ADT 2789

2 November 2018

Nick Dando Esq.
20 Darrington Road
East Hardwick
PONTEFRACT
WF8 3DS

LAND OFF COBBLER'S LANE, PONTEFRACT

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

ACOUSTIC CONSULTANCY REPORT ADT 2789/ENIA

Revision	Date	Issued By	Revision Notes
-	02 November 2018	Chris Middleton	first issue

ACOUSTIC DESIGN TECHNOLOGY LIMITED
CROSSLAND GRANGE, GREENWAYS, CHESTERFIELD, DERBYSHIRE S40 3HF
Telephone: 01246 554841 Facsimile: 01246 550141 Website: www.acousticdesign.co.uk E-mail: mail@acousticdesign.co.uk
Company Registered in England No. 4528227
V.A.T. Registration No. 593 7456 92

1.0 SUMMARY

The outline proposal is to develop the site for residential accommodation as shown on the planning application drawings.

Acoustic Design Technology Limited have undertaken an environmental noise survey to determine the existing ambient noise levels on the site.

The assessment indicates that while there is some degree of railway noise affecting primarily the northern end of the site, the trains are relatively infrequent, and noise levels in line with current noise guidance (BS 8233:2014 and ProPG: Planning and Noise) inside dwellings and in outdoor amenity areas are achievable without major noise control measures.

There is scope for optimising the layout using solid fencing to the northern site boundary and using low rise dwellings in that area to provide mitigation of the railway noise.

2.0 BASIS OF ASSESSMENT

2.1 Site Location

The site is located off Cobbler's Lane, Pontefract and is currently an agricultural field. The surrounding area is primarily residential, with established housing estates to the north and west, and more housing under construction immediately to the south.

A railway forms the northern site boundary, running in a shallow cutting. The A645 is around 150 metres away to the north, and the M62 / A1(M) some 700 metres away to the east.

2.2 Proposed Development

The outline proposal is to develop the site for residential accommodation as shown on the planning application drawings. The layout and housing mix has not been finalised at this stage.

2.3 Assessment Criteria

Indoor ambient noise criteria from Section 7.7.2 of BS 8233:2014 are as follows: -

Area	07:00 – 23:00	23:00 – 07:00
Living room	35 dB $L_{Aeq, 16 hour}$	-
Dining room / area	40 dB $L_{Aeq, 16 hour}$	-
Bedroom	35 dB $L_{Aeq, 16 hour}$	30 dB $L_{Aeq, 8 hour}$

In respect of regular individual noise events, there are no specific criteria in BS 8233:2014. The recently published ProPG: Planning & Noise (May 2017) includes a detailed study of this issue, with a recommendation in Appendix A20 of the document that L_{Amax} should not normally exceed 45 dB in dwellings more than 10 times per night.

In relation to noise levels in outdoor amenity areas, Section 7.7.3.2 of BS 8233:2014 states that:

> *For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments.*
>
> *However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.*

2.4 Assessment Methodology

During the initial appraisal of the site, noise from the railway on the northern site boundary was expected to be the most significant noise source, as the site is some distance from road traffic noise sources and there are no neighbouring commercial operations.

A draft assessment methodology was submitted to Wakefield Council environmental health department, as follows:

i. undertake a 2 to 3 hour environmental noise survey to measure a sample of typical railway noise and the otherwise prevailing road traffic noise
ii. calculate the noise levels over a typical day time and night time period using the sample measurements of railway noise and published data for typical railway operations
iii. assess the noise control measures required for compliance with the criteria in BS 8233:2014

This scope of work was approved by the EHO, with the proviso that

> *if you could ensure that any mitigation to homes allows for other means of ventilation (not just trickle vents) if it is not possible to open the window and achieve a good standard of amenity (noise and thermal comfort) for bedrooms.*

This requires further discussion. The relationship between noise intrusion and ventilation is discussed at length in ProPG: Planning & Noise. Clearly it is desirable for suitable indoor ambient noise criteria (for example the BS 8233:2014 outlined in Section 2.3 above) to be achieved with windows open, although in nearly all urban areas this is an impossibility, as the ambient noise levels are too high.

