

# Trees in the Townscape A Guide for Decision Makers



Trees & Design  
Action Group

# 21st Century Urban Trees...

## Trees make places work, look and feel better

As well as playing a role in climate proofing our neighbourhoods and supporting human health and environmental well-being, trees can also help to create conditions for economic success. This guide takes a 21st century approach to urban trees, providing decision makers with the principles and references they need to fully realise this potential.



Trees matter for 21st century neighbourhoods, towns and cities. While over 80% of the UK's population live in urban settings, trees in and around built-up areas – which many call the “urban forest” – have become a key component of the infrastructure that makes places work, look and feel better.

Trees are part of the solution to some of the key challenges of our age, from climate change to declining health and well-being. Trees work to restore the environmental and social balance in our neighbourhoods and town centres, contributing to the conditions for economic success. What is more, they can often do so in more cost-effective ways than some traditional forms of infrastructure. Consider for example stormwater management, urban cooling, air quality improvement and the visual amenity of seasonal colourful displays: no single man-made asset will match what a mature tree can deliver.

The idea of urban forestry might seem like an oxymoron. Yet the term is internationally used to emphasise how important it is for urban trees to be managed as a whole to bring maximum social, economic and environmental benefits to the local community. The research findings and tools now available for assessing the value of tree benefits make a strong case for this approach. In Torbay for example, the contribution local trees make to air pollution removal and carbon sequestration alone was estimated to be worth £6.4m a year.

It is not surprising in this context to see urban trees increasingly capturing attention in political decision-making. In 2010 the UK government launched the *Big Tree Plant* as the national tree planting campaign, alongside which the Mayor of London spearheaded the RE:LEAF initiative aimed at increasing London's tree cover. Further afield, the mayors of the three largest cities in the US – Los Angeles, New York and Chicago – have initiated ambitious urban forest programmes to plant and provide for the long-term stewardship of one million trees over the next few years.

### **This guide sets out 12 principles**

21st century towns and cities need a 21st century approach to trees – one that keeps pace with and responds to the challenges of our times.

*Trees in the Townscape* offers a comprehensive set of 12 action-oriented principles which can be adapted to the unique context of your own town or city to provide a roadmap for trees in a 21st century context. Each principle is fully supported by explanations of delivery mechanisms, examples of the principle in practice and links to further references.

*Trees in the Townscape* focuses on individual trees in the urban forest, whether highway trees, trees in public open spaces and housing land or private trees. It does not cover urban woodland management.

### **Who should use the 12 principles?**

The 12 principles in *Trees in the Townscape* are for everyone involved in making or influencing decisions that shape the spaces and places in which we live. It will be particularly relevant to local elected members, policy makers and community groups together with large land estate owners, such as registered social landlords. It will also be useful to those professionals who bring their technical expertise to facilitate delivery, such as engineers, architects, landscape architects or urban designers.

### **How were the 12 principles developed?**

This guide was developed by the Trees and Design Action Group (TDAG) based on over 40 interviews and wide consultation with key knowledge holders in the built environment sector including civil engineers, insurers, developers, designers, planners, tree officers, sustainability specialists, arboriculturists, tree nursery managers, ecologists, academics, and not-for-profit organisations specialising in community engagement and trees. More details about TDAG together with a full list of contributors can be found at the end of this document.

# ... need 21st Century Champions

## Become a *Trees in the Townscape* champion today:

- Circulate this document widely among local organisations and opinion-formers.
- Seek official endorsement of the 12 *Trees in the Townscape* principles by your city, county, town, district or parish council and other key local organisations. A ready-to-use

endorsement motion and an up-to-date list of endorsers can be found at [www.tdag.org.uk](http://www.tdag.org.uk).

While going to press, the 12 principles in this guide had already received a groundswell of endorsements. Here is what our first *Trees in the Townscape* champions had to say:



“Our councillors, parish council members and communities can now use sound, practical advice on how to make space for trees in towns to ensure they grow to last a lifetime. Our urban forest – the population of trees across our towns – will be better protected, improved and expanded through this initiative.”

Pam Warhurst, Chair of the Forestry Commission



“TreeBristol, is one of the most successful planting and management programmes for city trees in the country. *Trees in the Townscape* validates our approach and points out opportunities to go forward.”

Cllr Simon Cook, Leader, Bristol City Council



“Quality green spaces have a profound impact on people’s health and well being. That’s why at Peabody, we’ve been investing in turning the urban forest we manage into a proud asset – with the right trees in the right places for maximum positive impacts. *Trees in the Townscape* offers us a great set of principles to communicate and maintain momentum on this work.”

Stephen Howlett, Chief Executive, Peabody



“Birmingham is built on a vision: its future is as a sustainable city, where trees make a critical contribution to its success as a healthy place to live and work, and its resilience to climate change. I thoroughly recommend this practical guide.”

Cllr James McKay, Cabinet Member for a Green, Safe and Smart City, Birmingham City Council



“We fully recognise the important role that our trees and woodland areas play not only within the environment but also in terms of the quality of life for our residents and visitors. I am delighted that we are supporting *Trees in the Townscape* and helping to ensure that our decision makers and appropriate officers are given the support and guidance they need to ensure the long term future of our trees.”

Cllr Jeanette Richards, Executive Lead for Tourism and Environment, Torbay Council



“The multiple benefits trees bring to a business district make perfect economic sense. Often they are undervalued, but we are working to put this firmly back on the business agenda – and the 12 *Trees in the Townscape* principles provide a clear roadmap to get there.”

Tom Foulkes, Chairman, Victoria Business Improvement District



“The *Trees in the Townscape* 12 Principles is a great idea. It offers practical guidance and best practice examples to increase the number of trees in cities; bringing health and other environmental benefits for us and future generations of residents. The ‘York Economic Vision: New City Beautiful’ noted the relatively small number of trees in our city and we have since progressed our commitment to planting thousands more trees in York through our Treemendous York Campaign.”

Cllr James Alexander, Leader, City of York



“Trees should be seen as an asset rather than a liability; like any asset they need to be well managed to maintain their value. We endorse the principles in *Trees in the Townscape*, and will actively promote them to our partner organisations.”

Howard Toplis, Chief Executive, Tor Homes – part of the Devon & Cornwall Housing Group



“We recognise that trees are an integral component of our townscape, and we are committed to maintaining and increasing our tree cover wherever practically possible. *Trees in the Townscape* provides us with valuable examples of how to manage our existing trees and plan for new trees in order to ensure that their benefits are enjoyed both now, and by future generations.”

Cllr Philippa Roe, Leader, Westminster City Council



“Trees are an important part of the vitality and well-being of our City and help make it a more pleasant place to live and work. *Trees in the Townscape* provides a clear, comprehensive step by step framework to sustainable management of this valuable resource. It is a guide which Newcastle City Council will use as we continue to implement and develop our own tree strategy – Trees Newcastle.”

Cllr Nick Forbes, Leader, Newcastle City Council



“Hackney has invested considerably in street trees in recent years, in recognition of the many positive benefits they bring to the local environment and all who live, work, and visit the borough. We welcome this guide as an opportunity to both share our experiences and learn from experiences elsewhere.”

Jules Pipe, Mayor, London Borough of Hackney

# 12 Principles

## Plan

**1/ Know Your Tree Resource**  
[Page 10](#)

**Key Players**  
 Champion commitment at committee or board level

**2/ Have a Comprehensive Tree Strategy**  
[Page 15](#)

**Local Councillor Planner**  
**Sustainability, Housing, Highways, Open space Officers**  
**Tree Officer**

**3/ Embed Trees into Policy and Other Plans**  
[Page 20](#)

**Businesses and residents associations**  
 Lead policy writing and enforcement

- Key Actions**
- Establish who needs to know what
  - Build a big picture understanding of your urban forest
  - Where needed, add more details
  - Create a receptive environment through champions, engagement and consensus-building
  - Define policies and develop an action plan
  - Monitor, learn and review
  - Adopt ground rules for tree management, including explicit standards for tree replacement and tree planting
  - Dedicate resources to policy enforcement
  - Get trees into other plans

## Design

**4/ Make Tree-friendly Places**  
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**Key Players**  
 Bring forethought into briefs and proposals

**5/ Pick the Right Trees**  
[Page 35](#)

**Planner/ Development Control Officer**  
**Developer/ Site Owner**  
**Designer**  
**Tree officer**  
**Engineer**  
**Utilities providers**

**6/ Seek Multiple Benefits**  
[Page 40](#)

**Arboriculturist**  
**Nurseries**  
 Integrate green and grey infrastructure for wider returns

- Key Actions**
- Favour larger trees
  - Survey existing trees
  - Include underground matters - utilities, foundations
  - Draw up a robust tree protection plan
  - Consider the expected benefits and functions of the trees
  - Use the context to inform the selection process
  - Investigate site constraints, such as soil types and light
  - Call on specialist advice
  - Look at how trees can be part of the infrastructure, such as calming traffic, providing enclosures, supporting economic regeneration and public health programmes

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### Plant/Protect

**7/ Procure a Healthy Tree**  
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**8/ Provide Soil, Air and Water**  
Page 52

**9/ Create Stakeholders**  
Page 56

**Key Players**  
Demand and adhere to high quality works standards

**Tree officer**

**Site owner**

**Communities**

**Tree wardens**

**Contractors and sub-contractors**

**Tree voluntary organisations**

Widen knowledge, ownership and participation

#### Key Actions

- Understand tree production systems and use specifications
- Conduct nursery visits
- Make soil volume an upmost priority
- Ensure sufficient watering and maintenance
- Use trained individuals to do the planting
- Explore new planting technologies
- Involve local communities and train staff
- Ensure work on or near trees meets quality standards

### Manage/Monitor

**10/ Take an Asset Management Approach**  
Page 64

**11/ Be Risk Aware (Rather than Risk Averse)**  
Page 69

**12/ Adjust Management to Needs**  
Page 73

**Key Players**  
Prefer proactive over reactive interventions

**Site owner**

**Tree officer**

**Highway authority**

**Businesses and residents associations**

**Insurer**

**Arboriculturist**

Sustain attention to benefits over time

#### Key Actions

- Estimate the value of your tree resource
- Scale budgets and compensations accordingly
- Understand your duty of care
- Manage risks and benefits in tandem
- Rationalise tree inspections through zoning
- Computerise your logging, managing and inspecting works system
- Promote management regimes that foster biodiversity
- Consider the impacts of climate changes



The starting point for success is understanding where you are and where you want to go. The Plan principles will help you work with others, including councillors, planners and key officers leading on sustainability, housing, highways, green space and trees, together with community volunteers, businesses and residents, to establish these solid foundations for your tree strategy.



# Plan

**1** / Know Your Tree Resource

**7** / Procure a Healthy Tree

**2** / Have a Comprehensive Tree Strategy

**8** / Provide Soil, Air and Water

**3** / Embed Trees into Policy and Other Plans

**9** / Create Stakeholders

**4** / Make Tree-friendly Places

**10** / Take an Asset Management Approach

**5** / Pick the Right Trees

**11** / Be Risk Aware (Rather than Risk Averse)

**6** / Seek Multiple Benefits

**12** / Adjust Management to Needs

# 1/

## Know Your Tree Resource

### Objective

Create and maintain easy-to-use records of the existing canopy cover and the nature and condition of the tree population.

### Benefits

- Helps put trees on equal footing with other types of infrastructure when it comes to making decisions by ensuring that evidence of need can be supported with figures.
- Helps direct resources based on actual needs, rather than historical precedent, which is likely to yield both better results and, in the long run, save money.
- Provides a basis for monitoring progress and results, allowing the impact of development and tree management to be assessed.
- Provides the evidence needed for robust and effective policy, particularly in relation to landscape protection, tree preservation, planning obligations and development control.

## 1/ Know Your Tree Resource

## 2/ Have a Comprehensive Tree Strategy

## 3/ Embed Trees into Policy and Other Plans

### Key Players

Champion commitment at committee or board level

### Local Councillor Planner

Sustainability, Housing, Highways, Open space Officers

### Tree Officer

Businesses and residents associations

Lead policy writing and enforcement

### Key Actions

- Establish who needs to know what
- Build a big picture understanding of your urban forest
- Where needed, add more details
- Create a receptive environment through champions, engagement and consensus-building
- Define policies and develop an action plan
- Monitor, learn and review
- Adopt ground rules for tree management, including explicit standards for tree replacement and tree planting
- Dedicate resources to policy enforcement
- Get trees into other plans

## Actions

### Clarify data needs and data gathering objectives

As with any form of **asset management**, the foundation for ensuring maximum benefits from trees is a clear understanding of what you are dealing with. An important first step towards this is understanding what information is needed, who will use it, what for and how. Making sure the data collection criteria match those required by the evaluation or analysis tool to be used (see [Principle 10](#)) is also an important consideration. Clarity about future uses and system requirements for tree-related data means that the right amount can be collected in the right format.

### Understand the strengths and limitations of the data acquisition methods

Different data acquisition methods yield different results, some coarser than others.

Identifying the nature and conditions of a local tree resource will require ground surveys. Assessing the overall canopy cover in an area might be based on field survey work via visual crown size estimates. Canopy coverage can also be estimated remotely using **geographic information system (GIS)** and aerial or satellite images to manually or automatically map tree crowns.

When full surveys (or full remote analysis of tree canopy) are not possible, sampling techniques should be used so that the data collected still produces a reliable profile of the overall tree population. The more automated the data collection process and the smaller and less carefully considered the samples used, the coarser the results produced. Understanding the strengths and limitations of the approach taken in relation to the degree of finesse and robustness needed is essential.

### Capitalise on volunteering and crowdsourcing

For ground surveys, adequately trained and managed volunteers, such as tree wardens and members of organisations such as Trees for Cities or the Woodland Trust, can provide valuable help. Since 2004, the *Ancient Tree Hunt* (ATH) project led by the Woodland Trust and the Ancient Tree Forum has demonstrated how communities can be used effectively to monitor and map **ancient trees** across the British Isles. The ATH living database of 110,000

**ancient trees** offers a model that could be emulated at a different scale, and applied beyond old tree specimens. The Londoners Love Trees case study provides another good example.

Online collaborative mapping tools and associated phone apps that allow members of the general public to plot trees or add information to the urban forest map in a given area can make the process easier and more fun. The San Francisco case study below provides an example of how this can be managed successfully. Such approaches deliver more than cost effective data gathering; they also help to engage and educate the local community about their trees. To produce reliable results, a robust framework for data validation and training are required.

### Make data accessible and link it into geographic information systems (GIS)

However baseline tree data is held, it is important that it is accessible to a wide range of users. A local planner interviewed in the preparation of this guide explained that he had difficulties enforcing **tree preservation orders** and other tree protection mechanisms because the database holding the local tree survey information was held in a tree works management software, which only the local tree officer had the license to use.

All efforts should be made to ensure that the local tree survey results can be used in the corporate **Geographic Information System** (GIS). This means that data on trees and **canopy cover** can be analysed spatially and in combination with other datasets, which is particularly helpful in understanding needs, benefits and value from trees (see [Principle 10](#)).

### Embed data updates into routine management procedures

Data needs to be kept up-to-date. Once a baseline has been created, updating can be conducted on a rolling basis, integrating as much as possible of the survey work within maintenance and other routine works conducted. Some areas experiencing strong pressures or fast changes might need to be surveyed annually while others may only need to be looked at once every three years. Areas can be zoned based on level of use and surveyed accordingly (see [Principle 11](#)).

Terms that are defined in the Glossary found on page 78 are highlighted throughout the document

## Case Studies

### Greater Manchester tree mapping

In 2006, the City of Manchester commissioned Red Rose Forest, a local community forest organisation, to undertake the city's first full tree audit. At the time, the City only kept records on public street trees and knew very little about the overall size of Manchester's urban forest.

Red Rose Forest worked with a local consultancy using aerial photography to map the tree canopy across the city. The audit results were analysed to identify areas affected by both low canopy cover and high levels of deprivation. This allowed Manchester to target public tree planting efforts in disadvantaged

communities with very few trees. The audit results also provided the basis for setting a canopy cover increase target in *Manchester: A Certain Future*, the City's strategy to manage climate change.

The Manchester tree audit proved so cost effective and successful that neighbouring Salford City Council, which held no information on its local tree population, commissioned similar work. This in turn prompted all 10 Greater Manchester local authorities to join forces to do the same.

The Manchester Tree Audit phase 1 and phase 2 reports can be found at <http://www.redroseforest.co.uk/downloads2.htm>



Manchester's canopy cover map. © Red Rose Forest

### Londoners Love Trees

Trees for Cities started the Londoners Love Trees project in 2012. It is designed to recruit 4,000 volunteers for growing, planting, surveying and caring for urban trees. It builds on the success of Trees for Cities using trained and supervised volunteers to help conduct an i-Tree Eco survey in the Victoria Business Improvement District in the previous year. The project is delivered in partnership with The Tree Council, The London Tree Officers Association and Barcham Trees and funded by a Mayor of London's community engagement programme.

