	47.2	62.1	36.5	40.3
(2020/06/07 03:45:00.00)	50.5	67	37.1	42.1
(2020/06/07 04:00:00.00)	56.6	73.4	36.7	42
(2020/06/07 04:15:00.00)	63.6	75	38.6	43.8
(2020/06/07 04:30:00.00)	59.8	75.3	39.7	45.5
(2020/06/07 04:45:00.00)	60	75.8	39.8	44.7
(2020/06/07 05:00:00.00)	51.5	71.3	38.6	43.6
(2020/06/07 05:14:59.00)	53.8	66.5	41	45.7
(2020/06/07 05:30:00.00)	52.6	75.5	42.1	46.1
(2020/06/07 05:45:00.00)	49.7	64.1	40.6	45.1
(2020/06/07 06:00:00.00)	51.5	68.8	43.7	47.1

Date	Noise Level dB			
	L _{Aeq} 15min	L _{Af} Max	L _{Af} min	L _{Af} 90,15min
(2020/06/07 06:15:00.00)	51.3	64.3	41.2	46.6
(2020/06/07 06:30:00.00)	53.9	74.5	40.3	45.2
(2020/06/07 06:45:00.00)	52.3	70.5	40.4	44.8
(2020/06/07 07:00:00.00)	51	65.2	40.4	45.1
(2020/06/07 07:14:59.00)	51.2	65.4	39.5	45.5
(2020/06/07 07:30:00.00)	51.8	69.1	37.5	44
(2020/06/07 07:45:00.00)	51.4	65.1	39.8	45.8
(2020/06/07 08:00:00.00)	52.6	65	41.1	46.7
(2020/06/07 08:14:59.00)	52.4	64.9	40.9	46.2
(2020/06/07 08:30:00.00)	52.8	65	42	46.4
(2020/06/07 08:45:00.00)	53.5	66.2	43.1	47.7
(2020/06/07 09:00:00.00)	52.6	63.9	44.8	49
(2020/06/07 09:15:00.00)	53.9	69.6	44.8	49.1
(2020/06/07 09:30:00.00)	53.6	70.7	44.2	48.6
(2020/06/07 09:45:00.00)	53.3	62.6	45.2	49.7
(2020/06/07 10:00:00.00)	53.4	66.1	44.9	48.9
(2020/06/07 10:15:00.00)	53.7	68.6	45.1	48.9
(2020/06/07 10:30:00.00)	54.3	67.2	46.5	50.6
(2020/06/07 10:45:00.00)	53.9	65.3	45.4	49.8
(2020/06/07 11:00:00.00)	53.8	67.7	45.5	50.2
(2020/06/07 11:14:59.00)	54.2	71.4	45.8	50
(2020/06/07 11:30:00.00)	56.9	68.8	48	51.6
(2020/06/07 11:45:00.00)	55.9	71.5	47	50.8
(2020/06/07 12:00:00.00)	56.5	69.4	46.2	50.3
(2020/06/07 12:15:00.00)	54.9	62.8	48.3	51.8
(2020/06/07 12:30:00.00)	54.6	70.6	47.2	50.7
(2020/06/07 12:45:00.00)	55.1	65.6	45.8	51.7
(2020/06/07 13:00:00.00)	54.8	65.1	46.8	51.4
(2020/06/07 13:15:00.00)	54.9	66.8	46.6	51.1
(2020/06/07 13:30:00.00)	55.1	73.7	46.6	50.6
(2020/06/07 13:45:00.00)	54.3	70.8	45.3	50
(2020/06/07 14:00:00.00)	54.8	63.9	45.7	50.6
(2020/06/07 14:15:00.00)	54.5	74.7	46.2	50.7
(2020/06/07 14:30:00.00)	54.6	65.8	42.9	50.7
(2020/06/07 14:45:00.00)	53	62.2	45.9	49.7
(2020/06/07 15:00:00.00)	54	62.5	44.9	49.5
(2020/06/07 15:15:00.00)	53.3	61.2	46.2	50.2
(2020/06/07 15:30:00.00)	52.6	61.8	45.2	49.4
(2020/06/07 15:45:00.00)	54.8	73.3	42.7	48.8
(2020/06/07 15:59:59.00)	53.7	65.9	44.6	49.5
(2020/06/07 16:15:00.00)	52.8	62.8	41.9	47.6
(2020/06/07 16:30:00.00)	54	67.5	43.6	49.6
(2020/06/07 16:45:00.00)	53	65.9	44.7	48.9
(2020/06/07 17:00:00.00)	52.8	60.6	44.7	48.3

