

Introduction

- Over 25 years experience in acoustics
- Fellow of Institute of Acoustics
- Member of Institute of Licensing
- 5 years in enforcement in LA
- Expert Witness
- Practitioner - using acoustics for sustainable solutions
- Father of 4 !
- Work at Parliamentary level to raise science based knowledge based on acoustics



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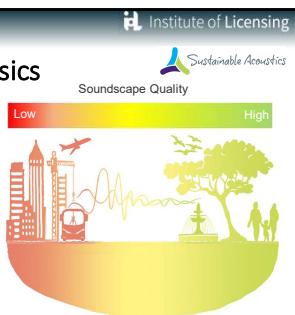
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Overview

- The Sound Basics
- What is the new normal ?
- What WHO say about noise at night
- What noise on the streets is like during pavement licences – Soho case study
- What are the implications for LA's, Premises & Residents ?
- What are the opportunities ?
- Conclusions

A reminder of the sound basics

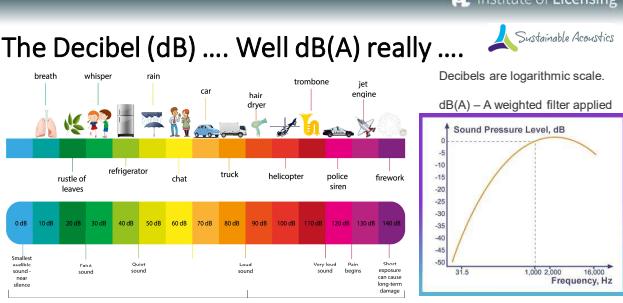
- Noise is unwanted sound
- Wanted sound of the same level does not cause the same impact on human wellbeing.
- Wanted sound is called euphonic
- Soundscape quality is how we perceive an environment



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The Decibel (dB) Well dB(A) really

Decibels are logarithmic scale.



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The cannon effect

Street level noise levels can be very similar to high level windows with buildings opposite.



Source :
https://www.google.com/url?sa=i&url=https%3A%2F%2Fnymag.com%2Ftinymetropolis%2Furban%2Ffeatures%2Fnoise%2F9461%2F&psig=AOvVaw2MxIC_MWNUiRfneewvrlR&ust=1625259260806000&cdrf&sig=PCAvQJnqRwTCIdnd5V_PMEQAAAAAdA4AAABAD

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A presentation slide with the title 'WHO 2009 – Night Noise' in large black font. Below the title is a quote in blue: 'Noise is amongst the top environmental risks to health, second only to air pollution'. To the right is a graphic featuring the WHO logo on a blue background, and a graph titled 'NIGHT NOISE GUIDELINES FOR EUROPE' showing a green line graph of noise levels over time.

WHO 2009 – Night Noise

“Sleep is an essential part of healthy life – a fundamental right under Article 8.1 of Convention of Human Rights”



World Health Organization

WHO 2009 – Night Noise

- $L_{night, outside} = (8 \text{ hours average over a year})$
- 40dB – modest effects are likely
- 50dB is an interim target
- At levels above 55dB "the situation is considered **increasingly dangerous for public health**... a sizable proportion of the population is highly annoyed and sleep disturbed". "Risks of cardiovascular disease increases".
- Inside L_{Amax} of 35dB causes EEG awakenings & fragmentation of sleep. This is 10dB lower than the 1999 guidance levels.

 World Health Organization

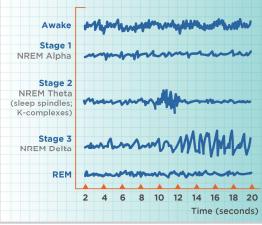
World Health Organization. Regional Office for Europe. (2009). Night noise guidelines for Europe. World Health Organization. Regional Office for Europe. <https://apps.who.int/iris/handle/10665/326486>

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EEG RECORDINGS DURING SLEEP



During sleep our perception of the environment decreases but our hearing does not switch off.

Studies with fMRI and EEG show "Sleep spindles" prevent sound reaching the auditory cortex, whilst "K-complexes" can help induce sleep or pass through sound to the sleeping brain.

