Proceedings of the Institute of Acoustics & Belgium Acoustical Society
Noise in the Built Environment, Ghent, 29 – 30 April 2010

QUIETENING OPEN SPACES TOWARDS SUSTAINABLE CITY SOUNDSCAPES CITY OF LONDON

M Stevens Environmental Protection UK
F Bellord BSc, PgDip Landscape architecture

1 INTRODUCTION

During Summer 2009, Environmental Protection UK[i] undertook research for the City of London to summarise current best practice in protecting quiet spaces for a liveable city, and to review methods that can be applied to open spaces in the City of London to reduce the impact of noise on users of the City's open spaces.

The work looked for definitions of quiet areas, best practice to date in quietening city open spaces, and current and pending policy applicable to London. The aim of the work was to identify ways forward for enabling the consideration of quiet in the design and management of open spaces, and to identify practicable noise mitigation measures. It examines how quieter City open spaces might be achieved through joined up policy making – in particular through working within initiatives to tackle climate change and promote biodiversity. Recommendations are made on potential projects for specific spaces in the City of London, the principles of which are transferable to other sites.

2 BACKGROUND

The City of London provides local government services for the square mile – the business centre of London. While the area is home to 8000 residents, it also accommodates 340,000 workers and 10,000 tourists everyday. City landmarks include St Paul's Cathedral, the Bank of England, and Monument (the tower commemorating the great fire of London). The City's noise environment is dominated by transport sources – road, rail and air, air handling plants and emergency sirens. There is extensive ongoing construction in the City, meaning some sites are particularly affected by building noise and associated traffic. The area has very few spaces with a noise level below 50dB Lden. Open spaces are very well used by workers and visitors through out the year. The City of London authority is developing a cross departmental Quiet Zone initiative, to work towards enhancing the quality of open space.

3 IDENTIFYING THE NEED FOR QUIET SPACES

Creating quiet spaces, free from the impacts of intrusive mechanised noise, increases value both in benefits to health and well-being, and economically. Attractive open spaces increase the value of adjacent property. Public attitudes to and perceptions of noise have been examined in a number of surveys. An ICM poll[ii] commissioned by Environmental Protection in April 2009 found that in Great Britain, nine out of 10 people (91%) think existing areas of quiet need protecting; 31% of people find time to visit quiet areas and the most popular quiet area to visit is a local park. In London, nearly two thirds – 62% - of Londoners think it is very important that quiet areas are protected; 40% of Londoners regularly visit quiet areas; 73% of Londoners (compared to 63% nationally) favour visiting a local park to find quiet. This reinforced findings of surveys in 2007 and 2008[iii], which found that in Great Britain people want quiet open space, and that such space is less available in London.

4 WHAT IS A QUIET OPEN SPACE?

4.1 Policy

In looking at what constitutes a quiet open space, we first looked at legislation and guidance. The World Health Organisation guideline noise level for gardens and recreational use is 55dBL_{Aeq}. The Environmental Noise Directive loosely defines Quiet Areas as "an area, delimited by the component authority, for instance which is not exposed to a value of Lden or of another appropriate noise indicator greater than a certain value set by the Member State, from any noise source."

4.2 Research

Across Europe, research has been undertaken into definitions of quiet open spaces, some of our findings as follows:

Westminster City Council undertook a survey of tranquillity in 20 open spaces in 2008, finding that noise levels at 75% of them were 60dBL_{aeq} or above. This work found that visual factors were as important as sound levels in determining whether an area is tranquil. The recommendation was that the small number of spaces with noise levels below 55dB should be protected.

For noise action planning in England, the Competent Authority "will only formally identify as Quiet Areas those open spaces which provide significant and important benefits because they are quiet. It is expected that such open spaces will already be regarded as special and that they may already be managed to sustain their quietness."

Northern Ireland: a value of 55dB has been suggested for quiet areas, not necessarily to exclude areas of high amenity value.

Eire: Dublin City Council specify an absolute value of below 55 dB daytime and below 45 dB night time, and lists spaces described as noise sensitive. A criterion for 'Relatively Quiet Areas' is also proposed.