Londoners Love Trees volunteers will assist with the first i-Tree Eco survey for the whole of London and with ongoing monitoring of the success and well-being of the trees that Trees for Cities has planted. Volunteers will have the opportunity to receive a wide range of training in urban forestry and community tree planting, with accredited options available.

Further information on the Londoners Love Trees volunteering scheme at <http://www.london.gov.uk/node/9371>

The Victoria BID i-Tree Eco report can be found at <http://www.victoriabid.co.uk/downloads/>

## San Francisco Urban Forest Map

The Urban Forest Map project is a collaboration between government, not-for-profit, businesses and residents to map every tree in San Francisco. It consolidates existing tree databases from various organisations, puts the information in the public domain and enables anyone to search through records or suggest edits. The project is managed and moderated to ensure that any data submitted via the website by individuals or organisations is validated before being definitely “written into” the map. The website also offers useful tips for people who are interested in

contributing to the project but come with little tree knowledge, including videos on how to easily measure **calliper** diameter, or how to recognise the most common species found in urban areas. As the map of San Francisco’s urban forest develops, the website also calculates and displays the environmental benefits trees provide in terms of energy savings, reduction in greenhouse gases, water management and air quality improvement. These benefits are calculated using i-Tree Eco (See Principle 10).

Further information at <http://www.urbanforestmap.org/>

The screenshot shows the Urban Forest Map website interface. At the top, there's a navigation bar with the site logo, a search bar for species, and a location dropdown set to 'San Francisco, CA'. Below this, a summary shows '86,818 trees selected' and 'Export options: KML CSV Shapefile'. A 'Yearly Eco Impact' section lists various benefits: Total Benefits of \$3,446,346 saved, Greenhouse Gas Benefits of 26,947,695 lbs CO2 reduced and \$538,953 saved, Water Benefits of 139,655,336 gallons conserved and \$558,621 saved, Energy Benefits of 13,554,900 kWh conserved and \$1,793,313 saved, and Air Quality Benefits of -94,027 lbs pollutants reduced and \$555,457 saved. A map of San Francisco shows tree locations in green. Below the map are sections for 'Recent updates' and 'Recent photos from users'. At the bottom, a 'How you can help' section provides three numbered steps: 1. Find a tree, 2. Add a tree, and 3. Edit a tree.

San Francisco Urban Forest online collaborative mapping tool.  
© San Francisco Urban Forest Map

## For More Information



Non-technical publications and resources



Ancient Tree Hunt Project  
<http://www.ancient-tree-hunt.org.uk/project>



Professional publications and resources



*Ancient Tree Guide No 4: What are ancient, veteran and other trees of special interest?*  
Ancient Tree Forum and Woodland Trust  
<http://frontpage.woodland-trust.org.uk/ancient-tree-forum/atfnews/news04/images/3709%20ATG%204%20FINAL.pdf>



Scholarly publications

*Guidance Note 7 - Tree Surveys: A Guide to Good Practice.* Arboricultural Association, 2005  
[http://www.trees.org.uk/publications/Guides/Guidance-Note-7-A-Guide-to-Good-Practice\\_2](http://www.trees.org.uk/publications/Guides/Guidance-Note-7-A-Guide-to-Good-Practice_2)

*Trees in Towns II. A new survey of urban trees in England and their condition and management.* Chris Britt and Mark Johnston, for the Department of Communities and Local Government, 2008  
<http://www.communities.gov.uk/publications/planningandbuilding/treesintownsii>

# 2

## Have a Comprehensive Tree Strategy

### Objective

Produce, adopt and implement a collaborative strategy for protecting, developing and managing a thriving, benefit-generating urban forest which is in tune with local needs and aspirations.

### Benefits

- Provides the most effective mechanism to achieve a good general tree coverage.
- Helps ensure that evidence-based and consensus-driven decisions are made, thereby limiting the scope for ad-hoc resource allocation which might favour the most vocal and articulate.
- Creates accountability within defined timeframes.
- Provides a basis for shaping robust planning policy in relation to trees.



## Actions

### Create a receptive environment

The effective development and implementation of a tree strategy requires executive sponsorship. In a local authority, this is best achieved when a councillor, a committee chair or, best of all, the council leader, is the designated “champion” for the strategy.

Equally important is the creation of a cross-disciplinary working group, involving key representatives from within or outside the organisations whose decisions have an impact on local trees, or who might have much to gain from a better management of the urban forest.

Spending time establishing how the working group will engage with a wider audience is also crucial. A great deal of the impact a tree strategy can have is born out of the process of developing it. Inviting other public bodies, commercial and business interests, voluntary organisations and community groups to contribute is one of the most effective mechanisms for gaining their support for delivery. The Manchester case study below provides a compelling example of how this can be done. (See also [Principle 9](#))

### Embrace the whole of the urban forest

It is critical that local authority tree strategies include highway trees, trees in public open spaces and housing land as well as private trees. The extensive survey conducted for the government-sponsored *Trees in Towns II* report found that 70% of urban trees in England fall within private property. Although mechanisms to influence private trees differ from those available for trees on publicly owned land (see [Principles 3](#) and [9](#)), they are equally important to consider.

### Fully address: What do we have? What do we want? What do we do? Are we getting what we want?

In *Trees in Towns II*, these four questions are defined as the pillars of “good practice” for producing a tree strategy.

**What do we have?** Understanding the nature and extent of the tree resource is the best starting point for any meaningful planning and management effort. This will include establishing the overall value of the local tree population as well as describing its profile in quantitative, qualitative and functional terms. For more details, see [Principles 1](#) and [10](#).

**What do we want?** Having objectives that clearly define what future success looks like and the specific benefits the urban forest is expected to deliver provides a critical compass for guiding action. Definition of such objectives requires a broad partnership of stakeholders going far beyond the staff involved with trees. See the Manchester example in below.

**What do we do?** To fulfil its role, a strategy needs to articulate the policy as well as the practical actions required to achieve each objective. This should include measures to:

- Address areas where trees are lacking and needed, which might involve setting some canopy cover goals, as in the Seattle case study below.
- Address imbalances in the age population and species distribution.
- Ensure that defendable, implementable and enforceable wording is adopted as policy and, for local authorities, written into local plans documents (see [Principle 3](#)).
- Set out management standards that support the delivery of expected benefits.
- Ensure that a robust partnership and community engagement programme is designed to fuel delivery (see [Principle 9](#)).

**Are we getting what we want?** Without monitoring progress, investigating why certain things are not working as anticipated and adapting accordingly, there is little chance that a strategy will deliver its stated objectives. *Trees in Towns II* recommends that such a review process is undertaken approximately every five years. The Newcastle case study below demonstrates how effective this can be.

In addition to the *Trees in Towns II* report, *Preparing Borough Tree and Woodland Strategies, a Supplementary Planning Guidance to the London Plan* jointly prepared by the Mayor of London and the Forestry Commission also provides a useful reference for all local authorities.



# Case Studies

## City of Seattle's Urban Forest Management Plan

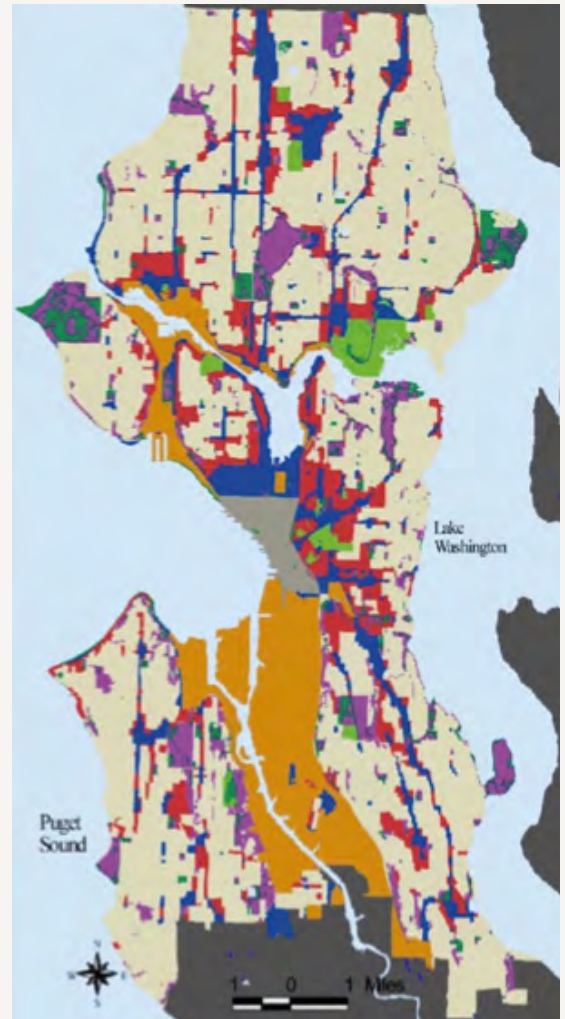
The City of Seattle's Urban Forest Management Plan (UFMP) provides a 30-year framework to reverse a severe decline in the city's canopy cover from 40% in the late 1960s to 18% in 2000. Published in 2007, the UFMP establishes a goal of reaching 30% canopy cover in 30 years, which requires the planting of approximately 650,000 new trees.

Because capacity for tree planting in an industrial setting is very different from that found in residential neighbourhoods or in parks, the UFMP assesses the opportunities and challenges for preserving and enhancing the urban forest in nine land use categories. Goals for canopy cover increase are set for each.

Overview of Seattle's UFMP  
<http://www.seattle.gov/trees/ufmpoverview.htm>

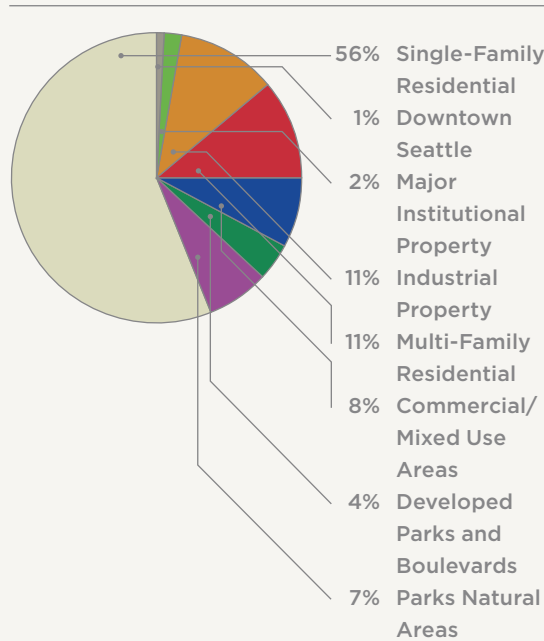
Urban Forestry Management Plan, City of Seattle, April 2007  
<http://www.seattle.gov/trees/management.htm>

UFMP 2010-2014 Implementation Strategy, City of Seattle, 2010  
<http://www.seattle.gov/trees/management.htm>



Extract from Seattle Urban Forest Management Plan. © Seattle UFMP

### Management Units Percentage of City



### Single-Family Management Unit (MU)

| Statistic   | Single-Family |              |
|---|---------------|--------------|
|   | Current       | 30-year Goal |
| <b>Acres in MU</b>                                | 29,921        |              |
| <b>MU as % of Seattle land use base</b>           | 56%           |              |
| <b>Canopy coverage</b>                            | 18%           | 37%          |
| <b>Number of trees</b>                            | 473,300       | 823,500      |
| <b>Planting needed</b>                            |               | 350,200      |
| <b>One-time cost of plantings</b>                 |               | \$52,530,000 |
| <b>Maintenance costs (yr)</b>                     | \$4,733,000   | \$8,235,000  |
| <b>Benefits (yr):</b>                             |               |              |
| <b>Stormwater mitigation value (yr)</b>           | \$7,500,000   | \$12,353,000 |
| <b>Air cleaning value (yr)</b>                    | \$1,420,000   | \$2,471,000  |
| <b>Carbon sequestration (tons CO<sub>2</sub>)</b> | 18,000        | 31,300       |
| <b>Carbon sequestration (value \$)</b>            | \$544,000     | \$947,000    |
| <b>Other benefits (energy, aesthetics, etc.)</b>  | \$6,082,000   | \$10,242,000 |
| <b>Net benefits:</b>                              |               |              |
| <b>all benefits</b>                               |               |              |
| <b>- all costs (yr)</b>                           | \$10,413,000  | \$18,117,000 |

## Case Studies

### Newcastle's commitment to its tree strategy

In 2002, Newcastle City Council adopted a tree strategy, Newcastle Trees, which has been a mechanism for ensuring that trees play their part in helping Newcastle reach its goal of improving quality of life for people living or doing business in the city.

The strategy objective to “protect the trees we have, care for them and plant more trees” has remained unchanged over the past decade. The tree policy and management guidelines that are central to the strategy have only been subject to one minor amendment, in 2006.

What has been fully updated and rewritten twice is the action plan, detailing the set of practical activities and programmes that fuel the implementation

of the strategy's vision and policy framework. The two consultative groups, with officers and members of the public who were involved in the preparation of the original action plan, were kept up-to-date on progress through annual status reports and engaged again to produce the 2008-2012 revised plan. By creating opportunities for feedback, this approach has identified enforcement issues, addressed cost concerns related to street tree replacement and energised the local tree warden scheme – all of which have provided a basis for a more effective implementation of the strategy for over a decade.

The Newcastle-upon-Tyne tree strategy and revised action plan can be accessed at <http://www.newcastle.gov.uk/environment/conservation-heritage-and-urban-design/tree-strategy>



Newcastle City centre square replanted in 2008/9. © Newcastle City Council

### Manchester Tree Strategy's bottom up development process

Manchester's tree strategy started from the bottom up. A small group of concerned citizens approached council members who embraced their idea of a much more concerted approach to managing Manchester's trees and championed the idea of developing a tree strategy. A tree strategy working group was formed, involving local authority officers together with community representatives. Rather than working in isolation, the group convened an ambitious conference in September 2005 to discuss the future of Manchester's trees and woodlands.

More than 60 representatives attended Valuing Manchester's Trees from a range of public, private and voluntary organisations and discussed what should be included in the tree strategy and what its core goals should be. Over 600 ideas, comments and queries were provided, and a complete report of all points raised in the conference was produced. These were eventually condensed into a vision and four objectives on which the strategy is based.

The Manchester Tree Strategy can be downloaded from <http://www.wildaboutmanchester.info/www/index.php/tree-strategy>

## For More Information



*Urban Forest Management Plan Toolkit.*  
California Urban Forests Council and  
the Inland Urban Forest Council, 2011  
<http://ufmptoolkit.com/>



*Green Infrastructure and Open Environments:  
Preparing Borough Tree and Woodland  
Strategies, Draft Supplementary Planning  
Guidance to the London Plan,* Mayor of  
London. Published in January 2012 for  
consultation  
[http://www.london.gov.uk/sites/default/files/  
SPG Tree and Woodland Strategy draft.pdf](http://www.london.gov.uk/sites/default/files/SPG_Tree_and_Woodland_Strategy_draft.pdf)

*Trees in Towns II. A new survey of urban  
trees in England and their condition and  
management,* Chris Britt and Mark Johnston  
for the Department of Communities and  
Local Government, 2008  
[http://www.communities.gov.uk/  
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treesintownsii](http://www.communities.gov.uk/publications/planningandbuilding/treesintownsii)

*Tree Strategies in London, Guidance for  
Local Authorities.* Forestry Commission, 2008  
[http://www.ltoa.org.uk/documents/cat\\_  
view/86-tree-strategy-guidance](http://www.ltoa.org.uk/documents/cat_view/86-tree-strategy-guidance)

# 3

## Embed Trees into Policy and Other Plans

### Objective

Adopt clear standards for the protection, care and planting of trees in the local plan and key corporate policy and investment documents.

### Benefits

- Provides performance thresholds for those working within, with or for the organisation (eg contractors), enabling greater consistency in the tree works being carried out and predictability in outcomes.
- Helps discharge the **duty of care** associated with trees.
- Offers an effective mechanism to manage public expectations, reducing time spent handling ad-hoc requests.
- Contributes to ensuring positive environmental outcomes from new developments.
- Ensures high level buy-in for tree-related issues, which may ease access to resources for trees.

