

# **NO TREES, NO FUTURE**

**Trees in the urban realm**

**Trees and Design Action Group  
November 2008**



# **No Trees, No Future Trees in the urban realm**

Published by



**The Trees and Design Action Group**

<http://www.forestry.gov.uk/forestry/INFD-7KDEHU>

November 2008

## Contents

1.	INTRODUCTION.....	4
1.9.	Why the Trees and Design Action Group? .....	5
2.	<b>SECTION ONE: GUIDELINES ON LARGE SPECIES TREES IN NEW DEVELOPMENT</b> .....	6
2.1.	General notes.....	6
2.2.	The benefits of urban trees .....	6
2.3.	Summary of technical and good practice guidance .....	7
2.4.	Trees and climate change.....	8
2.5.	Sustainable design codes and external spaces.....	8
2.6.	Climate adaptation strategies and action plans .....	9
2.7.	Tree strategies .....	9
3.	<b>GUIDELINES ON RESOLVING PERCEIVED ISSUES</b> .....	9
3.1.	Subsidence and risk of structural damage.....	9
3.2.	Indirect pressure from the insurance sector .....	10
3.3.	Structural failure of the whole or part of a tree.....	11
3.4.	Shading/cooling.....	12
3.5.	Light obstruction.....	12
3.6.	Leaf litter.....	12
3.7.	Honeydew drip .....	13
3.8.	Fruit fall.....	13
3.9.	Access obstruction .....	13
4.	<b>GUIDELINES ON REALISING THE BENEFITS</b> .....	14
5.	<b>GUIDELINES FOR PLANTING</b> .....	14
6.	<b>CLIMATE CHANGE AND SUSTAINABILITY</b> .....	15
7.	<b>GUIDELINES ON OVERCOMING BARRIERS IN NEW DEVELOPMENT</b> .....	15
7.13.	Local authority tree strategies.....	20
7.14.	Local authority planning powers .....	21
8.	<b>GUIDELINES ON INTEGRATING TREES INTO NEW DEVELOPMENT</b> .....	23
8.1.	Higher density developments – less space for trees .....	23
8.2.	Smaller private gardens & less green space .....	23
8.3.	Short development cycles and short tree lives .....	24
8.4.	Townscape suitability and capacity for trees .....	24
8.5.	Competition for space above and below.....	25
8.6.	Perceptions of structural damage risk.....	26
8.7.	Responding to an increasingly litigious climate .....	26
8.8.	Future maintenance costs and large trees .....	27
8.9.	Meeting the biological needs of trees .....	27
9.	<b>SECTION TWO: GUIDELINES FOR ASSESSING THE VALUE OF URBAN TREES</b> .....	28
9.1.	Financial benefits of integrating trees into new development.....	28
9.2.	Summary of three valuation methods .....	28
9.4.	The methods .....	29
9.5.	Guidelines for tree valuation .....	31
9.6.	Conclusions.....	32
	<b>APPENDIX A</b> .....	<b>33</b>
	References (numbered within text) .....	33
	<b>APPENDIX B</b> .....	<b>35</b>
	TDAG 10 Point Action Plan .....	35
	<b>APPENDIX C</b> .....	<b>37</b>
	Technical and Good Practice Guidance:.....	37
	<b>APPENDIX D</b> .....	<b>39</b>
	Further Reading.....	39
	<b>APPENDIX E</b> .....	<b>40</b>
	Case Studies .....	40

Note: References relating to superscript numbers within the text can be found in APPENDIX A.