In such cases, the ProPG guidance is that compliance with the indoor ambient noise criteria should be determined under Approved Document F 'whole dwelling ventilation' conditions, which is usually satisfied by a combination of trickle vents and intermittent extract fans (i.e. kitchen and bathroom extracts), provided that overheating of dwellings is considered. The guidance is that compliance with the acoustic criteria should not be determined under purge ventilation conditions.

In respect of overheating, the guidance in ProPG is that reasonable steps should be taken to minimise overheating during summer months through good design, and while thermal design is outside the scope of this report, it is understood that for modern dwellings insulation and solar shading are as important as open windows, if not more so, as open windows are only effective when the outside temperature is less than the inside temperature and a through draught can be created.

The basic reality is that compliance with the BS 8233:2014 criteria is unlikely to be achievable with windows open to control overheating, although this is exactly the same as for the existing houses in the surrounding area, and the provision of mechanical ventilation / comfort cooling systems to square the circle is not normal in a suburban housing setting with moderate noise levels.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Introduction

An environmental noise survey was undertaken over two periods, the first between approximately 13:30 hours and 14:50 hours on Monday 15 October 2018, and the second between around 00:30 hours and 03:00 hours on Tuesday 16 October 2018.

3.2 Instrumentation

The instrumentation used, and the field calibration values before and after the survey are detailed in Appendix A of this report.

3.3 <u>Procedure</u>

Two measurement positions were selected as described below and indicated on the attached site plan 2789/SP1:

i. on the southern site boundary
ii. on the northern site boundary

At measurement position 1 the microphone was mounted on a tripod approximately 1.2 metres above the ground and least 3.5 metres from any other acoustically reflective surface. At position 2 the microphone was mounted on a tripod approximately 3 metres above the ground and least 3.5 metres from any other acoustically reflective surface, as shown on the attached photo 2789/SP2.

The railway tracks were visible through the foliage from head height at measurement position 2, and would therefore have clear line of sight to the microphone at 3 metres above ground.

The noise levels were logged continuously for the duration of each survey period, with the sound level meters set to store the octave band and 'A' weighted 100ms short-term L_{eq} for subsequent post processing.

3.4 <u>Results</u>

The logged data has been post processed to determine $L_{Aeq,T}$ $L_{A90,T}$ and L_{Amax} levels for each 5 minute period, and these are listed in the attached tables 2789/T1 and 2789/T2 for the day time and night time periods respectively.

Octave band $L_{eq,T}$ averaged over each period are set out in the attached table 2789/T3, and octave band $L_{max,F}$ for freight trains measured at position 2 are listed in the attached table 2789/T4. Please refer to Appendix B for explanation of the noise units and the A-weighting term used in this report.

3.5 Weather Conditions

For the duration of each survey period the weather conditions were dry with no more than a light breeze.

3.6 Description of Existing Acoustic Environment

During the first survey period the noise levels were generally controlled by a combination of distant road traffic, primarily from the direction of the motorways, and construction noise from the south, particularly at position 1. There was a single passenger train and a single freight train, which were noticeable at position 2 only.

During the second survey period the noise levels were controlled by distant road traffic apart from two freight trains passing, which were clearly audible at position 2 and just about noticeable at position 1.

4.0 PRELIMINARY ASSESSMENT OF EXTERNAL NOISE INTRUSION

4.1 Introduction

The following sections provide indicative guidance on how to achieve compliance with the targeted noise criteria in relation to external noise affecting the site.

The guidance on sound insulation measures is based on the typical performance of generic constructions, and is intended to show how compliance may be achieved, although the performance ratings provided are not intended to be definitive acoustic performance specifications, and the sound insulation properties of the various constructions should be reviewed as part of the detailed design.

4.2 Site Noise Levels

When assessing external noise intrusion into new dwellings and noise levels in gardens it must be borne in mind that the noise climate may change in the future. The following discussion is by necessity based on the results of the environmental noise survey described in Section 3.0 above.

As noted in Section 2.4 above, the assessment is based on the sampled site noise levels, with corrections for the typical rail traffic over the course of a day time or night time period.