1 / Know Your Tree Resource

2 / Have a Comprehensive Tree Strategy

3 / Embed Trees into Policy and Other Plans

#### Key Players

Champion commitment at committee or board level

#### Local Councillor Planner

Sustainability, Housing, Highways, Open space Officers

#### Tree Officer

Businesses and residents associations

Lead policy writing and enforcement

#### Key Actions

- Establish who needs to know what
- Build a big picture understanding of your urban forest
- Where needed, add more details
- Create a receptive environment through champions, engagement and consensus-building
- Define policies and develop an action plan
- Monitor, learn and review
- Adopt ground rules for tree management, including explicit standards for tree replacement and tree planting
- Dedicate resources to policy enforcement
- Get trees into other plans

## Actions

### **Define and formally adopt the corporate dos and don'ts for the tree stock you control**

Whether within the context of local government or any other organisation, a policy sets the principles and scope for action for those within that organisation or subject to its authority. Under what circumstances will tree removal be considered? How and when will tree pruning be carried out? How will the role a tree may play in subsidence damage be examined? What approach to tree planting and species selection will be taken? These are just some of the ground rules that a corporate policy on trees will define.

To be effective, a policy statement for the management of an organisation's own tree stock needs to be formally adopted at the highest executive level and made public to those affected. For examples, see below the Tor Homes case study, as well as the policy adopted by the London Borough of Islington, presented under [Principle 11](#).

### **Incorporate clear tree protection, replacement and planting standards in the local plan**

In addition to needing sound rules for managing their own tree stock, local authorities have a regulatory role to ensure:

- The preservation of trees and woodlands that offer high public amenity value, regardless of their public or private ownership.
- The provision of adequate green infrastructure in new developments.

Having clear and defensible policies about trees in the local plan is the best starting place for fulfilling these duties. Success will also require dedicating resources for enforcing the adopted policy – but enforcement cannot take place without policy backing. This should involve both high-level policy statements and additional explanations of how policy will be interpreted. The case studies on Sefton and Bristol, below, provide an illustration of how this combination of high-level policy and supporting guidance can work. Critical policy issues to address include:

- An effective use of [Tree Preservation Order \(TPOs\)](#) and [Conservation Areas](#) for the purpose of protecting significant trees and landscape character.

- Clear rules to ensure, in the context of new development, that felling a tree is not always more economical than preserving one and that new developments lead to the planting of new trees (further explained below).

### **Establish tree replacement and compensation measures that make it cheaper for new developments to keep existing large trees rather than fell them**

It is only when a tree reaches and lives through a [mature stage](#) that the return on the investment made to plant and care for that tree is realised. Depending on species, it takes between 15 and 40 years for a tree to grow a sufficiently large canopy to deliver meaningful aesthetic, air pollution removal, rainwater management, and other benefits. From a nature conservation perspective, the older a tree, the richer its wildlife. As a result, even when the planting of a new tree compensates for the felling of an older one, a significant loss is incurred.

It is in recognition of that loss that more and more local authorities, as well as socially and environmentally responsible built environment professionals are adopting tree replacement and compensation measures going far beyond one for one, as exemplified in the Bristol case study example. Leadership in this matter can also be found in the private sector, as demonstrated in the Land Securities case study below.

### **Set tree planting standards for new developments**

Setting tree planting standards provides an effective mechanism to ensure that new developments contribute to the [green infrastructure](#) that makes towns and cities more pleasant and effective places to live and do business. The table provided overleaf offers some examples of how such standards have been defined in different local authorities around the country. Having adopted tree planting standards also enables the collection of [commuted sum payments](#), in lieu of tree planting, when circumstances preclude the requirement to be met on site. This can provide a meaningful complement to a local authority's budget for tree planting. For enhanced effectiveness, such planting standards should be complemented with soil volume requirements, particularly for trees planted in hard landscapes in dense urban environments (see [Principle 8](#))

**Table: Examples of tree planting standards**

|                               | Type (*) | Standard: number of trees          |   |   |
|-------------------------------|----------|------------------------------------|---|---|
|                               |          | Per new dwelling                   | Per new 100 sq.m. commercial floorspace | Per new 100 sq.m. industrial floorspace |
| Sefton <sup>(1)</sup>         | G        | 3                                  | 2                                       |   |
| Dacorum <sup>(2)</sup>        | G        | 1                                  | 1                                       | 0                                       |
| Waltham Forest <sup>(3)</sup> | G        | 3                                  | 2                                       | 1.25                                    |
| Kingston <sup>(4)</sup>       | ST       | 0.2                                | 0.1                                     |   |
| Thanet <sup>(5)</sup>         | G        | 10% cover of development site area |   |   |
| Liverpool <sup>(6)</sup>      | ST       | 0.2                                | 0.1                                     |   |

(\*) G = general tree planting requirement, ie: on-site or nearby; ST = street tree planting requirement

Sources:

- <sup>(1)</sup> *Green Space, Trees and Development Supplementary Planning Document*, Sefton Metropolitan Borough Council, July 2008 and Policy DQ3 saved from Sefton Metropolitan Borough Council's Unitary Development Plan
- <sup>(2)</sup> Dacorum Borough Council's Core Strategy Pre-Submission Draft, Policy CS29, November 2011
- <sup>(3)</sup> *Planning Obligations Supplementary Planning Document*, Waltham Forest, November 2008
- <sup>(4)</sup> *Planning Obligations Supplementary Planning Document*, and associated *Planning Obligations Contribution Matrix*, Royal Borough of Kingston, March 2010
- <sup>(5)</sup> *Planning Advice Note on Section 106 Contributions*, Liverpool City Council
- <sup>(6)</sup> Policy D2 saved from the Thanet District Council's 2006 Local Plan

**Ensure other plans fully relay and support aspirations for the future growth and management of the urban forest**

If the local tree resource is to deliver a wide range of benefits then it must be widely owned and supported. To be realised, urban forest aspirations need to be captured and articulated not only in the tree strategy and the associated action plan but also ripple through a wide range of thematic and/or area-based documents and programmes. Depending on the key local expectations of the tree resource, this might include a sustainability plan, green infrastructure strategies, public health strategies, or transport plans. The Birmingham Forest case study below, and Bristol Great Bus Network project explained under [Principle 4](#) provide examples.

# Case Studies

## Land Securities' 100 for 1 tree replacement policy

In the construction of the Trinity shopping centre in Leeds, developer Land Securities had to remove three trees and accidentally damaged another. As a result, it made a donation to 'The Gift That Grows', a tree sponsorship scheme managed by the local community forest, the South Yorkshire Forest Partnership, enabling the charity to plant 400 new

trees in Cantley Park in neighbouring Doncaster.

This initiative was the result of Land Securities' decision in 2010 to introduce a new corporate social responsibility target. It pledged that for each tree the company cut down or damaged in the process of making way for a new development, it would plant at least 100 new trees at a nearby site.

## Sefton's tree replacement and planting standards

Sefton Borough Council's local plan has a strong policy to ensure that new developments contribute to enhancing local environmental quality, of which trees are recognised as a critical component. Policy DQ3 sets the following conditions for planning permission to be granted:

- Developments should not result in an unacceptable loss of or damage to existing trees
- Trees not retained as part of a development have to be replaced at a ratio of at least 2:1
- New trees must be planted, at a minimum of three trees for each dwelling for residential development; or for non-residential development, whichever is the greater of one tree for each parking space or one tree per 50 square metres of gross floorspace.

Policy DQ3 also makes provision for cases where it is not possible to secure this new or replacement tree planting within the site. In such cases, developers are required to pay a sum in lieu, allowing the local authority to plant trees at a suitable location outside the site. The commuted sum also covers 10 years of maintenance costs.

Since 2005, Sefton Borough Council has planted nearly 2,400 trees, mostly alongside streets, as in the example of Miranda Road in Bootle (below). Approximately 80% of the budget for this work comes from **Section 106 agreements** signed between the local authority and developers as a result of Policy DQ3.

*Green Space, Trees and Development, Supplementary Planning Document, Sefton Borough Council, July 2007*  
<http://www.sefton.gov.uk/default.aspx?page=7446>



New trees along Miranda Road in Bootle paid for by Section 106 funding collected thanks to Sefton Borough Council's tree planting standard. © Sefton Borough Council

# Case Studies

## Bristol City Council tree replacement standard

As part of its goal to increase canopy cover from 13 to 30%, Bristol City Council made sure that its recently adopted **Core Strategy** included a policy on green infrastructure (Policy BCS9) which emphasised that:

- Individual green assets should be retained wherever possible and integrated into new developments.
- Loss of green infrastructure will only be acceptable where it is allowed for as part of an adopted **Development Plan Document** or is necessary, on balance, to achieve the policy aims of the **Core Strategy**.
- Appropriate mitigation for the lost green infrastructure assets will be required.

This, along with the Local Plan policy NE3 on Trees and Woodland, opened the way to the adoption of stringent tree replacement standards. The diameter of the trunk measured at breast height (DBH) provides a proxy for estimating the canopy size of the tree, and determining the number of replacement trees to be planted to achieve similar canopy cover:

| Trunk diameter of tree lost to development (cm)* | No of replacement trees required* (all replacement trees must be 16-18cm girth) |
|--|---|
| Less than 19.9                                   | 1   |
| 20-29.9  | 2   |
| 30-39.9  | 3   |
| 40-49.9  | 4   |
| 50-59.9  | 5   |
| 60-69.9  | 6   |
| 70-79.9  | 7   |
| 80+  | 8   |

\*Figures from SPD 4 draft 1 January 2012 (due for formal adoption 1 January 2013)

Replacement planting would normally be within the development site. Where this is not feasible, developers are expected to transfer funds to the council on a per tree basis. The council then arranges for the trees to be planted on the nearest suitable site.

Further information at <http://www.bristol.gov.uk/page/planning-advice-and-guidance>



Bristol City Council used the compensation payment it received for the loss of a large highway tree adjacent to a new development to plant four new street trees, including this one at a bare road junction on Spike Island. The developer involved also put a new tree back in the highway outside the development. © TreeBristol



### Tor Homes Tree Management Policy

Tor Homes is part of the South Devon and Cornwall Housing Group. As a social landlord, Tor Homes manages over 9,000 affordable homes across south Devon and also takes on the development of new affordable properties for rent or shared ownership.

In 2006 the Tor Homes board adopted a tree management policy, which established a presumption in favour of keeping trees unless there are demonstrable risks of harm. To ensure this is enforceable, the policy also defined how risks will be assessed and how a comprehensive audit of Tor Homes's tree stock would be conducted. The policy also defines clear responsibilities for tree care between the local authority, Tor Homes and its tenants, depending on where the tree is located and who planted it. For new developments, it also established the principle that consideration will be given to the care of existing trees and/or the careful species

selection of any new or replacement trees and will comply with British Standard 5837. Following the policy's adoption by the Tor Homes board, a brochure summarising its key content was circulated among all Tor Homes's tenants. An article was also written in the Tenants' newsletter to publicise the policy and procedure.

According to Rob Scholefield, the landscape manager for Tor Homes, "this tree policy has been worth its weight in gold". Rob has found that securing board level support for the policy has unlocked access to increased resources to manage trees and enabled him to focus spending where it is most needed. Having the policy in place, combined with the fact it was clearly being publicised and implemented, resulted in a dramatic decrease in the ad hoc calls and complaints that Tor Homes had previously received about trees from its residents.



As a result of its tree policy, Tor Homes's new development include good tree planting provisions.  
© Tor Homes

## Case Studies

### A Birmingham Tree Bond for the Birmingham Forest

The City of Birmingham firmly believes that, in order to create a thriving 'Sustainable City' in the 21st century low-carbon economy, a thorough rethink is needed on how to combine **grey** and **green infrastructure** to serve and meet local needs. This approach is transforming the way trees in Birmingham are planned, championed and paid for.

The City aims to increase its tree population significantly by up to 30% by 2026. This increase is designed to contribute to sustainable energy production and carbon storage, and to help dramatically enhance neighbourhood walkability, reduce the urban heat island effect, tackle acute localised air pollution and health issues (see Natural Health Improvement Zones case study under [Principle 6](#)) and provide more cost-effective solutions for stormwater run-off management. This vision, sometimes referred to as 'the Birmingham Forest', is strongly supported through a wide range of plans and programmes. It is clearly articulated in the City's emerging **Core Strategy** (2015 - 2028) and its sustainable development **SPD** called *Places for the Future*; the 2050 Energy Strategy for Birmingham; the City's Climate Change Adaptation Action Plan; and the City's Green Infrastructure Strategy (2012).

To manage this process the City operates a Green Infrastructure and Adaptation Delivery Group chaired by the Environment Agency and co-chaired by the Director of Public Health. In total there are nine disciplines represented in the group, including representatives from businesses, planning, climate risks and transport, in order to integrate evidence gathering, policy writing and delivery capacity.

For example, the group has devised the idea of a 'Birmingham Tree Bond' and will be able to oversee its implementation over the next few years. Essentially the fund is expected to comprise a 1% levy taken from the City's annual energy procurement contracts, to be matched by 1% of the City's annual Community Infrastructure Levy. For a City the size of Birmingham this could produce a perpetual revenue stream of up to £500,000 per year. The Tree Bond would be re-invested in tree planting, tree and woodland management as well as wood fuel production and distribution. This will ensure a wood fuel supply for city-owned buildings currently targeted for conversion to wood fuel biomass, allowing a larger proportion of the City's building assets to be zero carbon rated and eligible for the Renewable Heat Incentive income stream.

Further information at [www.birmingham.gov.uk/greenlivingspaces](http://www.birmingham.gov.uk/greenlivingspaces)



The Birmingham Forest. © Birmingham City Council

## For More Information



*British Standard 5837: 2012. Trees in relation to design, demolition and construction, Recommendations.* British Standards Institute  
<http://shop.bsigroup.com/en/ProductDetail/?pid=000000000030213642>



*Governance and the urban forest.*  
Anna Lawrence and Norman Dandy. In: *Trees, People and the Built Environment*. Forestry Commission Research Report, Mark Johnston and Glynn Percival (Eds.) for the Forestry Commission, 2012  
[http://www.forestry.gov.uk/pdf/Lawrence\\_Dandy\\_2012\\_ICF\\_Governance.pdf/\\$FILE/Lawrence\\_Dandy\\_2012\\_ICF\\_Governance.pdf](http://www.forestry.gov.uk/pdf/Lawrence_Dandy_2012_ICF_Governance.pdf/$FILE/Lawrence_Dandy_2012_ICF_Governance.pdf)

“The aim of urban forestry is to improve the welfare of urban residents; the planting and care of trees is a means to that end, not an end in itself.”

Dr. Mark Johnston (1985) *Community Forestry: a sociological approach to urban forestry*, *Arboricultural Journal* 9, 121-126



Realising the potential of the many benefits urban trees can deliver calls for careful consideration – the wrong tree in the wrong place can cause more pain than plaudits. The Design principles will help you to enable all those involved in the design process – including developers and site owners, designers, engineers and tree officers – to achieve the very best outcomes for trees and people.

# Design

**1** / Know Your Tree Resource

**7** / Procure a Healthy Tree

**2** / Have a Comprehensive Tree Strategy

**8** / Provide Soil, Air and Water

**3** / Embed Trees into Policy and Other Plans

**9** / Create Stakeholders

**4** / Make Tree-friendly Places

**10** / Take an Asset Management Approach

**5** / Pick the Right Trees

**11** / Be Risk Aware (Rather than Risk Averse)

**6** / Seek Multiple Benefits

**12** / Adjust Management to Needs

# 4

## Make Tree-friendly Places

### Objective

Create places where tree species can thrive and deliver their full range of benefits without causing harmful nuisance.

### Benefits

- Provides the conditions for the creation of leafy towns and neighbourhoods.
- Reduces the likelihood of conflicts between trees, structures and people, thus providing for smoother management and reduced costs.

# 4

## Make Tree-friendly Places

# 5

## Pick the Right Trees

# 6

## Seek Multiple Benefits

### Key Players

Bring forethought into briefs and proposals

**Planner/  
Development  
Control Officer**

**Developer/  
Site Owner**

**Designer**

**Tree officer**

**Engineer**

**Utilities providers**

**Arboriculturist**

**Nurseries**

Integrate green and grey infrastructure for wider returns

### Key Actions

- Favour larger trees
- Survey existing trees
- Include underground matters - utilities, foundations
- Draw up a robust tree protection plan

- Consider the expected benefits and functions of the trees
- Use the context to inform the selection process
- Investigate site constraints, such as soil types and light
- Call on specialist advice

- Look at how trees can be part of the infrastructure, such as calming traffic, providing enclosures, supporting economic regeneration and public health programmes

## Background

Principles 4 and 5 tackle some of the key considerations that can help to put the oft-cited “right place, right tree” adage into practice. Two areas ought to be considered in tandem: selecting and positioning trees on the basis of a sound appreciation of the context; and ensuring that the design of surrounding structures allows for trees to thrive. The importance of tree-friendly places is considered here first because it largely pre-determines the very possibility of having any trees in the urban landscape. This does not imply that all places should be expected to accommodate trees, but rather that their exclusion as a result of lack of forethought ought to be avoided.