Date	Noise Level dB			
	L _{Aeq} 15min	L _{Af} Max	L _{Af} min	L _{Af} ,90,15min
(2020/06/07 17:15:00.00)	53.1	66.5	44.1	48.2
(2020/06/07 17:30:00.00)	52.9	62.5	42.5	48.6
(2020/06/07 17:45:00.00)	53.2	66	44.4	48.6
(2020/06/07 18:00:00.00)	53.6	65.4	46.5	50
(2020/06/07 18:15:00.00)	53.1	63.2	45.1	48.1
(2020/06/07 18:30:00.00)	51.8	62.6	42.3	46.9
(2020/06/07 18:45:00.00)	51	61.9	41.2	46
(2020/06/07 19:00:00.00)	51.9	61.1	41.5	46.7
(2020/06/07 19:15:00.00)	56.2	74.1	44.5	47.9
(2020/06/07 19:29:59.00)	51.5	61.6	42.6	46.9
(2020/06/07 19:45:00.00)	51.1	63.4	42.4	46
(2020/06/07 20:00:00.00)	50.3	60.5	37.6	44.9
(2020/06/07 20:14:59.00)	50	61.9	40.2	44.5
(2020/06/07 20:30:00.00)	49.8	63.2	38.5	43.5
(2020/06/07 20:45:00.00)	49.7	63.2	38	43
(2020/06/07 21:00:00.00)	49.5	61.8	38.2	43.2
(2020/06/07 21:15:00.00)	48.3	60.9	36.5	41.1
(2020/06/07 21:30:00.00)	48.4	63.8	33	39.3
(2020/06/07 21:45:00.00)	46	60.6	34.2	37.8
(2020/06/07 22:00:00.00)	45.9	61.1	31.2	35.4
(2020/06/07 22:15:00.00)	47.9	63.4	37.2	40.7
(2020/06/07 22:30:00.00)	47.8	62.4	36.3	40.7
(2020/06/07 22:44:59.00)	44.6	63.8	31.7	34.6
(2020/06/07 23:00:00.00)	44.5	63.5	32.7	34.8
(2020/06/07 23:15:00.00)	45	62.6	32.3	36
(2020/06/07 23:30:00.00)	45.8	65.4	31.3	33.4
(2020/06/07 23:44:59.00)	46.4	64.3	30.1	33.3
(2020/06/08 00:00:00.00)	42.2	57.9	31.4	33.5
(2020/06/08 00:15:00.00)	43.3	61.2	30.2	32.7
(2020/06/08 00:30:00.00)	43.5	60.2	30.2	33
(2020/06/08 00:45:00.00)	43.6	63.4	31.5	33.5
(2020/06/08 01:00:00.00)	44.4	63.2	31.5	33.6
(2020/06/08 01:15:00.00)	42.7	60.1	32	34
(2020/06/08 01:30:00.00)	43.2	63.5	31.7	34.2
(2020/06/08 01:45:00.00)	38.6	57.8	30.2	32.1
(2020/06/08 02:00:00.00)	43.8	60.9	30.7	33.1
(2020/06/08 02:15:00.00)	43.7	62.3	32.3	34.6
(2020/06/08 02:30:00.00)	44.5	63.5	30.2	33.1
(2020/06/08 02:45:00.00)	42.9	65.1	31.7	34.3
(2020/06/08 03:00:00.00)	42.9	64.6	30.9	33.8
(2020/06/08 03:15:00.00)	46.6	65.5	32.8	37.1
(2020/06/08 03:30:00.00)	44.9	58.9	32.8	38.3
(2020/06/08 03:45:00.00)	51.5	65.4	36.4	42.8
(2020/06/08 04:00:00.00)	54	72.5	35.2	43.4

