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Quietening Open Spaces Towards Sustainable Soundscapes for the City of London

- Public perceptions of quiet and the need for quiet
- Defining quiet areas – UK and Europe
- Open spaces in the City of London
- Quietening open spaces in the City of London

Environmental Protection UK
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A report commissioned by the City of London, in which Environmental Protection UK present suggestions as to at how existing policy can be used to promote work towards improving tranquillity in City open spaces, together with practical ways in which tranquillity can be enhanced in parallel with other aspects of environmental quality.



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Environmental Protection UK's vision is of a cleaner, quieter, healthier world. We bring together environmental professionals, industry, policy makers, academics and the public, to inform debate and influence changes to policy and practice in air quality and climate change, land quality and noise.

Environmental Protection UK has been playing a leading role in environmental protection since 1898.

EXECUTIVE SUMMARY

“Noise is a landscape issue, in that it has a great impact on the perception of the character and quality of the landscape”

Environmental Noise Barriers, Kotzen, English 2009

“Tranquillity is a complex concept. It is both a state of mind as well as an indicator of environmental quality. For example, a Buddhist monk can find tranquillity in the noisiest of spaces whilst some rural households complain bitterly about noise levels taken for granted in the city”

Westminster Open Spaces Report, Scott Wilson 2009

When looking at what makes a quieter city open space, people’s perception of the space, as well as simple noise levels, can have an impact, and this summary of our findings reflects this. We believe that this should enable cities to move forward in working towards quieter city open spaces, as to achieve these integrating policy goals should lead to access to a wider range of professional resource and funding streams.

- Acoustic design and management need to be integrated into other aspects of local environmental quality. Research to date shows that for most people using open space, noise is just one element influencing perceptions of whether a space is tranquil or peaceful.
- Many of the measures that will improve the acoustic environment have additional benefits for environmental quality, and support a range of policies and initiatives aimed at improving the local urban environment, improving environmental health, and increasing both the aesthetic and monetary value of an area.
- Suitable non-acoustic measures can enhance the sense of tranquillity, or even of perceived ‘quiet’, including in places where clearly measurable noise reduction is not immediately practicable.

There is a body of existing knowledge that can be applied to enhancing open spaces in the City of London to provide more tranquil places. Space specific suggestions are given for a range of civic spaces and gardens.

- The enhancement of heritage sites and designing more natural spaces to attract natural sounds has the potential to add visitor and educational value.
- Better quality space can encourage moderate exercise, enticing more sedentary workers away from their desks, improving health and wellbeing.
- In a wider context protecting and enhancing quieter open spaces is compatible with the aims of the European Environmental Noise Directive, and can also contribute to air quality and biodiversity goals.
- Many measures that will reduce the impact of noise can also contribute to mitigating the impacts of climate change.

Policies specific to London that the ‘quietening’ of open spaces supports include:

- The Mayor’s Ambient Noise Strategy
- City of London Open Spaces Strategy
- Mayor’s Environment Strategy

In particular, the Mayor’s environment programme for the capital states ‘the time for trials and experiments is over’, and aims ‘to make grey spaces green’; move towards a transport network that will deliver ‘cleaner air, quieter streets’ and ‘protect and manage havens of calm in our busy city’. The programme supports the planting of more trees and the greening of buildings to address wider environmental goals. These policies support reducing the intrusion of noise.

In summary, this report sets out the policy context and practical ways in which existing open spaces in the City of London can be transformed into ‘havens of calm’.

1. Introduction

1.1 Purpose and Scope of Report

Environmental Protection (UK) was commissioned by the City of London to research and summarise current best practice in protecting quiet spaces for a liveable city, and to review the methods that can be applied to open spaces in the City of London to reduce the impact of noise on users of City open spaces.

Research was undertaken to establish the extent and nature of work to date in cities across the UK, Europe and beyond to source case studies illustrating any best practice to date in quietening city open spaces, and to seek transferable recommendations for potential projects that can be applied to specific spaces in the City of London, and to cities in the rest of the UK.

1.2 Quiet Scoping Study

This work follows on from a scoping study by Bureau Veritas¹ commissioned to evaluate options available with a view to developing the concept of quiet zones within the City of London. A three stage approach was used examining

- the strategy for the development of the evidence base;
- the development of policy; and
- the undertaking of special projects.

Several sites were specified by the City of London Environmental Services Department and L_{Aeq} measurements taken for these in October 2007 and compared with noise levels in the noise maps submitted by Defra under Environmental Noise Directive 2002/49/EC.

This report examines the policy context in which the need for quieter open spaces is being considered. It identifies research to date on identifying quiet areas and results from the search for any work in practice on reducing the noise impact on open spaces. It provides information about possible measures for the protection of quiet areas as well as improvement of existing soundscapes, looking in detail at potential ways in which existing City open spaces can be made into 'havens of calm'.

1.3 Developing Area Based Initiatives

This work is based on the Bureau Veritas recommendation to develop area-based initiatives to work towards quieter open spaces. We have looked at research to date in the UK and beyond which

- assesses public perceptions of quiet or tranquil urban spaces;
- looks at defining and identifying quiet spaces in urban areas and 'quietening' them – either through reducing noise levels or by improving other qualities of the space to induce greater tranquillity;
- reviews current knowledge on noise management and mitigation and work on soundscape design.

1.4 Overview

We found that a range of research has been undertaken – mostly in the context of implementing the Environmental Noise Directive, to establish definitions/descriptors for what constitutes a quiet area. This work includes noise measurement and public perception surveys, and is informed by existing knowledge and guidance on noise and health. To date, very little work has been undertaken in practice aimed specifically at protecting or enhancing spaces, in terms of either measurable noise reduction, or perceptions of quiet or tranquillity.

2. Quietening Open Spaces

Managing open spaces to mitigate noise and provide restful places for relaxation can be undertaken on a number of levels. To achieve the optimum result, it needs co-ordination between departments and disciplines which should result in multiple benefits beyond reducing the impact of noise.

Benefits of quietening open spaces

Noise

- Reduced noise impact
- Reduced noise

Aesthetics

- Visual enhancement
- Improved amenity

Health

- Better air quality
- Improve wellbeing
- Encourage physical activity

Climate change

- Decrease surface water run off
- Increase humidity
- Reduce urban heat island effect
- Support mitigation by reconnecting people with nature

Biodiversity

- Maintain or increase biodiversity
- Contribute to green corridors

Built Environment

- Improve building insulation
- Protect building fabric

Education and tourism

- Provide outdoor learning spaces
- Increase opportunity for heritage interpretation
- Increase opportunity for environmental education

At our current state of knowledge, not all of these impacts are directly measurable, although benefits could be gauged by attitude surveys carried out before and after work is undertaken. In the environment programme for the Capital and other research documents, the importance of most is acknowledged – but not coherently brought together.

¹ Bureau Veritas 2008

3. Why Do We Need Quiet Open Spaces?

In our densely populated and heavily trafficked cities, open spaces provide room for relaxation and rest for workers, visitors and residents in urban areas. Creating quiet spaces, free from excessive impact of mechanised sound increases the value of these spaces in enhancing wellbeing. This is recognised in public attitude/perception studies undertaken in London, across the UK and in other European cities. We outline findings of these here to help establish the essential elements of a quieter city space.

3.1 Public Opinion on Quiet

An ICM poll commissioned by Environmental Protection UK² in April 2009 found that:

Nationally

- Nine out of 10 people (91%) think existing areas of quiet need protecting
- 31% of people find time to visit quiet areas
- Most popular quiet area to visit is a local park.

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 added to work carried out by Ipsos MORI.³ A survey commissioned by Environmental Protection UK in 2008, found that, overall, a number of open spaces such as parks and churchyards were less likely to be perceived as quiet by adults surveyed across Great Britain than in 2007.⁴

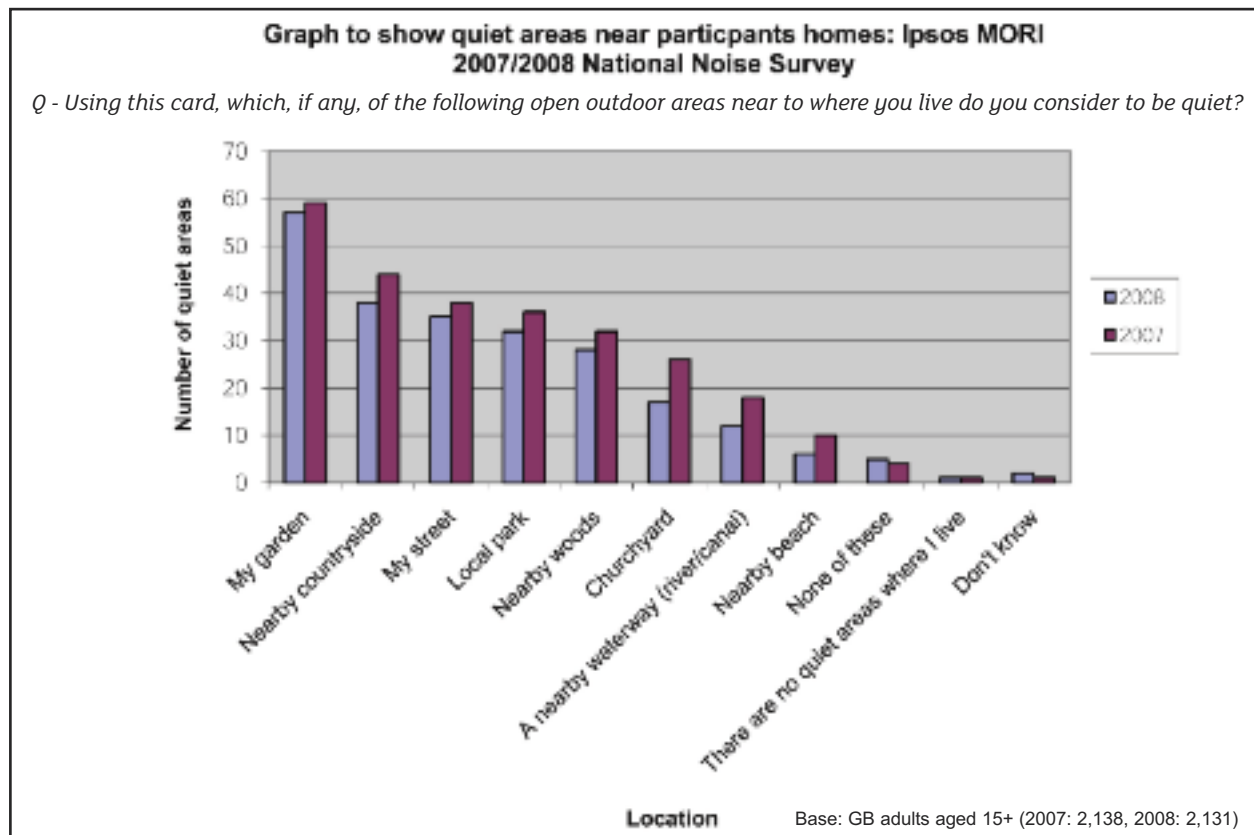
Our 2008 survey results also revealed that Londoners were more likely than most to say there were no quiet areas near to where they live/that none of the outdoor areas listed near to where they live were quiet (11% vs 6% overall).⁵ Only 50% said they had a quiet garden, compared to 57% across Great Britain. Londoners were also more likely to think their quality of life suffers either a great deal or a fair amount due to noise when they are at home (50% vs. 39% overall).