## 1. INTRODUCTION

- 1.1. It would be fair to say that our urban trees are under threat as never before. An inquiry and report by the London Assembly Environment Committee “Chainsaw Massacre” (2007)<sup>1</sup> highlighted the loss of street trees in London indicating that more large species trees are being cut down than are being replaced or newly planted.
- 1.2. Trees in Towns II<sup>2</sup>, the report on urban trees and tree management commissioned by Communities and Local Government, echoes these findings for trees across England. This report encompassed the entire urban realm from streets and estates through to parks and private gardens. In particular the report highlighted the threat to trees from built development in all its forms.
- 1.3. Particular victims are the larger structural trees, such as the London Plane, which contribute to London’s international reputation as a green, tree-filled capital. What is happening in London appears to be happening in many other urban centres throughout the United Kingdom.
- 1.4. Trees are one of the urban realm’s greatest allies and have been shown, to improve health and well-being, for people and the environment. They mitigate temperature extremes<sup>3</sup>, reduce pollution<sup>4,5,6</sup> and increase real estate values<sup>7,8,9</sup>.
- 1.5. In terms of climate change, trees have been identified as being a key element of any urban climate change adaptation strategy<sup>10,11,12</sup>. Trees are uniquely placed to be widely integrated into the urban fabric, providing a shading and cooling mechanism. Without this cooling mechanism, cities of the future, and London in particular, are likely to be very inhospitable places.
- 1.6. There is however a huge practicality gap between the aspirations detailed in climate adaptation strategies for more and larger trees to mitigate temperature extremes and the practical considerations required to achieve the presence of enough large species trees in the urban landscape to do the job required. This gap is in addition to the incremental erosion of the existing large tree populations highlighted in the reports detailed above.
- 1.7. We must plan now to ensure a legacy of urban trees for future generations. However, there are a series of contradictions that need to be resolved, many of which are based on understanding the urban environment in three, or even four, dimensions. In the case of trees this involves what is happening underground, at street level, at canopy level and how trees, as living elements in the urban realm, both change and need care and management over time.
- 1.8. The time has come to make information readily available so that the right people (primary decision makers) can make the right decisions at the right time to ensure that they provide the right place for the right tree.

## **1.9. Why the Trees and Design Action Group?**

- 1.9.1. The Trees and Design Action Group (TDAG) is a multi-disciplinary group of individual professionals and organisations from both the private and public sectors who have come together under The London Tree and Woodland Framework to collaborate in achieving an increased awareness of the role of trees in the built environment.
- 1.9.2. The TDAG has initially focused on London, however it is intended that its experience and actions will be equally applicable to other cities and that the experience and research from other cities will contribute to the actions of the TDAG.
- 1.9.3. The TDAG covers all trees (both existing and proposed) in the urban environment and will be publishing a series of guidance notes to cover aspects within the group's "Ten Point Action Plan" (see appendix B).
- 1.9.4. There is a considerable amount of professional guidance currently available on the technical aspects and desirability of both protecting existing trees and planting new trees in a range of urban situations (see appendix C).
- 1.9.5. The TDAG has identified unforeseen challenges with the practical implementation of this currently available guidance. More often than not much of it is used to justify the planting of smaller, less substantial trees when choices are being made on replacing street trees or the landscape elements of new developments.
- 1.9.6. The TDAG has a website, hosted by the Forestry Commission, London. This provides information on the Group's work, downloads of publications, useful links and a contact point for communications and responses. Its URL is:  
<http://www.forestry.gov.uk/forestry/INFD-7KDEHU>

## **2. SECTION ONE: GUIDELINES ON LARGE SPECIES TREES IN NEW DEVELOPMENT**

### **2.1. General notes**

- 2.1.1. This guidance is intended for use by developers, planners, designers and engineers and should be adopted and followed at the conceptual and design stages of a project but also with the benefit of expert arboricultural advice.
- 2.1.2. The Trees and Design Action Group (TDAG) recognises that large species trees confer the greatest benefits on urban spaces. If larger-growing trees are not incorporated as essential elements in new developments, the result will be a degraded and impoverished landscape that will also fail to deliver essential adaptive responses to the effects of climate change.
- 2.1.3. Consequently this guidance note seeks to address a gap in the advice available to professionals by coupling practical advice for integrating trees into new building schemes with qualitative advice on the reasons why large species trees should be used wherever possible.
- 2.1.4. References within the text are shown at APPENDIX A.

### **2.2. The benefits of urban trees**

- 2.2.1. There is a substantial body of research that supports the following benefits that trees bring to urban areas (see references in Appendix A).

