

SHARPS REDMORE

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Report

**Aldi Lampeter, Pontfaen
Road**

Environmental Noise
Assessment of a proposed
Aldi store and event
exhibition pods

Prepared by

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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 to undertake a noise assessment of a proposed Aldi store and event exhibition pods at Portfaen Road, Lampeter.
- 1.2 The proposal would include a new Aldi store with customer car park, a delivery loading bay and fixed plant equipment. The event exhibition site comprises three 'pods' and car parking provision on the western side of the site.
- 1.3 The site is located on the western side of Lampeter, off Portfaen Road, which forms the site boundary to the north. The closest existing residential properties are to the north along Pontfaen Road and the residential home off Peterwell Terrance to the east (as indicated at Appendix A).
- 1.4 The objective of the assessment is to determine how noise that may be generated as a result of the proposed Aldi store and event exhibition pods would affect residential amenity. Based on experience of similar retail developments, the following main impacts have been identified:
 - Noise from fixed mechanical services plant
 - Noise from servicing activity
 - Noise from car parking activity
- 1.5 Section 2 contains a discussion of the available methods of assessment and assessment criteria, and outlines the pre-application comments of the local authority in respect of noise.
- 1.6 Section 3 of this report presents details of the environmental noise survey undertaken at the site.
- 1.7 As assessment of noise from the operational of the proposed Aldi development is presented in section 4, whilst noise from the exhibition pods is considered in section 5; the assessment conclusions are contained in section 6.
- 1.8 A guide to the acoustic terminology used within the report is included in Appendix D.

2.0 Assessment methodology and criteria

National Planning Policy

- 2.1 Section 6.7.14 of Planning Policy Wales (PPW Revision 11, February 2021) states: “Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission.”
- 2.2 It is clear that where the policy refers to “proposed development should be designed *wherever possible* [my emphasis] to prevent adverse effects to amenity”. This policy has the same meaning as that contained in the NPPF, whereby when adverse impacts occur, they should be mitigated and reduced as far as possible, and not that such adverse impacts should not occur. It goes on “where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission”. In other words, if noise reaches a level above the threshold of an adverse impact, i.e it is significant, planning permission may be refused.
- 2.3 General guidance on noise for planning applications is still contained in Technical Advice Note (TAN 11), "Noise", issued in October 1997. TAN 11 contains advice in Annex A on the suitable noise limits for residential development near to different types of noise sources such as road traffic, rail traffic, air traffic, or mixed sources.
- 2.4 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 to compare the resultant sound level against the background sound level (L_{A90}) of the area. This is the method employed by BS 4142:2014 to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the new 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.

Guidelines for Community Noise

- 2.5 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.
- 2.6 In 2018 the WHO published the “Environmental Noise Guidelines for the European Region” (ENGER). The WHO Environmental Noise Guidelines (page 28) explain that *“The current environmental noise guidelines for the European Region supersede the CNG from 1999. Nevertheless, the GDG (Guideline Development Group) recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid”*. Hence the CNG remain relevant to this assessment.
- 2.7 The WHO ENGER brings together the latest research on the effects of specific types of noise on health in relation to transportation noise sources (road, rail and aircraft noise exposure), wind turbines and leisure noise. Hence in direct relation to the specific proposal that this noise assessment considers, the new WHO ENGER are not of material consideration.
- 2.8 The relevant World Health Organisation (CNG) noise values are summarised in the following table:

TABLE 1: WHO CNG values

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

- 2.9 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.
- 2.10 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.

Changes in noise level

- 2.11 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} .
- 2.12 Table 2 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 2: 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

- 2.13 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

- 2.14 As outlined, this British Standard enables the significance of sound impact to be determined in relation to industrial and commercial sources. The significance of sound impact is to be determined according to the following summary process:
- i) Determine the background sound levels, in terms of the index L_{A90} , at the receptor locations of interest.

- ii) Determine the specific sound level of the source being assessed, in terms of its L_{AeqT} level (T = 1 hour for day or 15 minutes for night), at the receptor location of interest.
- iii) Apply a rating level acoustic feature correction if the source sound has tonal, impulsive, intermittent, or other characteristics which attract attention.
- iv) Compare the rating sound level with the background sound level; the greater the difference between the two, the higher the likelihood of adverse impact.
- v) A difference (rating – background) of around +10 dB is an indication of significant adverse impact, depending on the context; a difference of +5 dB is an indication of an adverse impact, depending on the 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.
- vi) The intent of the planning system is to ensure that a development does not result in “significant adverse impacts on health and quality of life.” BS 4142:2014 considers that the threshold of significant adverse impact is “a difference around +10 dB or more ... depending upon the context”.

2.15 BS 4142:2014 introduces the concept of ‘context’ to the process of identifying noise impact. Section 11 of BS 4142:2014 explains “The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs (our emphasis). An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context” (our emphasis).