Fewer people in 2008 than in 2007 considered the following places near to where they live to be quiet:

- Local park (32%, compared with 36% in 2007)
- Churchyard (17% compared with 26% in 2007)

Both the MORI and the ICM polls indicate that people want quiet open space. This finding is also supported by work in other parts of Europe, outlined in section 6.

A number of reports from the Commission for Architecture and the Built Environment have recently



² ICM telephone poll carried out on a random sample of 1002 adults in Great Britain from 1st – 4th May 2009 as part of the ICM omnibus poll
³ National Noise Survey 2007, Ipsos MORI – face-to-face omnibus survey of 2,138 adults aged 15+ across Great Britain, between 19 and 25 April 2007 (data weighted to true population profile); National Noise Survey 2008, Ipsos MORI – face-to-face omnibus survey of 2,131 adults aged 16+ across Great Britain 17 – 22 April 2008 (data weighted to true population profile)
⁴ Local park - 32%, compared with 36% in 2007; churchyard - 17% compared with 26% in 2007
⁵ 'None of these' and 'There are no quiet areas where I live' combined. Outdoor areas listed: my garden, local park, my street, churchyard, nearby woods, nearby countryside, nearby beach, nearby waterway (river/canal) and other

discussed the health and environmental benefits of quality open spaces and greener city environments – however to date these have failed to include noise considerations. In particular, noise mapping and work towards identification of quiet areas could contribute to CABE's call to action on behalf of the green space sector to provide a national information base on urban green spaces (they do not call for a similar mapping of non-green space) www.cabe.org.uk/publications/grey-to-green.

4. What is a Quiet Open Space?

4.1 Sounder City

The Mayor's Ambient Noise Strategy 'Sounder City'⁶, published in 2004 recognised that levels of noise which were low in absolute terms were likely to be scarce in most urban areas, but that areas which were quiet relative to their surroundings could still provide respite. It recognised that people's perceptions were influenced by factors other than noise, so that policy should address the broader concept of 'tranquillity'. It also recognised that sounds with positive associations could, in some contexts, reduce the adverse impacts of noise (e.g. birdsong and flowing water in open spaces could draw attention away from traffic noise). It thus recommended identification of 'Areas of Relative Tranquillity or Special Soundscape Interest' (Policy 4F.29).

4.2 TRL Study on Defining Quiet Areas

In 2006, Defra commissioned research into the identification of quiet areas to inform the development of noise action planning. This outlined the challenges presented in developing a definition for quiet areas. Working within the limited time scale afforded by the Environmental Noise Regulations 2006 (quiet areas were to be designated by September 2007), TRL devised procedures for identifying quiet areas, based on area and noise levels, for use in the short and longer term. However, quiet areas were ultimately not designated in the timescale determined by the first tranche of English regulations. The regulations have since been revised, and Defra thinking on designating quiet areas is now set out in Noise Action Plans⁷ for agglomerations (see 5.2.1 below).

4.3 City of Amsterdam

Research by the City of Amsterdam into defining quiet areas concluded that "An area can be defined as quiet when the noise level is (roughly) 6 dB lower than the surroundings. The absolute noise levels seem of somewhat less importance. Below 40 dB are really special quiet areas"⁸.

This was the only adopted example of defining an urban quiet area that the study found. More research on quiet areas is detailed at section 6 below.

5. Policy Context

Over past years, bodies such as the World Health Organisation and the EU, and latterly a (currently draft) review published by the UK Health Protection Agency⁹, have recognised that the burden of increased noise caused by our mobile and mechanised society is leading to exposure to louder noise for longer, and over wider geographical areas, affecting a large number of Europeans. If the impact of this noise on our health and well being is not to continue to grow these bodies recognise that we need to manage noise better.

5.1 Europe

5.1.1 European Environment Agency

The European Environment Agency, in its recent TERM 2008¹⁰ report, states

"Fifty-five per cent of those living in urban areas with more than 250 000 inhabitants in the EU-27 — almost 67 million people — endure daily road noise levels above the lower EU benchmark (55 L_{den}) for excess exposure". It acknowledges that reducing noise needs more than simple traffic reduction, and that other noise mitigation measures are needed.

5.1.2 World Health Organisation (WHO) Guidelines

The WHO guideline noise level for gardens and recreational use is 55 dB L_{Aeq}. This level has been used by a number of administrations as a starting point for looking at the definition and designation of quiet areas in the context of the END, as set out in section 6. Work to date monitoring noise in central London open spaces finds that most if not all are likely to exceed this level. While this could be an aspirational goal, a more creative approach to criteria for defining 'quieter' spaces is needed, in addition to noise measurement.

5.1.3 Environmental Noise Directive (END)

Directive 2002/49/EC of the European Parliament relating to the assessment and management of environmental noise (END), requires Member States to draw up action plans designed to manage, within their territories, noise issues and effects. A rolling programme for noise mitigation is set out, starting with agglomerations with more than 250,000 inhabitants and an aim to protect quiet areas against increases in noise. The Directive defines quiet areas in Article 3 (l) as being

' [a] quiet area in an agglomeration' shall mean an area, delimited by the competent authority, for instance which is not exposed to a value of L_{den} or of another appropriate noise indicator greater than a certain value set by the Member State, from any noise source.

This very loose definition infers that each member state decides how quiet areas in agglomerations are to be defined, whether by a threshold value of L_{den}, or by other criteria, including qualitative, and makes plans to keep it below that

⁶ Sounder City, The Mayor's Ambient Noise Strategy, GLA 2004

⁷ Defra Noise Action Plans, March 2010, <http://www.defra.gov.uk/environment/quality/noise/environment/actionplan/index.htm>

⁸ Eurocities noise working Group Meeting, Florence, March 2009

⁹ Draft Report on Environmental Noise and Health in the UK, Health Protection Agency, July 2009

¹⁰ Transport at the Crossroads: TERM 2008 - EAA 2009

value. Member states could, for example, interview people and use findings to judge whether an area can be defined as quiet.

The Directive requires member states to map noise in agglomerations, to make this information available to the public and to consult on and adopt action plans with a view to preventing and reducing environmental noise.

At section 6, we summarise research to date carried out to establish the definition of quiet areas in the context of END.

5.2 UK

5.2.1 Noise Action Planning England

In March 2010 Defra published Noise Action Plans for 23 agglomerations in England, Part E looks at the definition of Quiet Areas, stating that,

'The Competent Authority will only 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. The Competent Authority will consider identifying as a Quiet Area part of an open space as long as it meets the requirements'.

For those spaces designated as quiet, local authorities will be expected to adopt policies to manage the local noise environment so as to protect the quietness of these spaces and avoid increases in noise from those sources of noise covered by this Action Plan (i.e. road, rail, aircraft and industry).

For the purposes of this work, the enhancement of quiet open spaces goes beyond the stated requirements of the noise action plans, in that we are looking to consider noise sources beyond transport which are a part of the aural environment of any city.

5.2.2 Planning Policy Guidance 17: Planning for Open Space, Sport and Recreation (PPG17)

(currently under review – to be incorporated into a new Planning Policy Statement for a Natural and Healthy Environment¹¹)

PPG 17 set out guidance on maintaining an adequate supply of open space and factors to consider when allowing development of open spaces. Of particular relevance to the quiet spaces within the City of London was a statement that areas of particular quality include

'Small areas of open space in urban areas that provide an important local amenity and offer recreational and play opportunities.'

It states that to ensure effective planning for open space, sport and recreation it is essential that the needs of local communities be known. Local authorities should undertake robust assessments of the existing and future needs of their communities for open space, sports and recreational facilities.

Defra's proposals for identifying and managing 'quiet areas' essentially seek to integrate these within the process of local government planning for open spaces.

¹¹ Out for consultation which closed on June 1st 2010

¹² The Mayor's Ambient Noise Strategy – GLA 2004

¹³ The London Plan 2004, GLA

¹⁴ See Sound-conscious Design Factsheets at www.london.gov.uk.

¹⁵ The City of London Open Space Strategy, 2008

5.2.3 Burial Ground Etiquette

Some of the local authorities that have considered the designation of quiet areas are understood to be proposing the designation of churchyards or cemeteries as quiet spaces. There have been instances of concern recently at inappropriate use of these spaces (for parking, picnicking). We suggest that the designation of these areas as 'quiet areas' should not, by definition, cause conflict with existing legislation and expectation regarding conduct. Burial ground etiquette is currently governed by a combination of convention, common sense and the law. Under the 1977 Local Authority Cemeteries' Order, which applies to England, Scotland and Wales, creating a disturbance in a churchyard, committing a nuisance, wilfully interfering with burials or graves, or playing games or sports, are all finable offences. There are also by-laws in some areas.

5.3 London

5.3.1 The Mayor's Ambient Noise Strategy and the London Plan

The Greater London Authority Act 1999 required a noise strategy for London. 'Sounder City – The Mayor's Ambient Noise Strategy'¹² was published in March 2004. This is a comprehensive strategic document for managing London's noise climate, and makes a number of recommendations. One observation was that 'High density medium-rise development with fairly continuous frontages can create or protect quieter areas.' In the City a number of spaces demonstrate this – for example St Dunstan in the East, Seething Lane Garden, Finsbury Circus.

The London Plan 2004¹³ (Policy 4A.14) lists a number of measures that the Mayor and boroughs should be mindful of, including 'reducing the impact of traffic noise through highway management and transport policies'; 'supporting new technologies and improved practices to reduce noise at source.' Policy 4A.20 advocates 'identifying areas of relative tranquillity, which it is intended should be protected or enhanced.' And 4.57 states 'Noise in terms of both abating adverse effects and maintaining or enhancing soundscape quality is expected to gain a higher profile in design and management during the life of this plan'. The strategy suggests that a review of UK and international best practice in sound conscious urban design could go a long way to guiding those in planning and urban management towards improving the aural quality of urban open spaces.¹⁴

5.3.2 City of London Open Spaces Strategy 2008

The City of London's Open Spaces Strategy 2008¹⁵ contains a vision for open space provision within the Square Mile, listing 277 spaces within the City:

"The creation of a network of high quality and inspiring open spaces which helps ensure an attractive, healthy, sustainable and socially cohesive place for all the City's communities and visitors." (p. 45)

While there is no explicit reference to noise or the quality of the aural environment in this strategy, some of the strategic objectives are linked to the establishment and protection of quiet areas:

Strategic Objective 1. To maintain and increase public access to existing open spaces and enhance the quality of these spaces, in terms of both design and management. (p. 45)

Strategic Objective 6. Ensure that enhanced and additional open spaces accord with high standards of sustainable design, construction and management and take account of the potential changes to the City climate. (p. 51)

5.3.3 Mayor’s Environment Programme 2009

Published on 31 July 2009, the Mayor’s Environment Programme¹⁶ for the Capital includes, among four key outcomes, to “reduce the environmental impact of transport, including air quality and noise” (p.15), stating that “we need to protect and manage better these havens of calm in our busy city” (p.16). There is also a pledge to extend the East London Green Grid Londonwide, and to establish a green network, part of a Strategic Walking network, to encourage walking and cycling. The Mayor undertakes to explore new ways to further improve London’s green spaces and increase their use. There are also plans to subsidise priority buildings to create green roofs and walls. Both can help make city spaces more tranquil – green roofs in attracting wildlife whose sounds may offset adverse impacts of traffic and building equipment noise, and green walls in reducing the reflection of sound from hard surfaces, as well as aesthetically calming city open spaces.