Specific brain waves (Theta) control the effects of noise on sleep. Healthy natural sleep is therefore a goal, with short term and long term impacts linked with serious health effects (Ref: Sleep Foundation)

University of Liège, "Brain waves control the impact of noise on sleep." ScienceDaily, 6 September 2011. www.sciencedaily.com/releases/2011/09/110906121014.htm

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Night Noise – Street licences

- $L_{night, outside} = (8 \text{ hours average over a year})$
- 40dB – modest effects
- 50dB is an interim target
- above 55dB – **dangerous for public health**... AVOID ...
- Inside L_{Amax} of 35dB $L_{Aeq,1min} \sim 70 \text{ dB(A), Max } 76 \text{ dB(A)}$



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Night Noise Dose (LEP,n)

Exposure level in dB(A) is LEP, taken from H&S calc gives us LEP,n for night dose for 8 hour night (23:00 to 07:00 hours)

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Night Noise Dose estimator

Exposure level	20 dB(A)
Exposure time	8.5 hr
Estimated exposure over end of night	53 dB(A) on avg (8%)

Night LEP,n

For weekly variation:

Monday	5.5
Tuesday	5.5
Wednesday	5.5
Thursday	5.5
Friday	5.5
Saturday	5.5
Sunday	5.5

Weekly Night LEP,n

53.5 dB(A) as a weekly average

Summary Night Noise Dose

Algoxy	Weekly	Monthly	in dB(A)	WHO check
54.7	55.5	54.8	54.8	Yellow

Notes:

- Complete the cells outlined in colour
- The WHO 2000 guideline levels for material life expectancy are 60 dB(A) in the target 50 dB(A) average target
- Max levels inside should be 53.5 dB(A)

For the Control of Noise at Work Regulations we use the Daily Personal Noise Exposure Level, LEP,d as a measure of the daily dose.

Essentially this is all the energy received by the ear during the working day and converted to an equivalent 8 hour level

$$LEP,d = 10 \log \left(\frac{t_1 \times 10^{210} + t_2 \times 10^{210} + t_3 \times 10^{210}}{8} \right)$$

<https://www.hse.gov.uk/noise/calculator.htm>

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Night Noise Dose

Assumptions :

- If time of exposure to go beyond 23:00 then assuming 1 hour of night-time at 70dB(A)
- Ambient average for remaining 7 hours = 45dB(A)
- Using the Night Dose estimator for all days, weeks, months the same $Lnight = 58.2dB(A)$
- Using a Night Dose profile to allow for so variation between days of week and months $Lnight$ reduced to $54.5dB(A)$

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0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB 80 dB 90 dB 100 dB 110 dB 120 dB 130 dB 140 dB

Small available sound near source
Faint sound
Quiet sound
Loud sound
Very loud
Non-exposure long-term damage

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Discussion

- Disruption of sleep quality is a serious health effect, and long term can cause serious harm. The WHO must not be ignored, as we've learnt from Covid.
- Night time is defined by WHO as 23:00 to 07:00 hours. In terms of misses out the period when children's are preparing to sleep, which is more like 19:00 to 06:00 as a range, so ignoring noise in the evening does not give the whole picture.
- The new GLA definition for night-time is 18:00 to 06:00, which would include to avoid, but suggest that noise over that period should also be assessed within the L_{night} parameter.
- It is likely that residents relying on openable windows in urban centres are experiencing unacceptable health risks as a result of noise, and serious harm may result from disturbed sleep, which is a human right.



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Opportunities

- With the soundscape baseline objectively defined with regular monitoring Noise Action plans should include the WHO ratings of areas where residents live that experience L_{night} of 55dB or higher, 55 to 50dB with aims to reduce to below 50dB as an interim target.
- The target of 40dB to be the goal for smart interventions that make use of strategies to reduce noise pollution, which should be fed into licensing and planning policy, including :
 - A noise respite period is likely to be needed over most of the night-time hours to reach the WHO targets
 - Smart management of traffic controls to reduce the ambient levels at those time, restricting to electric vehicles as one idea.

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Night Time Noise v Vibrancy Conclusions

- Night-time noise in the streets (at least beyond 23:00 hours and maybe after 18:00) needs controlling to protect healthy residential sleep, and avoid serious health effects say WHO.
- Most urban vibrant centres with residential overlooking streets, suffer canyon effect, rely on open windows and need respite from noise for ~8 hours
- Action is needed to risk assess the health risk in your area, and chart a strategic course correction to comply with WHO targets
- The opportunity is that dealing with it now will work toward sustainable city planning.

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