2.16 There are many *context* points to consider when undertaking an assessment of sound impact including:

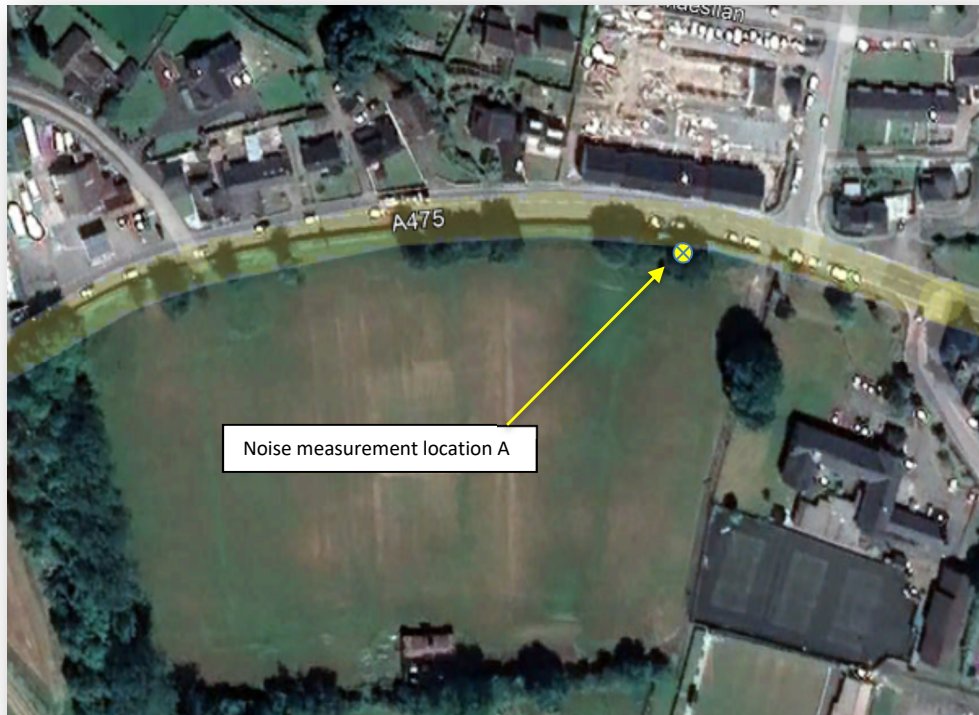
- The absolute level of sound;
- The character and level of the specific sound in the context of the existing noise climate; for example, is the sound to occur in a location already characterised by similar activities as those proposed?
- The sensitivity of the receptors;
- The time and duration that the specific sound is to occur;
- The conclusions of assessments undertaken using alternative assessment methods, for example WHO guidelines noise values or change in noise level;

2.17 It is therefore entirely possible that whilst the numerical outcome of a BS 4142:2014 assessment is indicative of adverse or significant adverse impact, when the proposal is considered in *context* the significance of the impact is reduced to an acceptable level.

3.0 Environmental noise survey details

3.1 An unattended noise survey was undertaken at the site between Wednesday 10th and Thursday 11th November 2021. Observations were made periodically during the survey to establish the current sources of noise affecting the site. The purpose of the survey was to establish the existing noise climate in the vicinity of the closest existing residential properties to Portfaen Road. A single measurement location (location A) was used as indicated at Figure 1 below.