6. Overview of Research to Date

6.1 England

6.1.1 London

6.1.1.1 Westminster Open Spaces Noise Study 2008 Final Report

Westminster City Council commissioned work to undertake a survey of tranquillity in 20 open spaces¹⁷. A questionnaire was used to assess tranquillity together with acoustic measurement in civic spaces, mixed surface spaces and parks. Noise levels measured at 15 of the 20 spaces were 60dB_{L_{Aeq}} or above. The work concluded no overall correlation between tranquillity score and acoustic features, finding visual factors often of equal or greater importance than sound levels in defining tranquillity. (see below).

The report looks at the definition of tranquillity and proposes five “pillars of urban tranquillity”:

- sounds
- presence of nature
- sense of safety
- culture of the place
- visual/aesthetic.

It suggests that evidence points to noise mitigation to ‘quieten’ the least tranquil/noisiest spaces, while in the less noisy spaces, enhancement can be achieved through visual, aural, and olfactory elements.

Civic space	
Contributing to tranquillity	Detracting from tranquillity
Hearing and seeing water features Seeing wide open spaces Seeing people Seeing historical buildings	Seeing cycle routes and cyclists Seeing dogs Hearing public speakers Hearing distinct vehicle noise
Mixed surface space	
Contributing to tranquillity	Detracting from tranquillity
Seeing greenery/grass Seeing bushes/flowers Hearing leaves rustling etc Hearing birdsong	Hearing and seeing homeless Construction/non natural sounds Public speeches Mobile phones/conversations
Park	
Contributing to tranquillity	Detracting from tranquillity
Seeing trees Seeing grass Seeing flowers/bushes Seeing green landscape and open spaces	Construction/non natural sounds Hearing and seeing homeless Hearing motorbikes/lorries Mobile phones/conversations

¹⁶ Leading to a Greener London, An environment programme for the capital, July 2009

¹⁷ Westminster Open Spaces Noise Study – Scott Wilson Ltd for Westminster City Council, 2008

For Westminster, given that many residents, workers and visitors lack access to quiet open space, the report recommends that the small number of open spaces in Westminster where noise levels are below 55dB should be protected.

Recommendations are made for protection and enhancement of the 20 sites surveyed. Measures include traffic management, planting, acoustic barriers, signage, water features, and relocating activities within the open space.

6.1.1.2 City of London – Quiet Zones Scoping Study

Measured noise levels at ten spaces were found in the range 58.4 - 70.5 dB_{L_{Aeq} 15 min}. Six out of those undertaken in open spaces were above the measurement category shown on Defra noise maps and one below. For the purposes of this work, what this does show is that high levels of noise are experienced in these London open spaces, reinforcing the case for quietening them.

6.1.2 Bristol

Having undertaken its own noise mapping, Bristol City Council has worked to engage the public in thinking about quiet open spaces as part of the CitizenScape project, funded by the European Commission. This demonstrated ways of using new webmapping and social networking technology to engage the public¹⁸. Marketing included radio and press coverage to promote the scheme, and community facilitators to reach communities. This work was due to be completed at the end of 2009, and to inform the identification of quiet areas in the city.

6.1.3 Birmingham

As pioneers in looking to define quiet areas in practice, Birmingham City Council used definitions in the TRL report commissioned by Defra. It found the spatial definition of parks over 9 hectares and less than 55 dB L_{day} too restrictive. It adapted the definition to include parks with over half their area less than 55 dB L_{day} as quiet areas.

Even given this new definition, no quiet areas lay within the city centre, defined as the area within the middle ring road. A further adaptation was added, specifying areas including churchyards, cemeteries, large areas of open land and canal towpaths as quiet areas. These areas were observed as being perceived as quiet areas, e.g. people would eat their lunch there or use it as a place to relax.

No action planning is currently in place on protection or enhancement; Birmingham has mooted that a night-time speed reduction on the M6 from 70 to 40mph could contribute to noise reduction. However, as noise action plans for England are only recently published, this has not been progressed to date.

6.2 Scotland

The Strategic Noise Action Plans for Edinburgh and Glasgow list candidate quiet areas for cities. Those listed are all in the rural fringes of the agglomerations.

6.3 Wales

Environmental Noise Action Planning for Wales takes the view that quiet areas are similar to Open Spaces, as specified in PPG17, so the work done to identify these can be used to specify quiet areas. Candidate quiet areas are therefore Open Spaces listed on the local [unitary] authorities' websites and include allotments, churchyards, beach, cycle paths and school grounds. Local assessments will be made to determine which of these will be quiet areas for protection from increase in noise and/or noise reduction.

6.4 Northern Ireland

In Northern Ireland, a number of options have been put forward for assessing candidate quiet areas with plans to develop an approach to identification during the first phase of action planning; suggestions include areas below 55dB L_{day}, although this would not necessarily exclude areas of high amenity value.

6.5 Europe

6.5.1 Dublin, Eire

Dublin City Council specifies an absolute value of below 55 decibels daytime and below 45 decibels at night time as one criterion for defining a Quiet Area. A second criterion for 'Relatively Quiet Areas' is proposed. These will be defined by their proximity to areas of high sound levels, and which provide a perceived area of tranquillity. Both qualitative and quantitative assessments will be used to identify these types of locations.

For example, St Stephens Green East exceeds daytime levels of 70 decibels, while sound levels in the centre of the Park range from 57- 60 decibels. People use this park at lunch and other times to escape from the bustle of city life.

Dublin also lists spaces described as 'Noise Sensitive', 'Quiet' or 'Recreational Open Spaces'. These include child care facilities, educational establishments, hospitals, nursing homes, parks & green areas, places of worship, and health centres.

6.5.2 Florence, Italy

In Florence¹⁹ a series of soundwalks and questionnaires around the City have been used to establish the subjective experience of quiet and tranquillity, together with noise monitoring. Objectives for quiet areas are to:

- Maximise the living surface
- Maximise the number of users
- Maximise the satisfaction indexes of the area.

The L_{Aeq} was measured at intervals in two spaces – the D'Azeglio Square and Fortezza Gardens in the City. Some of the measurements were related back to particular noises such as footsteps, birdsong or traffic noise.

Questionnaires were used to assess the attitude of people using the spaces. The questionnaires found out people's occupations, how often they visited the space and what they did there. Information was also gathered on noises people found

¹⁸ <http://www.bristol.citizenscape.net/core/portal/home>

¹⁹ Quiet Areas in Florence - Sergio Luzzi – WG Noise, Eurocities - Florence - 20 March 2009.

irritating and how much they liked a space. Generally spaces surveyed were well liked and used for activities like walking, taking children outside, exercising animals, reading and appreciating tranquillity.

6.5.3 Amsterdam, The Netherlands

Frits van den Berg from Amsterdam presented work at Internoise 2008²⁰ examining people's perception of quiet areas, why they need them, how important they are and where people think they are. Using a media campaign the public were invited to name quiet areas and answer a questionnaire examining perceptions and use of quiet areas. Findings included that

- Quiet places are thought of as green/blue (water)
- Quiet and well-kept
- 75% of respondents visit a quiet place to relax/recover, walk or cycle
- About 50% of respondents visit a nearby quiet place at least once a week
- About 50% of respondents visit a quiet place elsewhere (in the City) at least once a week
- About 50% of respondents think that quiet places should be better protected
- Quietness is more important for elderly and noise sensitive people
- A quiet home is most important, a quiet city least (neighbourhood in between).

6.5.4 Stockholm, Sweden

"Soundscape quality in urban open spaces"²¹, details research on soundscapes and peoples' responses to quiet areas. Questionnaire studies were conducted in several urban open spaces in the Stockholm area. Consistent relationships were found between measured overall sound levels and perceived soundscape quality. However, sound source identification was found to be a stronger predictor of soundscape quality than measured sound levels. Soundscape quality was negatively related to presence of technological sounds (e.g. road traffic) and positively related to presence of natural sounds. The results suggested that good soundscape quality in urban open spaces would require day-time traffic noise exposure below 50 dBL_{Aeq}. In situations with exposures between 50 and 55 dBA, soundscape design that promotes positive sounds from nature was thought to be efficient in improving the soundscape.

Further work has been undertaken in Sweden on developing the Noise Environmental Rating System (NERS) for noise action planning to apply to quiet areas. This sets out a methodology for assessing the influence of green areas or parks. It is not clear that this has led to identifying quiet areas. The work characterises 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.

The methodology gives a numerical rating to recreational spaces, and is complementary to work developed to inform the need for sound insulation for housing. Its intended use is for improving the outdoor noise environment. The tool can also be

used to identify areas where new or more quiet parks would have the most positive effect in terms of resident satisfaction.

6.6 Conclusion

What emerges from this work in European cities is that noise monitoring can provide an indication of suitability for an area to be classified as 'quiet', but more than decibel levels must be taken into account in assessing what constitutes a quiet, tranquil or relaxing space that might induce wellbeing. Local knowledge is needed to make a true assessment of the current and potential utility of any open space. Also, there are some regional differences – the criteria established in Sweden and Dublin for quiet would not be able to be applied in UK cities monitored to date.

Overall, in determining whether an area is 'quiet' to people using the space, the following findings can be derived from work carried out across Europe:

- Natural rather than mechanical sounds are favoured
- Visual quality can enhance 'quietness' or tranquillity
- Size as such is immaterial – small spaces in inner cities can have the high value in terms of providing respite, opportunity for relaxation and exercise
- Attitudes to what constitutes quiet are to some extent determined by culture and location
- The WHO guideline of 55dB(A) has been taken as a starting point for looking at the designation of quiet areas. In dense UK urban areas it would be unrealistic to expect early achievement everywhere, but it has been widely adopted as a longer term aim
- A substantial part of a space being at least 6 dB below the typical daytime level of its surroundings might be a practical early guideline.

7. Soundscapes

The concept of soundscapes originated in work led by R. Murray Schafer at the University of Vancouver, Canada in the 1960s/70s. In 1977 Schafer defined 'Soundscape' as "*the representation of the effects of the acoustic environment on the physical responses or behavioural characteristics of creatures living within it*".

So, in this context, looking at how we can reduce the impact of noise in an open space amounts to more than the measured noise level – as has been recognised to date in work aimed at defining quiet spaces.

