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**BOGNOR NORTHERN RELIEF ROAD, PHASE 1- PROPOSED FOOTPATH
CROSSINGS
THROUGH ACOUSTIC BARRIERS
NOISE IMPACT ASSESSMENT**

Technical Report: R4087-2 Rev 0

Date: 14th November 2012

For: Barratt David Wilson Southampton
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24 Acoustics Document Control Sheet

Project Title: Bognor Northern Relief Road, Phase 1- Proposed Footpath Crossings
Through Acoustic Barriers
Noise Impact Assessment

Report Ref: R4087-2 Rev 0

Date: 14th November 2012

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For and on behalf of 24 Acoustics Ltd				

Document Status and Approval Schedule

Revision	Description	Prepared By	Approved By
0	Approved for Issue	Reuben Peckham	Stephen Gosling

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EXECUTIVE SUMMARY

24 Acoustics Ltd has been retained by Barratt David Wilson Southampton (BDW) to undertake an assessment of the potential noise impact generated as a result of two footpath penetrations in the noise bunds/ barriers which separate Bognor Northern Relief Road from the BDW Felpham development and also from other (existing) properties both to the south and north.

Calculations have been undertaken based upon 2030 projected traffic flows and these have indicated that the footpath penetrations in the bunds are unlikely to increase the traffic noise levels at the existing properties at Hoe Lane by more than 0.1 dB $L_{Aeq,16\text{ hour}}$ during the daytime. An increase in noise level of 0.5 dB $L_{Aeq,16\text{ hr}}$ can be expected at the nearest existing residential property in Norman's Drive. These differences are all considered negligible and not subjectively perceptible.

Noise levels at the BDW development properties could increase by up to 2.3 dB $L_{Aeq,16\text{ hour}}$ during the day. This is a small increase in noise level, however, the daytime internal noise environment in all habitable rooms in all properties on the ground and first floor will still be classified as 'good' (as defined in BS 8233) when windows are closed and trickle vents open.

Noise levels in external amenity areas will increase marginally but, however, will remain substantially lower than the World Health Organisation aspirational noise level of 55 dB $L_{Aeq,16\text{ hour}}$.

As a result of the above it is considered that the marginal increases in noise levels as a result of the footpath penetrations through the bunds at some properties will not have any impact nor harm to the amenity of both the existing residential properties and also to the existing and proposed future BDW properties on the site.

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1.0 INTRODUCTION & SCOPE OF ASSESSMENT

- 1.1 24 Acoustics Ltd has been retained by Barratt David Wilson Southampton (BDW) to undertake an assessment of the potential noise impact generated as a result of two footpath penetrations in the noise bunds/ barriers which separate Bognor Northern Relief Road from the BDW Felpham development and also from other (existing) properties both to the south and north.
- 1.2 All noise levels in this report are quoted in dB relative to 20 μ Pa.

2.0 SITE DESCRIPTION

- 2.1 Bognor Northern Relief Road is located in Felpham to the north-east of Bognor Regis. The Barratt David Wilson Felpham development is located to the immediate south of the road and comprises residential properties with associated communal external amenity space and an external sports field. Existing residential properties are located further to the south (for example in Norman's Drive) and also located in Hoe Lane, to the north of the Bognor Regis Relief Road (BNRR). Figure 1 shows the site location and receptor properties.
- 2.2 Public Footpaths 2988 and 154 both run through the site from (approximately) south-west to north east and cross the BNRR. As part of the works to protect both existing and the new BDW properties from noise from road traffic using the BNRR a combination of acoustic bunds and noise barrier fences have been specified. Both footpaths will penetrate these bunds/ barriers, as shown in Figure 2.
- 2.3 Footpath 2988 will intersect the southern and northern BNRR acoustic barriers (comprising a 2 m bund with 1 m fence above to the south and 2 m bund with 1.5 m fence above to the north). Footpath 154 will intersect the southern BNRR acoustic barrier (comprising a 2 m bund with 1 m fence above). In each case the footpath will be 3 m in width and the bunds and fences will taper down to this (this is detailed in WSP drawing Reference BNRR NOISE0 02).

3.0 STANDARDS AND GUIDANCE

3.1 The National Planning Policy Framework (NPPF) [Reference 1] was published by the Department for Communities and Local Government in draft format in July 2011 and in its final form on 27th March 2012, and is now effective. This document is intended to replace specific guidance contained within the planning policy guidance and statement documents which are currently in force. This document therefore supersedes PPG 24 [Reference 2] which previously provided guidance on noise relating to planning and new development. For noise the NPPF policy states that planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions, while recognising that many developments will create some noise; and
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

3.2 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 3] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims.