Creating places that facilitate the co-existence of trees and structures requires integrated thinking on how the two fit together both over ground and underground throughout the life of the tree to maturity and beyond. Trees can easily outlive most of the hard components found around them in urban settings, such as benches, lamp posts, paving materials, and even many buildings. It therefore makes sense to make adjustments to ensure the shorter-lived hard components of our towns and cities are designed with trees in mind, rather than the other way around. For further reading on this, the CIRIA guide *Large species trees in urban landscapes – a design and management guide*, provides a useful reference.

## Actions

### Presumption in favour of large trees

A favourable presumption towards the inclusion of large canopy trees should be part of the policy context (see [Principle 3](#)). It should be considered in the [development brief](#) produced by local authorities setting out the guiding principles for new large developments as well as in any other project briefs directing the refurbishment or improvement of public spaces. For new developments, pre-application discussions provide an important opportunity for this to be clearly communicated to applicants and their design teams.

### Conduct a survey of existing trees early

Making a tree-friendly environment starts with understanding where existing trees are, in order to ensure that their needs are accounted for and, if appropriate, realistic opportunities for additional

planting can be identified. Planning applications routinely require that any existing trees that may be affected by a proposed development, whether on or near the site, should be recorded and taken into account. This information should be collected and made available as early as possible to the project team.

### Push for the use of shared ducts for utilities

Understanding and limiting underground constraints is critical to the creation of tree-friendly places. This includes soil type and conditions, particularly levels of compaction (see [Principle 8](#)) as well as the location of utilities. Use of shared ducts for utility apparatus should be considered as a priority, written into [development briefs](#) and made a planning condition for new developments. This represents a common and cost effective practice for sites that were previously undeveloped. In existing urban areas the relocation of utilities comes at an extra cost but the benefits go far beyond trees. The use of shared ducts greatly eases future utilities servicing and minimises the upheaval of roads.

### Select adequate building foundations to the local soil conditions

Building foundations require special attention to ensure that trees and buildings can safely co-exist. This is of particular importance in shrinkable clay soils where there is a risk of [subsidence](#) (see [Principle 11](#)). In such contexts, the use of deeper, engineered foundations ought to be preferred, as demonstrated in the Wauconda National Bank case study below.

### Ensure foreseeable risks during the development process are addressed in a tree protection plan.

Ensuring places are tree friendly also needs to continue after construction starts, as this is a time when existing trees are at risk of damage (see [Principle 9](#)). Typical sources of risks include site access, management of demolition and site clearance, extent of excavation and management of construction. As explained in BS 5837, these matters should be examined during the design stages of a project, via the production of a tree protection plan and associated method statements where appropriate. It is also useful to organise a pre-application site visit before construction starts, to demarcate tree protection zones.

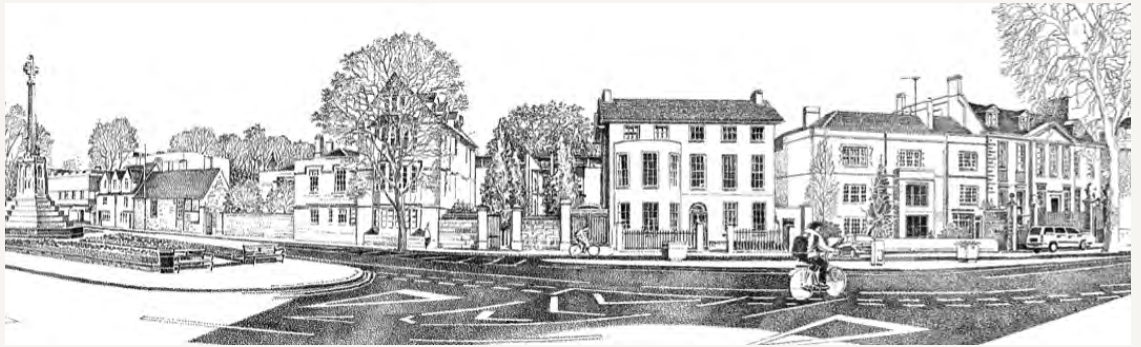
## Case Studies

### The Kendrew Quadrangle, St John's College, Oxford

A majestic mature beech tree is the focal point of the Kendrew Quadrangle inaugurated in autumn 2010. The four storey building adds 80 new student rooms, half a dozen flats, a new law library, college archives, teaching rooms, a gym, an events room and a café to St John's, one of Oxford's largest colleges.

According to MJP Architects, the lead designer for the project: "The tree was always an important design generator at the heart of our scheme - indeed the building is literally designed around it!"

During design development, the east wing of the quadrangle was moved further away to ensure protection of the tree roots.



Even from the street the view is not just of the building; there is also an enticing glimpse straight through the porters' lodge to the beech tree at the centre of the garden. © MJP Architects



The quadrangle is arranged around a splendid mature beech tree. © Michael Murray



**Wauconda National Bank, Illinois, USA,  
built around and amongst mature oaks**

When the Wauconda National Bank in the northwest suburbs of Chicago, Illinois, decided to expand its building, there were 12 oak trees standing in its way.

Now, in two places, walls completely surround the trees, and the trees grow through the bank's roof. Interior glass walls provide a view of the trees and a special drainage system directs water falling onto the roof through an underground route to the trees' roots.

The project also has a foundation system that props the building up on 17 cylinders. The cylinders were sunk eight feet into the soil with bell-shaped wire cages built

at their bases that fan out underneath the roots (picture a support network shaped like 17 huge bathroom plungers). The supports were then filled with concrete. This design allows the concrete to narrow as it passes the tree roots and then spread at a deeper level to provide support.

While this approach made the project more expensive, managers declared to the local press: "The community's acceptance was overwhelming. We couldn't have spent the amount in marketing dollars that it would take to get that kind of response from people."

Twenty years later, both the trees and the building are still standing happily together.



The Wauconda National Bank, in a suburb of Chicago, designed their new building amongst and around mature oaks. 20 year on the trees and the building are still happily standing. © Gary Watson

## For More Information



*Right Tree, Right Place* web resource, Arbor Day Foundation  
<http://www.arborday.org/trees/rightTreeAndPlace/index.cfm>



*British Standard 5837: 2012. Trees in relation to design, demolition and construction. Recommendations.* British Standard Institute  
<http://shop.bsigroup.com/en/ProductDetail/?pid=000000000030213642>

*Large Species Trees in Urban Landscapes - A Design and Management Guide.* CIRIA, 2012  
<http://www.ciria.org/SERVICE/Home/core/orders/product.aspx?catid=2&prodid=2005>

*Subsidence of Low Rise Buildings,* Institute of Structural Engineers, 1994. Second edition in 2000: chapter 8 has advice on the biology of trees

# 5

## Pick the Right Trees

### Objective

Select and use trees appropriate to the context.

### Benefits

- Enhances certainty of outcomes for everyone.
- Improves opportunities to achieve a mature working landscape.
- Avoids costs of remedial work.

# 4

## Make Tree-friendly Places

# 5

## Pick the Right Trees

# 6

## Seek Multiple Benefits

**Key Players**  
Bring forethought into briefs and proposals

**Planner/  
Development  
Control Officer**

**Developer/  
Site Owner**

**Designer**

**Tree officer**

**Engineer**

**Utilities providers**

**Arboriculturist**

**Nurseries**

Integrate green and grey infrastructure for wider returns

### Key Actions

- Favour larger trees
- Survey existing trees
- Include underground matters - utilities, foundations
- Draw up a robust tree protection plan

- Consider the expected benefits and functions of the trees
- Use the context to inform the selection process
- Investigate site constraints, such as soil types and light
- Call on specialist advice

- Look at how trees can be part of the infrastructure, such as calming traffic, providing enclosures, supporting economic regeneration and public health programmes

## Actions

### Consider the full range of factors for long-term success

As the Tree Council puts it, the overriding consideration for successfully choosing a tree is that “unborn generations should thank you for it” (*Trees in Your Ground*, p40). Factors to consider relate to the tree, the location and the people who will maintain it. These might include:

- **Function:** the desired benefits from the tree – see [Principle 6](#).
- **Character:** the historic and landscape character of the area.
- **Diversity:** the characteristics and profile of the wider tree population – see [Principle 1](#).
- **Design:** the scale, balance, impact, texture, colour expected from the tree.
- **Site constraints**, including:
  - Soil types and conditions, amount of sun, surrounding building heights, and available space both above and underground.
  - Potential nuisance, including: pollens, obstruction of light to habitable rooms, sightlines for CCTV, highway and street lighting, clearances for overhead cables and vehicles.
  - Risk of damage to structures the tree may cause – this requires an awareness of soil type, the tree species and its characteristics as well as of the design of foundations.
- **Support capacity:** alignment with community’s aspirations as well as with long-term management and maintenance capacity.

### Build ecological value and resilience

Important ecological considerations for species selection are often narrowed down to a debate on whether or not native trees should be systematically preferred. Such framing diverts attention away from a balanced approach considering both ecological value and resilience.

From an ecological value perspective, and as further highlighted in [Principle 6](#), trees can play a critical role in enhancing urban wildlife, due to the wide ranging invertebrates and associated species they can support.

Enhancing ecological resilience to diseases and climate change requires a highly diverse local tree population. This is important to consider both at species and gene level. When trees planted are all identical, as was seen with London Planes during the Victorian era, the vulnerability of the urban forest to a complete and

rapid wipe-out is greatly heightened. This risk can be reduced by paying greater attention to diversifying the gene pool of the new tree specimen being planted (see [Principle 7](#) on procurement), and by drawing from a wide-ranging planting list featuring both native and non-natives suitable to different types of urban settings.

### Do not let trees go un-mentioned in development briefs

**Development briefs** produced by local authority planners provide a good opportunity to build upon policies written into the local plan (see [Principle 3](#)) and set site-specific expectations regarding the inclusion of trees in new developments. (See the Poundbury development brief example). The six factors presented above provide a useful framework for developing such contextual guidance.

If local planners are to produce **development briefs** that adequately cover expectations relating to trees, they need easy-to-use analyses of the local tree population and context that adequately cover the contribution trees make to local character and identity. It is therefore critical to:

- Involve local planners in the definition of tree-related data needs (see [Principle 1](#)).
- Ensure planners ask for the role of trees to be covered when they commission **landscape character assessments**.

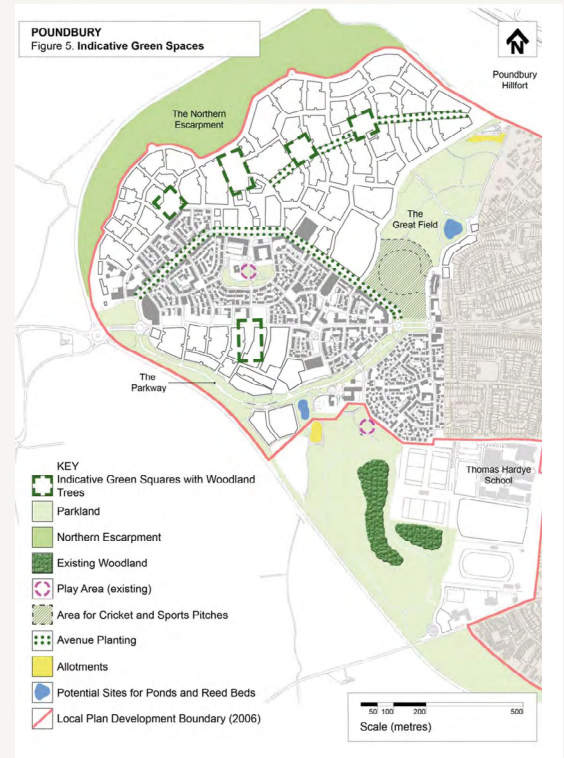
# Case Studies

## Poundbury development brief

The Poundbury brief sets out some of the key functions that trees in the development are expected to perform, including:

- Reducing energy use by sheltering buildings in windy locations through planting a combination of large trees and shrubs on the perimeter of the development, particularly on the southwest side which is the direction of the prevailing wind
- Providing shade during the summer by choosing deciduous trees for trees overlooking gardens.
- Softening of built up areas by providing large canopy trees within parking court.
- Reinforcing the street hierarchy by using a more formal planting style along main roads.

Further information at <http://www.dorsetforyou.com/poundbury>



The Poundbury development brief provides both maps and text articulating the key functions trees are expected to perform. © West Dorset District Council

## Earl's Court hierarchy of trees

The 77-acre redevelopment at Earl's Court and Seagrave Road is expected to create up to 7,600 new homes in central London over the next 20 years. Key to the landscape framework developed by Patel Taylor to complement the vision and masterplan by Terry Farrell & Partners is an ambitious network of green spaces including green roofs, a linear park (called the "lost river park"), residential squares and communal and private gardens. The proposal also includes a sophisticated "hierarchy of trees" that uses a variety of tree forms, sizes and species, to help establish a strong sense of character. For example:

- Broadway, the main north-south high street, is to be lined with plane trees or oaks.
- The communal green spaces proposed at the heart of most of the new residential blocks are expected to feature clusters of trees that are lighter in texture, such as birches, to muffle noise from children's play areas while allowing light to come in.
- In private gardens, smaller trees are recommended to form hedges to create defendable spaces.

- Green squares are expected to host a combination of large canopy trees and smaller fruit/flowering trees.
- In the "lost river park" small groups of woodland trees are recommended in combination with poplars, due to their water tolerance, as the park will also feature some small ponds to manage stormwater run-offs.
- Along east-west residential streets, it is recommended that tree pits also help manage stormwater run-offs.

# Case Studies

## Accordia, Cambridge

This award-winning residential scheme developed by Countryside Properties next to the Botanic Gardens in Cambridge created over 370 new homes on a site which formerly housed government offices and prefabricated Second World War buildings within what used to be the large garden of Brooklands House. Grant Associates, the landscape architects for the project, worked alongside Feilden Clegg Bradley Studios, the masterplanners, to create a scheme emulating the idea of 'Living in

a Garden'. The 9.5-hectare development features a 3.5-hectare network of green spaces, making the most of the mature vegetation that existed on and in the immediate proximity of the site, providing a striking demonstration that trees can have greater longevity than most of the hard components that surround them. The perimeter landscapes feature groups of trees that offer a forest feel, while the communal gardens have been designed with intertwined pear trees to create elegant, flower- and fruit-bearing screens.



Incorporation of pre-existing mature vegetation in the Accordia development gives a unique forest feel to the new neighbourhood. Section above © Grant Associates. Photo below © Michael Murray

## For More Information



*Right Tree for a Changing Climate* web resources, initially developed by the Greater London Authority and now managed by the Forestry Commission

<http://www.righttrees4cc.org.uk>



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# 6

## Seek Multiple Benefits

### Objective

Harvest the full range of benefits trees can deliver as part of a local green infrastructure system, focusing on key local aspirations.

### Benefits

- Reduces the need for (often costlier) grey infrastructure projects to successfully meet the needs of local communities.
- Enhances return on investment in capital and revenue expenditure spent on trees.
- Stimulates wider ownership of the local tree resource.

# 4

## Make Tree-friendly Places

# 5

## Pick the Right Trees

# 6

## Seek Multiple Benefits

### Key Players

Bring forethought into briefs and proposals

**Planner/  
Development  
Control Officer**

**Developer/  
Site Owner**

**Designer**

**Tree officer**

**Engineer**

**Utilities providers**

**Arboriculturist**

**Nurseries**

Integrate green and grey infrastructure for wider returns

### Key Actions

- Favour larger trees
- Survey existing trees
- Include underground matters - utilities, foundations
- Draw up a robust tree protection plan

- Consider the expected benefits and functions of the trees
- Use the context to inform the selection process
- Investigate site constraints, such as soil types and light
- Call on specialist advice

- Look at how trees can be part of the infrastructure, such as calming traffic, providing enclosures, supporting economic regeneration and public health programmes



## Actions

### Take a holistic view

The inclusion or retention of trees is best approached as a means to an end, rather than as an end in itself. When adequately selected, integrated and managed, trees have the potential to play a critical role, among other green infrastructure elements, in helping to meet the needs of residents, businesses and other users. When considering the aspirations for a neighbourhood, a street or a single site, the questions should always be asked: how can trees support the vision for this place? How can trees provide solutions to the issues identified? Such a mindset helps identify solutions that are more widely accepted, more cost-effective and therefore more sustainable. Designing with trees is a matter of trying to achieve a balance between securing the maximum required benefits with the least possible disadvantages.

### Consider – and if relevant, design for – the contribution trees can make to:

#### Quality of place

Trees have an important aesthetic role in our townscapes for many reasons. As Henry Arnold explained “they create spatial rhythms to heighten the experience of moving through outdoor spaces.” Trees also create a sense of scale that makes us feel more comfortable, bring delight with their changing colour and foliage over the seasons, modulate light through shadow patterns on walls and pavements and frame buildings.

#### Economic potential

Trees make a positive contribution to the creation of places that are good for business.