Amsterdam, Netherlands: research here concluded "an area can be defined as quiet when the noise level is (roughly) 6dB lower than the surroundings… Below 40 dB are really special quiet areas"

Florence, Italy: used surveys in city areas to establish that people enjoy open spaces for the opportunity for outdoor activity and appreciating tranquillity.

Stockholm, Sweden: A Noise Environmental Rating has been developed for noise action planning – characterising three noise level interval classes for recreational areas: Class A: 50 dB (A) – good noise environment; Class B: 50 – 55 dB (A) – acceptable noise environment; Class C: > 55 dB (A) – poor noise environment.

4.3 Conclusion

Noise monitoring provides an indication of suitability for an area to be classified as 'quiet' – but more than decibel levels needs to be taken into account when assessing what makes a space quiet, tranquil or relaxing. Regional differences in background noise levels mean that 'quiet' will be a relative term – for example what would be a quiet space in Stockholm or Dublin would not be achievable in London – or very likely in other UK cities. In summary, a quiet open space could be where:

- According to WHO – 55 dBL_{Aeq}
- Natural sounds dominate rather than mechanical sounds
- Visual quality enhances 'quietness'

- Where culture and location lead to the perception of quietness
- A substantial area 6 dB below daytime level could be a starting point

5 SOUNDSCAPES

We have established that when considering whether outside spaces can provide areas for quiet/tranquil relaxation, we need to consider aspects of a space other than noise. Similarly, we need to consider the sounds, not just the noise. The concept of Soundscapes originated in the 1960s/1970s and is defined as: 'the representation of the effects of the acoustic environment on the physical responses or behavioural characteristics of creatures living within it." Schafer

Work on Soundscapes commissioned by the Greater London Authority led to the Soundscape Design Toolkit[iv], which lists the steps required to create and maintain a desired aural impact as: 'Noise control; Listening and critical evaluation; Preservation and protection; Design interventions; Maintenance'. In looking at potential options for quietening open spaces in the City of London, we had in mind the steps outlined – although for a number of spaces the options for conventional noise control are limited.

6 WIDER BENEFITS OF QUIETENING OPEN SPACES

6.1 Health

Quiet and open spaces are both linked to good heath. The draft report Environmental Noise in the UK[v] states *"exposure to tranquil areas of nature is thought to be stress reducing and have positive effects on physical and mental health"* – these effects may, of course, be partly due to exercise.
In July 2009, a study by English Nature found that people living over a mile from a park had a 27% greater chance of being overweight. Proving, they believe, that people are healthier living in an attractive natural environment. In 1993, Building Green[vi] referred to research showing that hospital patients with a view of natural greenery recover more quickly than those with a greyer outlook.

6.2 Air Quality

Planting that contributes to quietening open spaces can also contribute to better air quality. For example, measurement work to date in the Netherlands has found a reduction in adsorption of PM10 of 20% and of PM 2.5 of 17%. While this was in a motorway situation, it indicates that planting can reduce air pollution.[vii]

6.3 Climate change mitigation/adaptation

City structures and hard surfaces absorb and store heat, and reflect heat – contributing to the build up of temperatures in city centres – the 'urban heat island'. These surfaces also reflect noise. Increasing the amount of space covered by vegetation not only provides physical and psychological reduction of noise impact, it can also contribute to keeping city temperatures down[viii]. In hard landscaped areas, the use of porous or permeable pavements, which may have less mass and therefore store less heat, have the potential to increase sound absorption as well as reducing rainwater run off. Increasing vegetation also increases summer cooling and humidity as transpiration from plants replenishes atmospheric moisture. Vegetation and soil retain moisture and therefore reduce rainwater runoff. Research in Berlin[ix] has shown that green roofs reduce run off from buildings by 75%. Where water can drain into soil there is capacity for huge reduction in water discharged to drains, reducing the risk of flash flooding during the extreme rainfall events predicted with climate change.

6. 4 Biodiversity

Using appropriate planting for noise mitigation and the enhancement of spaces to distract from noise provides opportunities for increasing biodiversity through attracting insects and birds – complementing any city plans for habitats in small public spaces (in the City of London's gardens habitat action plan, for example).