#### **2.2.2. Environmental**

- Reduce localised temperature extremes (The Urban Heat Island) <sup>3</sup>
- Provide shade, making streets and buildings cooler in summer <sup>3</sup>
- Help to improve air quality by reducing dust and particulates <sup>4,5,6</sup>
- Improve environmental performance of buildings <sup>13</sup>
- Help to reduce traffic noise, absorbing and deflecting sound
- Help to reduce local wind speeds
- Increase biodiversity and provide food and shelter for wildlife <sup>14-21</sup>
- Assist in land remediation
- Reduce the effects of flash flooding by rainfall interception <sup>22</sup>

#### **2.2.3. Social**

- Improve the quality and perception of the urban environment
- Create community focal points and landmark links
- Create sense of place and local identity
- Benefit communities socially by instilling higher public esteem and pride for an area <sup>23,24,25</sup>

- Positive impact on both physical and mental health and well being<sup>23,24,25</sup>
- Positive impact on crime reduction<sup>26,27</sup>
- Improve health in the urban population<sup>28</sup>

#### **2.2.4. Economic**

- Have the potential to increase residential and commercial property values by between 7% to 15%<sup>7,8,9</sup>
- Improve the environmental performance of buildings and therefore the economic performance through reducing heating and cooling costs<sup>13</sup>
- Can provide mature landscapes that confer a premium for development sites<sup>9</sup>
- Assist the appreciation of property values proportionate to their scale as they grow larger<sup>10</sup>
- Creating a positive perception for prospective purchasers of property
- Enhance the prospects of securing planning permission
- Improve health in the urban population, thus reducing healthcare costs<sup>28</sup>
- Provide a potential long term renewable energy resource<sup>12,29</sup>

### **2.3. Summary of technical and good practice guidance**

- 2.3.1. There is a wealth of technical guidance produced by various bodies and organisations on the physical requirements for large species trees and buildings to co-exist without creating problems in terms of the structure and fabric of the building or the health and growth of the tree. Much of this guidance and technical information has been available for many years and is regularly updated and amended to keep pace with technical innovation and changing circumstances. References are included in Appendix C.
- 2.3.2. Unfortunately, the guidance that could be informing building construction to accommodate the presence of large species trees can often be applied counter intuitively to result in a decline in the scale and stature of the trees being planted in our towns and new developments.
- 2.3.3. This is largely because trees, although aspired to in the conceptual stages of development, tend to be dealt with at the end of the planning stage in terms of practical delivery. Decisions are made that can lock the development team into selecting smaller species in preference to the larger growing species that are more likely to confer greater benefit both to the development and the wider environment.

## **2.4. Trees and climate change**

- 2.4.1. Climate change and the need to adapt our cities to the expected future conditions have created an imperative where conventional assumptions about landscape in our urban environment and, in particular, provision for new tree planting are being challenged.
- 2.4.2. Methods of building design and construction need to be reviewed and revised, as the buildings and spaces in which we currently live and work are unlikely, in the medium term, to provide adequately for our needs if the expected impacts of climate change in the UK are realised.
- 2.4.3. Research has demonstrated that the urban heat island effect can be ameliorated by providing more green space and high tree cover in urban situations<sup>3</sup>. Trees are an essential component of this greening strategy<sup>10</sup>. In comparison to other green landscape features, a tree can provide the largest volume of leaf area and evapo-transpirational cooling effect, whilst occupying very little ground level area within the urban environment because of its piloti or umbrella-like structure. Provided there is adequate provision for the tree's root system and crown to develop, the premium surface space of streets, squares and the public realm can be used for other functions, many of which may benefit, directly or indirectly, from tree cover.
- 2.4.4. Trees also have an important role in the management of water flows and flash flooding in urban areas by complementing sustainable urban drainage systems (SUDS) and subject to appropriate design, providing a rainfall interception mechanism in areas where this would otherwise be impossible to achieve without large scale surface treatment.
- 2.4.5. Vernacular architecture found elsewhere in the world for coping with high temperatures may not be readily transferable to the UK situation for cultural, spatial and economic reasons<sup>30</sup>.
- 2.4.6. Trees and greenery have been an integral element of civilised settlement throughout history and are seen as a vital part of most well-regarded cities, particularly London. They are also seen as playing an essential functional role in settlements in hotter climates, such as we are likely to be facing in the future.
- 2.4.7. Increasing green space and, in particular, the canopy cover of trees is likely to remain one of the more cost effective means of making cities liveable in the future. However, unless future developments of all types are designed and constructed to accommodate the presence of large trees, which confer the greatest benefits in terms of adaptation to climate change effects, we will be foreclosing this opportunity for the future.