Date	Noise Level dB			
	L _{Aeq} 15min	L _{Af} Max	L _{Af} min	L _{Af} ,90,15min
(2020/06/08 04:15:00.00)	52.6	64.3	39.7	44.6
(2020/06/08 04:30:00.00)	60.3	69.1	39.5	45.4
(2020/06/08 04:45:00.00)	56	68.9	40.8	46.6
(2020/06/08 05:00:00.00)	57.2	68.8	40	44.6
(2020/06/08 05:15:00.00)	53	67.2	42.7	48
(2020/06/08 05:30:00.00)	56.2	68.5	41	46.9
(2020/06/08 05:45:00.00)	53.4	68.8	40.5	47
(2020/06/08 06:00:00.00)	53.6	64	44.8	49
(2020/06/08 06:15:00.00)	55.3	69.9	46.9	50.5
(2020/06/08 06:30:00.00)	56.8	71.9	47.7	52.1
(2020/06/08 06:45:00.00)	56.6	71.2	47.1	51.6
(2020/06/08 07:00:00.00)	59	78.7	48.8	52.8
(2020/06/08 07:15:00.00)	54.8	65.7	45.7	51.5
(2020/06/08 07:30:00.00)	54.6	65.2	46.7	51
(2020/06/08 07:45:00.00)	54.5	64.6	43.7	50.6
(2020/06/08 08:00:00.00)	55	66.1	48.4	51.6
(2020/06/08 08:15:00.00)	54.4	65.4	46.6	50.7
(2020/06/08 08:30:00.00)	53.5	61.5	46.4	50.5
(2020/06/08 08:45:00.00)	52.9	64.8	44.6	48.7
(2020/06/08 09:00:00.00)	54.4	73.1	43	50
(2020/06/08 09:15:00.00)	54.1	63.3	45.6	50.8
(2020/06/08 09:30:00.00)	56.8	68.9	48.7	52.2
(2020/06/08 09:44:59.00)	55.5	68.7	44.8	50.5
(2020/06/08 10:00:00.00)	54.4	68.3	45.8	50
(2020/06/08 10:15:00.00)	53.2	64	44.4	49.6
(2020/06/08 10:29:59.00)	56	65.8	50.5	52.9
(2020/06/08 10:45:00.00)	55.1	66.3	44.6	51
(2020/06/08 11:00:00.00)	52.7	64.2	45.5	49.5
(2020/06/08 11:15:00.00)	52.7	63.9	46.9	49.7
(2020/06/08 11:30:00.00)	54.9	70.6	45.2	50.1
(2020/06/08 11:44:59.00)	55.7	77.4	48.4	51.6
(2020/06/08 12:00:00.00)	54.6	64.7	47.6	51.1
(2020/06/08 12:14:59.00)	53.6	69.4	45.8	49.7
(2020/06/08 12:30:00.00)	52.1	64.6	45.3	48.8
(2020/06/08 12:45:00.00)	52.5	62.9	45.2	49.1
(2020/06/08 13:00:00.00)	52.7	67.4	38.1	48.6
(2020/06/08 13:15:00.00)	56.8	81.2	48.2	51.2
(2020/06/08 13:30:00.00)	55.6	79.8	48.1	51.1

APPENDIX C

ALDI SOURCE DATA



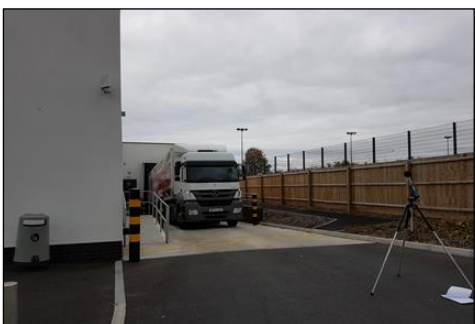
Source Noise Data for Wagon Arrival/Departure and Loading/Unloading at ALDI store.