Studies conducted by Kathleen Wolf at the University of Washington in the US have established that the presence of trees in retail areas positively affects both the perception and behaviour of shoppers.

Streets lined with mature trees are also reported to decrease sales time for residential properties and support stronger values in the market.

#### Health and well-being

Trees influence both the physical and mental health of local communities. The use of trees to remove air pollutants can be part of a wider strategy to curb respiratory illnesses, as exemplified

by Birmingham’s Natural Health Improvement Zones initiative below.

Trees also contribute to creating attractive street and park settings for walking, cycling and running thus facilitating wider adoption of more active lifestyles.

Access to trees and green spaces has been found to aid patient recovery and accelerate healing times in hospitals. The creation of a ‘health park’ as part of the recent extension to Alder Hey children’s hospital in Liverpool is a good example of how health professionals are increasingly seeking to manage and design their grounds for the therapeutic value they can provide.

Trees can also help create environments that reduce stress, alleviate mental health problems and improve interpersonal dynamics. An extensive survey was conducted by William Sullivan and Frances Kuo in a large Chicago social housing estate with two nearly identical sets of apartment buildings that differed only in the amount of trees and grass growing around them. The study found that residents living in buildings surrounded with trees used more constructive, less violent methods to deal with conflict.

#### Nature conservation and habitat connectivity

Trees bring nature into towns and cities in many ways. Trees act as bridges, maintaining connectivity for species through an urban landscape. While not all trees have high biodiversity value, some can operate as **keystone species** that are critical for the survival of countless other species including invertebrates, lichens and fungi, providing the basis of a healthy food chain that benefits birds and mammals. Trees species that are effective at supporting a rich wildlife will be more prone to fully realise this potential when growing in the less stressful parts of the urban landscape, such as large parks, cemeteries or other land estates under suitable management.

#### Local food and community links

Fruit trees can be a great addition to a local food initiative. Planting new community orchards in underused spaces and residential grounds, or even along streets, can help address the current urban allotment shortage and offer communities the opportunity to rediscover the pleasures of eating fruit grown close to home.

### **Traffic calming**

Carefully positioned trees can improve sightlines and help to slow down cars. Within urban settings they can be used as an alternative to bollards and speed bumps (see the Pitfield Street example) or to reinforce the presence and enhance the role of a central reservation, as exemplified with the Whiteladies corridor in Bristol (see Greater Bristol Bus Network case study below).

### **Stormwater management**

Trees can contribute to reducing stormwater run-off and do so in several ways. Their canopies intercept falling rain and hold a significant proportion of it in leaves and bark. Some of this intercepted water will evaporate and some will be gradually released into the soil below. Below ground, the soil in which trees grow will infiltrate and store water, a process facilitated by tree roots. The larger the tree and its canopy, the greater the impact. Innovative tree pit designs can both create better underground conditions for trees to grow, and greatly enhance stormwater management benefits, as demonstrated in the MARQ2 case study below.

### **Air pollution control**

All trees act as air filters. As with stormwater benefits, tree size matters considerably. However, not all varieties perform this function to the same extent and across the full range of urban air pollutants that are harmful to human health. Gases such as nitrogen dioxide and ozone are captured in the stomata (breathing apparatus) of leaves. Trees with the most leaf area capture gases and particles efficiently. Trees can form part of an air pollution control strategy on a regional scale (see [Principle 2](#)).

### **Cooling and sheltering**

Trees can influence ambient temperatures around buildings by providing shading from the sun and shelter from dominant winds and this can reduce energy usage for both heating and cooling. The shade from trees in summer, while possibly reducing light to dwellings, will prove increasingly beneficial with the anticipated effects of climate change and deciduous trees will allow welcome access for the sun in winter.

### **Noise abatement**

Trees and shrubs help to mask noise through the rustling of leaves, the movement of branches in the wind

and the sounds of birds, insects and other animals. They can also contribute to reducing noise through reflection, deflection and absorption, and are best used in combination and support of other noise abatement measures. Research shows that foliage is the most efficient part of a tree for scattering sound and that large leaves are more effective than small leaves. Low shrubs and/or hedges along the edge of a group of trees can improve sound reduction. (See the Earl's Court example under [Principle 5](#)).

# Case Studies

## Birmingham's Natural Health Improvement Zones

A 2007 report by Asthma UK and the Heart of Birmingham Primary Care Trust, highlighted Birmingham as having the highest hospital admissions for asthma in the UK. Tackling air pollution has since become a priority issue for the local authority. The designation of Natural Health Improvement Zones (NHIZ) is one of the initiatives endorsed in the 2011-15 Health Protection Agency Strategy for Birmingham to tackle this challenge. The programme targets areas where both health and environmental factors are considered poor. NHIZs are centred around those areas most affected by air pollution (called Air Quality Management Areas), and, within these areas, trees and green walls will be planted to facilitate the trapping of pollutants by foliage.



Trees already contribute to making Birmingham's city centre attractive to pedestrians. © Birmingham City Council

## Metasequoia trees to slow traffic on Pitfield Street, Hackney

In Shoreditch, the London Borough of Hackney has opted for a green solution to turn Pitfield Street, which used to be a fast through route fed by traffic from Old Street, into a calmer neighbourhood street. An existing roundabout near to the junction with Old Street was removed and the intersection turned into a simple crossroad. Trees were planted with the aim of creating the perception of a narrower street, guiding sight lines and enhancing the character of the area.



Above right: Pitfield street before the removal of the roundabout. Below: Today, Metasequoias help to signal the reconfigured intersection to drivers and slow down traffic, while creating an impressive gateway for the neighbourhood. © London Borough of Hackney

# Case Studies

## MARQ2: trees saving \$2 million of sewer refurbishing to the Twin Cities

The Marquette Avenue and 2nd Avenue (MARQ2) project, completed in December 2011, was the first of a series of large works in the twin cities of Minneapolis and St Paul, USA. Minneapolis had long faced capacity problems with stormwater management in its downtown. Rather than spending \$3.5m on refurbishing its sewer system with larger pipes, the city engineers chose to spend \$1.5m on taking an integrated approach to tree planting and stormwater management. The project, designed by a multidisciplinary team from Short Elliott Hendrickson Inc. replaced previously impervious sidewalks

with pervious pavement, allowing for greater infiltration and filtration of stormwater within specially designed tree pits supporting 173 trees. Modelling showed a 10% reduction in peak flows to Minneapolis's stormwater system as a result of this installation.

City of Minneapolis webpage on MARQ2 [http://www.ci.minneapolis.mn.us/publicworks/stormwater/green/stormwater\\_green-initiatives\\_marq2-tree-install](http://www.ci.minneapolis.mn.us/publicworks/stormwater/green/stormwater_green-initiatives_marq2-tree-install)

American Society of Landscape Architect's case study on MARQ2 [http://www.asla.org/uploadedFiles/CMS/Advocacy/Federal\\_Government\\_Affairs/Stormwater\\_Case\\_Studies/Stormwater\\_Case\\_363\\_Marq2\\_Structural\\_Cells\\_with\\_Trees\\_for\\_Stormwater\\_Minneapolis,\\_MN.pdf](http://www.asla.org/uploadedFiles/CMS/Advocacy/Federal_Government_Affairs/Stormwater_Case_Studies/Stormwater_Case_363_Marq2_Structural_Cells_with_Trees_for_Stormwater_Minneapolis,_MN.pdf)

## Trees for the Greater Bristol Bus Network

With support from the government, four local authorities – Bristol City, Bath and North East Somerset, North Somerset and South Gloucestershire Councils – are together investing £70 million in a reliable bus network for the 52 million plus bus journeys made in the sub-region each year. The project, due for completion in 2012, aims to reduce traffic congestion and pollution by making bus travel easier and more attractive on 10 key routes across the region.

Bristol has dedicated £450k from the transport funds earmarked for this project to environmental improvements,

including the planting of 500 new trees along key routes in the city. The result will be a more effective and attractive bus system and a safer, higher quality environment for other street users – as demonstrated along Whiteladies Road. The works recently completed there, featuring the creation of new central reservations enhanced with trees and low maintenance plants, has resulted in the high street working better not only for buses but also for pedestrians and local businesses.

For further details see [http://www.bristol.gov.uk/sites/default/files/documents/environment/land\\_management/tree\\_management/Greater\\_Busnetwork\\_Planting\\_Plan\\_0.pdf](http://www.bristol.gov.uk/sites/default/files/documents/environment/land_management/tree_management/Greater_Busnetwork_Planting_Plan_0.pdf)



The creation of a central reserve with trees along Whiteladies Road demonstrates how green and grey infrastructure is being combined in Bristol to deliver a better local transport system. © TreeBristol

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“Trees are the most exquisite and the most sparingly apportioned raw material of urban design. Our cities display a mere dollop of their sensual colour and form. There are exceptions both in North America and Europe to this general rule. Yet the paradox remains – we fail to design with our most humane raw material.”

Henry Arnold, *Trees in Urban Design*



A healthy, hard-working and resilient urban treescape requires good quality supplies, high standards of practice – and people who care, from nurserymen to contractors. The Plant/Protect principles highlight key points you need to know to enable success when digging starts.

# Plant/ Protect

**1** / Know Your Tree Resource

**7** / Procure a Healthy Tree

**2** / Have a Comprehensive Tree Strategy

**8** / Provide Soil, Air and Water

**3** / Embed Trees into Policy and Other Plans

**9** / Create Stakeholders

**4** / Make Tree-friendly Places

**10** / Take an Asset Management Approach

**5** / Pick the Right Trees

**11** / Be Risk Aware (Rather than Risk Averse)

**6** / Seek Multiple Benefits

**12** / Adjust Management to Needs

# 7/

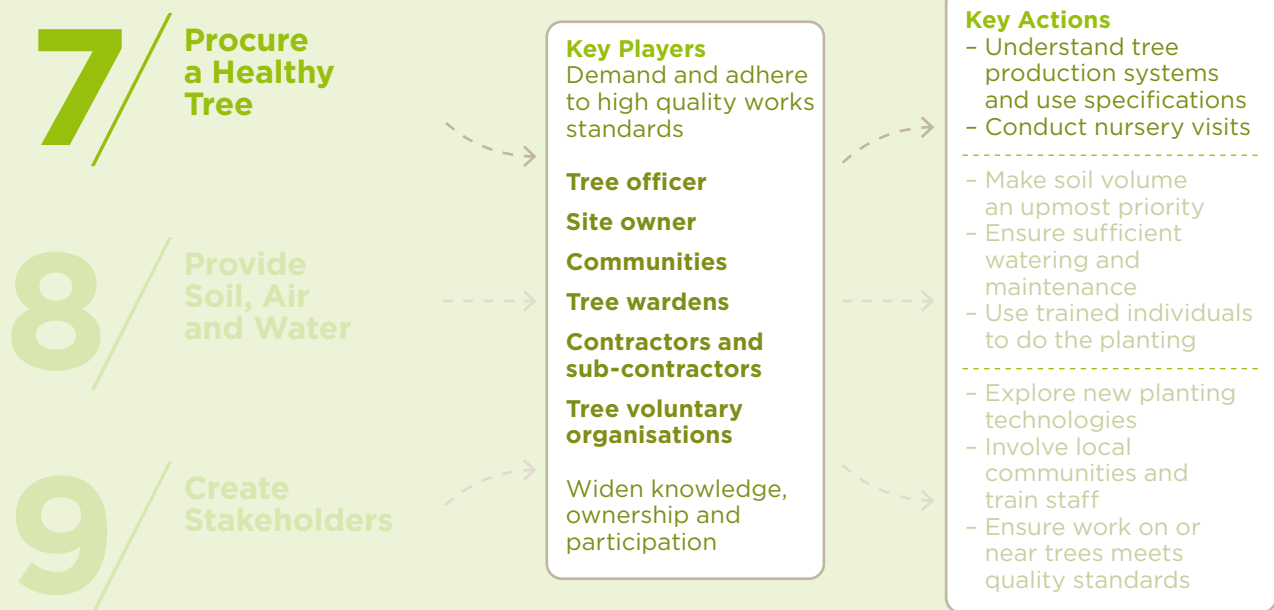
## Procure a Healthy Tree

### Objective

Plant healthy, vigorous trees that have been adequately conditioned to thrive in the environment in which they are destined to live.

### Benefits

- Enhances tree health, a key contributor for increasing urban forest growth.
- Reduces tree failure rate and associated replacement costs.
- Provides better value for money in the tree procurement process.





## Background

A healthy urban forest starts with a healthy and vigorous tree at the time of planting. The *Trees in Towns II* survey found an average loss rate of 23% for newly planted highway trees and 24% for newly planted trees in public open spaces. A lack of quality in the tree stock being planted is partly to blame for such poor survival rates, alongside inadequate planting conditions (see [Principle 8](#)) and poor aftercare during the establishment phase (see [Principle 12](#)).

## Actions

### **Use specifications to get healthier, nursery grown trees**

Specifications are particularly important in ensuring that trees purchased from tree nurseries are of the highest quality and fit for purpose. These should include details of stem **girth**, tree height, **central leader** and branch structure. Additional features such as stem **taper** and height/stem diameter ratio can also be specified. However these features are visual and refer only to the morphological condition of the trees and say nothing about its physiological condition. It is possible to ask for evidence of good physiological health and a number of tests are currently available which are non-invasive and easily carried out.

Specifications should also be used to describe delivery expectations and the length of time the trees supplied have actually spent in the supplying nursery. Imported trees are often just transferred from one lorry to another as they arrive and despatched immediately. This results in highly stressed specimens which are bound to fail. A “nursery grown” tree should have spent a minimum of two years in the same nursery. This also ensures that plants can be fully controlled for pests and diseases prior to being transplanted.

### **Understand the different nursery production systems.**

The root system of the young tree is critical to its success and longevity in the landscape. The way root systems are nurtured and their condition when the trees are finally dispatched to their final destination is primarily determined by the nursery production system used. In the UK, there are three main nursery production systems: bare root, root-balled and containerised. Each has advantages and disadvantages and there is no right or wrong, but it is

important to understand the differences and to be able to specify the elements that make up best practice.

### **Conduct nursery visit to ensure specifications are met**

Obtaining trees that will be healthy and vigorous, free of insects, diseases and mechanical defects and also well-formed not only requires a good specification, it should warrant a visit to the nursery!

# Case Studies

## Successfully greening the concrete jungle: quality procurement for the Hong Kong Green Master Plans

Hong Kong has one of the highest population densities in the world. While historically the emphasis has been on rapid development, in the last 20 years there has been an increasingly vocal demand for a greener city. In response, the local government administration initiated an ambitious set of area-based greening programmes intended to link together existing green spaces and city streets, making extensive use of tree planting.

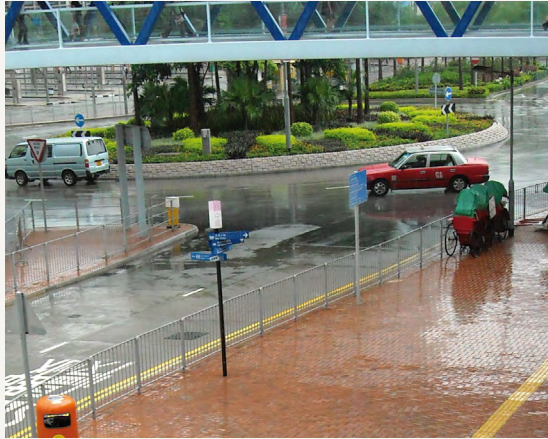
Paramount to the success of these Green Master Plans (GMPs) has been the quality of workmanship and plant material, especially the tree stock. International arborists were brought in to lead training courses so that the local landscape architects, resident site engineers and inspectors, as well as contractors,

understood the quality requirements for this project.

New and more stringent specifications were drawn up for all trees including palms and conifers in line with international arboriculture standards. Photographs of all proposed plant stock were requested as part of the tender conditions. Nursery inspections were carried out to ensure adherence to the specifications. In-house arborists were employed to control plant quality at reception and to monitor installation by contractors. The results are clearly visible and the need for replacement planting has been reduced, creating a better instant greening effect.

Further information at <http://www.gov.hk/en/residents/environment/sustainable/greening.htm>

<http://www.cedd.gov.hk/eng/greening/index.htm>



Left image: Footway near the new Star Ferry Pier in the Hong Kong Central District before completion of the Green Master Plan (GMP).

Below image: The same footway, after completion of the GMP. © Information and images provided by ACLA Limited, consultant for three out of the five GMP studies commissioned by the Civil Engineering and Development Department of the Hong Kong Government



## For More Information



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# 8

## Provide Soil, Air and Water

### Objective

Ensure trees have access to the nutrients, oxygen and water they need to fulfil their genetic potential for growth and longevity.

### Benefits

- Produces more value from trees: trees that grow bigger, live longer, and are able to generate a real ‘payback’.
- Reduces need for outside interventions: trees are better at looking after themselves.
- Builds a resilient urban forest with a strong capacity to adapt.