6.5 Education/interpretation opportunities

Noise barriers have a poor reputation as ugly structures, contributing to perceived or real severance of spaces. However, sympathetically designed barriers, can, in city spaces, provide surfaces for conveying information – for example interpretation of a historical site; poetry/quotes that fit in with the site; directions (if part of a network of spaces/soundwalk) and sponsorship. Where spaces are planted to mitigate noise, the plants used could form part of an educational network on green spaces and offer a diversion for city workers and visitors, in addition to the more traditional heritage approaches.

6.6 Benefits to buildings

Using cladding on buildings to reduce acoustic reflection – whether it be passive or living - can provide a degree of insulation. Plants can keep buildings cooler in summer (although in winter they may also keep outside walls damp and cool). Plant cover can also protect the fabric of the building from the elements - aside from a few species, such as buddleiah and ivies, whose invasive roots can cause damage unless purpose designed support structures are used to protect building fabric.

6.7 Added value

The 'gut feeling' of British developers is that an area with good quality green space can enhance property values by up to 10% (Building Green). The London Mayor's[x] environment programme also equates urban greening to adding value to property. Greening spaces and buildings should make economic sense, therefore, to potential sponsors of projects which contribute to the quietening of open space - for example, giving permission for, and allowing planting of, climbers to reduce reflection of noise from buildings.

6.8 Applying landscape theory

In designing city open spaces to reduce the impact of noise, the landscape design principle of 'prospect and refuge' can be applied: *"aesthetic satisfaction, experienced in the contemplation of landscape, stems from the spontaneous perception of landscape features which, in their shapes, colours, spatial arrangements and other visible attributes, act as sign-stimuli indicative of environmental conditions favourable to survival, whether they really are favourable or not."* [xi]

In some spaces, measurable noise reduction, while it is the ultimate goal in creating quieter open space, may not be feasible in the short to medium term. However, if we are able to provide pleasing spaces that are comfortable, relaxing and safe environments, with sounds that have a positive association (birdsong, water), this should offset at least some of the impact of noise.

6.9 Awards

In the UK, Green Flag and Green Heritage awards add value to open spaces, For example, criteria for the Green Flag are: A welcoming place - Healthy, safe, secure – Sustainability - Community involvement. European NGOs concerned with noise (European Federation for Transport and the Environment, European Environment Bureau) are proposing that the European Commission set up an EU award scheme for the towns and cities which have most improved their noise levels or have taken particularly innovative measures, and establish an EU accreditation scheme for recognised 'Quiet Areas'. Such schemes would stimulate commitment from the responsible authorities, raise

public recognition of their achievements and encourage engagement from authorities who have not yet recognised the value of actively working to improve the noise environment.

7 QUIETENING CITY SPACES IN PRACTICE

7.1 Noise in the City of London

In the City of London, a scoping study[xii] found measured noise levels at ten open spaces to be in the range of 58.4 – 70.5 $L_{AEq\ 15\ min}$ - highlighting the challenge faced in meeting the WHO recommended guideline for many open spaces. Westminster City Council[xiii] found measured noise levels at 15 out of 20 open spaces to be at or above 60BL_{Aeq}, and recommended that the small number of sites below 55dB be protected.

7.2 Noise Control

Traditionally noise control has been addressed in three steps in sequence – reduction of noise at source; modification of the sound pathway and mitigation at the receiver. When it comes to reducing noise impact at source, responsibility lies to a large extent at EU level through regulation. At country/city level, operators can be encouraged to take responsibility through procuring quieter fleets and optimizing operations to reduce noise impacts. Within local government, quieter procurement and traffic management can have additional benefits for air quality and climate change.

For insulating/shielding space from noise, measures include distance separation – for example rerouting traffic; altering openings/entrances to block or attenuate sound pathways; physical noise barriers – these can be used creatively to contribute to, rather than detract from the aesthetics and value of spaces. In the case of open spaces, the space is the receiver. Measures would include reducing the area of acoustically reflective surfaces and improving other qualities of the space to distract attention away from any noise that cannot be attenuated and introducing or attracting sounds that mask noise.