7.1 London – Soundscape Indicators

The GLA commissioned work looking at ways of defining soundscapes in December 2007. While acknowledging that work on soundscapes is in its infancy, the report saw proactive soundscape design in urban areas as an opportunity to provide urban spaces that acknowledged the buzz of a thriving city, while contributing towards a toolkit to deliver the requirements of the Environmental Noise Directive. Arup define soundscape design as:

²⁰ Quiet places in Amsterdam, Frits van den Berg, Municipal Health Service, Amsterdam. Internoise 2008, Shanghai.

²¹ Soundscape quality in urban open spaces, Mats E Nilsson, Inter-noise 2007, Istanbul

“the interdisciplinary activity through which the sound of an external environment is positively shaped (in addition to controlling any significant adverse noise effects – e.g. nuisance and significant annoyance”.

The report defines soundscape as:

“a physical sound environment with an emphasis on the way it is perceived by the individual, or by a society”.

7.2 Soundscape Design Toolkit

Subsequent work produced a toolkit for soundscape design²², which authors Arup defined as “the creation, shaping or improvement of any such physical soundscape environment”.

The Soundscape Design Toolkit lists the steps required to create and maintain a desired aural impact:

1. Noise Control
2. Listening and critical evaluation
3. Preservation and protection
4. Design interventions
5. Maintenance.

In looking at potential options for quietening open spaces in the City of London, we have in mind the steps outlined although for a number of spaces options for conventional ‘noise control’ are likely to be limited.

7.3 Positive Soundscapes Project

This multidisciplinary research project looked at the elements that make up the urban soundscape with a focus on sounds which might be perceived positively, as opposed to the traditional negative focus on noise, with a view to informing future urban design. The project concluded at the end of September 2009, and material is still being added to the website www.positivesoundscapes.org.

8. Tranquillity

When looking at quietening open spaces, it is clear that factors other than noise can enhance our experience of the space. Tranquillity has been used mostly in the context of rural areas; however, in working to reduce the impact of noise in urban open spaces we are working to increase tranquillity. Work looking at people’s perception of urban space is similar to that carried out to define rural tranquillity.

8.1 Tranquillity Indicators

In 2005, CPRE worked with Northumbria University to produce maps of tranquil areas²³. More recently, research at the University of Bradford is looking at developing tranquillity indicators to be applied to open spaces – using visual and aural qualities to define the tranquillity of open space.²⁴

²² Soundscape Design Toolkit – Arup Acoustics for GLA

²³ Mapping Tranquillity – CPRE 2005

²⁴ Validation of a Tranquillity Rating Method, G. Watts et al, Noise in the Built Environment 2010

²⁵ Building Green, London Ecology Unit 1993

^{26 & 27} Air Pollution Mitigation: the Dutch R&D Programme, I McCrae, TRL, Environmental Protection UK, April 2009

²⁸ Trees and Sustainable Urban Air Quality, Lancaster University Centre for Ecology and Hydrology, 2005

²⁹ Effects of Trees on the dilution of vehicle exhaust emissions in urban street canyons, C.Gromke; B. Ruck, International Journal of Environment and Waste Management, 2009, 4, 225-242

9. Beyond Noise – Benefits of Quietesting Open Spaces

9.1 Health

Quiet and open spaces are linked to good health. The draft (at time of writing) report Environmental Noise and Health in the UK 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, Natural England launched an “Our Natural Health Service” campaign following a study finding that people in neighbourhoods more than a mile from a park had a 27% greater chance of being overweight. They believe this proves a common sense notion – that people are healthier living within in an attractive natural environment. They are working to encourage everyone to make the most of green space, believing parks, woodlands, countryside and tree lined streets are a major resource that can help us combat rising levels of diseases such as diabetes, obesity and depression. This links to other findings that quality of life and ‘well being’ is improved by providing open spaces that encourage people to take active exercise outdoors. Back in 1993, Building Green²⁵ referred to research showing that hospital patients with a view of natural greenery recover more quickly than those with a greyer outlook.

9.2 Air quality

The City of London is in an air quality management area, and the enhancement of open spaces can have a positive impact on air quality. ‘Building Green’ quotes work stating that leaves can reduce the number of particles suspended in the air by very high percentages, but does not specify particle sizes; it also found that leaves of climbing plants provide a large surface area which can filter dust and particles out of the air. More recent work states that “although vegetation can certainly have a positive impact on air quality, no computer models have been identified that are able to accommodate the physical and biological capture of particulate matter”²⁶. Measurement work to date in The Netherlands has found a reduction absorption of PM₁₀ of 20% and PM_{2.5} of 17%. While this is in a motorway situation it does indicate that planting can reduce pollution. For NO₂ a 20% reduction was found over 45 - 90 metres (this work, part of the Dutch Air Quality Innovation Programme, is ongoing²⁷). Previous work by Lancaster University also found a benefit.²⁸

More recent work suggests that trees planted down the middle of city streets can lead to improvement in air quality, but planted too close together in canyons they can trap air pollution as high density leafy canopies can restrict air flow.²⁹ This indicates that planting could have some impact on reducing airborne pollutants – but dense vegetation where canopies overhang roads in canyon streets is not helpful.

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Plants can be a source of VOCs (biogenic emissions) which contribute to ozone formation in hot spells. Work by Lancaster University²⁸ gives trees an urban air quality score – grouping trees that have the greatest capacity to improve air quality, and those that have the potential to worsen air quality. These are listed in Appendix 2.

Overall, we would suggest that the all round benefits of planting should on balance outweigh any emissions, provided species are chosen that are suitable for the situation.

Another air quality benefit of using planting to mitigate noise is cited in 'Building Green' which states that "green areas are generally cooler and windier, so introducing fresh air into the city". Improved air movement associated with open spaces in cities is a significant benefit complementing noise mitigation, which needs to be considered in design of measures to enhance the tranquillity of such spaces.



City of London AQMA

9.3 Climate Change Mitigation / Adaptation

Hard materials of city structures both absorb and store heat, and also reflect heat which contributes to the build up of temperatures in city centres – the 'urban heat island'. Increasing the amount of space covered by vegetation in available open spaces, and using vegetation to cover hard surfaces not only provides some physical and psychological protection from noise, it can also contribute to keeping city temperatures down. This is covered in 'London's Urban Heat Island'³⁰. In hard landscaped areas, the use of porous or permeable pavements, which may have less mass, and therefore store less heat, has the potential to increase surface sound absorption as well.

Increasing vegetation can also increase summer cooling and humidity as transpiration from plants replenishes atmospheric moisture.

Vegetation and soil retain moisture, and therefore reduce rainwater run-off. Pollutants washed out of the air – such as heavy metals and nutrients – will tend to be bound in soil rather than running off into water courses. Research in Berlin has shown that green roofs reduce run-off from buildings by 75%. Where water can drain to subsoil rather than fall on hard

surfacing, there is capacity for a huge reduction in water discharged to drains, thus reducing the risk of flash flooding due to extreme rainfall events, which are likely to become more common with climate change.

9.4 Biodiversity

Using appropriate planting for noise mitigation and enhancing spaces to attract insects and birds, whose sounds can distract attention from noise, provides opportunities for contributing to objectives to increase biodiversity. This should complement the City Gardens action plan for habitats in small public spaces.

9.5 Educational / Interpretation Opportunities

Noise barriers have a poor reputation as ugly structures that can increase real and/or perceived severance, and divide spaces. However, considerably designed barriers can, in city spaces provide surfaces that can be used to convey information, and could attract sponsorship – for example interpretation of a historical site, poetry/quotes that complement the site, or directions (especially if part of a network of spaces/soundwalk). Where spaces are planted to mitigate noise, the plants used could form part of an educational network on green spaces, for city children who have limited access to green space, or with more specialist associations (e.g. plants with stories related to medicines, foodstuffs or other materials, or which have links with City Livery Companies or other institutions). These could also offer a diversion for city workers and visitors, in addition to more traditional heritage approaches.

9.6 Awards

The Green Flag Award and Green Heritage awards are highlighted in the Bureau Veritas scoping study as ways in which quieter open city spaces can be used to build the reputation of the City. Measures to quieten City spaces could all contribute to their meeting the following Green Flag criteria:

- A Welcoming Place
- Healthy, Safe and Secure
- Sustainability
- Community Involvement.

There is also increasing support from organisations concerned with noise for an award scheme to recognise good practice. European Environmental groups are calling for this, and it is supported by many groups in the UK including CPRE, Sustrans and Environmental Protection UK. These groups believe an awards scheme would serve to promote good practice and encourage those currently disengaged to compete. Existing awards schemes coordinated by the European Commission's Environment Directorate, such as the European Green Capital Award and the Mobility Week Award, are very successful in terms of encouraging large numbers of local authorities to strive for environmental excellence. The groups are encouraging the EU to establish an award scheme that will:

- reward those who have most improved their noise levels or have taken particularly innovative measures, and

²⁸ Trees and Sustainable Urban Air Quality, Lancaster University Centre for Ecology and Hydrology, 2005

³⁰ London's Urban Heat Island - a summary for decision makers

- establish an EU accreditation scheme for recognising 'Quiet Areas'

and in the next round of the Environmental Noise Directive, to improve noise assessment methods and issue qualitative guidelines in order to ensure comparability across Europe, as the basis for such schemes.

Such schemes would stimulate commitment from the responsible authorities, raise the public recognition of their achievements, and have likely co-benefits in terms of property values in those areas. This would in turn encourage engagement from authorities who have not yet recognised the value of actively working to improve the noise environment.

9.7 Benefits to Buildings

Using cladding on buildings to reduce acoustic reflection – whether it be passive or living/growing – can provide a degree of insulation. Plants can keep buildings cooler in summer (although in winter they may also keep outside walls damper and cooler). Plant cover can also protect the fabric of the building from the elements, although a few species, such as buddleia and many vigorous ivies, have roots or suckers which can cause damage if in direct contact with some building materials (purpose-designed supporting structures for ivies and other climbers can however be used).

9.8 Added Value

It has been reported that 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 Mayor's environment programme also equates urban greening to adding value to property. With the City a centre for business, greening spaces and buildings should make economic sense to potential sponsors of projects which contribute to the quietening of open space (for example, allowing planting of climbers and supporting structures that reduce reflection of noise from buildings), as well as providing associated local benefits as outlined above.

9.9 Applying Landscape Theory

In designing city open spaces that reduce the impact of noise on people using those spaces, the landscape design principle of 'prospect and refuge'³¹ 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"*. 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, the presence of sounds which have positive associations for most people, in the relevant context, can improve perception. If we are able to provide pleasing spaces, that are comfortable, relaxing and safe environments, the overall quality of the space should offset at least some of the impact of noise.

9.10 Conclusion

Adding qualities to our open spaces that will reduce noise and/or the impact of noise can only contribute to greatly improved open space quality, adding value both economically and aesthetically, with a number of measures also having additional environmental benefits for air quality, biodiversity, education/interpretation, and climate change mitigation. All in all, if the requirement to make our urban open spaces quieter and more attractive is embedded into wider planning, open spaces and environmental policies and strategies, we can reduce the impact of noise through these, reducing the requirement for specific resources/funding to be sourced.