Location : ALDI Store, 2 Donald Mackintosh Way, Ipswich, IP8 3LQ

Date: 12 October 2017

Weather Conditions: Dry, Overcast, south westerly winds > 5m/s



Equipment Used:

Meter: Norsonic 140 Sound level Meter – Serial Nos 1403667

Microphone: Norsonic 1225 – Serial Nos 103158

Pre-amp: Norsonic 1206 – Serial Nos 31080

Calibrator: Norsonic 1251 – Serial Nos 32427



Description of delivery activity.

Vehicle enters site through car park and reverses onto loading bay. Refrigeration unit switched off on arrival. Once on loading bay, driver unloads palletised goods using pallet truck. Main source of noise is as pallets are pulled over tailgate into store.

No good unloaded or external delivery activity.

Delivery vehicle leaves in forward gear main noise source is engine noise

Noise source data (normalised to distance of 10 metres)

Event Noise Level at 10 metres						
Arrival		Unloading		Departure		Overall
Duration (Mins)	L _{AeqT} (dB)	Duration (Mins)	L _{AeqT} (dB)	Duration (Mins)	L _{AeqT} (dB)	L _{AMAX} (dB) Arrival-departure/Unloading
2	67	40	58	0.5	69	75 /79

The above noise levels have been validated at other ALDI stores and have been accepted by numerous local authorities and at planning appeals as representative of delivery activity at ALDI.

Head Office

Sharps Redmore The White House, London Road, Copdock, Ipswich, IP8 3JH

T 01473 730073 **E** contact@sharpsredmore.co.uk **W** sharpsredmore.co.uk

Regional Locations South England (Head Office), North England, Wales, Scotland

Sharps Redmore Partnership Limited Registered in England No. 2593855

Directors TL Redmore BEng, MSc, PhD, MIOA; RD Sullivan BA, PhD, CEng, MIOA; DE Barke MSc, MIOA; KJ Metcalfe BSc, MIOA

APPEDNDIX D

DELIVERY CALCULATIONS

Appendix D: Delivery Calculations

Assessment project: Aldi Hostmoor Av March	Delivery component		
	Arrival	Unloading	Departure
Delivery noise activity - predicted ambient noise levels (L_{AeqT}) *			
Closest residential property address:	R1		
Source noise level at 10 metres L_{AeqT}	67	58	69
Time - minutes	2	40	0.5
Distance between noise source and residential property in metres	90	115	95
Screening attenuation dB	0	10	0
Convert to 1 hour - dB	-14.8	-1.8	-20.8
Convert to 15 mins - dB	-8.8	0.0	
Distance attenuation correction - dB	-19.1	-21.2	-19.6
Activity $L_{Aeq\ 1\ hr}$	33.1 dB	25.0 dB	28.7 dB
Activity $L_{Aeq\ 15\ mins}$	39.2 dB	6.0 dB	-
Rating level correction		3 dB	
Resultant daytime rating level $L_{Ar, Tr}$	33.1 dB	28.0 dB	28.7 dB
Resultant nighttime rating level $L_{Ar, Tr}$	39.2 dB	9.0 dB	-
Overall delivery activity noise (arrival, unloading, departure) $L_{Aeq\ 1\ hr}$	35 dB		
Overall delivery activity noise (arrival + unloading) $L_{Aeq\ 15\ mins}$	39 dB		
Rating level dB $L_{Aeq\ 1\ hr}$	35 dB		
Rating level dB $L_{Aeq\ 15\ mins}$	39 dB		
Delivery noise activity - predicted peak noise levels (L_{Amax})			
Source noise level at 10 metres L_{amax}	75	79	75
Distance between noise source and residential property in metres	90	115	95
Screening attenuation dB	0	0	0
Distance attenuation correction - dB	-19.1	-21.2	-19.6
Peak noise level L_{Amax}	56 dB	58 dB	55 dB