## **2.5. Sustainable design codes and external spaces**

- 2.5.1. The Code for Sustainable Homes simply addresses the structure and fittings of discrete buildings, but takes no account of context or surroundings and the effects that layout, orientation and external spatial

design, including tree planting, can have on the energy efficiency, comfort and sustainability of both new and existing housing developments.

- 2.5.2. The TDAG supports the Landscape Institute's call for a more holistic approach incorporating sustainable landscape elements into a revised code to extend the scope of the present standards. Tree canopy cover clearly has an important role to play in this respect.

## **2.6. Climate adaptation strategies and action plans**

- 2.6.1. Climate adaptation strategies are increasingly highlighting urban tree cover as being an important contributor to the objective of reducing the urban heat island effect <sup>10,12</sup>.
- 2.6.2. Implementation of these strategies will require partnership working at all levels of delivery <sup>2,10,12</sup>.

## **2.7. Tree strategies**

- 2.7.1. With the production of new local development frameworks and supplementary planning documents, local authority tree strategies will be of increasing importance. They will provide the detail in terms of policy direction and management action plans formerly contained in Unitary Development Plans.
- 2.7.2. Formally adopted by the local authority, a comprehensive tree strategy will be a material consideration in the determination of planning applications.
- 2.7.3. Trees in Towns II <sup>2</sup> highlights the importance of local authorities having a comprehensive tree strategy that covers all the tree and woodland resource held on both public and private land.

# **3. GUIDELINES ON RESOLVING PERCEIVED ISSUES**

## **3.1. Subsidence and risk of structural damage**

- 3.1.1. In London, and many other parts of the country, trees on shrinkable clay subsoils may cause foundation movement to structures during periods of drought.
- 3.1.2. Subsidence is one of the single biggest threats to trees in the urban realm, not primarily because it is so prevalent, in fact, it is not.<sup>12</sup> But because the perceived fear of damage to buildings from trees is creating the issues such as those highlighted in the London Assembly's report. (Chainsaw Massacre 2007) <sup>1</sup>.

- 3.1.3. **Guidance:** In the case of shrinkable soils new structures should be designed and constructed to withstand or accommodate the potential effects of movement which are likely to increase with climate change regardless of the presence of trees.
- 3.1.4. Future building movement may be unwittingly caused by the selection of particular trees within the design of the landscape scheme. Their presence should be considered and accommodated by the construction of adequate foundations to allow the trees to reach their full potential species size – thereby maximising the benefits listed above.
- 3.1.5. Movement may also arise from root activity associated with trees planted subsequent to construction without knowledge of the building's foundation design. In these cases it is incumbent on the building owner/ tree planter to ascertain the appropriate species and location so that the trees are unlikely to create a problem in the future.
- 3.1.6. Movement in subsoils and risk of structural damage may also arise some considerable time after the removal of large trees nearby ('soil heave' effects arising from an increase in moisture content) or following periods of drought or flooding. These events are expected to be more frequent as a result of climate change.
- 3.1.7. The over-riding objective should be to avoid the risk of such foreseeable damage by ensuring that foundation designs for structures are 'fit for purpose' over their intended lifetime, particularly in the case of new housing in vulnerable locations.
- 3.1.8. Addressing such matters at the design, planning and construction stages of a development provides substantial cost benefits when compared to the cost and disturbance associated with remedial actions at a later date.

## **3.2. Indirect pressure from the insurance sector**

- 3.2.1. Insurance companies and their advisers may see the presence of trees close to a building as posing a general risk, regardless of the foundation design, subsoil characteristics or tree species.
- 3.2.2. This can result in pressure from developers on designers of new housing to avoid the risk altogether by not planting any trees within a predefined distance of the buildings.
- 3.2.3. It can also lead to pressure on homebuyers to remove nearby trees following superficial surveys.
- 3.2.4. Given the higher density of new housing and resultant reductions in garden areas, this can result in housing developments with few, if any, trees other than in larger public open spaces.
- 3.2.5. **Guidance:** There is now a substantial body of research and information relating to the effects of tree roots on built structures, particularly relating

to subsidence damage, but this needs to be more widely applied in new developments (see appendix C).