FIGURE 1: Noise measurement location



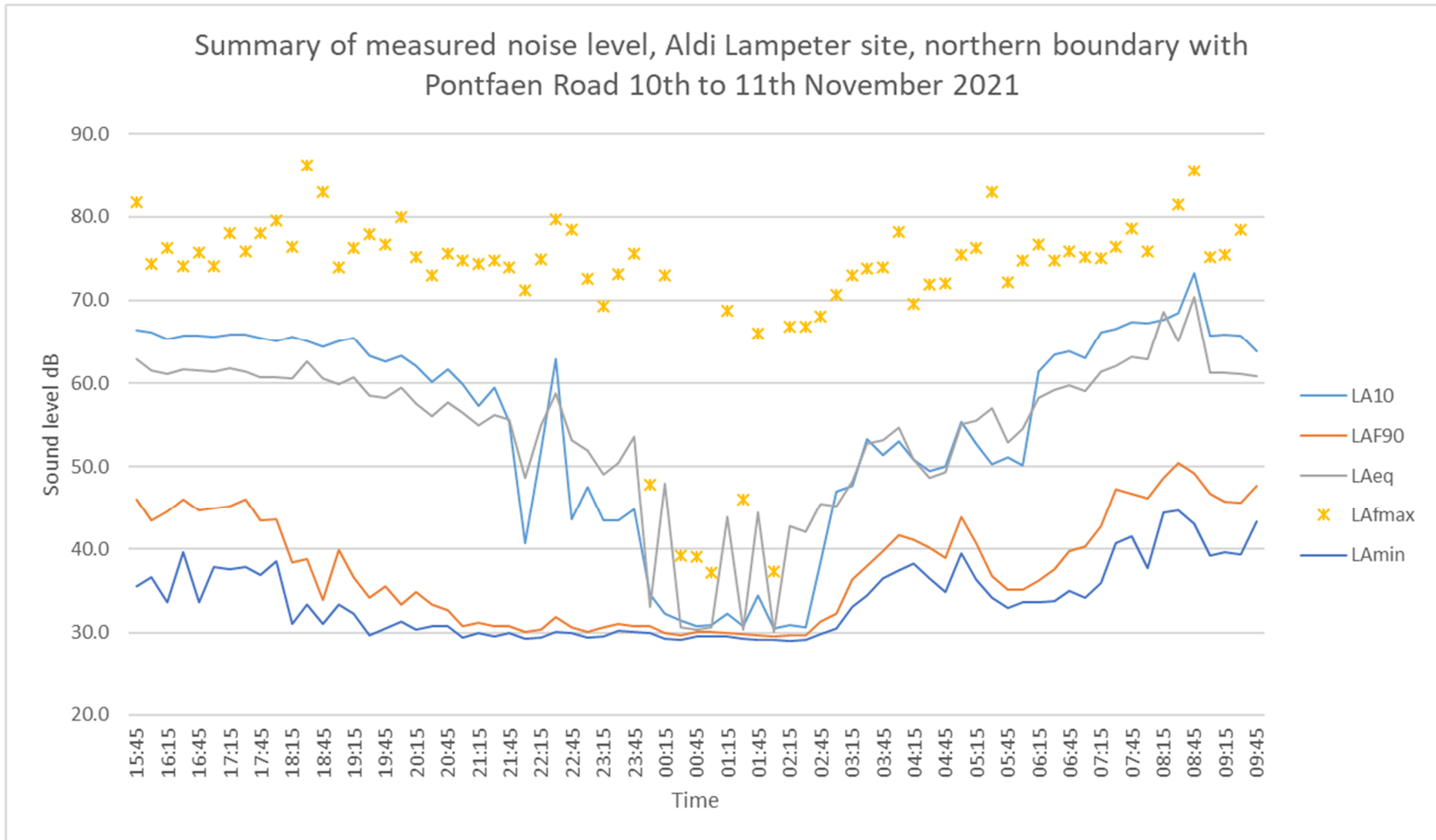
- 3.2 Noise level measurements were undertaken using a Norsonic 118 sound level meter fitted with environmental microphone kit. The sound level meter was calibrated before and after the measurements and no drift in calibration signal was observed.
- 3.3 Weather conditions during the survey were dry, partly cloudy with a light westerly wind (<5m/s). Noise measurements were taken over 15 minutes sample periods in free field conditions at a height of approximately 1.8 metres above local ground level.
- 3.4 The noise levels measured during the survey were dominated by road traffic sources on Portfaen Road.
- 3.5 The measured noise levels from location 1 are summarised in Table 3 below and Figure 2; the complete noise survey data is presented at Appendix B.

TABLE 3: Summary of measured noise levels at location A

Date	Time	Noise level dB		
		L _{A90} 1 hour	L _{A90} 15 mins *	L _{Aeq} 1 hour
10.11.21	16:00	44.7		61.5
	17:00	45.0		61.3
	18:00	38.7		61.2
	19:00	36.6		59.4
	20:00	33.6		57.9
	21:00	30.9		55.9
	22:00	30.8		55.3
	23:00		30.1	51.6
11.11.21	00:00		29.7	42.3
	01:00		29.7	41.3
	02:00		29.6	42.5
	03:00		32.3	51.0
	04:00		38.9	51.6
	05:00		35.2	55.4
	06:00		35.2	58.3
	07:00	44.3		61.6
	08:00	48.6		67.7
	09:00	46.5		61.1