## Background

The productive capacity of a tree greatly increases as it gets larger.

To make the most of the social, economic and environmental benefits to be gained by investing in the urban forest, many big trees are required, especially in the most environmentally compromised areas such as streets, car parks, and commercial strips. These places have two things in common that make them hostile to trees: more than 90% impervious surface cover and highly compacted soils.

Soils under pavements are highly compacted to meet load-bearing requirements and engineering standards. This often stops roots from growing, causing them to be contained within a very small useable volume of soil without adequate water, nutrients or oxygen. Subsequently, urban trees with most of their roots under paved surfaces grow poorly and die prematurely. Trees that survive in such a context often interfere with pavement integrity. While sometimes initially generating higher installation costs, greater consideration for soil volumes yield much less resource wasteful outcomes.

## Actions

### **Put money into the tree and into providing adequate soil conditions**

Much can be spent on tree guards and other “accessories” for urban trees. In some contexts, this is appropriate to ensure adequate protection of a young tree without undermining the urban quality of its setting. Making a young tree and its protection devices look attractive can help inspire respect and limit vandalism. In other situations, such accessories can be positively harmful to the tree if left without adequate maintenance.

In all circumstances, clear priority should be given to ensuring that the money invested goes first into the tree itself (see [Principle 7](#)), as well as into providing adequate soil for growth. In dense urban areas, the amount of soil installed will, to a large extent, determine the size the tree will reach over its lifespan. This has been well documented and modelled in the US, particularly through the work of James Urban who has defined the ratio of tree size to soil volume.

The use of soil volume standards for tree planting in dense paved urban

environments as a matter of policy, and via the use of a planning condition for the management of private developments by local authorities, is highly advisable (see [Principle 3](#)).

### **Ensure planting is conducted by adequately trained or supervised individuals, and followed by appropriate post-planting maintenance**

Successfully planting a tree requires knowledge and skills, yet it is often left to those who have nothing else to do at the time. Ensuring those who carry out the planting are either trained or supervised is critical to avoid common mistakes (see [Principle 9](#) on contractors) such as damaging roots, planting the tree too deep or too high or staking the tree inappropriately.

Lack of water is one of the major causes of failure of newly planted trees. Initiating a tree planting campaign whether in streets, in parks or any urban site without a clear understanding of who will water the trees for the first two growing seasons and how they will do so can lead to a very high rate (50-100%) of tree failure.

### **Make the most of new technologies**

A range of constructive measures has become available to meet the load-bearing requirement for a structurally sound pavement installation while enhancing the amount of rooting space for urban trees and encouraging root growth away from the pavement. These include root paths, structural soil and suspended pavement systems (see the Bomber Command Memorial example overleaf), and each has benefits and drawbacks. Seek expert guidance to identify the best approach for your project.

# Case Studies

## Pennsylvania Avenue NW, Washington DC, USA

Two rows of trees planted at the same time on either side of the footway of Pennsylvania Avenue NW in Washington DC have grown to dramatically different sizes according to whether they were planted in an open grass area or in pits with only about 8.5 cubic meters of available soil under the footway. The difference was already noticeable a few years after the planting in the early 1980s as pictured here, and there is still a significant difference in trunk size and canopy density 40 years on. No better illustration could be provided of the difference access to soil, air and water makes for a tree!



Trees along Pennsylvania Avenue NW show dramatic differences in growth depending on the soil volume they have access to. © Nina Bassuk, Urban Horticulture Institute, Cornell University

## RAF Bomber Command Memorial's green legacy

Five lime trees had to be removed to accommodate a new memorial built in London's Green Park in honour of the 55,573 men of Bomber Command who lost their lives in the Second World War. Westminster City Council agreed to the removal on the grounds that the losses would be mitigated in the landscaping installed around the monument in Green Park and on Piccadilly.

The new trees planted in Green Park did not cause concern because they were installed in park soil. However, Westminster City Council attached special conditions to the two semi-mature plane trees that were going to frame the façade of the memorial on Piccadilly. The council insisted that each

should enjoy a minimum of 15 cubic metres of soil volume so that the trees had a chance to grow healthily.

The use of a modular cell system provided each tree with 18 cubic metres of good soil in the street, despite the many utilities riddling the area. In addition, the system was laid out so as to create a path providing access for roots into the nearby park as the trees mature. As Jeremy Barrell, the tree consultant who worked on the project, explains: "Such big trees would not have survived a season without special preparation of the rooting environment below the street. These trees will be here for hundreds of years, providing a spectacular green legacy to match the grandeur of this unique monument."



Installation of the 'Silva Cell' modular cell system ensuring news street trees planted in front of the new RAF Bomber Command Memorial in London will grow big. © Jeremy Barrell

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# 9

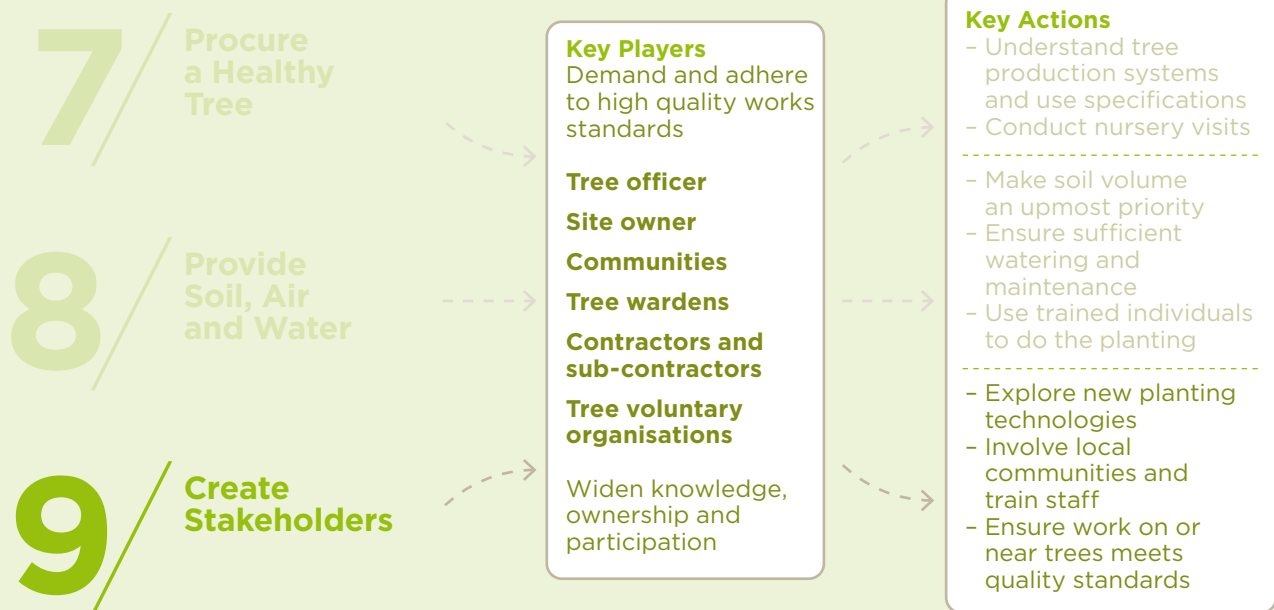
## Create Stakeholders

### Objective

Work with local political, professional and community stakeholders to champion the value of trees in the townscape.

### Benefits

- Power is in numbers.
- Reduces pressure on internal resources by building a wider range of partners that might bring additional funding or delivery capacity.
- Reduces conflicts and complaints associated with nuisance trees.





## Actions

### Consider establishing a strategic tree partnership or forum

A local forum bringing together organisations, groups and individuals who want to conserve and improve local trees provides an effective mechanism to:

- Promote effective co-ordination and communication between different council services (including parks, highways and planning), statutory agencies, key environmental organisations and local community groups and volunteers.
- Enhance opportunities to attract external funding and sponsorship, which council services might not be eligible to provide, or might struggle to ring fence within the council's budget.
- Give the wider community greater ownership of and influence over tree issues.
- Provide an engine to support the development and, most importantly, implementation of the local strategy.

### Capitalise on community tree champions and/or a Tree Warden scheme

**Urban forestry** is as much about people as it is about trees and so maintaining a healthy urban forest requires contact and support from within the community. While setting up local volunteer groups requires time, the payback is substantial in providing committed ears, eyes and hands reaching far beyond what corporate resources could achieve.

The London Borough of Hackney has brought the failure rate of newly planted street trees down to just 1% by recruiting community tree champions to conduct consultations and co-ordinate aftercare. Local volunteers, such as those involved in the Tree Wardens Scheme co-ordinated by the Tree Council, can conduct some tree planting, monitor health issues, work with schools, fundraise, get involved in tree issues associated with development sites and manage advocacy for trees.

### Organise staff and member training

It is critical that there is a shared understanding of the duties, risks, benefits and basic best practices for tree management across professionals whose decisions affect the local tree resource. Full advantage should be taken of all opportunities to capitalise on the tree expertise of the local authority's tree officer or parks service to deliver training sessions to planning, highway or housing management staff. (See Leeds City Council case study below).

### Require contractors to demonstrate adequate levels of tree awareness and qualifications

Tenders and statements of work for construction or maintenance around trees should be explicit on qualification levels. Contractors conducting work on trees should provide evidence of adequate insurance and an arboriculture professional qualification. Contractors working near trees (which is almost anyone conducting work on streets) should also demonstrate adequate environmental awareness. For example, the London Borough of Islington requires ISO 9001 accreditation for all contractors carrying out work on its streets.

Tender documentation, contracts as well as corporate policy should also communicate very clearly expectations of best practices to be followed:

- All contractors working in the proximity of trees should be required to abide by the *British Standard 5837:2012 Trees in relation to design, demolition and construction - Recommendations*.
- Contractors working on highways should be required to work to the revised version of the National Joint Utilities Group (NJUG)'s *Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees*.
- Contractors working directly on trees should follow *British Standard 3998: 2010 Tree Works*.

Contracts as well as corporate policy should also make it very clear that compensation will be sought in case of non-compliance and tree damage. More importantly, if/when breaches occur, enforcement needs to take place.

## Case Studies

### Hackney's tree champions and carers

The London Borough of Hackney does not advertise its tree planting programme. Yet Mayor Jules Pipe's 2006 pledge that 1,000 street trees would be planted by 2010 was fulfilled one year early, and 1,800 residents are involved in looking after them. The loss rate is staggeringly low: the borough reports a 1% death rate in its newly planted street trees. When residents contact the borough to request a tree, they are invited to become a "tree champion" for their street. They undertake a consultation, based on a simple yes/no survey with their neighbours. The goal of the survey is to determine whether there is support for planting along the street, and if people will assist with the watering and monitoring of the newly planted trees. The borough estimates that it has around 300 tree champions who have signed up 1,500 "tree carers".

If the consultation results demonstrate a good level of support, the local tree champion is invited to go back to the small tree group they have formed to help with the species selection, based on a menu of options provided by the council. With close to 250 different species planted over the past eight years, Hackney's streets are slowly growing Britain's first urban arboretum. Residents enlisted as tree carers are given a pack, which includes a description of the tree planted outside their door, and an explanation of the care it needs. Although the council's contractor will water the tree twice a month during the first growing season, the brochure explains that it will require additional watering. To make it easier for tree carers, they are also given a watering can and the trees are equipped with a hip-level watering tube.



Hackney 'tree carer'. © London Borough of Hackney



### Plymouth Tree Partnership

The Plymouth Tree Partnership is managed by the local Tree Wardens who help coordinate efforts by residents, community groups and leading conservation charities to improve the local tree cover. The partnership, which is part of the Tree Council's National Tree Warden Scheme, fundraises and manages consultations with residents as well as the delivery of community planting schemes. This typically includes agreeing responsibilities for tree establishment by identifying one or two local people who will take on the essential husbandry tasks for the first few years.

Key accomplishments since 2007 include:

- Publishing Plymouth's Favourite Trees, a book assembling a collection of inspirational local accounts about the value of trees, an initiative conducted

as part of the Tree Council's Green Monument Campaign.

- Establishing a School Trees Programme, initially funded from the £5000 proceeds of the book, that resulted in the planting of trees in over 20 local schools and the commitment of school tree reps - usually teachers - to the aftercare.
- Running The Family Tree Scheme to progressively plant over 100 trees in a dedicated area of Central Park.
- Securing funding from wide ranging sources, including local businesses and national grant schemes.

To date, the Plymouth Tree Partnership has attracted 29 Tree Wardens, 70 tree friends and 13 school tree reps.

Further information at <http://www.plymouthtrees.org/>

### The Leeds approach to training – spreading tree knowledge

Leeds City Council's **Core Strategy**, finalised in 2012, set an ambitious vision for increasing the city's canopy cover from its current rather low level (6.9%) to England's national average (8.2%) by 2030. An additional 32,000 trees will need to be planted between now and then. The city is also committed to a significant programme of woodland creation. Such a level of commitment would not have been possible if the council's natural environment team had not worked at raising awareness and

delivery capacity about trees among local social landlords and the planning and highway teams and offered training at both executive and operational level.

At an executive level, this allowed the council to sell the vision of integrating trees and woodlands as a critical component of a green infrastructure for the city, delivering measurable and essential services such as stormwater management and prevention. At an operational level, this proactive approach to knowledge sharing created confidence in the ability to deliver while limiting risks.

### Widening participation in Brick Lane

Trees for Cities is an independent charity which inspires people to love and plant trees worldwide. Its inclusive approach was born out of frustration that improving the environment was traditionally the preserve of a small section of the population. The charity uses a range of engagement techniques, built around tree planting programmes, to counter social exclusion resulting from poverty, unemployment or lack of education.

and in need of trees. The photographs were displayed in a local exhibition space and a competition was held to find the most thought-provoking photograph. Once the sites were finalised, the groups joined in the planting of the trees. The project was particularly successful because of the active role played by the group leaders and the simple concept of the engagement activities, which produced a tangible result that could be easily understood regardless of language spoken.

Trees for Cities' Cityside Street Trees Project planted 50 new street trees in and around Spitalfields and Brick Lane in East London, an area affected by low environmental quality (poor access to green space, very poor tree cover), and pockets of high levels of deprivation. The sites were chosen by the local residents, particularly the Bangladeshi community who form a large proportion of the population of the project area. Key to the project was the initial engagement of community group leaders. They provided the important links to the community and advised on language and suitable activities. Trees for Cities met with the group leader a number of times before starting group activities in order to build a trusting relationship. An initial informal discussion was held with each group, assisted by the group leader, about trees and streets, histories, cultural associations and memories. Each group was then given a disposable camera and a freepost return envelope and asked to take photographs of the sites they felt were the most significant



Trees for City volunteers finishing new planting in Archibald Open Space. © Trees for Cities

## Case Studies

### St Giles three-way partnership for preserving the quality of Oxford's northern gateway

St Giles is an ancient, wide tree-lined street in the Central Oxford Conservation area. It was described by Sir John Peshall in 1773 as follows: "In the north entrance into this city, through St. Giles's (a "rus in urbe" having all the advantages of town and country) is a well-built street, 2,055 feet long and 246 broad, planted with rows of elms on each side and having parterres of green before the respective houses" (*Ancient and Present State of the City of Oxford*, 1773).

The preservation of St Giles' treescape continues through an informal partnership between three key players: Oxfordshire County Council which owns the highway trees, St John's College which owns and manages the trees outside its entrance and Oxford City Council which manages the publicly owned trees for the County. All share a common understanding of the importance of the trees on St Giles for the quality of Oxford's townscape and this has guided management decisions over the years. Most of the elms were cut down for an 18th century improvement

scheme and plane trees were planted in about 1875. The photograph of 1883 shows the young plane trees on the right hand side and the older trees that were retained outside St John's on the left. It appears that some of the St John's trees were replaced in the 1960s.

As Kevin Caldicott, tree officer with Oxford City Council explains: "In addition to ensuring a consistent approach to day to day management of trees (pruning, new planting etc) to meet townscape objectives, partnership working ensures a more robust response to challenges arising from disease and storm events."