- 3.2.6. In many cases, e.g. where the subsoil is not a shrinkable clay, the risk is very low. Where the risk is real, buildings and their foundations should be designed to withstand or accommodate possible future soil movement, whether caused by trees or other factors.
- 3.2.7. A longer-term and better-informed approach to the build quality of new housing in susceptible areas would remove the perception of trees as a potential risk to stability and would also significantly reduce the insurance industry's exposure to claims in the future.
- 3.2.8. For existing trees and housing in shrinkable clay areas, it is important that both house owners and representatives of the arboriculture, surveying and insurance sectors are better informed of the actual risks. This should include identification of early signs of problems and knowledge of remedies that do not necessarily lead to tree removal <sup>12</sup>
- 3.2.9. In all situations, a commitment to the appropriate long term maintenance of trees is a key element in the successful co-existence of trees and the built environment <sup>12</sup>.

### **3.3. Structural failure of the whole or part of a tree**

- 3.3.1. Trees are susceptible to damage, disease and decay for many reasons, both natural and man-made.
- 3.3.2. **Guidance:** Trees are remarkably resilient and normally do not fail without some warning. Most structural problems in trees may be identified by adequate visual and technical inspection by a professional arboriculturist.
- 3.3.3. Obvious defects (e.g. dead wood, broken hanging branches, movement at the base of a tree, areas of decay with fungi) may be apparent to a lay observer and signal the need for expert advice.
- 3.3.4. This issue may be addressed by adequate levels of inspection appropriate to the location and context. The dynamic nature of the built environment, including highways, requires closer inspection of trees than would be the case in un-built or less frequented areas, such as open countryside.
- 3.3.5. Ensuring safety and avoiding damage to people or property are, of course, paramount but these objectives can be achieved through a sensible and pragmatic approach that pays due consideration to the benefits of trees.
- 3.3.6. In most cases of potential hazard, remedial work can be carried out without removing the whole tree and usually without significant loss of the other benefits that the tree provides.

### 3.4. Shading/cooling

- 3.4.1. Traditionally in the UK, trees causing heavy shade on buildings, gardens and public spaces have always been viewed as being detrimental.
- 3.4.2. **Guidance:** Tree management can substantially reduce this issue whilst retaining the tree for its benefits and securing a subsequent contribution to climate change adaptation <sup>12</sup>
- 3.4.3. The expected impacts of climate change, particularly in urban areas such as London, will mean trees that provide dense shade will be at a premium <sup>3, 10</sup>.
- 3.4.4. In addition to shade, trees are now welcomed as they provide a cooling mechanism that also reduces the urban heat island effect <sup>10</sup>.

### 3.5. Light obstruction

- 3.5.1. A common complaint made against trees is that they obstruct both sunlight and natural daylight.
- 3.5.2. This can be more of a problem with evergreen trees as they tend to be densely foliated and continue to block light in the winter months when there are fewer hours of daylight and the sun is low.
- 3.5.3. Deciduous species not only lose their foliage in the winter but tend to include more lightly foliated specimens and be more capable of being thinned or pruned.
- 3.5.4. **Guidance:** Careful consideration of the eventual height, spread and density of leaf cover, as well as the location of new plantings in relation to windows, open water areas, sun decks and other features should avoid problems in the future.
- 3.5.5. Existing problems can frequently be alleviated through arboricultural work such as selective branch removal or overall thinning of foliage.

### 3.6. Leaf litter

- 3.6.1. Leaf litter has long been viewed as a problem by residents and local authorities alike.
- 3.6.2. **Guidance:** Sustainable management of leaf litter at recycling centres enables it to be used as a valuable component of locally sourced compost.
- 3.6.3. Leaf fall leading to blocked gutters and drains can be avoided by fitting proprietary mesh systems that enable water to drain whilst ensuring that leaves remain separate to be dispersed by the wind or collected.

### 3.7. Honeydew drip

- 3.7.1. Honeydew drip is caused by aphid infestations on some species of tree and can be an issue in respect of vehicles, glazing and paved surfaces.
- 3.7.2. **Guidance:** It may be avoided by planting appropriate aphid resistant species in sensitive locations, particularly over smooth or high quality hard surfaces and vehicle parking areas.
- 3.7.3. Selective pruning or crown reduction can help to alleviate existing situations.
- 3.7.4. Trees such as limes and sycamores that thrive in urban areas but are susceptible to aphid infestations, do however provide a positive benefit, as the sticky leaves collect and trap dust and PM10s particles and so help to reduce airborne pollution<sup>4</sup>.