*Lowest L_{A90} 15 minutes in hour period

FIGURE 2: Summary of measured noise levels



4.0 Noise from proposed Aldi development

Fixed plant noise

- 4.1 The precise details of the fixed plant equipment for the proposed Aldi store are to be finalised, however, the fixed plant is likely to comprise of a mixture of refrigeration and ventilation equipment. The refrigeration plant compound would be located on the south side of the store building adjacent to the loading bay. It is appropriate to seek to set plant noise limits that could be secured through imposition of a suitably worded planning condition, based on the survey background sound levels.
- 4.2 The closest existing residential properties to the proposed Aldi fixed plant equipment would be Hafan Deg care home to the east.
- 4.3 The objective assessment of plant sound sources in commercial premises should be undertaken in accordance with British Standard 4142:2014+A1:2019. This Standard enables the resultant sound levels from new plant equipment to be compared against the existing background sound level (L_{A90}) of an area to assess the impact.
- 4.4 In terms of seeking to set appropriate plant rating sound limits, the advice in BS 4142:2014 is that *“The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source of having a low impact, depending on the context”* (clause 11, note ‘d’).
- 4.5 Hence in relation to the guidance above from BS 4142:2014 there is a technical case to seek to set plant sound limits that match the current typical background sound climate. The noise survey indicates evening background noise levels of 35 dB (within the ‘acoustic daytime’ period – 0700-2300 hours) and 30 dB during the night-time. In view of these measured levels and the guidance above, it is proposed that plant rating noise level limits should be set at 35 dB daytime and 30 dB at night.
- 4.6 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 35 dBA between 0700 and 2300 hours, and 30 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+A1:2019.”

Noise from customer car parking activity

- 4.7 SR has previously undertaken extensive noise monitoring of Aldi store car parks; at 10 metres from the boundary of a busy car park measured noise levels are 48 dB $L_{Aeq,1hr}$ (free field) have been found. During off peak trading periods, car park source noise levels can be approximately 5 dB lower.
- 4.8 Aldi typically trades between 0800 and 2200 hours; customer car parking activity noise is therefore considered in the context of daytime assessment criteria.
- 4.9 The closest proposed car parking spaces are approximately 44 metres from Twyn Glas in Ffynon Bedr to the north of the site. The resultant predicted car park activity noise level (during peak trading conditions) at this property would be 35 dB $L_{Aeq,1\text{ hour}}$ (based on distance attenuation of $20 \cdot \log[10/44]$) during peak hour trading and 30 dB during off peak trading.
- 4.10 The predicted car parking activity noise levels are well below both the WHO CNG and the existing ambient noise climate. It is therefore considered that noise associated with Aldi store trading between 0800 and 2200 hours would be indicative of low impact (hence complying with the requirement to avoid significant adverse impact).

Noise from delivery activity

- 4.11 Noise levels of the different components of service activity have been measured at other Aldi stores, and the following maximum levels have been recorded.

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

Delivery event noise level (at 10 metres)					
Arrival		Unloading		Departure	
Duration (mins)	$L_{Aeq T}$ (dB)	Duration (mins)	$L_{Aeq T}$ (dB)	Duration (mins)	$L_{Aeq T}$ (dB)
2	68	45	58	1	67

- 4.12 All these sound levels are representative at 10 metres and are measured with the microphone in free field, away from any reflecting surfaces. The levels stated are realistic worst-case noise levels from a large collection of sample measurements and include all typical delivery activity noise (including reversing alarms, movement of goods, refrigeration units). Typically, Aldi have two daily deliveries.
- 4.13 Table 5 below summarises the predicted ambient ($L_{Aeq T}$) Aldi delivery activity noise levels at Hafan Deg care home to the east of the Aldi site (the full delivery event activity noise levels are included in Appendix C). The predicted delivery activity noise levels to the care home are based on screening attenuation provided by a 3 metre high acoustic grade fence (or equivalent) along the loading bay (as indicated at Appendix A).

TABLE 5: Predicted Aldi delivery activity noise levels

Receptor	Predicted noise level dB L_{Aeq} 1 hour
Hafan Deg care home	39

- 4.14 An assessment of Aldi delivery activity noise levels using the methodology in BS 4142:2014 is presented in Appendix C. The table below summarises the comparison of the predicted delivery rating level and background noise climate.

TABLE 6: Summary of BS 4142:2014 assessment of Aldi delivery activity noise

Receptor	Excess of rating level over background level dB				BS 4142 guidance
	Day	Evening	Night	0600-0700	
Hafan Deg care home	-2	+8	+15	+10	Indicative of between low (daytime) and significant adverse impact* (night time)

*Depending on the 'context

- 4.15 Section 11 of BS 4142:2014 explains “The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs (my emphasis). An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context” (my emphasis).
- 4.16 The BS 4142 assessment at Appendix C3 summarises the key contextual considerations in this instance, this includes the significance of comparing predicted delivery activity noise levels to WHO CNG in relation to sleep disturbance criteria for the period between 0600 and 0700 hours, during which period Aldi would want the flexibility to make deliveries to this store.
- 4.17 The comparison of predicted delivery activity noise levels to the WHO CNG values is shown in the table below.