10. Quietesting City Spaces in Practice

The method outlined in the Soundscape Design Toolkit can be used as a starting point for looking at quietening city open spaces. The application of a subjective method, to underpin decibel measurements, is compatible with research findings across Europe to date, that the quality of an open space does to a large extent determine the impact environmental noise has on the recipient. Therefore, the soundscape approach outlined below fits:

1. Listening and critical evaluation
2. Preservation and protection
3. Design interventions
4. Maintenance.

10.1 Noise Control

Traditionally, noise control has been addressed in three steps, in sequence, supporting the 'polluter pays' principle in first considering the responsibility of the noise maker:

- i Reducing at source
- i Modifying the sound pathway
- ii Mitigation at the receiver.

10.1.1 Reducing at Source

Measures to reduce noise at source for aircraft, helicopters and vehicles lie to a large extent at EU level through regulation. Operators can be encouraged to take some responsibility by procuring quieter fleets, and optimising operational procedures to reduce noise impacts. Sirens are a particular source of noise in the City – primary responsibility lies with the Home Office and the emergency services. Within local authorities, procurement of quieter technologies (which often have additional benefits, such as for air quality and climate change) for vehicles operating in the City can be encouraged. Also, management of traffic can have an impact. In summary:

- Quieter procurement:
 - the use of electric or hybrid-electric vehicles
 - encouragement of non-motorized transport – walking and cycling
 - use of quieter tyres on fleet vehicles.

³¹ The Experience of Landscape - Jay Appleton, John Wiley, 1975

- Traffic Management
 - smoothing traffic flow
 - street redesign, including traffic calming
 - quieter road surfacing
 - advisory notices e.g. no horns in sensitive areas, or real-time responsive signage
 - traffic/vehicle restrictions at sensitive times of day.

10.1.2 Modifying the Sound Pathway

Insulating/shielding the space from noise can be undertaken in a number of forms:

- increasing the distance between the quiet space and the noise source such as by rerouting heavier traffic flows
- altering openings/entrances to block or attenuate sound pathways
- enclosing noise sources, e.g. building over main roads, as already done in parts of the City
- physical noise barriers
- earth bunds, or experimenting with more subtle surface treatment and planting, e.g. ridge-and-furrow with very dense (low) vegetation
- living noise barriers, incorporating planting, and 'sonic crystals'.

10.1.3 Mitigation at the Receiver

In the case of open spaces, this will be the receiving space, or an area within the open space. Measures to reduce the impact of noise here would include:

- Reducing the area of acoustically reflective surfaces around it (e.g. by cladding or growing plants up walls)
- Improving other qualities of the space to attract attention away from any noise that cannot be attenuated
- Introducing or attracting sounds that mask or draw attention away from the noise – these could include:
 - planting for sound by introducing plants that rustle in wind
 - using materials that create sound, e.g. gravel paths that reveal footfall
 - planting to attract insects and birds
 - installation of water feature³²
 - installation of sculpture with sound³³
 - distracting senses by use of scented/aromatic plants
 - providing low key recreational attractions – swings, games.

11. Noise Barriers

Well designed noise barriers can be used creatively in urban open spaces. Many materials can be used – including concrete, glass, perspex, metals and mixes of recycled materials. There is scope for using barriers to contribute to the aesthetic qualities of the area. In historic open spaces that are viewed from outside, or where views out or light ingress are valuable, transparent barriers can ensure vistas are retained. If designs echo the style of a space, they could even enhance an area. Transparent barriers could be used for inscriptions/interpretation. Inclined or curved surfaces might be used to reduce reflection, and issues of cleaning and algal growth need to be considered. Where solid barriers are appropriate, planting around them or growing plants over them can disguise the barrier, as well as providing potential wildlife habitat. Also, 'windows' in solid barriers can improve personal security as well as providing views from streets into open spaces.



Evergreen planting on solid barriers / fencing can screen noise sources

12. Designing for Noise Reduction

12.1 Planting

12.1.1 Green Walls

These have attracted much attention in the urban design and horticultural worlds. While they can look spectacular and have great visual benefits, they can require very high maintenance, including complex irrigation systems, and be highly vulnerable to vandalism. Therefore they are not ideal in cities where water may be at a premium in dry seasons. This maintenance is also expensive. However, simply growing climbing plants up walls, while not as spectacular, has a number of benefits. Some climbing plants may reduce sound reflection from hard surfaced buildings, particularly if a supporting structure is designed for

³² Greg Watts et al at University of Bradford have analysed how different types of water sound have varying associations, which may assist in avoiding the wrong type of water feature.

³³ Introduction of electroacoustic sound needs to be handled with great sensitivity to context and user expectations, as some may object to the principle, e.g. <http://www.pipedown.info/>. Gianluca Memoli et al have analysed, using the 'slope' indicator, the impact of subtle place-specific interventions by Lorenzo Brusci et al, in Firenze and elsewhere, incorporating specially-designed sonic emitters as part of an overall sonic garden design concept, not just adding sound 'ad hoc', e.g. <http://www.lorenzobrusci.com/blog/sound-modules-and-installations-short-history/>. Issues include how adaptive garden sound should be to ambient, times of operation, and (cumulative) overspill. Trials in a London context might compare the relative impacts on perception of sound compositions with real time translocation of naturally-generated sounds (e.g. birdsong, leaf rustle and water movement at the core of an open space being made more audible at a bench on its edge).

the purpose, thus contributing to noise reduction in urban spaces. Plants can also provide some insulation from summer heat, and protect the fabric of a building from harsh ultra violet light and heavy rainfall. Climbers on walls can also provide a habitat for birds and insects. Appendix 2 lists some climbing plants that have good potential to attract wildlife. Birds and insects can also add to enhancing the tranquillity of an area.

12.1.2 Green Roofs

The term 'green roofs' can refer to roof gardens, where some of the space can be readily used for sitting outside or other leisure activities, or to roofs covered with planting where regular access is not feasible, e.g. sedum roofs. The soundscapes of people-accessible roof gardens can be improved with a high perimeter wall³⁴. 'Living roof' is probably a more descriptive term for a planted roof, as few will be literally green all year round. Increasing the area of green space in the City has the potential to contribute to the quietening of spaces below and the building itself. Adding a layer of substrate and vegetation to a roof can improve exterior to interior sound insulation. In principle, some green roofs may reduce sound propagation across the surface, or reduce multiple reflection where used within a lightwell or other semi-enclosed building form, though less information is available on this. Living roofs also have the potential to form a part of green corridors, attracting more insects and birds into the centre of the City. If this is complemented by considered planting at ground level, more insects and birds will be attracted into City open spaces, with the potential to enhance the natural soundscape, and therefore increase the perceived tranquillity of these open spaces.

12.1.3 Green Ground

Along with vertical surfaces, the type of ground surfaces can contribute to the overall acoustic environment. Hard pavements reflect sound; uneven surfaces can increase noise from vehicles and other wheeled artifacts like suitcases and delivery trolleys. Freight operators and/or receiving premises could be encouraged to use roll-out mats where uneven surfaces at delivery entrances cannot be avoided. In the City some street surfaces may form part of a heritage site, for example cobbled paving. However, quieter designs for small stone blockwork surfaces have been investigated, e.g. in the EU SILENCE project. Trials have also been carried out with small blocks incorporating a poroelastic surface, which could be very quiet. Overall creating acoustically softer surfaces will add to the tranquillity of an area, thus having some impact on noise reduction. Where hard surfaces can practically be replaced with permeable/semi permeable surfaces or planting, this could also reduce surface water run-off. Solar reflectivity and heat absorption should also be considered during surface replacement. In some spaces, gravel paths, which can also be permeable, could add some masking sound.

12.1.4 Planting for Sound

Different plants generate varying turbulence or 'rustle' in wind, or when otherwise disturbed, creating the natural sounds that attitude surveys indicate enhance feelings of tranquillity. Gardening columnist of 'The Observer', Dan Pearson, says of

the bamboo in his garden *'When it is in motion it is the rustle that I hear, not the sound of Peckham Road beyond'*³⁵. Appendix 2 lists some plants that have these qualities.

12.1.5 Green Corridors/Green Grid

There is increasing recognition that the creation of corridors for wildlife in urban areas can contribute to maintaining healthy ecosystems. Planting appropriate open spaces in a more naturalised style, greening walls to reduce reflection of sound, using planting as visual, at least, barriers to reduce the perceived impact of traffic noise, also provide an opportunity to contribute to creating or enhancing green corridors in the City. The Greater London Authority, Design for London (DfL) and other partners are currently working to develop the East London Green Grid into an All-London Green Grid. Engagement with this network could ensure any plan for greening could also consider potential for planting to mitigate noise intrusion and air pollution.

12.2 Noise Screens

For acoustic barriers to be effective in reducing decibel levels they need to be of sufficient height, and continuous. Any entrances to a space need to be staggered or incorporate a chicane to prevent noise intrusion. In smaller urban spaces continuous barriers may prove impracticable due to restrictions of space, requirement for natural light/sight of the sky in the space as many are already surrounded by high sided buildings. Innovative 'acoustic tube' entrances could be explored. Barriers that screen traffic or other noise sources entirely from view may be acoustically effective, but barriers are less effective at reducing low sound frequencies than high – so a 'low rumble' often remains, and people can find this particularly unsettling when they can hear but not see it.

In many places an aesthetic enhancement that reduces the awareness of users of a space of the noise source (in most instances traffic) may be a more appropriate solution than a noise barrier. Even a simple hedge over a low wall is likely to have some effect in enhancing tranquillity.

12.3 Elevation

Areas that are a little below the level of the noise source (mostly roads) can be quieter as users of the space are sunken within a 'noise shadow'. The phenomenon is common on canals, and river foreshores. Protection of slightly sunken open spaces can be enhanced with a low screening on the back edge of surrounding footways which still allow natural surveillance of the space. By contrast, open spaces moderately elevated above street level tend to have wider exposure to noise sources.

However, in the City, there will, of course, be places where exposure to vistas may be more important. There are, however, already some examples of sunken outdoor areas in the City (see below). It may be possible to provide sunken areas in some open spaces, that will reduce the impact of noise from surrounding streets, and these could also be designed to provide emergency holding areas for rainwater in extreme weather events (any sinking would, of course, depend on underground structures or services in these areas).

³⁴ E.g. Ismaili Centre, south of the V&A Museum, designed by Hugh Casson.

³⁵ Sounds of Silence, Dan Pearson, The Observer Magazine, 9 November 2008



Sunken open space, in this case planted with spaced out trees, outside the Aviva building, Bishopsgate, can reduce the visual and aural impact of traffic

12.4 Reducing the Impact of Noise from Above

In many City spaces noise from aircraft and helicopters is frequent. It is possible to provide some visual shielding using trees, pergolas and other features but, with multiple reflection from building surfaces of moving aerial point sources, it is unlikely that effective sound screening can be achieved. 'Flightpath design' is an issue that justifies further research, but it is likely that the impact of aircraft and helicopter noise can be to some extent reduced by avoiding very tight courtyards, and maximising the use of acoustically absorptive surfacings.