### 3.8. Fruit fall

- 3.8.1. Fallen fruit presents a potentially hazardous slippery surface to pedestrians and results in an unsightly mess if not cleared away.
- 3.8.2. **Guidance:** Trees bearing fruit are important for urban diversity and are increasingly being seen as contributing to the expanding urban agriculture initiative.
- 3.8.3. Appropriate planting locations are crucial so that these benefits can be realised without causing nuisance in line with the Right Place - Right Tree<sup>31</sup>

### 3.9. Access obstruction

- 3.9.1. There is often a conflict between the provision of street trees and accessibility on public footways. This includes widths of available footway, expansion of trunk girth and root induced pavement deformation.
- 3.9.2. **Guidance:** These issues can be avoided by ensuring that there is adequate space for a newly planted tree to grow to maturity and that the planting pit is designed and constructed to allow for some root expansion and flexibility in the future.
- 3.9.3. Flexible tree pit sizes are an effective means of accommodating irregular sized and shaped surface rooting where space allows.
- 3.9.4. Existing situations may be addressed through initiatives such as kerb side build outs or removing existing paving and resurfacing after expert pruning of non-structural surface roots.

- 3.9.5. Wherever possible, there should be a presumption that pedestrian access has precedence over vehicle access and that existing mature trees should be retained.

## **4. GUIDELINES ON REALISING THE BENEFITS**

- 4.1. Most professional decision-makers concerned with development appreciate the wide-ranging benefits of trees as set out earlier in this guidance and strive to include them in their plans and designs.
- 4.2. However, the planting of trees and their future maintenance are perceived as an additional cost to or constraint upon the development. Their positive contributions tend to be ignored or under-valued because these are less tangible, less well-documented and often longer term in the realisation of their effects.
- 4.3. There is no single agreed approach for tree officers, designers, landscape architects and developers to demonstrate and agree, in financial terms, the added value conferred by integrating tree species of large scale into schemes. While currently at present there is no common standard, there are various valuation methods that may be useful in informing decision-making. (See Section 2) The concept of valuing the ecosystem services provided by trees is gaining ground and TDAG believe will in future be a material consideration in the development process.<sup>2,32</sup>

## **5. GUIDELINES FOR PLANTING**

- 5.1. When new developments are planned, the scope for planting large scale tree species is frequently limited by conventional low cost build approaches involving shortest distance underground services, often installed separately, and minimum foundation specification. Highway sight lines and furniture such as lighting, signage and CCTV cameras are often designed and constructed without taking either existing or potential tree planting into account and are given precedence over proposed trees in the final layout.
- 5.2. Trees, and particularly large trees, should be considered as an essential component of the infrastructure of new development, just as is drainage, energy or access. Allowance and, where necessary, compromise may need to be made by all concerned with infrastructure provision, layout and construction to ensure that the planting, retention and long-term maintenance of trees on development sites are given a high priority at an early stage of and throughout the design and development process.
- 5.3. This approach will be supported through comprehensive tree strategies forming a key part of the planning process. Formally adopted strategies will ensure that existing or proposed trees are given due weight and that all those submitting, assessing and determining planning applications have clear guidance from the beginning. See Appendix C for further guidance.

## 6. CLIMATE CHANGE AND SUSTAINABILITY

- 6.1. The TDAG believe that landscape of which trees are a major part is a crucial element for creating climate change resilience in new developments. The intelligent and informed use of trees, bio-engineering principles and green infrastructure generally in development will make a significant contribution to the sustainability of new homes. TDAG therefore supports The Landscape Institute's position in advocating a Code for Sustainable Landscape. This would incorporate criteria relating to the treatment of the external environment and the beneficial effects of this on the performance of buildings and spaces.

## 7. GUIDELINES ON OVERCOMING BARRIERS IN NEW DEVELOPMENT

### 7.1. Limited, ineffective or non-existent tree strategy

- 7.1.1. Local authority tree strategies have a valuable but limited role in planning decisions. The absence of a tree strategy is a serious impediment to effective policy delivery.
- 7.1.2. **Guidance:** Local authorities should adopt a comprehensive tree strategy as part of their integrated policy documentation, preferably making the tree strategy itself or a summary of the document a Supplementary Planning Document that informs the Local Development Framework.