Typical railway operations are understood to be as follows:

	Trains	
	Day (07:00 - 23:00) 16 hours	Night (23:00 - 07:00) 8 hours
Passenger	4	0
Freight	4	6

Please note that the freight numbers are allocated slots, which do not necessarily translate to actual trains running. For example, during the night time survey 4 freight trains were expected over the survey period, and in the event only 2 of them actually ran. The above figures therefore represent the worst case scenario.

The derivation of the $L_{Aeq,T}$ for railway noise over the full day time (07:00 – 23:00) and night time (23:00 – 07:00 hours) periods is therefore as follows:

	Train noise	
	Position 1	Position 2
Measured $L_{Aeq, T}$ dB	58	61
Surveyed period (minutes)	73	60
Full 16 hour period (minutes)	960	960
Correction for time period dB	-11	-12
Surveyed trains	1 passenger, 1 freight	1 passenger, 1 freight
Trains over 16 hour period	4 passenger, 4 freight	4 passenger, 4 freight
Correction for actual trains dB	+ 6	+ 6
Derived $L_{Aeq, 16 hour}$ dB	53	55

The same analysis over the night time period is as follows:

	Train noise	
	Position 1	Position 2
Measured $L_{Aeq, T}$ dB	46	54
Surveyed period (minutes)	147	124
Full 16 hour period (minutes)	480	480
Correction for time period dB	-6	-6
Surveyed trains	2 freight	2 freight
Trains over 8 hour period	6 freight	6 freight
Correction for actual trains dB	+ 5	+ 5
Derived $L_{Aeq, 8 hour}$ dB	46	53

The resulting $L_{Aeq,T}$ and L_{Amax} for the purposes of the analysis are therefore as follows:

Location	$L_{Aeq,T}$ dB		Night time L_{Amax} dB
	Day (07:00 - 23:00)	Night (23:00 - 07:00)	
Northern boundary, position 2	55	53	84
Southern boundary, position 1	53	46	57

Clearly there will be a regression in railway noise levels with distance from the northern site boundary.

4.3 Noise Criteria

BS 8233:2014 internal and external noise criteria from Section 2.3 above are summarised as follows:

Area	07:00 – 23:00	23:00 – 07:00
Living room	35 dB $L_{Aeq, 16 hour}$	-
Dining room / area	40 dB $L_{Aeq, 16 hour}$	-
Bedroom	35 dB $L_{Aeq, 16 hour}$	30 dB $L_{Aeq, 8 hour}$ 45 dB L_{Amax}
Outdoor amenity areas	50 – 55 dB $L_{Aeq, 16 hour}$	-

4.4 Indicative Assessment of Noise Intrusion to Dwellings

Based on the incident $L_{Aeq,T}$ noise levels set out in Section 4.2 above and the noise criteria set out in Section 4.3 above, the following table provides the resulting overall noise reduction requirements for the houses, based on the $L_{Aeq,16 hour}$ and $L_{Aeq,8 hour}$

Location	Noise reduction of $L_{Aeq,T}$ required dB	
	Day (07:00 - 23:00)	Night (23:00 - 07:00)
Northern boundary, position 2	20	23
Southern boundary, position 1	18	16

It is generally accepted that a typical residential facade with windows open for ventilation provides 10 to 15 dB noise reduction, and it should be apparent from the figures in the above table that despite the relatively low incident $L_{Aeq,T}$, compliance with the targeted indoor ambient noise criteria would not be achieved with windows open for ventilation.

However, with windows closed (typically R_w 29) and standard trickle vents (typically $D_{ne,w}$ 30) the required noise reductions should comfortably be achieved, in terms of both the $L_{Aeq,16\ hour}$ and $L_{Aeq,\ 8\ hour}$. This would be an acceptable outcome in the context of the guidance on noise intrusion and ventilation as described in Section 2.4 above.

Considering the night time L_{Amax} resulting from freight trains, to reduce the incident L_{Amax} of 85 dB on the northern site boundary to 45 dB inside a dwelling would require an overall 40 dB noise reduction of the train controlled L_{Amax}, which is not realistically achievable with domestic double glazing and trickle vents.