Assessment project: Aldi Hostmoor Av March	Delivery component		
	Arrival	Unloading	Departure
Delivery noise activity - predicted ambient noise levels ($L_{Aeq\ T}$) *			
Closest residential property address:	R2		
Source noise level at 10 metres $L_{Aeq\ T}$	67	58	69
Time - minutes	2	40	0.5
Distance between noise source and residential property in metres	95	145	115
Screening attenuation dB	0	0	0
Convert to 1 hour - dB	-14.8	-1.8	-20.8
Convert to 15 mins - dB	-8.8	-0.3	-
Distance attenuation correction - dB	-19.6	-23.2	-21.2
Activity $L_{Aeq\ 1\ hr}$	32.7 dB	33.0 dB	27.0 dB
Activity $L_{Aeq\ 15\ mins}$	38.7 dB	34.5 dB	-
Rating level correction	3 dB	3 dB	3 dB
Resultant daytime rating level $L_{Ar,\ Tr}$	35.7 dB	36.0 dB	30.0 dB
Resultant nighttime rating level $L_{Ar,\ Tr}$	41.7 dB	37.5 dB	-
Overall delivery activity noise (arrival, unloading, departure) $L_{Aeq\ 1\ hr}$	36 dB		
Overall delivery activity noise (arrival + unloading) $L_{Aeq\ 15\ mins}$	40 dB		
Rating level dB $L_{Aeq\ 1\ hr}$	39 dB		
Rating level dB $L_{Aeq\ 15\ mins}$	43 dB		
Delivery noise activity - predicted peak noise levels (L_{Amax})			
Source noise level at 10 metres L_{amax}	75	79	75
Distance between noise source and residential property in metres	95	145	115
Screening attenuation dB	0	0	0
Distance attenuation correction - dB	-19.6	-23.2	-21.2
Peak noise level L_{Amax}	55 dB	56 dB	54 dB

APPENDIX E

BS4142:2014 ASSESSMENT

Appendix E1 – 317 Wisbeach Road (R1) – Weekday/Saturday

Results	Time period													Relevant clause	Commentary
	1900 - 2000	2000 - 2100	2100 - 2200	2200 - 2300	2300-0000	0000-0100	0100-0200	0200-0300	0300-0400	0400-0500	0500-0600	0600-0700	0700-0800		
Receptor	317 Wisbeach Road														
Background sound level dB (L ₉₀₀)	46 dB	48 dB	46 dB	42 dB	40 dB	39 dB	39 dB	40 dB	39 dB	44 dB	48 dB	50 dB	54 dB	8.1, 8.1.3	For daytime the background sound level is the L _{900 1 hour} value
Specific sound level - predicted delivery event noise level	35 dB	35 dB	35 dB	35 dB	39 dB	39 dB	39 dB	39 dB	39 dB	39 dB	39 dB	39 dB	35 dB		Predicted delivery activity noise level is L _{Aeq 1 hour} for daytime
Acoustic feature correction (applied in delivery calc sheet)	rating level of +3 dB added (within delivery calculation to delivery component)													9.2	+3 dB rating level correction applied for 'just' perceptible impulsivity from bangs and crashes of unloading activity, and 3dB 'other characteristics' for arrival
Rating level	38 dB	38 dB	38 dB	38 dB	42 dB	42 dB	42 dB	42 dB	42 dB	42 dB	42 dB	42 dB	38 dB	9.2	
Background sound level	46 dB	48 dB	46 dB	42 dB	40 dB	39 dB	39 dB	40 dB	39 dB	44 dB	48 dB	50 dB	54 dB	8.1 8.1.3	
Excess of rating level over background level	-8	-10	-8	-4	+2	+3	+3	+2	+3	-2	-6	-8	-16	11	
Assessment subject to context	<p>Relevant clause 11</p> <p>The context is:</p> <p>1. Predicted delivery event noise levels (L_{Aeq 1 hour}) and LAmax are below the WHO daytime and night time guideline values</p> <p>2. The predicted delivery event noise levels are well below the existing ambient noise climate</p>														
Uncertainty of the assessment	<p>Relevant clause 10</p> <p>Weather conditions may have had some influence on the measured background noise climate</p> <p>Uncertainty of the measured noise climate is reduced by analysis of the noise climate across the weekend period. Noise levels are considered to be typical as they are consistent and repeatable over the entire survey duration.</p> <p>Uncertainty of the delivery noise source data is reduced by the large sample of delivery activity noise collected at numerous Aldi stores nationwide.</p>														

