

Bristol City Council

# Parks & Greenspace Strategy

## Discussion Paper Landscape Infrastructure in Balanced & Sustainable Communities: **Trees and Woodland**

June 2007 re

## 1. Context

'Trees are beautiful objects. More than that, trees offer us important practical benefits: they provide protection from the elements, they remove pollutants from the air, they reduce noise, and they provide shelter for wildlife. Their contribution to our cities is immense, especially to our own health and well-being (Tree Roots in the Built Environment).

The distribution of street trees and trees in parks and green space and accessible woodland is not evenly distributed across the city. Many neighbourhoods across the city are missing out on the important benefits trees and woodland can bring. To achieve balanced and sustainable communities we need to retain existing tree cover where this makes a positive contribution, but also to plant more trees and woodland where space allows especially where there is a deficit.

The urban environment is a difficult place to plant and maintain healthy trees. Problems include drought stress, poor soils, salt damage, vandalism and conflict with neighbours as trees encroach and potentially damage properties and cause shade and problem of leaves. Underground space in urban areas is commonly crowded with the infrastructure needed to connect homes, offices, factories and other buildings to the utility networks (Tree Roots in the ....). Bristol is no exception, and this prevents tree planting in many streets and green spaces that otherwise are in desperate need of greening. Solutions to this problem are available, but often are expensive: typically the greatest opportunity to re-route underground services is when land is re-developed.

## 2. The Value of Trees and Woodland

The contribution that trees and woodland make to balanced and sustainable communities is summarised below. Whilst these benefits are presented individually, they must be considered as a whole. Equally, such benefits should be read in combination with the benefits of wildlife in general which is more fully explored in *Topic Paper: Landscape Infrastructure in Balanced and Sustainable Communities: Wildlife*.

The benefits of trees and woodland can be summarised in four main areas:

**Attractive environment and healthier lives** - trees green the city and soften harsh urban environments, trees make people feel better, reduce stress, reduce airborne pollution, act as air conditioners, people get satisfaction from planting and growing trees and trees and woodland bring wildlife into the city.

**The local and regional Economy** - tree rich landscapes encourage inward investment and create jobs, house prices are higher where there are mature trees.

**Improving difficult urban land** - trees stabilise soil and help with land reclamation

**Useful products** - wood biomass used to generate power and heat.

In further detail the following benefits are recognised:

## An Attractive City

Bristol's trees and woodland make a significant contribution to the overall sense of a green city. Our trees make the city a more attractive place to live, relocate, work or visit. Street trees in particular bring essential greenery in otherwise harsh urban environments, especially where there is a lack of parks and green spaces. Whilst the total area of woodland in the city is relatively small, when viewed together with trees in parks, green spaces and private land the impression across parts of Bristol is of an extensive 'urban forest'.

## Cultural Importance and Local Distinctiveness

Trees can 'strengthen local distinctiveness and this in turn can help engender a stronger sense of community pride (1)'. As established features within an area, they will also reinforce its special local character, and help 'counter the sameness of so much of the modern built environment (1)'.

Trees have, over centuries, been significant in marking or defining key elements of local communities. Typically, a tree enclosed square or green, will have functioned as a settlement's hub, where people would meet and interact socially, be entertained and hold markets, etc.

## Strengthening Communities

The involvement of local people in issues associated with their environment is a recognised catalyst to their greater engagement in, and commitment to, community life. Initiatives for the planting and establishment of trees are common means for triggering people's realisation that they can have a tangible long-term stake in where they live (71 and 72 in TM). The involvement of children and young people in planting young trees can be particularly powerful. It can engender a sense that they are stakeholders in their environment, whilst increasing their awareness of the years it takes to establish trees, whereas it only takes minutes of vandalism to kill a mature tree.

## Community Safety and Crime Reduction

Recent research indicates that the presence of trees actually reduces the incidence of crime. This may, in part, be due to the higher natural surveillance of well-used greenspace, as sites with trees have been found to attract more people than those without. Research has also linked the presence of vegetation to mitigation against mental fatigue, often 'a precursor of outbursts of anger and violence (40)'.