It is worth noting, however, that the L_{Amax} 45 dB requirement defined in ProPG and similar guidance documents relates to frequent L_{Amax}, that is, those occurring at least 10 times per night. In this case there are understood to be at most 6 trains over the night, and often less or none at all, and on that basis there is no clear imperative to control the freight train noise to L_{Amax} 45 dB inside the dwellings within the context of the relevant guidance. That said, there are relatively simple measures that could be taken to reduce the impact, including:

i. using solid timber fencing along the northern site boundary to provide acoustic screening, nominally 1800mm high. The fact that the railway runs in a cutting will enhance the effect of the barrier.
ii. minimising the height of the dwellings nearest the northern site boundary, for example, bungalows or low rise two storey dwellings

4.5 Indicative Assessment of Noise Levels in Gardens

Reference to Section 4.4 above reveals derived $L_{Aeq, 16 hour}$ of 53 – 55 dB, which are within the BS 8233:2014 recommended range of 50 – 55 dB. On that basis the noise levels in gardens should be acoustically suitable without additional noise control measures.

Solid screening to the railway boundary as indicated in Section 4.4 above and the screening provided by buildings and garden fences should reduce the levels in gardens further, closer to the lower end of the BS 8233 range.

4.6 Summary

This assessment indicates that while there is some degree of railway noise affecting primarily the northern end of the site, the trains are relatively infrequent and noise levels in line with current noise guidance is achievable without major noise control measures.

The site is too small for acoustic optimisation on a large scale, using a buffer zone for example, although some degree of mitigation can be provided using solid fencing to the northern site boundary and selecting low rise units in that area.

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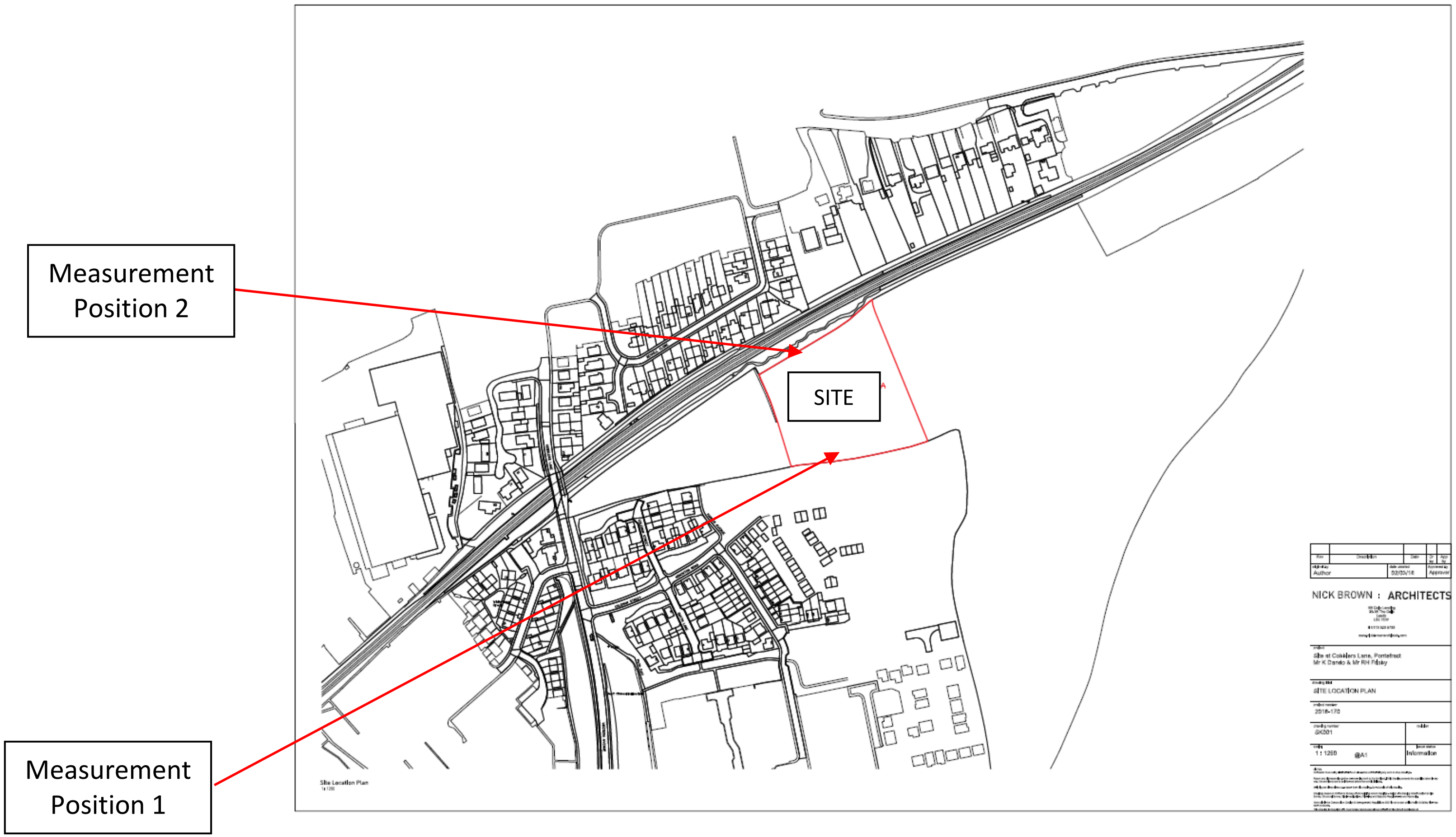