St Giles in 1883 and in 2012. Top image: © English Heritage Bottom image: © Michael Murray

## For More Information



*How to increase business participation in community tree-related activities.*  
Best practice guidelines. Trees for Cities  
[http://www.treesforcities.org/index.php/download\\_file/499/141/](http://www.treesforcities.org/index.php/download_file/499/141/)

*How to involve black and ethnic minority communities in improving public spaces in urban areas through tree planting.*  
Best practice guidelines. Trees for Cities  
[http://www.treesforcities.org/index.php/download\\_file/371/141/](http://www.treesforcities.org/index.php/download_file/371/141/)

*How to involve young people in urban tree planting initiatives. Best practice guidelines.*  
Trees for Cities  
[http://www.treesforcities.org/index.php/download\\_file/498/141/](http://www.treesforcities.org/index.php/download_file/498/141/)

Tree Council web page on tree wardens  
<http://www.treecouncil.org.uk/tree-wardens>

*Securing urban trees through community involvement: Planting street and community trees in disadvantaged urban locations.*  
Katie Roberts for Trees for Cities, 2008  
[http://www.treesforcities.org/index.php/download\\_file/351/141/](http://www.treesforcities.org/index.php/download_file/351/141/)



*Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees.* National Joint Utility Group, 2007 - includes worksheets  
<http://www.njug.org.uk/publication/52>

“Put simply, now that we have established trees as part of the infrastructure of the city, we have to get trees and their requirements to the same level as water meters, electric lines, curb widths, and the road widths, instead of being the least important piece of the infrastructure. To do this we have to look below the ground.”

James Urban, City of Toronto 2008 Tree Symposium



Unlike most traditional infrastructure found in the urban realm, which deteriorates with age, generally the more mature the trees, the more returns they can yield. The Manage/Monitor principles provide a guide to looking after this valuable resource in the most effective way.

# Manage/ Monitor

**1/** Know Your Tree Resource

**7/** Procure a Healthy Tree

**2/** Have a Comprehensive Tree Strategy

**8/** Provide Soil, Air and Water

**3/** Embed Trees into Policy and Other Plans

**9/** Create Stakeholders

**4/** Make Tree-friendly Places

**10/** Take an Asset Management Approach

**5/** Pick the Right Trees

**11/** Be Risk Aware (Rather than Risk Averse)

**6/** Seek Multiple Benefits

**12/** Adjust Management to Needs

# 10

## Take an Asset Management Approach

### Objective

Inform all planning, management and investment decisions with a robust understanding of both the costs and the value trees deliver.

### Benefits

- Optimises costs and benefits from trees in a strategic way.
- Uses best practice to articulate needs for resources: councillors understand that they are voting for a resource allocation with a known quantity and value.
- Gets wider buy-in and support for the returns generated by the urban forest.

# 10

## Take an Asset Management Approach

# 11

## Be Risk Aware (Rather than Risk Averse)

# 12

## Adjust Management to Needs

**Key Players**  
Prefer proactive over reactive interventions

**Site owner**  
**Tree officer**  
**Highway authority**  
**Businesses and residents associations**

**Insurer**  
**Arboriculturist**  
Sustain attention to benefits over time

### Key Actions

- Estimate the value of your tree resource
- Scale budgets and compensations accordingly
- Understand your duty of care
- Manage risks and benefits in tandem
- Rationalise tree inspections through zoning
- Computerise your logging, managing and inspecting works system
- Promote management regimes that foster biodiversity
- Consider the impacts of climate changes



## Background

The International Organisation for Standardisation (ISO) defines **asset management** as “the coordinated activities of an organisation to realise life cycle value from assets in delivery of its objectives” (source: draft ISO 55000 Asset Management Standard).

Applying an **asset management** approach to the urban forest puts trees on a more equal footing with **grey infrastructure** for decision-making by applying a similar framework based on costs, benefits and alignment with overall objective.

It also helps ensure that decision-making acknowledges that trees are one of the few assets in the built environment that appreciate over time.

## Actions

### Estimate the value of the local tree resource

A number of valuation methods are currently available for providing estimates of the value of trees. Each takes a different perspective on defining the value of trees ranging from considering solely replacement costs, to attempting a more holistic appreciation of both the structural (intrinsic value) and functional (use value associated with social and environmental benefits) values. These include:

- **Depreciated Replacement Cost (DRC)**, which values trees based on replacement costs.
- **Helliwell**, which is based on a number of factors (location, size, conditions, form, etc) that are given numerical values and multiplied by an indexed baseline monetary figure.
- **The Capital Asset Value Amenity Trees method (CAVAT)**, which is based on replacement costs as well as the community value of the tree (via the use of the Community Tree Index, which considers the number of people that interact with the trees, and crown size).
- **i-Tree Eco**, which accounts for both the structural value of the trees (based on replacement costs) and the value of the environmental benefits it delivers, such as carbon sequestration and storage as well as air pollution interception and removal.

Some, like the Depreciated Replacement Cost method are designed for considering individual specimens. Others, like i-Tree Eco, work best at a larger scale.

### Integrate the valuation results into decision-making.

Results from valuation can be used to support a wide range of activities, including:

- Strategic planning – to clarify the key services delivered by the urban forest and how these compare to local priorities and expectations. (See Torbay i-Tree case study overleaf).
- Financial planning – asset management best practices recommend that the amount spent in management and maintenance is commensurate to the asset value. (See Islington case study under [Principle 11](#)).
- Risk management – to balance risks and benefits.
- Compensation issues for damage to public trees – when NJUG guidelines (see [Principle 9](#)) haven't been followed. As an example, Bristol City Council reports having collected £200,000 from utilities as a result of the use of CAVAT (see Bristol case study below).
- Subsidence cases – to contribute to evidence levels as recommended by the London Tree Officers' *Risk Limitation Strategy* (see [Principle 11](#)).

### Do not let tree-generated green waste drop off the value chain.

Green waste generated by trees should be turned into a resource benefiting the owner of the tree, rather than being sent to landfill sites, or providing unaccounted-for additional remuneration for contractors. Routine tree management can generate mulch, firewood or other types of woodfuels. These can provide welcome cost savings, such as reduced costs for buying mulch, or complementary income sources from sales. In 2010, Leeds generated £15,000 from selling firewood. London has set up the Croydon Tree Station and the North London Wood Fuel Hub. Careful management is needed to ensure that this does not drive management practices inappropriately, resulting in the depletion of the local tree resource. (See Croydon Tree Station case study overleaf).

## Case Studies

### Torbay's i-Tree Eco assessment: putting trees on the map

Torbay enjoys approximately 818,000 trees, covering 11.8% of its land area. The town's i-Tree Eco assessment conducted in 2010-11 allowed the local authority to scope for the first time the full extent, composition and size of the whole of the local urban forest, regardless of private or public ownership, and also to estimate that, each year, Torbay's treescape:

- stores 98,100 tonnes of carbon.
- sequesters a further 4,279 tonnes of CO<sub>2</sub>.
- removes 50 tonnes of pollutants from the atmosphere, a service with an estimated value of £281,000.

Overall, the structural value of Torbay's tree stock was calculated at a remarkable £280 million.

These findings have considerably raised the profile of trees within the council and beyond, including the local and regional media. Torbay Council's tree budget has remained unchanged over the past two years, since the results were announced, while all other services in the council had to accommodate an 11% budget cut. Neil Coish, the senior tree officer who oversaw the study, observes that "tree officers are now invited to the table for discussions with developers or on highway projects". No street or junction improvement schemes go forward without opportunities for tree planting to be closely examined, and a proportion of the transport budget is to be allocated to tree planting.

Torbay's Urban Forest: Assessing Urban Forest Effects and Values, Treeconomics, 2012  
<http://www.treeconomics.co.uk/wp-content/uploads/Torbays-Urban-Forest.pdf>

### Croydon tree station: turning waste into revenue for off-setting tree management costs

The London Borough of Croydon looks after 33,000 highway trees, in addition to those found in its 120 parks. The borough also manages 450 hectares of woodlands.

To avoid paying landfill costs to get rid of the green waste generated by this resource, the borough partnered with its main arboricultural contractor, City Suburban Tree Surgeons Limited, and Bioregional Development Group to

operate a timber station. Larger waste items are sold as logs and firewood. Green waste collected at household waste recycling centres is mixed with waste from parks maintenance and arboricultural work to produce compost branded and commercialised as "Croypost". The timber station is also set up to produce fuel-quality woodchip from tree surgery waste produced by all Croydon's arboricultural contractors which feed Slough's heat and power combined power station with over 8,000 tonnes of woodchip per year.



Fuel quality wood chip from tree surgery waste for electricity generation at heat and power stations and for woodchip boilers in municipal buildings. © City Suburban Tree Surgeons Ltd

### **Bristol City Council's use of CAVAT**

Bristol's Hotwells Road site is an excellent example of what can be achieved to retain mature trees and obtain monetary compensation for further tree planting within the city where tree retention isn't possible.

Localised flooding issues had prompted the building of stormwater storage units and alterations to the pipe system under Jacobs Wells Road and Hotwells Road, Bristol, in 2006. The initial set of plans produced by Wessex Water for conducting the works proposed the removal of several council-owned street trees ranging from newly planted specimens to 150-year-old planes. Bristol City Council used the CAVAT system

to put a monetary value on the trees shown for removal. The system was easy to use and provided tree officers with a rationale to work with other professionals involved to avoid tree removal where practical.

In areas where potential conflict existed, trenches were opened to investigate where roots from adjoining trees were located and to see whether storage units and pipework could be built while retaining the trees. Where it was not possible to move the proposed pipework, redesign storage units or sever roots without de-stabilising adjoining trees, both parties agreed to the removal of trees, with Wessex Water providing funds for compensatory planting.



Replacement trees next to where an underground stormwater storage tank was installed by Wessex Water.  
© TreeBristol

## For More Information



CAVAT

<http://www.ltoa.org.uk/resources/cavat>

Helliwell

<http://www.trees.org.uk/publications/Guides/Guidance-Note-4-Amenity-Valuation-of-Trees-and-Woodlands>

i-Tree Eco

<http://www.itreetools.org/eco/index.php>

*Of Chips and logs...making the most of a local authority arboricultural arisings in the Mersey Belt.* Report to Forestry Commission North West England Conservancy, 2006  
<http://www.merseyforest.org.uk/files/Of%20chips%20and%20logs.pdf>

*Trees in Towns II. A new survey of urban trees in England and their condition and management.* Chris Britt and Mark Johnston, for the Department of Communities and Local Government, 2008

<http://www.communities.gov.uk/publications/planningandbuilding/treesintownsii>

*Valuation of trees for amenity and related, non-timber uses.* 1st Edition, Guidance Note, RICS, 2010

<http://www.rics.org/uk/knowledge/professional-guidance/guidance-notes/valuation-of-trees-for-amenity-and-related-non-timber-uses/>

# 11

## Be Risk Aware (Rather than Risk Averse)

### Objective

Take a balanced and proportionate approach to tree safety management.

### Benefits

- Meets **duty of care** within budget constraints.
- Ensures maximum enjoyment and returns from local trees.
- Reduces potential for conflict with biodiversity policies and obligations.

# 10

## Take an Asset Management Approach

# 11

## Be Risk Aware (Rather than Risk Averse)

# 12

## Adjust Management to Needs

### Key Players

Prefer proactive over reactive interventions

#### Site owner

#### Tree officer

#### Highway authority

#### Businesses and residents associations

#### Insurer

#### Arboriculturist

Sustain attention to benefits over time

### Key Actions

- Estimate the value of your tree resource
- Scale budgets and compensations accordingly
- Understand your duty of care
- Manage risks and benefits in tandem
- Rationalise tree inspections through zoning
- Computerise your logging, managing and inspecting works system
- Promote management regimes that foster biodiversity
- Consider the impacts of climate changes

## Background

Each year five or six people in the UK are killed when trees fall on them. This fatality rate drops to three when focusing on trees in public spaces. As almost the entire population of the UK is exposed to this risk, the risk per person is about one in 20 million. The risk per tree of causing fatality is of the order of one in 150 million for all trees in Britain or one in 10 million for those trees in, or adjacent to, areas of high public use (source: <http://www.hse.gov.uk/lau/lacs/23-22.htm>). By measure of comparison, the annual risk per person of dying in a road accident is one in 16,890.

## Actions

### Create and communicate a clear framework for managing risks and benefits

A tree strategy (see [Principle 2](#)) provides a good vehicle for defining a transparent and predictable process for tree safety management. It also allows joint consideration of the management of tree risks (whether risks to people or to structures) and tree benefits to create a consensus on acceptable trade-offs.

Approaches to safety that are used for structures (fail weight, loading, etc) are not readily transferable to trees, which are living organisms and therefore much less predictable. While risks cannot be eliminated, they can be managed via a range of responses including:

- Falling branches or trees: inspection based on use-driven zoning.
- Pavement trip hazards: use of flexible surfacing materials, adequate soil volume and tree planting standards.
- Subsidence: hot spots mapping, cyclical pruning, evidence-based claim processing.
- Diseases and pests with possible impact on public health (for example irritations and allergic reactions caused by oak processionary moth): cooperation programmes for eradication and containment involving a wide range of stakeholders as well as the general public.

### Understand what the duty of care implies in relation to trees

The law requires that people should “take reasonable care to avoid acts or omissions which cause a reasonably foreseeable risk of injury to persons or property”. In practical terms, this indicates that owners of land with trees need to have their trees inspected periodically by a competent person.

## Rationalise inspection through zoning of use levels

As budgets are limited, it is essential to prioritise allocation of resources to the areas of the greatest risk. This is less about the condition of the tree than the level of use of the land on which the tree stands. For instance, trees in a high use area might need to be inspected annually, whereas trees in an area with very low levels of access might not need any formal inspection at all. This approach helps ensure that safety surveys do not become too time- or budget- consuming.

### Establish a clear process - backed by policy - for handling tree-related structural damage

*Trees in Towns II* found that fewer than one in three local authorities has a formal policy for managing trees in relation to their liability for tree-related structural damage. Failure to address potential liability in this area through the production of a policy could be costly for local authorities in the long term. The London Tree Officers' *Risk Limitation Strategy*, which London boroughs such as Islington use as policy, includes a number of useful recommendations.

# Case Studies

## Shifting away from risk to benefit management in Islington

A few years ago, the London Borough of Islington used to allocate insufficient money to manage their trees effectively. At the time, the local authority did not hold data on tree conditions, and as a result, management happened on an ad-hoc, empirical basis. The choice was made to reduce the pruning budget, so as to free up resources to employ an officer who would be responsible for collecting tree and management data, helping to realise a better allocation of the borough's limited funds towards priorities.

As a result of this approach, the borough was able to increase maintenance budgets, and pace both inspection and pruning based on risk levels. Adoption of a cyclical pruning regime, where trees are pruned on a regular basis, has also helped curb insurance claims while allowing the negotiating of better rates with contractors.

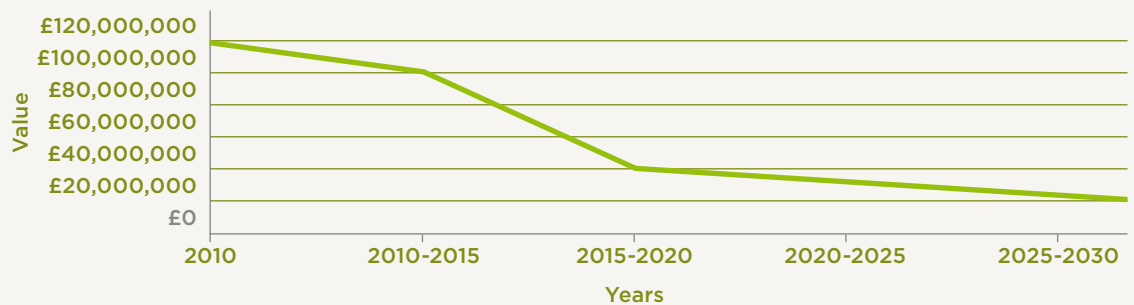
The data collection efforts conducted enabled the borough to use the CAVAT tree valuation method and apply asset management principles advocated by the Chartered Institute of Public Finance and Accountancy (CIPFA) to calculate both the present and future value of their tree stock. Models for groups of trees were

developed predicting how their different management regimes would affect their value, as well as forecasting when they would need to be replaced. These models enabled the forecasting of the overall effect on tree and canopy value. They helped identify the level of planting required to keep canopy levels at the current levels and also to increase canopy levels. They also helped demonstrate how there would be a decline in canopy cover if no or insufficient tree planting took place.

Getting more insight into the local tree population's condition permitted, as Jake Tibbetts, the borough's arboricultural manager observed, "a move away from a risk focused approach to one that embraces benefits management. Tree removal, tree planting rates and management approaches - including risk mitigation via pruning - need to be considered jointly. Together with the distribution of species, quantifying these factors can demonstrate how canopy will fluctuate over time when different management approaches and investment are applied."