TABLE 7: Comparison of predicted Aldi delivery event noise levels with the WHO CNG values

Noise level	Parameter	
	L _{Aeq T}	L _{Amax}
Receptor	Hafan Deg Carehome	
Predicted delivery event noise level day/night ^[1]	39/42	55-56
WHO guideline daytime/night time noise value ^[2]	55/45	60
Comply with WHO day/night time guidelines	YES	YES

Notes

[1] Where L_{Aeq T} = 1 hour daytime, 15 minutes night time

[2] Where L_{Aeq T} = 16 hour daytime and 8 hour night time

- 4.18 Predicted Aldi delivery event noise level complies with the WHO CNG daytime and night time values at the closest existing residential property. This is a key indicator as to the magnitude of the noise impact from delivery activity at the care home, since the principle assessment location is internal within bedrooms/living areas, as opposed to the difference between the external background noise level and predicted delivery activity noise level.
- 4.19 A further contextual consideration is how the predicted Aldi delivery activity noise levels compare to the existing ambient noise climate to consider the change in noise level. However, the noise monitoring location was, for security reasons located closer to Portfaen Road than the care home, so the ambient noise level at the care home would be lower than those indicated at Table 3/Appendix B.
- 4.20 Based on the measured ambient noise levels at Table 3, the daytime ambient noise climate at Hafan Deg care home could be expected to be typically between 50 and 55 dB L_{Aeq 1 hour}. Hence in respect of change in noise level predicted delivery activity noise levels of 39 dB LAeq 1 hour would give rise to a change in noise level of less than 1 dB.
- 4.21 The impact classification in the context of change in noise level for Aldi delivery activity occurring during the daytime (at a change of less than +1 dB) is considered to be low for the Hafan Deg care home.
- 4.22 Overall when considering the outcomes of all three assessment methods, it is concluded that Aldi deliveries could be made between 0600 and 2100 hours.

5.0 Noise from event exhibition pods

- 5.1 The periodic use of the proposed exhibition pods is not anticipated to generate noise over and above that associated with the proposed Aldi store. The proposed site layout plan indicates parking provision for the exhibition pods. The closest parking spaces to the residential properties to the north on Portfaen Road are approximately 60 metres away.
- 5.2 If a worst-case scenario were assumed whereby car parking activity source noise levels from the use of the exhibition pods were the same as that from Aldi car park (i.e 48 dB $L_{Aeq\ 1\ hour}$ at 10 metres), then resultant car parking activity noise levels at the closest properties in Portfaen Road would be 33 dB $L_{Aeq\ 1\ hour}$. This would be well below both the WHO CNG and the existing ambient noise climate, and hence would be considered to be indicative of low impact.
- 5.3 Although there is no indication that any of the pods would have any fixed plant associated with them, if this were to be the case then it would be recommended that associated noise would be controlled through the same plant noise limits that are set at paragraph 4.5 in respect of Aldi fixed plant equipment.

6.0 Assessment conclusions

6.1 Having undertaken this assessment against objective criteria, it is concluded that the Aldi development could proceed without the likelihood of noise from subsequent operations giving rise to significant adverse impact, on the basis of the following operating hours:

Trading: 0800 to 2200 hours

Deliveries: 0600 to 2100 hours

6.2 Fixed plant equipment can be designed such that the suggested criteria in the table below are achieved at the nearest noise sensitive property.

TABLE 8: Proposed plant rating noise limits

Rating level limits (dB)	
Daytime	Night time
45 dB	32 dB

6.3 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 35 dBA between 0700 and 2300 hours, and 30 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+A1:2019.”