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life;
- Where possible, contribute to the improvement of health and quality of life.

- 3.3 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'. The following guidance is provided within the NPSE:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

- 3.4 The NPPF and NPSE documents do not refer to specific noise criteria. When considering the impact of noise from road traffic upon housing 24 Acoustics considers that the spirit of the requirements of the NPPF and NPSE will be complied with if criteria from British Standard 8233 [Reference 4] are adopted.
- 3.5 British Standard 8233 [Reference 4] defines a range of ambient noise levels for a number of design criteria for 'good' or 'reasonable' acoustic conditions inside certain habitable rooms. Table 1 shows a summary of the levels recommended in BS 8233 for used for resting and sleeping.

Criterion	Typical Situation	Design Range, dB $L_{Aeq, T}$	
		Good	Reasonable
Reasonable resting/ sleeping conditions	Living rooms	30	40
	Bedrooms	30	35

Table 1: Indoor Ambient Noise Levels as Recommended in BS 8233

- 3.6 BS 8233 also states that for 'reasonable' acoustic conditions in bedrooms noise levels should not regularly exceed 45 dB $L_{Amax, f}$.
- 3.7 The World Health Organisation provides guidance on desirable internal noise levels to minimise the risk of sleep disturbance. The WHO 2000 guidelines [Reference 5] suggest internal noise levels not exceeding 30 dB L_{Aeq} or regularly exceeding 45 dB $L_{Amax, f}$ for 'a good sleep'.

- 3.8 The 2000 WHO document also states that *'To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terrace and outdoor living areas should not exceed 55 dB L_{Aeq} for a steady continuous noise'*. It is relevant to note that the WHO values are aspirational and the WHO guidance has no force in current planning legislation.
- 3.9 Building Bulletin 93 [Reference 6] provides guidance on suitable noise levels in (unoccupied) playgrounds and playing fields and suggests that the ambient noise level should not exceed 55 dB $L_{Aeq, 30 \text{ min}}$.

4.0 NOISE IMPACT ASSESSMENT

- 4.1 Calculations of the noise level from road traffic using the BNRR have been undertaken using the DoT Publication 'Calculation of Road Traffic Noise' [Reference 7]. Immi 2011 noise mapping software has been used. Road traffic flows have used the data provided by Boreham Consulting Engineers (14500 vehicle movements per 18 hr day and 5% HGVs) for the year 2030 which are considered to represent a worst-case assessment.
- 4.2 The acoustic model has calculated the road traffic noise level at a number of Barratt properties, open space receptors and at the closest existing receptors to the South (37 Norman's Drive) together with a number of the receptors in Hoe Lane. The model has calculated the baseline noise level at each receiver (that would be expected without the footpath penetrations in the bunds) and the 'with footpath' levels. Acoustic contours showing the noise propagation across the site for these two scenarios are provided in Figures 3 and 4. The output of the model is provided in Table 2 below in terms of the $L_{A10, 18 \text{ hour}}$ noise index.

Receptor	Noise Level, dB $L_{A10, 18 \text{ hr}}$		
	Baseline	With Bund Penetration	Difference
Plot 100 1.5 m	51.3	53.0	1.7
Plot 101 1.5 m	50.7	53.7	3.0
Plot 102 1.5 m	49.5	51.5	2.0
FP 2988 adj amenity Space	50.6	51.4	0.8
Rear 37 Normans Drive	44.7	45.2	0.5
Plots 327-335	48.0	48.7	0.7
Centre Football Pitch	46.5	47.2	0.7
Amenity Adj FP154	50.0	51.8	1.8
Plot 101 4 m	54.6	56.9	2.3
The Cottage, Hoe Lane	48.9	49.0	0.1
Jem House, Hoe Lane	48.4	48.5	0.1
Marks Cottage, Hoe Lane	49.5	49.6	0.1
Flansham Cottage, Hoe Lane	50.0	50.1	0.1

Table 2: Results of Acoustic Bund Calculations, $L_{A10, 18 \text{ hr}}$

- 4.3 The corresponding $L_{Aeq, 16 \text{ hr}}$ noise levels have been estimated from the $L_{A10, 18 \text{ hr}}$ noise levels (using the relationship shown in PPG 24). These are shown in Table 3 below.