In parts of London schools under aircraft flightpaths lack space suitable for delivering the outdoor curriculum, with a concern that many children may be deterred from experiencing healthy use of outdoor space. One suggestion has been to investigate the feasibility of special acoustically-designed 'winter garden' structures that provide some screening from aerial noise sources, while providing an experience of access to nature.

One way forward might be to seek research support and/or sponsorship for developing a design that might have applications within the City, Kew Gardens and more widely under London's flightpaths.

Another possible response would be 'sound event cocooning'. Intelligent signal recognition would be developed to identify potentially intrusive events before they were audible to

open space users, and activate a water feature or other 'positive' sound to provide attentional (if not acoustic) masking. This concept aims to avoid any permanent raising of the background level associated with most sonic interventions to date.

The creation of 'semi-screened' or sheltered space outdoors may, of course, have other benefits in providing screening from localised noise sources, as well as increasing usage in winter and providing shade in summer. Arbour style seating, shade sails, semi-covered walkways or arcades, and pergolas are all features that may have benefits in a range of settings.

12.5 Summary of Design Elements

In summary, design elements that can be employed to reduce noise impact or enhance tranquillity are:

Planting:

- Dense screening plants to work year round – evergreen or semi-evergreen
- Rustling plants
- Greening walls to reduce noise reflection – also contribute to cooling/increase urban humidity
- Greening ground to reduce noise reflection, sound of footfall
- Plants for enhancing wildlife.

• Barriers/screens

- Noise barriers designed to fit the space – transparent where vistas required – or earth bunds
- Innovative ways of providing 'straight through' access.

• Elevation

- Lowering level of open space to provide ground-shielding from noise.

• Shelter

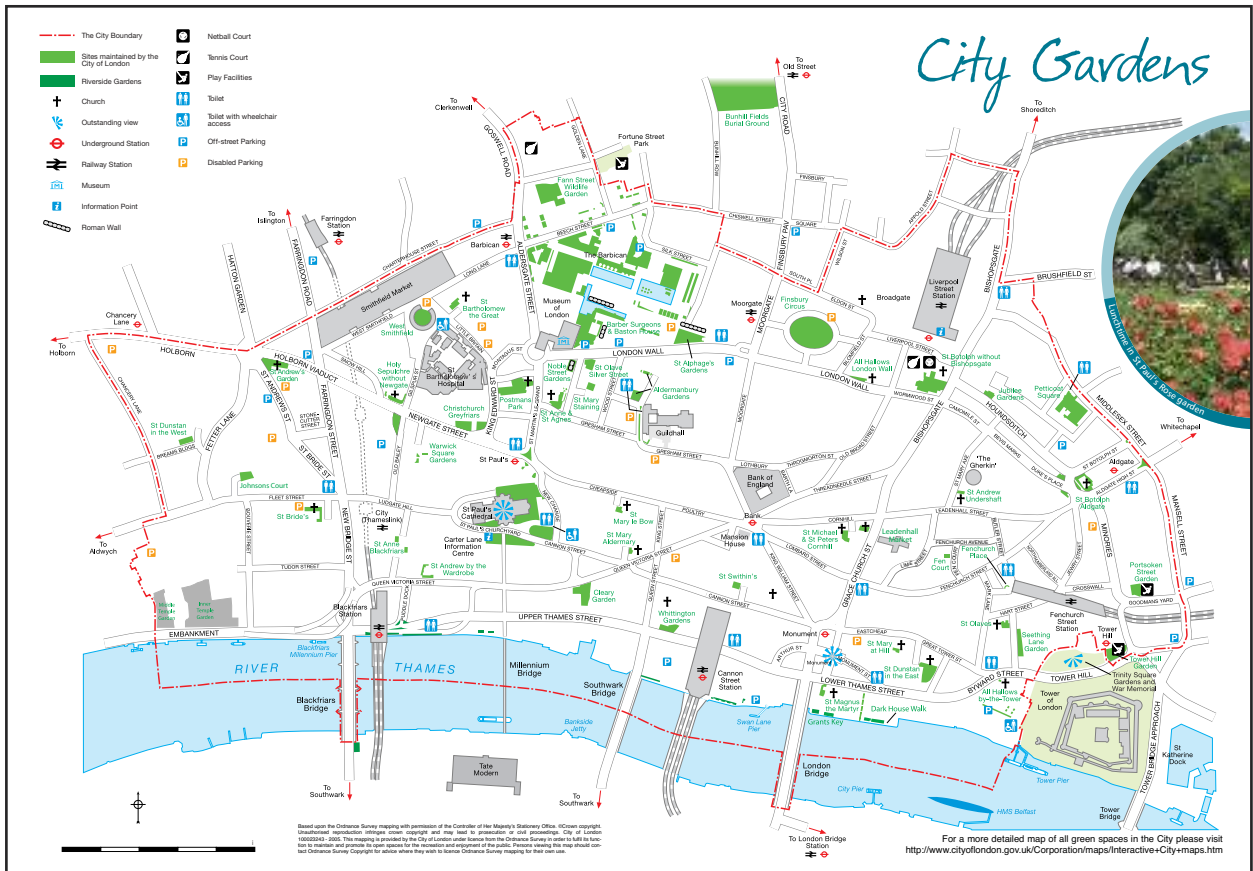
- Arbour seating
- Pergolas
- Sail shades
- Arcades
- Investigation of 'winter garden' structures.

• Sound design

- Water features, sonic gardening, and other sound design, using attentional and/or acoustic masking, responsive to changing ambient, and sensitive to context.

Recommendations for City of London Open Spaces

Here we look at a number of specific open spaces in the City, with suggestions of how noise levels, or the perception of noise, might be reduced, to provide quieter spaces. These are designed to fit with current and developing policy for both reducing noise and enhancing the sustainability of city spaces, notably for air quality, biodiversity and climate change – as outlined in sections 5 and 9.



Gardens managed by the City of London Corporation

A. Monument

1. Site Character

Monument is an iconic historic site. On site visits it was noted it is used by local office and manual workers lunching, by tourists – particularly reading the inscription on Fish Street roadside, and by visiting school parties.

2. Measured Noise Level

63.7 dBL_{Aeq 15 minute} Bureau Veritas October 2007 – although at the time, building work was being undertaken on the East side.

3. Soundscape

In the survey, this area was approached from Monument Street to the West, it was noted that this side of the Monument did not have such a calm atmosphere as the main square to the East

of the Monument. We understand that the area has recently been refurbished.

On the West side there was very noticeable traffic noise, on one occasion dominated by an ice cream van. While Fish Street is not busy, it is a bus route also used by trucks. The space is very open, and all surfaces are hard, including sloping decking in the north east corner. Occasional aircraft overflight.

4. Use of Area

On summer site visits it was noted the area was used by workers having lunch, tourists visiting the Monument, and school parties. In particular, it was noted that class teachers were talking through the inscription on the West side of the Monument, which opens on to busy King William Street, needing to shout to make themselves heard. The area around the Monument is paved, with a wooden decked area of seats on

■ Quietening Open Spaces

the North Eastern side. This consists of scattered individual seats facing a disabled toilet. At the time of visit seats were occupied by a mixture of tourists and lunching office workers, with builders sitting on adjoining walls, and school parties passing through.



Top row, l to r –

1. Teachers shout to be heard as a school party reads the inscription on the noise road facing west side.
2. Seating faces a toilet

Bottom row, l to r –

3. Seating on decked area on quieter east side.
4. The road surface of Pudding Lane to the east could be quieter

5. Options for Quietening

The measured noise level exceeds the WHO 55dB guideline. Our subjective judgement was that this space could not currently be termed quiet or tranquil. There is much scope for adding noise protection, planting and possibly the greening of walls to make the space feel quieter, as well as to provide some shade and shelter. However, given the nature of the space, with large numbers of visitors coming to find out about the origin of the Great Fire of London, and to climb the Monument for the view, it is considered more appropriate to focus on enabling teachers and guides to be heard by pupils and other visitors, than creating a tranquil space in the full sense of that term.

It may be noted that seating provided appeared insufficient for the number of people and largely arranged to face the toilet. Any redesign could examine improving screening of the seating from higher noise sources, while maintaining sunny orientations with a more attractive outlook.

5.1 Road Closure

Intermittent traffic was observed using Fish Street Hill and individual vehicles were noisy – buses, waste trucks, large lorries which all had difficulty negotiating the street, as well as taxis. On one visit the most prominent noise source was a parked ice-cream van. Options for consideration might include

- Closing this road/restricting vehicle size and/or entry times to early and late would afford more opportunity for reducing traffic noise, providing a more relaxing and improved educational and visitor experience, at what is an iconic London space.

- Increasing the width of the pavement would allow a more pedestrian friendly space around the base of the Monument, on the West side in particular as this is where the inscription is which is read by teachers (aloud to their pupils) and by tourists and photographed; this would give more distance between the Monument and vehicles, and allow space for noise mitigation.

5.2 Road Surfacing

The uneven granite sett paved surface of Pudding Lane is likely to increase noise from tyres considerably, probably by 6 dB. Using a quieter surface, such as a suitable stone blockwork surface that maintains historic association could be considered (the granite sett surface appears to have been installed relatively recently for its associations, rather than preserved for its actual age). However, little traffic was observed here.

5.3 Noise Barriers

We suggest that a transparent glass or Perspex noise barrier could be used here to shield noise from the road to the West. A screen could be designed specifically to improve conditions for speech transmission between teachers/guides and pupils/visitors. A staggered barrier could continue around the space, with suitably-designed openings for people arriving at the site from the adjacent tube station. It should allow the Monument to be visible on approach, with entrances offset/staggered on either side to minimise noise transmission through openings. The screens could be engraved with information on the area, and/or illustrations and timelines depicting the Great Fire, to be read from the Monument side. The transparent screen could be designed with special integral or base-mounted lighting to create an evocative ‘fire spreading’ feature at night. The (sparing) use of sound for attentional masking as well as visitor interpretation could also be considered in a non-continuous ‘son et lumière’, subject to consultation with users and neighbours. This would serve not only to reduce noise, but to enhance the visitor experience and increase the educational value of the site. To balance the space, similar barriers could be used to the East, on Pudding Lane – although this is probably not essential as it was noted that traffic noise was far less intrusive from this side.

The main road approach to London Bridge is a significant source of noise. Subject to access, it would be desirable to investigate the feasibility of creating a noise screen as close as possible to London Bridge road traffic. A largely transparent screen could be designed, for example, as a ‘ghost’ of the shops and other buildings which lined the old ‘inhabited’ bridge. There is potential for ‘attentional masking’ sounds here to include an evocation of the rushing waters constrained between the massive piers and narrow arches of Old London Bridge.

5.4 Planting

Currently there is minimal planting here, with a few planters near the seated area to the North East where Pudding Lane comes into the space. Choice of planting could be informed by historical associations, but some evergreens (e.g. box/bay/holly) would be in keeping with the historical nature of the area, as well as providing a framework for other plants, e.g. herbs, while serving as ‘green screens’ from noise, in addition to transparent noise barriers to create suitable places for listening and reflection. Whether these are planted

or in planters would depend on underground services. Also, the addition of some evergreen trees/hedging could provide shade/shelter, in what is a very exposed area. At the time of our visits there was no wind, and on one occasion it was extremely hot. Planting could make the space more usable in a wider range of weather. Also, there is scope for more greening of the buildings around the space – if feasible, climbing plants could reduce reflected noise and improve the microclimate of the area.