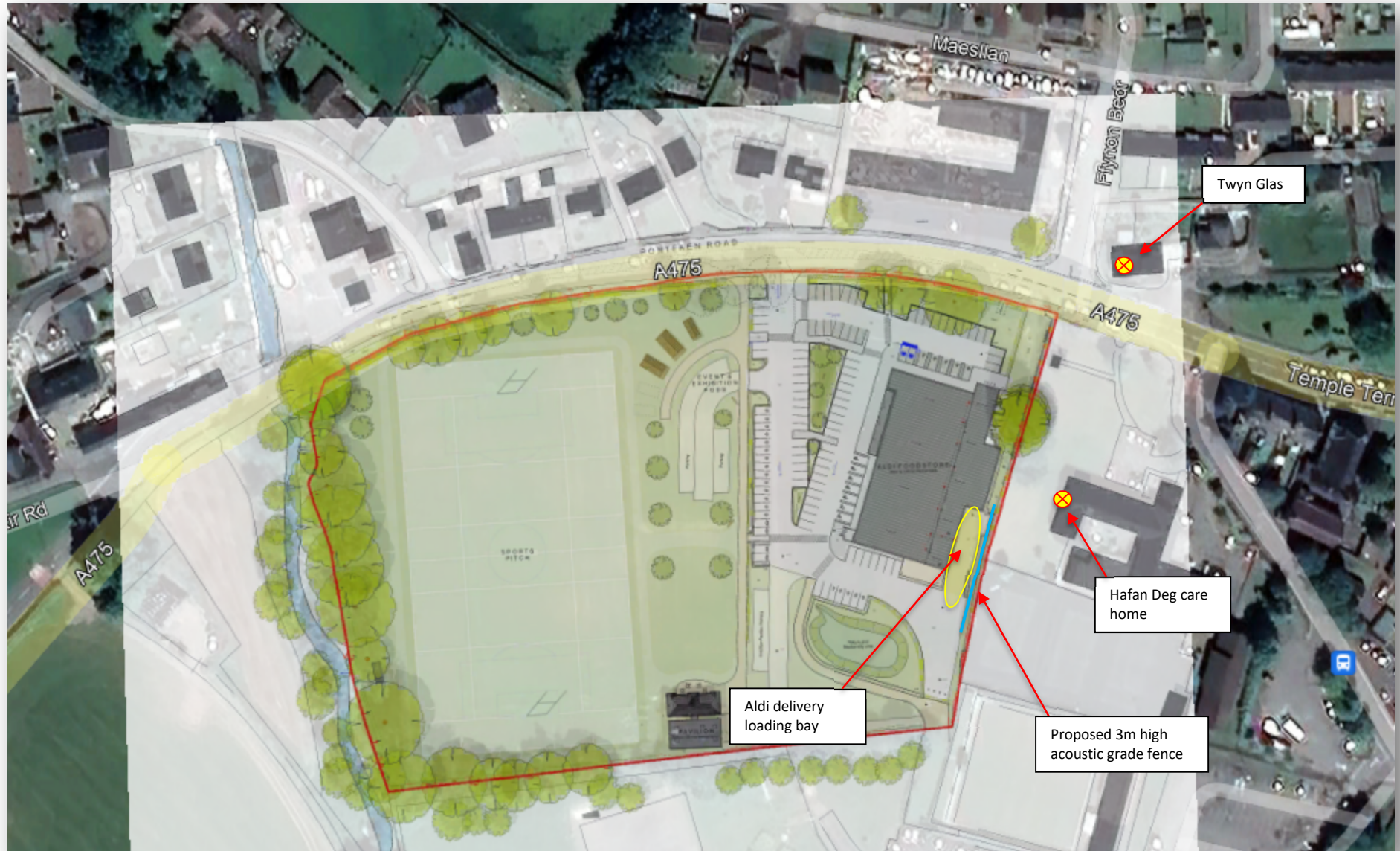
6.4 The periodic use of the proposed exhibition pods is not anticipated to generate noise over and above that associated with the proposed Aldi store.

6.5 In summary, based on a thorough assessment against objective standards, noise associated with the proposed development would comply with the objectives of PPW to “prevent adverse effects to amenity, health and the environment...”.

APPENDIX A

SITE LOCATION PLAN

Appendix A: Site location plan



APPENDIX B

NOISE SURVEY RESULTS

Measurement location A - Boundary with Portfaen Road, Lampeter

Date	Sample start time	Noise Parameter - dB				
		L _{A10}	L _{A90}	L _{Aeq}	L _{AMAX}	L _{AMIN}
10.11.21	15:45	66.4	46.0	62.8	81.7	35.6
	16:00	66.1	43.4	61.5	74.3	36.7
	16:15	65.3	44.5	61.1	76.3	33.6
	16:30	65.7	46.0	61.7	74.1	39.7
	16:45	65.7	44.7	61.5	75.7	33.6
	17:00	65.6	45.0	61.3	74.0	37.8
	17:15	65.8	45.3	61.8	78.0	37.6
	17:30	65.8	46.0	61.4	75.9	37.8
	17:45	65.5	43.5	60.7	78.0	36.9
	18:00	65.0	43.6	60.7	79.5	38.5
	18:15	65.6	38.4	60.6	76.4	31.1
	18:30	65.1	38.8	62.6	86.2	33.3
	18:45	64.3	33.9	60.5	83.0	31.0
	19:00	65.0	39.9	59.9	73.9	33.3
	19:15	65.4	36.6	60.7	76.2	32.2
	19:30	63.3	34.2	58.5	77.9	29.7
	19:45	62.6	35.5	58.2	76.7	30.5
	20:00	63.3	33.4	59.4	79.9	31.3
	20:15	62.0	34.9	57.6	75.1	30.3
	20:30	60.1	33.4	56.1	73.0	30.7
	20:45	61.7	32.7	57.7	75.6	30.7
	21:00	59.8	30.8	56.5	74.8	29.4
	21:15	57.2	31.2	55.0	74.4	29.9
	21:30	59.5	30.8	56.2	74.7	29.6
	21:45	55.4	30.8	55.6	73.9	29.9
	22:00	40.7	30.1	48.6	71.2	29.2
	22:15	52.0	30.4	54.9	74.9	29.4
	22:30	62.9	31.9	58.8	79.6	30.1
	22:45	43.6	30.6	53.1	78.4	29.9
	23:00	47.5	30.1	52.0	72.5	29.4
23:15	43.5	30.6	49.1	69.3	29.5	
23:30	43.5	31.0	50.5	73.1	30.2	
23:45	44.9	30.7	53.6	75.6	30.1	
11.11.21	00:00	34.6	30.7	33.1	47.9	30.0
	00:15	32.3	30.0	48.0	73.0	29.3
	00:30	31.5	29.7	30.6	39.2	29.1
	00:45	30.7	30.1	30.4	39.1	29.6
	01:00	30.9	30.1	30.6	37.2	29.5
	01:15	32.2	30.0	43.9	68.7	29.6
	01:30	30.8	29.8	30.4	46.1	29.2
	01:45	34.4	29.7	44.4	66.0	29.1
	02:00	30.5	29.6	30.1	37.3	29.1
	02:15	30.9	29.7	42.8	66.8	29.0
	02:30	30.6	29.7	42.1	66.8	29.1
	02:45	38.4	31.3	45.5	68.0	29.8
	03:00	47.0	32.3	45.2	70.7	30.5
	03:15	47.7	36.3	48.3	73.0	33.1
	03:30	53.3	38.0	52.8	73.8	34.4