Notes	**Description** Site Plan Showing Noise Monitoring Locations		Acoustic Design Technology Noise and Vibration Consultants
	Project Land off Cobbler's Lane, Pontefract		
	Survey Date 15 and 16 October 2018	**Drawing No.** 2789/SP1	

Notes	Description		
	Measurement position 2		
	Project		
	Land off Cobbler's Lane, Pontefract		
	Survey Date	**Drawing No.**	
	15 and 16 October 2018	2789/SP2	Acoustic Design Technology Noise and Vibration Consultants

SURVEY RESULTS FOR DAY TIME SURVEY PERIOD

Measurement start	Position 1 (southern boundary)			Position 2 (northern boundary)			Trains
	$L_{Aeq,\ 5mins}$ dB	L_{Amax} dB	L_{A90} dB	$L_{Aeq,\ 5mins}$ dB	L_{Amax} dB	L_{A90} dB	
13:35	56	72	55				
13:40	56	62	55	56	66	55	
13:45	58	69	56	58	73	55	passenger train
13:50	57	63	56	57	59	55	
13:55	57	62	55	56	60	55	
14:00	58	75	55	56	60	55	
14:05	58	68	55	57	62	55	
14:10	57	73	55	57	63	55	
14:15	60	80	56	57	63	55	
14:20	58	68	56	70	85	56	freight train
14:25	58	71	56	56	65	55	
14:30	58	75	55	56	61	55	
14:35	59	79	55	56	72	54	
14:40	57	69	55	56	60	55	
14:45	57	64	56				
14:50	60	78	56				

Table 2789/T1

SURVEY RESULTS FOR NIGHT TIME SURVEY PERIOD

Measurement start	Position 1 (southern boundary)			Position 2 (northern boundary)			Trains
	$L_{Aeq, 5mins}$ dB	L_{Amax} dB	L_{A90} dB	$L_{Aeq, 5mins}$ dB	L_{Amax} dB	L_{A90} dB	
00:40	47	52	44				
00:45	49	54	45				freight train
00:50	47	53	44	52	78	45	
00:55	49	57	45	67	84	46	freight train
01:00	48	55	45	47	54	45	
01:05	48	53	45	48	53	46	
01:10	47	52	44	47	52	44	
01:15	46	51	43	47	55	45	
01:20	45	51	42	45	51	43	
01:25	44	50	42	45	52	43	
01:30	44	49	42	45	51	43	
01:35	44	52	41	46	68	43	
01:40	45	51	40	45	51	42	
01:45	45	50	41	44	52	41	
01:50	46	51	41	45	51	42	
01:55	47	52	43	47	52	44	
02:00	45	50	41	46	51	42	
02:05	46	51	43	46	52	44	
02:10	45	51	39	46	51	43	
02:15	46	51	43	46	51	44	
02:20	45	51	42	45	50	43	
02:25	44	50	41	45	51	42	
02:30	45	50	41	46	51	43	
02:35	46	52	43	46	53	43	
02:40	46	54	41	47	52	44	
02:45	45	51	41	45	52	42	
02:50	43	51	38	43	52	40	
02:55	44	50	41				