5.5 Seating

We found the current seating arrangement rather odd. Seating was available in the quieter, north eastern corner – with individual seats arranged on sloping wooden decking to look directly at an (admittedly artistic) disabled toilet. This was rather unwelcoming and does not engender calm. Seating could be better placed – grouped to allow interaction, with more seating facing the Monument which is the main feature of the space. This should help to distract attention from noise. The use of planting and/or shade sails could provide shelter and possibly some screening from highly placed noise sources.

5.6 Water Feature

As this space has the character of a civic square rather than a park, a water feature could be designed as part of an interpretation of Old London Bridge, and could serve to provide a counter-attraction to noise that cannot be reduced, while providing some cooling/humidity in summer.

B. St Botolphs without Bishopsgate

1. Site Character

This is a church garden and a relatively large green space, with a number of distinct areas, mature trees and including a netball court, next to the Church of St Botolphs without Bishopsgate. This site is listed by the London Wildlife Trust as hosting a number of birds.

2. Measured Noise Level

62.5 dBL_{Aeq 15minute} Bureau Veritas, October 2007

3. Soundscape

At the times of visiting any sense of tranquillity in this park was very much affected by noise from construction work directly to the East of the entrance onto Bishopsgate. Traffic noise was also very prominent. Aircraft and helicopter noise too was noticeable. Gardeners working here reported that they perceived a noticeable increase in noise in winter when no leaves were on the trees. Winter noise could, however, also be increased by seasonal meteorological conditions.

4. Use of Area

The eastern end of the space was less used – this end was extremely noisy and had no seating. A few people were seated on benches/walls in an elevated area further into the gardens, facing across to a court for ball games. It is well used as a thoroughfare, a very busy walkway as well as a space for



Visualisation of a quieter west side of Monument – using staggered transparent barriers to preserve the iconic vista, allow easy access for tour parties and provide surfaces for historical information / interpretation, and planters / planting to make a more tranquil space

relaxation. We felt much could be done to quieten and enhance the space.



This church garden has an unappealing entrance and is very open to traffic noise from busy Bishopsgate and construction; the entrance is wide with low retaining walls and scantily planted with mostly deciduous plants and trees which provide some screening in summer.

5. Options for Quietening

5.1 Noise Barriers

Screening the road would reduce noise, and the continual reminder of the presence of traffic, and undoubtedly improve tranquillity. This space offered a number of options for noise screening, although this would need very sensitive design. The park is used by rough sleepers and gates and railings are already being considered.

As the Park protrudes out into the street we believe one option would be to create raised earth bunds, with dense planting of hedging on top. The street facing slopes could provide scope for seasonally variable planting to attract people into the space, and the internal slopes could be left as grass banks, providing space to sit in summer, and/or ledge bench seating ranged along here facing into the park. Bio-barriers are available – these require some maintenance and can be up to 2- 4 metres in height. There are established trees here, so any barriers need to avoid changing ground levels around these. Alternatively, a thick hedge could be planted in the currently sparse space, or a structure incorporating both glazed and planted elements, perhaps with local historical associations.

If barriers are used, the entrance could be staggered or diagonal to prevent traffic noise intrusion. As the space is long,

there is room for an entrance to be set back. Alternatively, if a view into the park is to be retained, the feasibility of an 'acoustic tube' structure, perhaps suggestive of a 'cloister arch' could be investigated, and/or a water feature set back from the entrance, or reflecting the small water basin feature in the old stone gate pillars. This could both attract visitors and provide attentional masking from traffic noise.

5.2 Enhancing Space

There is currently a broken fountain – replacement of this with an appropriate working fountain would serve to mask noise, and also provide a water source for birds and provide a more relaxing space.

5.3 Encouraging Natural Sound

This church garden is a fairly large area, which gives scope for enhancement through natural planting that might encourage more birds. On one visit we noted starlings eating rowan berries. Increasing the native planting here would have a number of sensory benefits that could detract from the noise of traffic. On the north side of the park is a raised lawn. Planting the border of this with aromatic shrubs – for example lavender – could provide scents to attract the attention of those passing away from any noise, while having biodiversity benefits.

5.4 Horizontal Screening

At the time of our visits noise from high rise construction to the east of the park was dominant. There were a number of planes flying over. Creating sheltered areas using pergolas, or use of arbour seating overgrown with climbers would provide spaces that could give perceived protection from noise from above. These would also potentially provide food and perches for birds (other than pigeons), encouraging natural sound.

C. Whittington Gardens

1. Site Character

The west side features a paved raised square, with a fountain surrounded by benches and raised beds. The eastern side is lawned, dominated by a large deciduous tree. To the south there is a thin hedge facing onto a very busy road. The northern edge of the garden faces onto a quieter area, with a little wide paving and a little used road bounded by a church.

2. Measured Noise Level

None available.

3. Soundscape

These gardens are dominated by the extremely heavy traffic on Upper Thames Street, which forms a canyon of high sided buildings to the south of the gardens. Traffic is made up of many lorries and construction vehicles from which vibration can almost be felt. In addition, commentary from a London tour bus was heard, as well as sirens. The fountain in the middle of the seated area and splashing pigeons has a minor attentional masking effect. The north side of the space is a quiet road in front of a church. No motor traffic was seen here during visits.

4. Use of Area

On summer visits benches around the fountain were packed with lunching office and manual workers on the west side, and people reading throughout the day. A few people sat on the ground under the tree on the east side.



1. Quiet north side is shielded from road by wall of the raised garden
2. Raised seating is well used, but exposed to noise and pollution from heavy traffic of Upper Thames Street. A small fountain provides a slight calming effect
3. A narrow band of low hedging provides little barrier

5. Options for Quietesting

5.1 Noise Screening

For any form of screening to have a real impact on the extremely dominant traffic noise from Upper Thames Street, it would have to be high and solid. Even then, the high proportion of heavy vehicles implies a high proportion of low frequency noise, against which noise barriers are relatively ineffective. Traffic speed, flow smoothing and road surfacing on Upper Thames Street should be reviewed. The use of higher, more dense evergreen planting, or a solid wall overgrown with climbers such as ivy and honeysuckle, could have some impact in screening, together with an offset hedge masking the entrance. This would only be required on the south side. Air quality in this street is poor with pollutant build-up in the canyon, so a solid noise barrier could worsen air quality on the street, while evergreen leafy planting could contribute to reduction of airborne particles. Also, the use of planting to create more secluded seating areas would help to quieten this space.

5.2 Expand the Space

Beyond the boundary of the garden is a quieter area of pavement, with cycle parking and a bench which was not used at the times of visiting. Extending the gardens to include this space, using boundary planting to create a new area, would provide a quieter area, lower down, away from the busy road.

5.3 Lower the Level of the Gardens

The seated area and fountain that form the focal point for the numerous visitors to these gardens are elevated above the road. If feasible, lowering the level of these, to that of the street to the north, or lower if possible, could reduce the impact of traffic noise on this space.

5.4 Reduce Noise Reflection

Due to the canyon nature of the street, reducing the area of hard surface here could reduce noise impact and create a more relaxing area. This could be achieved by reducing the amount of paved area in the garden, and growing climbers on the walls of surrounding buildings. The contribution of sound absorptive surfaces on buildings within the street canyon could be modelled, and absorptive surfaces sought in future proposals for redevelopment or re-cladding. Innovative advertising-funded overpanels, in sound-absorptive materials, could also be considered, subject, of course, to civic design and road safety considerations.

5.5 Water Feature

The fountain currently in the seated area does provide a slight distraction from the traffic noise. If more solid barriers are not feasible in this space, a water feature closer to the road could provide more attentional if not acoustic masking of the road traffic noise. Also, as air quality is poor here, the use of an extended water feature might make some improvement to air quality by washing out some pollutants and increasing humidity.

D. Guildhall

1. Site Character

An enclosed civic square, bounded by the original medieval Guildhall, the original seat of London government. There is a more recently constructed west wing. The extensive paved area provides access for vehicles, and a ceremonial space. The outline of a Roman amphitheatre is marked in the paving. There are simple benches on the south side and no other features in the space. At the southwest corner, outside the main square is an attractive pond, with seating.

2. Measured Noise Level

67.4 dBL_{Aeq,15minute} Bureau Veritas, October 2007

3. Soundscape

At times of visiting environmental noise was not significant – sounds heard included a helicopter, and construction noise from Gresham Street.

4. Use of Area

At times of visiting in midsummer we saw very few people spending time in this very large open space. It did appear to be used as a through route, however the close relationship of this highly formal space within the precincts of the Guildhall is likely to make many potential users feel reluctant to linger if they do

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not have some specific purpose linked to the Guildhall. A few service vehicles were parked. Builders were lunching on steps and a family lunching on a bench. A guided tour of elderly people stayed on the shady side of the yard out of the sun, and a few walked through. In contrast, the pond outside the yard appeared a popular area for lunching and reading.



The unwelcoming space of the Guildhall means most visitors pass through

5. Options for Quietening

With the Guildhall available for event hire, and open to the public, we felt that this very large open area was under-used, possibly due to its formal nature and shortage of features which encourage people to feel it is appropriate to linger. Although the noise level measured was relatively high, this might not be wholly representative, and this was subjectively one of the quieter spaces we visited – however we felt it would not currently meet any criteria for a welcoming space. Features could be added to make it a more attractive and tranquil area for visitors and workers.

5.1 Reduce Noise Reflection

The canopy over the entrance to the library and other bare concrete fascias that are modern could be greened with

appropriate evergreen climbers (for example ivy or honeysuckle). Using a suitable supporting structure, this could contribute to the absorption of noise in the space and also encourage biodiversity.

5.2 Planting a Tranquil Area

As this is a very large space, it may be possible to create a small planted area at the eastern side where seating and shade would provide a comfortable sheltered space for visitors to enjoy the architecture of the Guildhall – the pond outside the yard appears very successful even though it provides only a view of the street. Evergreen planting/pergola/arbour seating could be provided to reduce the subjective impact of overflying aircraft. Planters could also be used to break up the space. These could be situated to take account of civic events, and some could be mobile. Alternatively, a border of planters could be placed inside the yard, which would allow some sheltered seating and a walkway around the central space, with plants marking the entrance to the Guildhall itself. Evergreens such as holly and bay and herbs like rosemary and lavender would be appropriate to the medieval space (and could have the added benefit of attracting birds and natural sounds into the space); alternatively planting could draw on associations with the Roman amphitheatre or specific trades once carried on in the City, including demonstrating links with Livery Companies

5.3 Noise Barriers

Noise intrusion from surrounding streets was not significant at the time of our visits. Barriers at the entrances to surrounding streets could provide protection from intermittent traffic and construction noise; they could be transparent to retain views into the space, staggered to allow vehicles to enter and leave and/or potentially moveable. These could also provide surfaces for some interpretative information about the Guildhall. Alternatively, corridors of planting or planters leading into the yard, while affording less actual noise reduction, could help create a more relaxed space.