Measurement location A - Boundary with Portfaen Road, Lampeter

Date	Sample start time	Noise Parameter - dB				
		L _{A10}	L _{A90}	L _{Aeq}	L _{AMAX}	L _{AMIN}
11.11.21	03:45	51.4	39.8	53.2	73.9	36.5
	04:00	53.0	41.7	54.6	78.1	37.5
	04:15	50.9	41.2	50.9	69.6	38.3
	04:30	49.5	40.2	48.7	71.9	36.5
	04:45	50.0	38.9	49.4	72.0	34.8
	05:00	55.4	43.9	55.1	75.4	39.5
	05:15	52.8	40.8	55.5	76.2	36.3
	05:30	50.3	36.8	57.0	83.0	34.2
	05:45	51.1	35.2	52.9	72.1	32.9
	06:00	50.1	35.2	54.5	74.7	33.6
	06:15	61.3	36.2	58.2	76.6	33.6
	06:30	63.4	37.6	59.2	74.7	33.8
	06:45	63.8	39.8	59.7	75.8	35.0
	07:00	63.0	40.3	59.0	75.2	34.2
	07:15	66.1	42.8	61.3	75.0	36.0
	07:30	66.6	47.3	62.0	76.4	40.7
	07:45	67.4	46.7	63.1	78.6	41.5
	08:00	67.3	46.2	62.9	75.8	37.7
	08:15	67.6	48.6	68.6	97.8	44.4
	08:30	68.5	50.4	65.0	81.5	44.7
08:45	73.2	49.2	70.4	85.5	43.0	
09:00	65.7	46.8	61.2	75.2	39.2	
09:15	65.9	45.8	61.2	75.4	39.6	
09:30	65.7	45.6	61.1	78.4	39.4	
09:45	63.8	47.7	60.8	90.1	43.3	

APPENDIX C

PREDICTED DELIVERY EVENT NOISE LEVELS AND BS 4142 ASSESSMENT

Appendix C1: Predicted Aldi delivery activity noise levels

APPENDIX C1.1

Assessment project: Aldi Lampeter	Delivery component		
	Arrival	Unloading	Departure
Delivery noise activity - predicted ambient noise levels ($L_{Aeq,T}$) *			
Closest residential property address:	Hafan Deg care home		
Source noise level at 10 metres $L_{Aeq,T}$	68	58	67
Time - minutes	2	45	1
Distance between noise source and residential property in metres	47	26	47
Screening attenuation dB	5	13	5
Convert to 1 hour - dB	-14.8	-1.2	-17.8
Convert to 15 mins - dB	-8.8	-0.3	-
Distance attenuation correction - dB	-13.4	-8.3	-13.4
Activity $L_{Aeq,1\text{ hr}}$	34.8 dB	35.5 dB	30.8 dB
Activity $L_{Aeq,15\text{ mins}}$	40.8 dB	36.4 dB	-
Rating level correction	0 dB	6 dB	3 dB
Resultant daytime rating level $L_{Ar,Tr}$	34.8 dB	41.5 dB	33.8 dB
Resultant nighttime rating level $L_{Ar,Tr}$	40.8 dB	42.4 dB	-
Overall delivery activity noise (arrival, unloading, departure) $L_{Aeq,1\text{ hr}}$	39 dB		
Overall delivery activity noise (arrival + unloading) $L_{Aeq,15\text{ mins}}$	42 dB		
Rating level dB $L_{Aeq,1\text{ hr}}$	43 dB		
Rating level dB $L_{Aeq,15\text{ mins}}$	45 dB		
Delivery noise activity - predicted peak noise levels (L_{Amax})			
Source noise level at 10 metres L_{Amax}	73	77	74
Distance between noise source and residential property in metres	47	26	47
Screening attenuation dB	5	13	5
Distance attenuation correction - dB	-13.4	-8.3	-13.4
Peak noise level L_{Amax}	55 dB	56 dB	56 dB