Receptor	Noise Level, dB $L_{Aeq, 16 \text{ hour}}$		
	Baseline	With Bund Penetration	Difference
Plot 100	49.3	51.0	1.7
Plot 101 1.5 m	48.7	51.7	3.0
Plot 102	47.5	49.5	2.0
FP 2988 adj amenity Space	48.6	49.4	0.8
Rear 37 Normans Drive	42.7	43.2	0.5
Plots 327-335	46.0	46.7	0.7
Centre Football Pitch	44.5	45.2	0.7
Amenity Adj FP154	48.0	49.8	1.8
Plot 101, 4 m	52.6	54.9	2.3
The Cottage, Hoe Lane	46.9	47.0	0.1
Jem House, Hoe Lane	46.4	46.5	0.1
Marks Cottage, Hoe Lane	47.5	47.6	0.1
Flansham Cottage, Hoe Lane	48.0	48.1	0.1

Table 3: Results of Acoustic Bund Calculations, $L_{Aeq, 16 \text{ hr}}$

- 4.4 The calculations indicate that penetrations in the acoustic barriers will generate a change in noise level at the existing properties in Hoe Lane of no more than 0.1 dB $L_{Aeq, 16 \text{ hr}}$ which is negligible. An increase of 0.5 dBA can be expected at the closest existing property at Norman's Drive (rear of #37) which is also negligible.

4.5 Differences in noise level of up to 2.3 dBA can be expected at the closest BDW properties to the footpath penetrations can be expected. It is understood that these properties have been constructed using standard thermal glazing and trickle vents. The difference in noise level from inside to outside when windows are closed and vents are open can be expected to be at least 25 dBA and consequently noise levels inside in all habitable rooms (including those on the first floor) are highly unlikely to exceed 30 dB $L_{Aeq,16 \text{ hour}}$ during the daytime and will therefore comply with the BS8233 suggested 'good' internal noise level.

4.6 Noise levels on the sports pitch and in external amenity areas within the BDW development site will be lower 55 dB $L_{Aeq,16 \text{ hour}}$ and therefore also considered acceptable.

5.0 CONCLUSIONS

5.1 24 Acoustics Ltd has been retained by Barratt David Wilson Southampton (BDW) to undertake an assessment of the potential noise impact generated as a result of two footpath penetrations in the noise bunds/ barriers which separate Bognor Northern Relief Road from the BDW Felpham development and also from other (existing) properties both to the south and north.

5.2 Calculations have been undertaken based upon 2030 projected traffic flows and these have indicated that the footpath penetrations in the bunds are unlikely to increase the traffic noise levels at the existing properties at Hoe Lane by more than 0.1 dB $L_{Aeq,16 \text{ hour}}$ during the daytime. An increase in noise level of 0.5 dB $L_{Aeq,16 \text{ hr}}$ can be expected at the nearest existing residential property in Norman's Drive. These differences are all considered negligible and not subjectively perceptible.

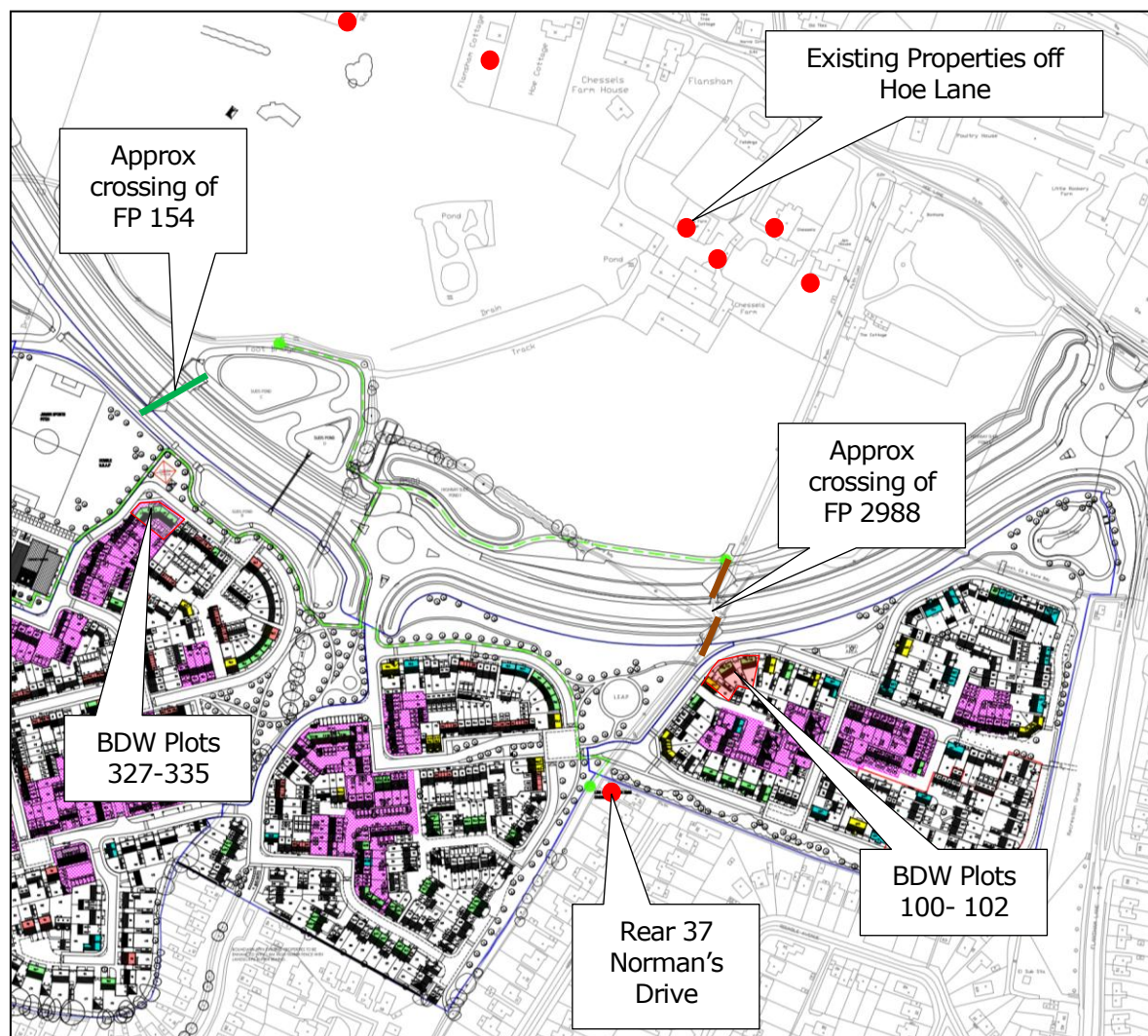
5.3 Noise levels at the BDW development properties could increase by up to 2.3 dB $L_{Aeq,16 \text{ hour}}$ during the day. This is a small increase in noise level, however, the daytime internal noise environment in all habitable rooms in all properties on the ground and first floor will still be classified as 'good' (as defined in BS 8233) when windows are closed and trickle vents open.