Panoramic impression of a greener, more tranquil, Guildhall yard

5.4 Water Features

Addition of an appropriately placed and designed water feature – maybe in front of the newer west wing – could provide attentional masking sound reducing the intrusion of environmental noise, and an additional area for seating and space for calm reflection. Alternatively, paving-mounted water jets could be inserted in a pattern reflecting the Roman amphitheatre, or cutting across it with a pattern reflecting another era in the long history of the City. Experience at Somerset House has shown how such large scale ‘architectural’ use of water and its sounds can animate a space, transforming popular perceptions of it. Continued use for formal civic and other purposes is allowed when the water jets are switched off.

E. Aldermanbury Memorial Garden

1. Site Character

A commemorative garden with an elevated seated area to the south and a sunken grassed area in the church ruin, comprising a knot garden and symbolic hedging.

2. Measured Noise Level

Bureau Veritas: 59.7 dBL_{Aeq,15 minute}, October 2007

3. Soundscape

At this site noise was intermittent from vehicles with no persistent traffic. Other sounds included aircraft, helicopters and construction.

4. Use of Area

At the times of visiting the elevated area was filled with lunching workers on the benches, people sleeping, and people were also seated in the sunken area of the former church. A tour party visiting historic churches also passed through.



The sunken area of Aldermanbury provides a quiet space in summer. Seating in the elevated area is well used, but exposed to noise and weather

5. Options for Quietening

This garden was one of the quieter of those visited. The formal seating area, however, is very exposed and would probably be less enticing in winter. More protection from sound and the elements could be provided by higher evergreen hedging, with trellis/ pergola around the seating area to provide some shelter. Also, plants that create sound such as beech hedge would give some attentional masking of environmental sounds.

F. Leadenhall Market

1. Site Character

Enclosed roofed building, open ended, with cafes, restaurants, shops and market stalls.

2. Measured Noise Level

67 dBL_{Aeq,15 minute}, Bureau Veritas, October 2007

3. Soundscape

At the time of visiting, mid morning in summer, most sound came from conversation at cafes. Also intermittent reversing alarm on rubbish trucks, rubbish trolley rattling, sirens. This is a highly enclosed area with hard surfaces so when busy, multiple reverberation will tend to raise sound levels substantially.

4. Use of Area

Restaurants, cafes, market stalls, boot cleaning.



Uneven paving increases noise from deliveries

5. Options for Quietening

Most of the noise here was generated within the enclosed space, with only intermittent noise coming from outside. At the time of visiting the dominant noise was conversation, which was likely to be perceived by most users as pleasant. It might be possible to reduce intrusion of environmental noise from external sources such as service vehicles by use of sound absorptive surfaces or even suitably designed glazed screening across entrances, although the latter could require changes to delivery arrangements and would change the character of the arcades. It would be preferable to seek improvements in the sound design of delivery vehicles and, particularly, delivery trolleys where considerable improvements could be made at limited cost. The surface inside the market was a mixture of slab paving and older tiled paving. If these are not of heritage interest, the use of acoustically softer, sound adsorbing surfaces could reduce some of the clatter of tables and chairs, and trolleys used for transporting goods and waste. A competition could be considered for demonstrating innovative surfaces. Also, some work³⁶ has found that plants can absorb and scatter sound in hard surfaced indoor spaces, so

³⁶ <http://www.plants-in-buildings.com/acoustic.php>

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increasing the number of plants against walls and in corners of the space could also be considered.

G. Finsbury Circus

1. Site Character

Oval park enclosed by trees, surrounded by medium height buildings. Hosts a restaurant and bowling green.

2. Measured Noise Level

70.5 L_{Aeq 15 minute} Bureau Veritas, October 2007

3. Soundscape

Traffic noise was distant. Most sound came from people – footsteps, rustling sandwich wrappers, wheeled suitcases. The noise level recorded in this area appears high, as although busy, this park subjectively felt calm and peaceful.

4. Use of Area

The park was packed on a hot summer lunchtime with workers and visitors.



Very busy in the summer, Finsbury Circus is shielded by buildings so the main source of noise is visitors.

5. Options for Quietening

Finsbury Circus is well protected from wider traffic noise by the continuous line of surrounding buildings and vegetation. Providing more evergreen planting could increase protection in winter. Also, seating was in short supply – with all wall surfaces taken up at time of visiting, more designated seating, if space allows, might reduce congestion. However, overall this space appeared as a good example of a tranquil City park. We understand that Finsbury Circus is scheduled to be taken out of use as a construction site for Crossrail. If this leads to the loss of mature trees, and if traffic still needs to use the street around the edge of the open space, changes in edge design, and possibly lowering the level of the space could be considered (subject to maintaining sunlighting, given the height of buildings to the south). Also, as this space was observed to be extremely well used, we would suggest that improvements to nearby open spaces should be prioritised if Finsbury Circus is to be out of use.

H. Cleary Gardens

1. Site Character

The garden is on several levels. A pergola screened by railings faces onto busy Queen Victoria Street, with a wide entrance to the side leading to a level garden. Steps lead down to a second hard surfaced level, and further to a grassed area. The tube station is

vented in the middle of the garden – the odour from the tube tunnel is evident, together with the intermittent passage of trains. Sponsored by a French wine company, there is some planting that lends a rustic feel. There are also many hard surfaces and pergola structures with little green cover. This area is well provided with seating. The garden is listed on London Wildweb suggesting it hosts wildlife. While secluded and quiet, the lower area did not feel particularly safe or welcoming.

2. Measured Noise Level

None available.

3. Soundscape

Traffic noise from the road is very intrusive in the upper level. Also the distant sound of the tube can be heard. The lower levels of the garden are shielded from the noise. While quiet, we felt that these lower spaces were not particularly welcoming, with many hard surfaces and, being overshadowed by high buildings, with restricted light.

4. Use of Area

At the time of visiting one or two resting workers sat in the upper garden, while businessmen drank beer in the lower garden. Although very well provided with benches, we did not observe these being used.



With hard surfaces and uneven planting, this area around the tube vent would benefit from a more welcoming layout

5. Options for Quietening

The main noise source here was traffic in the upper part of the garden. The tube could be heard but at a level likely not to be perceived as intrusive.

5.1 Upper Level

To reduce the impact of the traffic noise, barriers or planting could be used. We observed no-one seated in the covered walkway which looks through railings onto the road. Using planting that creates sound here, e.g. beech hedge or bamboo, as a solid barrier would help protect the garden. The entrance allows noise in and a view of the busy road. Providing a set back hedge here or another type of screen could reduce the visual if not the aural impact of the road. More could be done to reduce the impact of the tube vent. Growing climbers such as honeysuckle on this might also reduce the impact of odour.

5.2 Lower Levels

At the time of visiting, while quiet, these areas did not feel particularly safe or comfortable. Providing more greenery might make them more welcoming and therefore more inviting. This

could also attract more wildlife. However, the seclusion and lack of sunlight, while making the space relatively quiet did not make it feel particularly safe.

I. Barbican

1. Site Character

The public area of the Barbican hosts an arts centre and a sizeable open space, of which the focal point is a large artificial lake, with multiple fountains and other water features. To the north are restaurants attached to the arts centre. To the south is a large paved area outside St Giles church, with gravestones set on raised areas, used for seating.

2. Measured Noise Level

60.9 dBL_{Aeq 15 minute}³⁷ Bureau Veritas, October 2007

3. Soundscape

On the arts centre side, the sound of fountains dominates. Traffic noise is scarcely perceptible here. On the church side, there is intermittent distant vehicle noise, and the area is used for vehicular access.

4. Use of Area

The area is well used by visitors to the Barbican taking refreshment or relaxing.



Fountains in the Barbican provide a background sound for the seated area outside the arts centre.

5. Options for Quietesting

While this area is fairly quiet, vehicles do pass through on a designated route in front of St Giles. There are a few trees here. Planting of a dense mixed evergreen hedge, to screen off the vehicle route would increase the sense of tranquillity in this area and reduce the noise impact of any passing vehicles, although the numbers are small. It would also, however, provide shade and shelter in what some may feel is a fairly harsh open space, and add to opportunities for wildlife habitat. On the arts centre side of the lake, the fountains dominate the soundscape. The level of sound generated by the multiple water features is almost certainly higher than required to mask background city sounds, particularly during evenings and weekends. There is evidence³⁷ to suggest that varying the sound of water features through time improves perception, compared with continuous, unvarying water jets, which can be perceived as relentless and over-dominating. In the case of the Barbican, the water features could, following consultation with arts centre users and residents, be operated so as to provide both short term variability, perhaps in patterns developed with participation of musicians or sound artists, and real-time responding to changes in the levels of otherwise intruding ambient noise. Savings in the energy cost of pumping water for these large water features might meet the cost of introducing such variability. User surveys might be carried out to help optimise patterns of operation, and to provide useful evidence for design of other water features in the City and beyond.

³⁷ e.g. Analysis of Peace Gardens, Sheffield by Professor Jian Kang et al, University of Sheffield

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Appendix 2 Plant Suggestions

Plants for Sound

There are a number of plants that can impact on the acoustic environment – although we could find no detailed research on this. Dense evergreens can shield noise sources and may have some impact on noise reduction – for example: Holm oak; Laurel; Holly

Grasses and bamboos can provide screening, rustling sound; suggestions include

- *Miscanthus* sp. – good for screening, movement and rustling sound
- *Arundo donax* – large reed, useful for screening, provide movement
- *Miscanthus floridulus*
- *Bamboo* sp. – non native evergreens, provide movement and rustling sound

Plants for Air Quality (Lancaster University)

Best	Medium		Worst
Ash	Apple	Holly	Crack willow
Common alder	Cherry laurel	Italian alder	English oak
Field maple	Common elm	Lawson cypress	Goat willow
Larch	Common lime	Leyland cypress	Poplar
Norway maple	Elder	Lilac	Red oak
Scots pine	Grey alder	Mountain ash	Sessile oak
Silver birch	Hawthorn	Sycamore	White willow
	Hazel	Wild cherry	

Climbers for Wildlife (Living Roofs)

Name	Deciduous/evergreen	Orientation	Wildlife
Jasmine <i>Jasmin officinale</i>	Semi E	S E W	Night scented, attracts night insects and moths
Ivy <i>Hedera helix</i>	D	N E S W	Provides shelter and foraging for birds, shelter for butterflies
Climbing hydrangea <i>Hydrangea petiolaris</i>	D	N E W	Attracts insects, useful for nesting birds
Climbing rose <i>Rosa</i> sp.	D	E S W	Protection for nesting birds
Virginia creeper <i>Parthenocissus quinquefolia</i>	D	N E S W	Attracts insects, butterflies and nesting birds -
Clematis insects throughout the year	D & E	N E W	Range of species provide food and shelter for birds and
Honeysuckle <i>Lonicera periclymenum</i>	D	N E S W	Excellent for insects and birds
Firethorn <i>Pyracantha atalantiodes</i>	E	E S W	Good for birds, bees and butterflies
Nasturtium <i>Tropaeolum majus</i>	annual	E S W	Good for insects