## Emotional Well-being

A growing amount of scientific evidence supports the popular belief that people feel better in green, leafy surroundings, many seeking solace amongst trees and woodland, and in the presence of wildlife. Urban residents suffering from stress have been shown to experience less anxiety when they have view of trees (25, 26, 27 TM)

Peoples association with trees is important and this is frequently borne out by research and press coverage. Prior to progress with the Dings Homezone, Sustrans had recorded a concern in excess of 85% regarding 'the lack of trees and greenery within the study area'.

It can be little surprise that trees are so instrumental in raising spirits; they bring people back in touch with nature and of natural cycles, including seasonal change, and that becomes progressively more important as the built environment intensifies. Their calming green presence is also conducive to relaxation in

### Physical Well-being

In an increasingly sedentary, vehicle and sofa-bound society, lack of exercise is very serious threat to public health. A well-treed urban landscape is more sheltered, more stimulating, and more likely to encourage local journeys on foot or bike, thus making active outdoor exercise more enjoyable (T M).

Physical exercise taken in greenspace with trees that filter airborne pollution will be more beneficial than that taken alongside a busy highway with traffic fumes (17 in TM).

### Shelter

Trees substantially reduce windspeeds (2), and as a result, bring shelter to urban spaces and reduce air turbulence around buildings, particularly tall buildings that can generate localised vortices and create what would otherwise be an uncomfortable human environment. Whilst protecting buildings from some of the more impacting effects of weathering, the presence of trees can reduce the cost of their heating and air conditioning costs. This may well also result in energy consumption savings of up to 10%, whilst reducing air pollution that would otherwise arise from heating through burning fossil fuels (3).

### Air Quality and Air Cooling

(See also *Topic Paper: Landscape Infrastructure in Balanced & Sustainable Communities: Health & Wellbeing*)

PPG 17 acknowledged that green spaces in urban areas, act as 'green lungs' and 'can assist in meeting objectives to improve air quality' (REF1).

Green infrastructure in all its forms, notably as greenspace, trees, and green roofs, will have an important contribution in countering what is termed the Urban Heat Island (UHI) effect, where built-up areas are by their nature significantly warmer than surrounding areas which are not.

Trees directly contribute to cooling the air (6), particularly in summer, through the moisture they emit from their leaves; the shade they cast and the upward reflection of heat from their foliage.

Where large belts of trees are planted, they tend to be very effective at trapping toxic particles, such as lead (15 in TM), that are known to have a range of health impacts.

The UK Government estimates that more than 24,000 people die prematurely each year as a result of air pollution (14 in trees matter). Tree canopies physically filter dust and fine particles such as PM<sub>10</sub>s, which are known to make chronic asthma and bronchitis worse. A study in the West Midlands, suggest that doubling tree cover across the region would reduce the concentration of PM<sub>10</sub>s by 25%, which could prevent 140 premature air pollution related premature deaths in the region every year (17 in TM).

The cooling and shading effect of urban trees also help reduce the rate at which ozone (O<sub>3</sub>) is produced; ozone is a smog-forming gas that can, if concentrations are high enough, result in symptoms ranging from stinging eyes, nose and throat, to irritation of the lungs, coughing and chest pains (13/4).

### Noise Reduction

Noise pollution is a major cause of stress. If a belt of trees is dense enough it can reduce noise by as much as 6-8 decibels for every 30 metres width of woodland (21 in TM). And there is evidence that if trees hide the source of the noise then it can seem less intrusive (23 in TM).

In this way, the addition of tree and hedge planting to the edge of Greville Smyth Park has brought some valuable buffering from the A370, Jessop Way.

### Shade Provision

Excessive exposure to the sun is being linked to an increased incidence of skin cancers. As climate change becomes a reality and summers become hotter and sunnier, trees play a vital role in providing dapple shade. Provision of adequate summer shade is seen as particularly important in car parks, in school grounds (24 in TM) around retirement homes, in city streets and sitting areas in parks and green spaces.

### Ecology

Trees and woodlands represent important wildlife habitat in Bristol, a city that has a national, if not international, reputation for its nature conservation. ‘Much of our wildlife has its origins in the natural woodland cover of the British Isles, and the trees and woods in towns provide an opportunity for the public to enjoy nature on the doorstep (1, 25). However, ‘it is not always necessary to have direct physical access in order to enjoy woodland wildlife. People can be satisfied simply by knowing that wildlife exists around them, (1, 32), and undisturbed sanctuary areas can increase wildlife populations for the surrounding neighbourhood (1, 31, 33)’.