5.4 Noise levels in external amenity areas will increase marginally but, however, will remain substantially lower than the World Health Organisation aspirational noise level of 55 dB $L_{Aeq,16 \text{ hour}}$.

- 5.5 As a result of the above it is considered that the marginal increases in noise levels as a result of the footpath penetrations through the bunds at some properties will not have any impact nor harm to the amenity of both the existing residential properties and also to the existing and proposed future BDW properties on the site.

REFERENCES

- 1 Department for Communities and Local Government. The National Planning Policy Framework (NPPF), 2012.
- 2 Department of the Environment. Planning Policy Guidance (PPG) 24, Planning and Noise, September 1994.
- 3 Department for Environment, Food and Rural Affairs. Noise Policy Statement for England (NPSE), 2010.
- 4 British Standards Institution. British Standard 8233: Sound Insulation and Noise Reduction for Buildings, 1999.
- 5 World Health Organisation. Guidelines for Community Noise, 2000.
- 6 Department for Education. Building Bulletin 93, Acoustic Design of Schools, 2004.
- 7 Department of Transport. Calculation of Road Traffic Noise, 1988.



Project:
Bognor North Relief Road

Description:
BNRR and Surrounding Residential Receptor Locations

DWG No: Figure 1

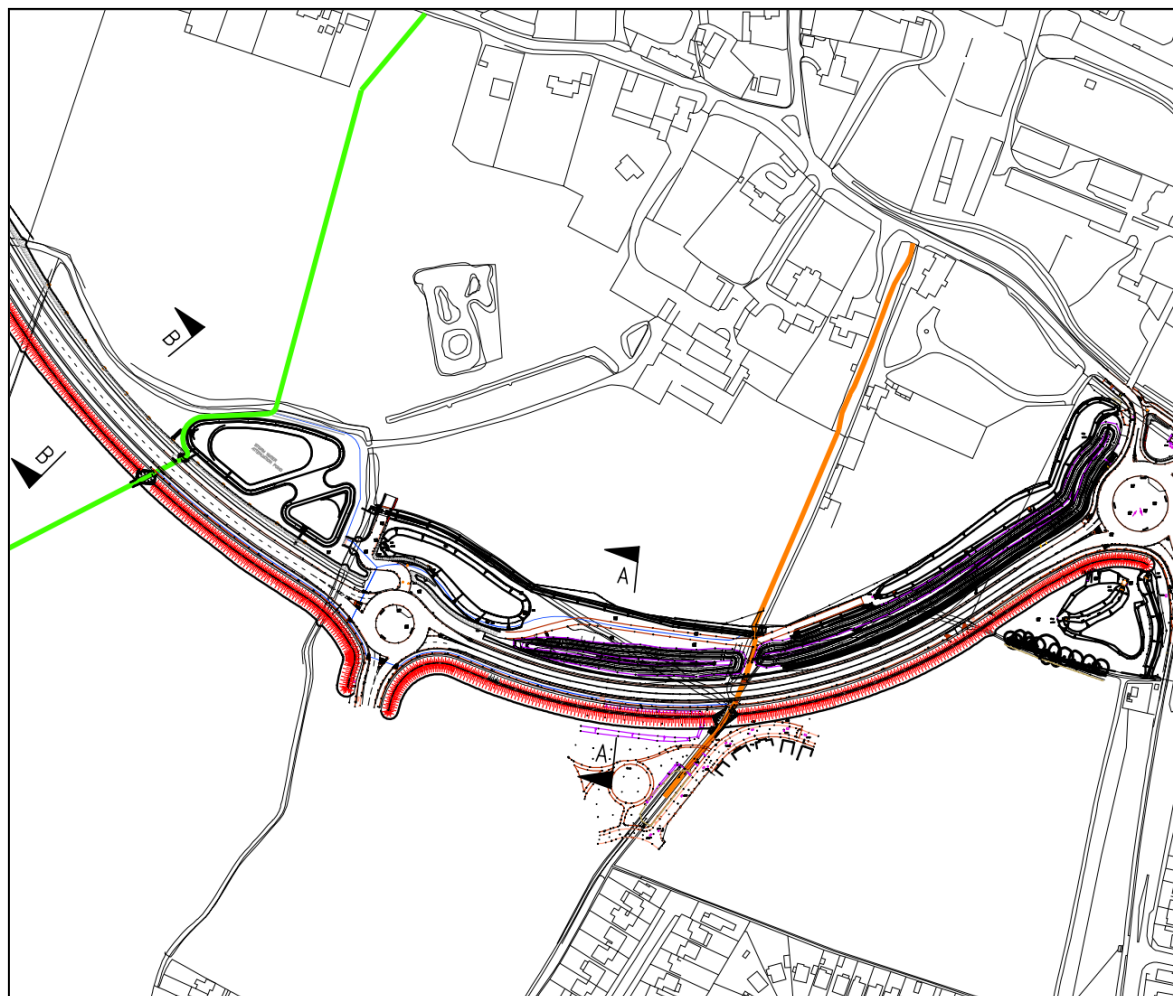
Scale: N.T.S.

Rev: A

Date: November 2012

Drawn By: RP

Job No: 4087-2

**DO NOT SCALE****KEY**

-  FOOTPATH 2988
-  FOOTPATH 154
-  NORTH ACCESS BUND (CONSTRUCTED)
-  SOUTHERN ACCESS BUND (CONSTRUCTION 2014)
-  OTHER BATCH WORK
-  1m HIGH ACOUSTIC FENCE
-  1.5m HIGH ACOUSTIC FENCE
-  2m HIGH ACOUSTIC FENCE

NOTES

1. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
2. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT & ENGINEERING DETAILS, DRAWINGS & SPECIFICATIONS.
3. ANY DISCREPANCIES SHOULD BE REPORTED TO THE ARCHITECT AND/OR ENGINEER IMMEDIATELY, SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORKS.
4. FOR COLUMNS PLANTED AT OR ADJACENT TO BATTER SLOPE REFER TO STANDARD DETAILS.
5. 'FOR CONSTRUCTION' SUBJECT TO PLANNING CONDITION APPROVAL.
6. FOR NOISE BUND CONSTRUCTION DETAILS REFER TO BNRR NOISE 02.

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Project:
Bognor North Relief Road

Description:
Footpath/ Acoustic Bund/ Barrier Penetrations

DWG No: Figure 2

Scale: N.T.S.

Rev: A

Date: November 2012

Drawn By: RP

Job No: 4087-2



Project:
Bognor North Relief Road

Description:
Baseline Noise Map, dB $L_{A10,18hr}$

DWG No: Figure 3

Scale: N.T.S.

Rev: A

Date: November 2012

Drawn By: RP

Job No: 4087-2



Project:
Bognor North Relief Road

Description:
Noise Map- With Footpath/ Bund Penetrations, $L_{A10, 18 \text{ hr}}$

DWG No: Figure 4

Scale: N.T.S.

Rev: A

Date: November 2012

Drawn By: RP

Job No: 4087-2

APPENDIX A: NOISE UNITS

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dB(A) weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB(A) is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB(A). The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB(A) corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

- i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

- ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 [1] as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T , has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.