Appendix E2 – 317 Wisbeach Road (R1) - Sunday

Results	Time period													Relevant clause	Commentary
	1900 - 2000	2000 - 2100	2100 - 2200	2200 - 2300	2300-0000	0000-0100	0100-0200	0200-0300	0300-0400	0400-0500	0500-0600	0600-0700	0700-0800		
Receptor	317 Wisbeach Road														
Background sound level (L ₉₀)	46 dB	44 dB	40 dB	38 dB	34 dB	33 dB	33 dB	33 dB	38 dB	45 dB	45 dB	46 dB	45 dB	8.1, 8.1.3	For daytime the background sound level is the L ₉₀ 1 hour value
Specific sound level - predicted delivery event noise level	35 dB	35 dB	35 dB	35 dB	39 dB	39 dB	39 dB	39 dB	39 dB	39 dB	39 dB	39 dB	35 dB		Predicted delivery activity noise level is L _{Aeq 1 hour} for daytime
Acoustic feature correction (applied in delivery calc sheet)	rating level of +3 dB added (within delivery calculation to delivery component)													9.2	+3 dB rating level correction applied for 'just' perceptible impulsivity from bangs and crashes of unloading activity and 3dB 'Other characteristics' for vehicle arrival/departure
Rating level	38 dB	38 dB	38 dB	38 dB	42 dB	42 dB	42 dB	42 dB	42 dB	42 dB	42 dB	42 dB	38 dB	9.2	
Background sound level	46 dB	44 dB	40 dB	38 dB	34 dB	33 dB	33 dB	33 dB	38 dB	45 dB	45 dB	46 dB	45 dB	8.1 8.1.3	
Excess of rating level over background level	-8	-6	-2	0	+8	+9	+9	+9	+4	-3	-3	-4	-7	11	
Assessment subjective to context	Relevant clause 11 The context is: 1. Predicted delivery event noise levels (L _{Aeq 1 hour}) and (L _{max}) are below the WHO daytime and night time guideline values 2. The predicted delivery event noise levels are well below the existing ambient noise climate during the additional time periods that deliveries are sought														
Uncertainty of the assessment	Relevant clause 10 Weather conditions may have had some influence on the measured background noise climate Uncertainty of the measured noise climate is reduced by analysis of the noise climate across the weekend period. Noise levels are considered to be typical as they are consistent and repeatable over the entire survey duration. Uncertainty of the delivery noise source data is reduced by the large sample of delivery activity noise collected at numerous Aldi stores nationwide.														