Appendix C2.1

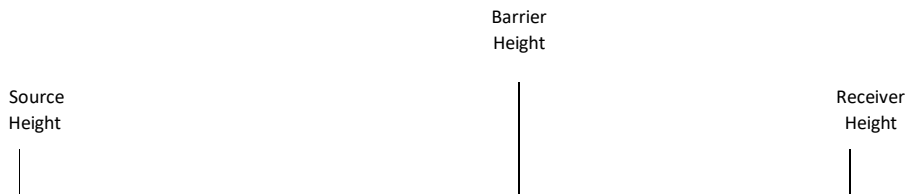
BASIC BARRIER ATTENUATION

(based on Maekawa or CRTN)

Receptor: **Hafan Deg care home**
Project: **Aldi Lampeter**

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

Receiver: **Hafan Deg care home**



Source-to-Barrier Distance

Receiver-to-Barrier Distance

Source-to-Barrier Distance	11.0 m
Receiver-to-Barrier Distance	18.0 m

Source Height	2.0 m
Receiver Height	4.5 m
Barrier Height	3.0 m

Acoustic fence

Path difference = 0.000 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	4.8	4.8	4.8	4.8	4.8	4.8	4.9	5.0	5.0 dBA

Appendix C2.2

BASIC BARRIER ATTENUATION

(based on Maekawa or CRTN)

Receptor: **Hafan Deg care home**
 Project: **Aldi Lampeter**

Source: **Delivery activity: unloading**

Receiver: **Hafan Deg care home**



Source-to-Barrier Distance

Receiver-to-Barrier Distance

Source-to-Barrier Distance	5.0 m
Receiver-to-Barrier Distance	22.0 m

Source Height	0.0 m
Receiver Height	4.5 m
Barrier Height	3.0 m

Acoustic fence

Path difference = 0.510 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	8.3	10.2	12.5	15.1	18.0	20.9	23.8	26.8	13.2 dBA

Appendix C3: BS 4142 assessment

APPENDIX C3.1

Results	Time period*				Relevant clause	Commentary
	10-11.11.21					
	Daytime	Evening	Night time	0600-0700		
Receptor	Hafan Deg care home					
Background sound level dB (L _{A90})	45.0	35.0	30.0	35.0	8.1, 8.1.3	For daytime the background sound level is the L _{A90 1hour} value, and night time L _{A90 15 minute} value, these are the lowest measured levels from the survey
Specific sound level - predicted delivery event noise level	39 dB	39 dB	42 dB	42 dB		Predicted delivery activity noise level is L _{Aeq 15 minute} for nighttime and L _{Aeq 1 hour} for daytime
Acoustic feature correction (applied in delivery calc sheet)	rating level corection +6 dB				9.2	Rating level of +6 dB applied to the unloading event for clearly perceptible impulsivity of bangs and crashes of unloading activity
Rating level	43 dB	43 dB	45 dB	45 dB	9.2	
Background sound level	45 dB	35 dB	30 dB	35 dB	8.1	
Excess of rating level over background level	-2	+8	+15	+10	11	
Assessment is indicative of low impact daytime, adverse impact evening and significant adverse impact during the night time	<p>Relevant clause 11</p> <p>The context is:</p> <ol style="list-style-type: none"> 1. Predicted delivery event noise levels (L_{Aeq 1 hour}) are below the WHO Community Noise daytime and night time guideline values 2. The predicted delivery event noise levels are below the existing daytime ambient noise climate 3. In consideration of noise impact that may occur during the early morning period, the difference between an external rating noise level and the existing (external) background noise level does not best represent the true impact. This is because people are generally inside properties at this time sleeping. Therefore the key noise impact indicator is the absolute level of noise in relation to sleep disturbance criteria, such as those contained in the WHO CNG. 					
Uncertainty of the assessment	<p>Relevant clause 10</p> <p>Weather conditions at the time the noise measurements were taken were good such that meteorological conditions are not considered to have influenced the measu</p> <p>The baseline noise survey is over 10 years old and should be checked/validated post Covid-19 restrictions</p> <p>The excess of the rating level over the background sound level is between -19 dB and 0 dB in this instance the uncertainty of the measurement is unlikely to have any significance to the outcome of the assessment.</p>					

NOTES:

Where Daytime is 0700 to 1900 hours; evening 1900 to 2300 hours; night time 2300 to 0700 hours;

APPENDIX D

ACOUSTIC TERMINOLOGY

Acoustic Terminology

D1 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.

D2 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.

D3 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).

D4 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 .

D5 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.

D6 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.

- D7 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.

- D8 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:

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