The London Borough of Islington's tree policy can be downloaded from [http://www.islington.gov.uk/DownloadableDocuments/Environment/Pdf/greenspace/tree\\_policy\\_2011.pdf](http://www.islington.gov.uk/DownloadableDocuments/Environment/Pdf/greenspace/tree_policy_2011.pdf)

### Future CAVAT Value



Graph showing the anticipated decline in tree asset value (CAVAT assessment) over time if no new tree planting is undertaken. © London Borough of Islington

## For More Information



*Common Sense Risk Management of Trees, Guidance on trees and public safety in the UK for owners, managers and advisers.*

National Tree Safety Group, 2011

[www.forestry.gov.uk/pdf/FCMS024.pdf/\\$FILE/FCMS024.pdf](http://www.forestry.gov.uk/pdf/FCMS024.pdf/$FILE/FCMS024.pdf)



*The Risk Limitation Strategy for Tree Root Claims*, London Tree Officers Association, 2008

[http://www.ltoa.org.uk/index.php?option=com\\_docman&task=cat\\_view&gid=99&Itemid=78](http://www.ltoa.org.uk/index.php?option=com_docman&task=cat_view&gid=99&Itemid=78)



# 12

## Adjust Management to Needs

### Objective

Conduct proactive and tailored tree maintenance to ensure optimum benefits in response to local needs.

### Benefits

- Builds up support for trees by ensuring benefits outweigh occasional inconvenience.
- Secures higher tree survival rates.
- Improves the contribution trees make to local biodiversity.

# 10

## Take an Asset Management Approach

# 11

## Be Risk Aware (Rather than Risk Averse)

# 12

## Adjust Management to Needs

### Key Players

Prefer proactive over reactive interventions

#### Site owner

#### Tree officer

#### Highway authority

#### Businesses and residents associations

#### Insurer

#### Arboriculturist

Sustain attention to benefits over time

### Key Actions

- Estimate the value of your tree resource
- Scale budgets and compensations accordingly

- Understand your duty of care
- Manage risks and benefits in tandem
- Rationalise tree inspections through zoning

- Computerise your logging, managing and inspecting works system
- Promote management regimes that foster biodiversity
- Consider the impacts of climate changes

## Actions

### **Adopt a systematic and proactive approach to tree maintenance**

To realise any planned objectives, the practical management of the urban forest should be undertaken in a systematic manner.

Systematic management will be facilitated by:

- Having a tree strategy that defines clear objectives and priorities for the management and growth of the local tree resource (see [Principle 2](#)).
- Conducting systematic and cyclical inspection of trees (see [Principles 1 and 11](#)).
- Using computerised systems to manage and store information on survey (see [Principle 1](#)), as well as inspections and works.
- For local authorities: having an integrated tree management team or very strong cross-departmental collaborative arrangements.

Combined, these elements will help ensure that a majority of tree maintenance work is proactive and scheduled, rather than ad hoc and reactive. Benefits include enhanced tree health, lower complaints and insurance claims in relation to trees as well as better value for money.

### **Promote management regimes that foster tree longevity and biodiversity.**

Over-mature and declining trees and trees with dead wood and cavities provide valuable wildlife habitats particularly for bats, birds and invertebrates. For example, the London Borough of Waltham Forest has made it a key policy that “examples of trees with dead wood and cavities including over-mature and declining trees will be retained in parks, gardens and woodlands to provide a habitat for wildlife (subject to appropriate health and safety inspections)”.

### **Anticipate the impact of a changing climate**

Climate change is expected to lead to increased physiological stress for trees growing within urban areas. This, in turn, will predispose trees to attacks from a range of pests and pathogens. Climate change is also expected to create a more favourable environment for new pests and pathogens to which the local tree population will not have been exposed before. Given these scenarios, improved levels of awareness and collaboration to

facilitate early detection and knowledge sharing amongst key stakeholders and urban tree owners, including neighbouring local authorities, is very important. Creating resilience in the tree population by widening species diversity and genetic variability is also critical.

## For More Information



*British Standard 3998: 2010 Tree work. Recommendations*, British Standards Institute  
<http://shop.bsigroup.com/ProductDetail/?pid=000000000030089960>

Tree Management Toolkit for Social Landlords - online resource developed by Neighbourhoods Green  
<http://www.neighbourhoodsgreen.org.uk/>

## Case Studies

### Tor Homes: moving from ad-hoc reaction to proactive tree management

When it adopted its tree policy in 2006 (see case study under [Principle 3](#)), trees on Tor Homes's ground were managed on an ad hoc basis. The policy secured executive support for a more systematic approach, starting with a holistic survey of all trees located on the 3,500 properties it managed at the time.

The lead ground maintenance staff underwent training so that they could conduct the survey themselves, and it was carried out over three years, in order to manage parallel workloads. Trees located near A roads and railway lines were deemed to offer greater potential for risks and were inspected first. Next up were areas of Tor Home's estates that the ground maintenance staff were not familiar with, and, third, the properties the staff had managed in the past.

The survey differentiated between trees that displayed signs of risk of harm from those where other work was needed. Management and maintenance resources were initially targeted solely to risk reduction work. Once the backlog of risk issues had been mostly cleared, remedial work addressing those other issues that had been identified, was progressively undertaken. Today, far from focusing solely on tree safety issues, the grounds maintenance team is able to include scheduled tree planting into its maintenance activities. The recent amalgamation of Tor Homes into the Devon and Cornwall Housing Group has meant an increase in the number of properties to be managed, but the policy and survey procedure has simply been rolled out across the wider portfolio.



Well cared for ancient oak on the doorstep of Tor Homes residents in Culverdale, Totnes. © Tor Homes

## Case Studies

### TreeBristol, building a flexible and robust infrastructure for tree success

TreeBristol was launched in 2005 by Bristol City Council as an integrated programme combining tree planting, tree care and community engagement to increase the City's tree canopy cover to 30%. The programme manages the replacement of lost street trees and the planting of trees in new sites across Bristol that are in greatest need of more trees. The programme is delivered using a combination of contractors and in-house teams.

Critical to its success has been the attention dedicated to aftercare for newly planted trees. New trees planted via TreeBristol are regularly watered for up to three years, and mulched for as long as five to seven years. Russell Horsey, who manages the programme, reports that such upfront investment does pay back with long-term savings.

Another key success factor has been the sustained focus on progressively building a strong infrastructure that could enable both flexible and resilient delivery of the overall programme. Year on year, Bristol City Council has invested in mobile water tanks that have been branded TreeBristol and that both contractors and the council in-house team can use to water young trees. This provides the

Council with more flexibility to change its delivery model when needed, without being reliant on the infrastructure a particular contractor might provide. The bright banding also offers a great tool for promoting the work being done and the importance of tree management to the wider public. Similarly, the team has also invested in a stock of tree guards that get re-used once a tree gets older, as well as tools for community planting events. Together these components provide the TreeBristol programme with the infrastructure it needs to be long-lived and cost effectively deliver the City's canopy cover goal.

For more information  
<http://www.bristol.gov.uk/page/treebristol#jump-link-0>



Top image: TreeBristol bowser in action in Queen Square.  
Bottom image: New oak avenue planted in Victoria Park. © TreeBristol

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Non-technical publications and resources



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[www.forestry.gov.uk/pdf/FCRP017.pdf/\\$FILE/FCRP017.pdf](http://www.forestry.gov.uk/pdf/FCRP017.pdf/$FILE/FCRP017.pdf)

“Trees are the only part of infrastructure that actually appreciate in value while the rest depreciates.”

Pepper Provenzano, Treelink

# Glossary

**Ancient tree:** one that is old for its species (i.e. beyond peak **maturity**), a living link with the past with a curious beauty typically associated with wildlife habitat from dead and decaying wood.

**Asset management:** the coordinated activities of an organisation to realise life cycle value from assets in delivery of its objectives.

**Caliper:** the diameter of a tree trunk.

**Canopy cover:** the percent of a fixed area covered by the crown of a tree.

**Carbon sequestration:** the process by which atmospheric carbon is absorbed in to carbon sinks such as the oceans, forests and soil.

**Central leader:** the clear and dominant main stem at the top of a tree.

**Commutated sum payment:** a one-off payment from a developer in lieu of on-site provision of trees.

**Conservation area:** areas designated for special protection due to architectural or historic interest. Anyone proposing to prune or fell a tree within such area must give the local authority six weeks' notice of their intention. This is to enable the council to examine the proposal and decide whether or not to issue a **TPO**.

**Core Strategy:** what the key compulsory document in a local plan used to be called before the National Planning Policy Framework came into force in March 2012. It sets out the Local Planning Authority's vision, key strategic objectives and how these will be delivered.

**Crowdsourcing:** the practice of obtaining services, ideas, or content by soliciting contributions from a large group of people and especially from the online community.

**DBH – Diameter at Breast Height:** the diameter of the trunk measured at 1.5 metres above the ground.

**Development briefs:** non-statutory guidelines prepared for certain large sites that are expected to be subject to development. Briefs normally contain details of important trees that are considered sufficiently valuable to retain.

**Development Plan Documents (DPDs):** what the statutory document that makes up a local plan used to be called before the National Planning Policy Framework came into force in March 2012. This includes the **core strategy** and other area-specific or thematic **DPDs** providing greater details on the broad policies included in the **core strategy**.

**Duty of care:** in regards to trees, refers to the obligation under the law for the owner of a tree to “take reasonable care to avoid acts or omissions which cause a reasonably foreseeable risk of injury to persons or property”.

**Ecosystem:** short for ecological system. It refers to plants, animals and other living beings living together in a certain space with their environment and functioning as a loose unit. Together, these components and their interactions form a dynamic and complex new whole, which bears characteristics that cannot be found in each individual component on its own.

**Girth:** circumference of the tree stem measured 1 meter above the ground.

**Geographic Information Systems (GIS):** allow users to view, understand, question, manipulate, interpret geographically referenced data in forms including maps, reports, and charts that help reveal relationships, patterns, and trends.

**Green infrastructure:** the network of green spaces and other natural features within and around towns and cities that conserves natural **ecosystem** values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife.

**Grey infrastructure:** constructed assets and networks such as roads, railway lines, bridges, utilities, hospitals designed to support human settlements – and traditionally designed to replace (rather than work with and integrate) natural systems to deliver their benefits, sometimes resulting in harmful consequences for the environment.

**Joint Mitigation Protocol:** a method agreed by large insurers and the London Tree Officers Association for the processing and investigation of tree root-induced building damage, with benchmarked timescales for responses and standards of evidence.

**Keystone species:** a species whose presence and role within an **ecosystem** has a disproportionate effect on other organisms within the system.

**Landscape character assessments:** The tool that is used to help us to understand, and articulate, the character of the landscape. It helps us identify the features that give a locality its “sense of place” and pinpoints what makes it different from neighbouring areas.

**Local character assessment:** a technique used to develop a consistent and comprehensive understanding of what gives a local area’s landscape its character and makes it unique.

**Mature tree:** the definition of maturity in trees is as broad as it is in humans. Trees are certainly not considered mature until they are old enough to reproduce and bear seed, but many will continue to grow taller and wider after that point is reached.

**Stratification:** the process of partitioning data into distinct or non-overlapping groups – for example a tree dataset might be stratified using ownership or land use criteria.

**Subsidence:** the downward movement of the ground supporting a building. Problems arise when the movement varies from one part of the building to the other, when cracks and structural damage can occur.

**Supplementary Planning Documents (SPDs):** these are incorporated into a local plan to provide greater details on the policies included in the **core strategy** and other **development plan documents** the local plan might include. The term predates the publication of the National Planning Policy Framework, which came into force in March 2012, which simplified prescriptions on the elements to be included in a local plan.

**SuDS – Sustainable Drainage Systems:** solutions offering an alternative to traditional sewer systems for dealing with stormwater run-offs by imitating natural drainage processes.

**Taper:** the degree to which a tree’s stem decreases in diameter as a function of height above ground.

**Tree Preservation Orders (TPOs):** used to protect selected trees and woodlands if their removal would have, “a significant impact on the environment and its enjoyment by the public”. They can apply to a single tree or a group of trees. Priority for TPOs is generally given to trees that are considered to be under threat, for example where imminent development is proposed.

**Urban forest:** public and private trees located in and around an urban area.

**Urban forestry:** a planned, systematic and integrated approach to the management of the trees and woodlands in and around towns and cities in effort to optimise resulting social, environmental and economical benefits for local communities.

**Veteran tree:** one, while not yet necessarily ancient, that has wildlife habitat significance derived from natural ageing and wounding or from imposed stresses and damage.

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## Trees and Design Action Group

The Trees & Design Action Group (TDAG) is a pioneering group of individuals, professionals and organisations from both the public and the private sectors who have come together to increase awareness of the role of trees in the built environment throughout the United Kingdom.

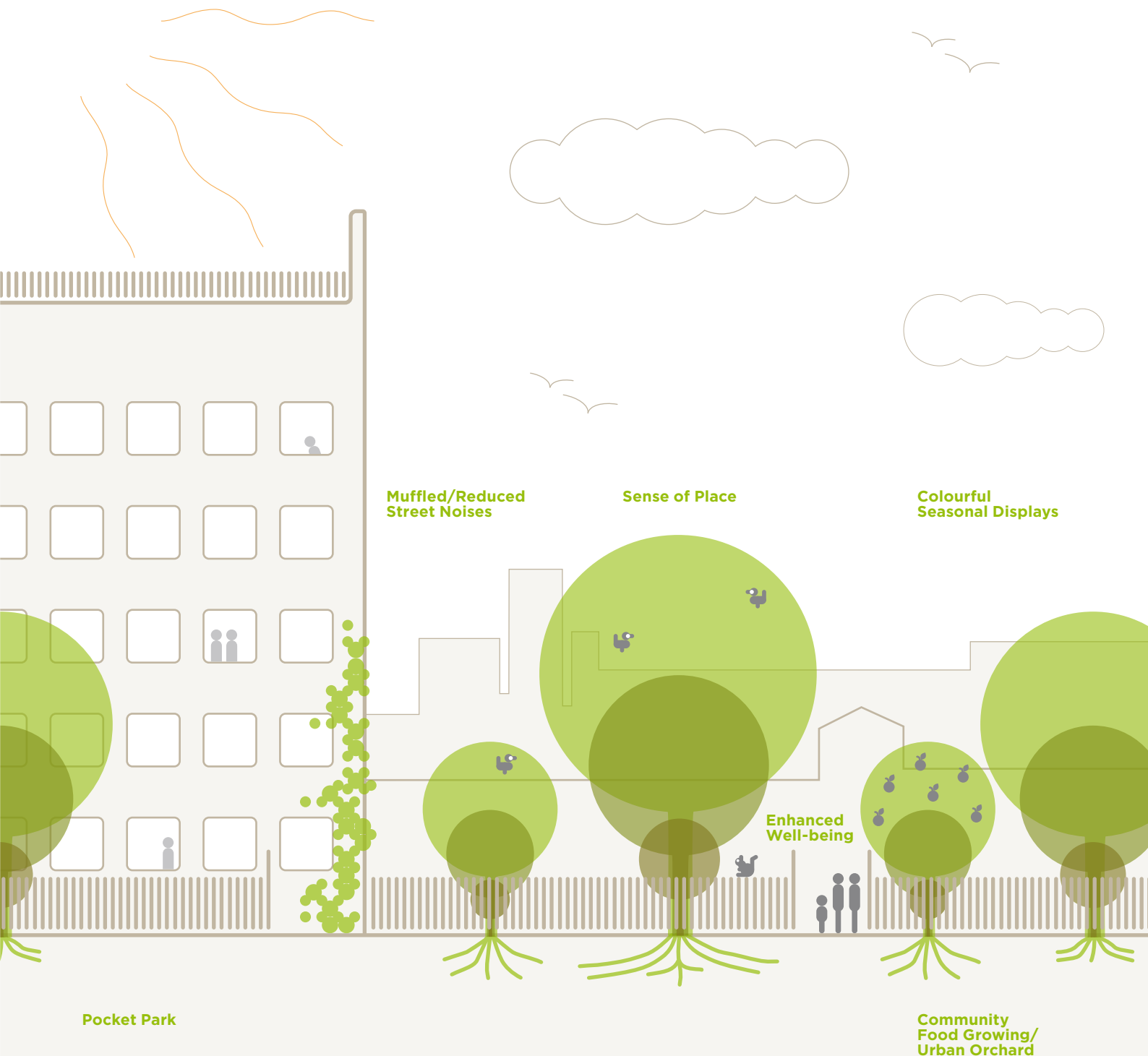
The group shares the collective vision that the location of trees, and all the benefits they bring, can be secured for future generations by influencing the planning, design, construction and management of our urban infrastructure and spaces.

Established in 2007, it is not-for-profit and apolitical. Its membership, online publications and information are free. This approach enables TDAG to assimilate ideas and knowledge independently of organisational hierarchy, profit or commercial interests.

For more information go to [www.tdag.org.uk](http://www.tdag.org.uk)

“Trees are a vital part of urban infrastructure and offer a variety of benefits – shade in summer, shelter from rain and wind; they help to keep the air clean and breathable, support wildlife and add value to the culture and economy of our towns and cities. Now is the time to work together to protect the urban trees we have and plant more so they survive and deliver these and many more benefits into the future.”

Sue Holden, Chief Executive, Woodland Trust



For more information go to  
[www.tdag.org.uk](http://www.tdag.org.uk)



Trees & Design  
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