Table 2789/T2

SURVEY RESULTS (OCTAVE BAND $L_{EQ,T}$)

Measurement position	Period	$L_{eq,T}$ (dB) Octave band centre frequency (Hz)								$L_{Aeq,T}$ (dB)
		63	125	250	500	1k	2k	4k	8k	
1	day	65	59	50	53	56	47	40	32	58
2	day	60	57	59	58	58	51	46	33	61
1	night	49	41	35	41	44	36	25	20	46
2	night	53	50	52	52	50	44	39	36	54

Table 2789/T3

SURVEY RESULTS (OCTAVE BAND L_{MAX}, FREIGHT TRAINS)

Measurement position	Period	$L_{max,F}$ (dB) Octave band centre frequency (Hz)								$L_{Amax,F}$ (dB)
		63	125	250	500	1k	2k	4k	8k	
2	day	86	84	86	82	81	74	70	58	85
	night	81	80	81	82	78	74	72	70	84

Table 2789/T4

APPENDIX A - INSTRUMENTATION

Manufacturer	Type and / or Model	Serial Number	Last Laboratory Calibration	Calibrator Output (dB)	Free Field Correction (dB)	Initial reading (dB)	Final reading (dB)
01dB	(Black) Solo Class 1 Sound Level Meter	65201	October 2017		-0.10	114.1[(1)] 114.1[(2)]	114.2[(1)] 114.3[(2)]
01dB	PRE 21 S Pre-Amplifier	15619	October 2017				
01dB	MCE 212 ½ inch Microphone	101204	October 2017				
01dB	(Blue) Solo Class 1 Sound Level Meter	60320	April 2017		-0.10	114.1[(1)] 114.1[(2)]	114.1[(1)] 114.1[(2)]
01dB	PRE 21 S Pre-Amplifier	16866	April 2017				
01dB	MCE 212 ½ inch Microphone	90549	April 2017				
Norsonic	Nor1251 Calibrator (Cal 5)	34220	January 2018	114.19			

Notes:-

(1) first survey period 15 October 2018
(2) second survey period 16 October 2018

APPENDIX B

Acoustic Terminology

The annoyance produced by noise is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and any variations in its level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

A-weighting — The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the A-weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average person. It is also possible to calculate the A-weighted noise level by applying certain corrections to an un-weighted spectrum.

When the noise being measured has variable amplitude, such as traffic noise, it is necessary to qualify the basic dB unit. This may be done using a statistical index L_n dB, where n is any value between 0 and 100, and is the percentage of the sample time for which the stated level is exceeded. In defining the use of the index, both the value of n and the length of the sample period must be stated.

L_{10} — L_{10}, being the level exceeded for 10% of the time, has been shown to be a good indicator for traffic noise intrusion, and is used in assessing the effect of traffic noise on residential or commercial premises.

L_{90} — L_{90} is the level exceeded for 90% of the time, and is used as a measure of background noise level, as it excludes the effects of occasional transient levels, such as individual passing cars or aircraft.

In addition to the statistical noise indices defined above, the following noise units are also used to define variable amplitude noise sources:

$L_{eq,T}$ — $L_{eq,T}$ is defined as the notional steady sound pressure level which, over a stated period of time, would contain the same amount of acoustical energy as the actual fluctuating sound measured over the same period. In other words, it is a measure of the "average" noise level

L_{max} — L_{max} is the maximum time-weighted sound pressure level recorded over the stated time period