For further detail see: *Topic Paper: Landscape Infrastructure in Balanced and Sustainable Communities: Wildlife*. Refer also to: *Topic Paper: Landscape Infrastructure in Balanced & Sustainable Communities: Ecology*.

### Economy

Many of the ways in which trees contribute to the local economy, may be considered in the context of an overall greenspace contribution, as described in greater detail in associated *Topic Paper: Landscape Infrastructure in Balanced & Sustainable Communities: Economy*.

### Rain Storm Protection & Flood Control

The presence of greenspace is an optimum element of Sustainable Urban Drainage Systems (SUDS). Environmental gain may be increased where green areas not only provide natural water attenuation capacity but also accommodate existing or new habitats that will be beneficial for wildlife. Researchers also point to the cost benefits of SUDS schemes over conventional drainage construction. Tree canopies also play a valuable role in intercepting rainfall before it reaches the ground, allowing it to gradually drip or evaporate, thereby reducing the risk of flash flooding, whilst conserving ground water (5).

### Ground Stabilisation

Trees make a major contribution to ground stabilisation, whereby tree root systems act to bind the particles of soil together. Their presence will also serve to reduce the risk of soil erosion, their foliage intercepting heavy rainfall and ‘taking the sting’ out of any immediate impact. The brown colour of the River

Avon, arising from the amount of water-borne sedimentation, provides local evidence of the amount of soil irreversibly lost during each heavy rain storm. Where trees are able to reduce such loss, benefits will also be realised in the reduction of costs otherwise associated with highway drainage and water waste management.

### **Remediation of Contaminated Land**

In common with many cities, Bristol has its legacy of contaminated land. Whilst any remediation must be guided by scientifically-based and authoritative principles, in some cases a programme of measures may include ‘phytoremediation’ or ‘phytostabilisation’ which use plants and trees to immobilise, convert, or remove some contaminants. These are long term measures, ultimately resulting, for example, in the felling and removal of timber, thereby extracting a level of contamination (8). The planting of trees in this way may also reduce the damaging effects of leaching and erosion, although advisers must be clear as to the appropriateness of this approach in relation to the nature of the contamination.

### **Climate Change**

Trees, in common with all vegetation, absorb carbon dioxide (one of the principal greenhouse gases) and release oxygen during the process of photosynthesis. However, since it takes a wood the size of a football pitch to absorb the carbon dioxide of an average person in the UK (2 in TM), this role for trees in towns will always be strictly limited (3 in TM). The greatest opportunity is to use trees to adapt to climate change whether that be to reduce temperature by shading and air conditioning, or to plant new species of tree better able to cope with an altered climate.

## **3. Challenges associated with Protecting Existing and Establishing New Trees**

In ensuring that trees are able to contribute adequately to both future development and the regeneration of the existing environment, a substantial number of barriers need to be overcome. These may include:

- Some developers’ desire to maximise the fullest possible built footprint, without taking adequate account of the value enhancing effect of a green outlook from property of any kind,
- Services, including the routes of underground cables and inspection chambers,
- Highway-related constraints, including sight lines,
- Interruption of key views,

In addition to these are concerns that relate to the wellbeing of existing trees, or conditions that may impact upon existing or new specimens’ ability to flourish or survive.

- Vandalism,
- Disease,
- New services, including cable communications service providers, trenching through tree root systems,
- Highway widening measures, including incorporation of bus lanes,
- New driveway construction, where adjacent to existing street trees,
- Removal where not covered by tree preservation order or conservation area constraints,
- Poor management of private trees

Whilst acknowledging that there are inevitable constraints in relation to establishing trees in urban areas, the hope is that a heightened awareness on what trees bring, can unlock a shared commitment from all involved to pressing hard for a city full of trees.

## 5. Conclusions

- In the context of building new balanced and sustainable communities, trees will bring both balance and sustainability.
  - As living densities increase, so too will the need for a green outlook.
  - In pure cost: benefit terms, trees are low cost: high value to the community.
  - The inclusion of trees as part of green infrastructure, must be an integral part of the development equation, spatially and financially.
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