Appendix E3 – Papworth (R2) – Weekday/Saturday

Results	Time period													Relevant clause	Commentary
	1900 - 2000	2000 - 2100	2100 - 2200	2200 - 2300	2300-0000	0000-0100	0100-0200	0200-0300	0300-0400	0400-0500	0500-0600	0600-0700	0700-0800		
Receptor	9 Salisbury Road														
Background sound level dB (L ₉₀)	46 dB	48 dB	46 dB	42 dB	40 dB	39 dB	39 dB	40 dB	39 dB	44 dB	48 dB	50 dB	54 dB	8.1, 8.1.3	For daytime the background sound level is the L _{90 1hour} value
Specific sound level - predicted delivery event noise level	36 dB	36 dB	36 dB	36 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	36 dB		Predicted delivery activity noise level is L _{Aeq 1 hour} for daytime
Acoustic feature correction (applied in delivery calc sheet)	rating level of +3 dB added (within delivery calculation to delivery component)													9.2	+3 dB rating level correction applied for 'just' perceptible impulsivity from bangs and crashes of unloading activity and 'other characteristics' for arrival/departure
Rating level	39 dB	39 dB	39 dB	39 dB	43 dB	43 dB	43 dB	43 dB	43 dB	43 dB	43 dB	43 dB	39 dB	9.2	
Background sound level	46 dB	48 dB	46 dB	42 dB	40 dB	39 dB	39 dB	40 dB	39 dB	44 dB	48 dB	50 dB	54 dB	8.1 8.1.3	
Excess of rating level over background level	-7	-9	-7	-3	+3	+4	+4	+3	+4	-1	-5	-7	-15	11	
Assessment is indicative of low impact	Relevant clause 11 The context is: 1. Predicted delivery event noise levels (L _{Aeq 1 hour}) and (L _{max}) are significantly below the WHO daytime and night time guideline values 2. The predicted delivery event noise levels are well below the existing ambient noise climate during the additional time periods that deliveries are sought														
Uncertainty of the assessment	Relevant clause 10 Weather conditions may have had some influence on the measured background noise climate Uncertainty of the measured noise climate is reduced by analysis of the noise climate across the weekend period. Noise levels are considered to be typical as they are consistent and repeatable over the entire survey duration. Uncertainty of the delivery noise source data is reduced by the large sample of delivery activity noise collected at numerous Aldi stores nationwide.														

Appendix E4 – Papworth(R2) – Sunday

Results	Time period														Relevant clause	Commentary
	1900 - 2000	2000 - 2100	2100 - 2200	2200 - 2300	2300-0000	0000-0100	0100-0200	0200-0300	0300-0400	0400-0500	0500-0600	0600-0700	0700-0800			
Receptor	9 Salisbury Road															
Background sound level dB (L _{90%})	46 dB	44 dB	40 dB	38 dB	34 dB	33 dB	33 dB	33 dB	38 dB	45 dB	45 dB	46 dB	45 dB	8.1, 8.1.3	For daytime the background sound level is the L _{90% 1hour} value	
Specific sound level - predicted delivery event noise level	36 dB	36 dB	36 dB	36 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	36 dB		Predicted delivery activity noise level is L _{Aeq 1 hour} for daytime	
Acoustic feature correction (applied in delivery calc sheet)	rating level of +3 dB added (within delivery calculation to delivery component)														9.2	+3 dB rating level correction applied for 'just' perceptible impulsivity from bangs and crashes of unloading activity and 'other characteristics' for arrival/departure
Rating level	41 dB	41 dB	41 dB	41 dB	41 dB	41 dB	41 dB	41 dB	41 dB	41 dB	41 dB	41 dB	41 dB	9.2		
Background sound level	46 dB	44 dB	40 dB	38 dB	34 dB	33 dB	33 dB	33 dB	38 dB	45 dB	45 dB	46 dB	45 dB	8.1 8.1.3		
Excess of rating level over background level	-5	-3	+1	+3	+7	+8	+8	+8	+3	-4	-4	-5	-4	11		
Assessment is indicative of low impact	Relevant clause 11 The context is: 1. Predicted delivery event noise levels (L _{Aeq 1 hour}) are significantly below the WHO daytime and night time guideline values 2. The predicted delivery event noise levels are well below the existing ambient noise climate during the additional time periods that deliveries are sought															
Uncertainty of the assessment	Relevant clause 10 Weather conditions may have had some influence on the measured background noise climate Uncertainty of the measured noise climate is reduced by analysis of the noise climate across the weekend period. Noise levels are considered to be typical as they are consistent and repeatable over the entire survey duration. Uncertainty of the delivery noise source data is reduced by the large sample of delivery activity noise collected at numerous Aldi stores nationwide.															

APPENDIX F

ACOUSTIC TERMINOLOGY

Acoustic Terminology

- F1 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. $50 \text{ dB} + 50 \text{ dB} = 53 \text{ dB}$. 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.
- F2 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.
- F3 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).
- F4 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 .
- F5 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.
- F6 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.

- F7** 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.

- F8** 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:

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