7.3 Designing for Noise Reduction

In attempting to quieten City spaces, there are a number of soft and hard landscaping devices that can be employed. Adjusting the elevation of a space can reduce noise, as areas below the noise source are within the noise shadow (eg canal footpaths)**,** and noise barriers/screens can shield. Softer devices, which can also have wider environmental benefits mentioned at (6) above include green walls; green roofs; green ground; planting for sound and green corridors. The impact of noise from above (planes, helicopters), while not attenuated per se, can be reduced by shielding from above – using planting, pergolas, covered walkways and shade sails, for example, which have additional benefits in terms of weather protection and sound attenuation.

7.4 Case Study – Monument, City of London[xiv]

A 61 metre Doric tower, designed by Sir Christopher Wren, was built in 1670s to commemorate the Great Fire and rebuilding of London. Visitors can climb the tower. It is located just to the north east of London Bridge, in a hard surfaced open space, surrounded by fairly high buildings, with a road used by buses and trucks passing within meters of an inscription plaque on the west side.

7.4.1Soundscape

Measured noise level 63.7 dBLAeq 15 min. On the west side there is very noticeable traffic noise, dominated in turn by an ice cream van and intermittent buses and large trucks. The space is very

open, all surfaces are hard. Our subjective judgement was that this area could in no way be termed quiet, tranquil, or at all welcoming, healthy or secure.

7.4.2 Use of area

The site attracts numerous visitors. In particular school parties gather round the inscription plaque adjacent to the road and teachers and guides shout to be heard. This is also a popular spot for tourists to photograph. On the east side some scattered seating is angled towards an automated toilet. Seating and walls are occupied by lunching office workers and builders, and visitors.

7.4.3 Options for quietening

There is much scope in this space for noise protection to enable teachers and guides to be heard and make it a more welcoming place for visitors. Our proposals include closing/restricting vehicle size and entry times on the road adjoining the space to the west. Also, or alternatively, increasing the width of the pavement would allow a more pedestrian friendly space. A transparent noise barrier could be used to shield noise from the west while maintaining the view of the Monument. This could be designed to improve speech transmission. The screen could be engraved to provide information, enhancing the visitor experience. Neighbours permitting, sounds could be added – of the fire, or water under London Bridge - to provide additional interpretation and noise masking. Currently there is minimal planting at the site, so planting informed by historical associations could be used to enhance the area. There is potential for growing plants against walls, therefore reducing noise reflection and enhancing the space. Given the civic nature of the space a contextual water feature could also be added.

8. CONCLUSION

For most people using an open space, noise is one element in their perception of that space. Acoustic design and management should therefore be integrated with other aspects of local environmental quality. Many of the measures that improve our experience of the acoustic environment have additional benefits. These can support a range of policies and initiatives aimed at improving the local urban environment, improving environmental health, adapting to and mitigating the impacts of climate change and adding aesthetic and monetary value. Conversely, non acoustic measures can enhance a sense of tranquillity or perceived 'quiet'. Therefore, with policy makers looking to reverse the 'greying' of our cities and encourage 'greener' approaches, we believe that through engaging with policy makers and city and open spaces managers, the opportunity is there for us to work towards quieter, healthier open spaces,

---

[i] Environmental Protection UK is the charity supported by environmental professionals. We have been working for a cleaner, quieter, healthier world since 1898.
[ii] Transport Noise Survey, ICM/Environmental Protection UK 2009
[iii] Ipsos MORI Noise Surveys 2007/2008 for Environmental Protection UK
[iv] Soundscape Design Toolkit, GLA/ARUP 2007
[v] Environmental Noise and Health in the UK, Health Protection Agency 2009
[vi] Building Green, London Ecology Unit 1993
[vii] Air Pollution mitigation; the Dutch R&D Programme – I.McCrae, EPUK, April 2009
[viii] London's Urban Heat Island – GLA, 2007
[ix] Living Roofs and Walls – GLA, 2008
[x] Mayor's Environment Programme
[xi] The Experience of Landscape - Jay Appleton, John Wiley, 1975
[xii] Quiet Zones Scoping Study, Bureau Veritas, 2008
[xiii] Westminster Open Spaces Noise Study – Scott Wilson Ltd 2008
[xiv] illustrated in 'Quietening Open Spaces" – Environmental Protection UK for City of London, spring 2010