### 7.2. Inadequate guidance for the built environment professional

- 7.2.1. Lack of adequate guidance that is accessible for planning and design professionals.
- 7.2.2. **Guidance:** Although there exists plenty of guidance relating to trees, there is insufficient guidance on its interpretation for planning and design professionals. They would benefit from cross-cutting guidance to link the tree-based information with the built environment not as a substitute for professional arboricultural advice but to set the scene and encourage a common language and approach.
- 7.2.3. Where trees are potentially affected by development or new tree planting proposed, design professionals should, take appropriate arboricultural advice during the earliest stages of the development process.
- 7.2.4. Planners should make full use of their existing powers relating to tree retention and the provision of new planting.

- 7.2.5. Design and planning professionals should also take account of published good practice guidance on retaining and incorporating large trees and addressing key issues relating to them. Specifying new trees on a new development may create a requirement to amend the built infrastructure proposals to accommodate fully the potential growth and scale of the trees planned. This may well entail taking specialist advice from engineers, arboriculturists and others which is likely to involve cost implications and budget adjustments.
- 7.2.6. This provision of infrastructure enhancements to accommodate large species trees can add significant value to the completed development and reduce potential nuisance and management costs for end users or occupiers.

### **7.3. High density development**

- 7.3.1. Higher density developments can result in less space for tree's rooting zones and canopy cover.
- 7.3.2. **Guidance:** This need not be the case if due consideration is made at the conceptual and design stages.
- 7.3.3. Appropriately selected large species trees can be included successfully in areas of communal or public open space, on or near site boundaries, along access routes or within parking or service areas.
- 7.3.4. Well-informed choice of species can enable large-growing trees to be incorporated in a variety of spaces when appropriate, e.g. selecting trees that are fastigate (upright growing) or that have open branching structures and less dense foliage.
- 7.3.5. If the foundations are adequately constructed, high density developments that incorporate communal gardens and areas of public realm may accommodate significant trees in proximity to the buildings and provide the benefits listed above.
- 7.3.6. Surface areas can remain available for use, subject to provision being made to accommodate root and canopy growth.

### **7.4. Developments with structured landscapes**

- 7.4.1. In inner urban areas, where land values are high, developments usually include extensive basement areas and public spaces are often placed at podium level.
- 7.4.2. **Guidance:** The need here is to plan for trees at the outset to achieve adequate planting depths and rooting volumes. However, it should be recognised that trees and landscape planted in these situations are often semi-permanent in that they are linked to the life-span of the development and so may not provide the full scope of benefits listed above.

7.4.3. Trees planted within access routes or near site boundaries may be less likely to present constraints on future development and are more likely to be capable of being planted in existing ground, thus reducing both construction and maintenance costs.

7.4.4. Wherever possible therefore all developments should plan for a percentage of sustainable, large growing, long lived structural trees. The intention being that they will live beyond successive development cycles. Trees planted in this way will make a heritage contribution.

## 7.5. Short development cycles

7.5.1. These have become common in urban areas, particularly in non residential and commercial sites where the development cycle is often less than 30 years. Trees are increasingly subject to similar considerations (as described in the structured landscape section) where those that are planted are not allowed to reach maturity due to being removed as part of the subsequent development cycle.

7.5.2. **Guidance:** Sustainable planting of long term structural trees intended to survive each development cycle should be a priority.

7.5.3. Short development cycles are inherently contrary to the principles of sustainable development. The planting of long term structural trees that survive successive cycles can assist in improving the sustainability of the development particularly when this is linked to infrastructure enhancements that embed climate adaptation resilience into the development.

## 7.6. Smaller private gardens

7.6.1. New developments are providing much smaller private gardens than was traditionally the case with many 20th century suburban houses, resulting in less space for larger trees.

7.6.2. **Guidance:** In such circumstances, every opportunity should be exploited to design areas for larger trees in locations such as communal areas (including parking areas), the public realm, particularly streets, and at the shared boundaries of several rear gardens.

## 7.7. Less public realm green-space

7.7.1. Increasingly, intensive urban development makes less provision for integral areas of public realm and green space. However, well-planned, well-designed multi-functional open space with significant greenery is of particular value in densely built up areas in its contribution to amenity, well-being and quality of life for city residents, visitors and workers alike.

- 7.7.2. **Guidance:** Local authority Open Space Strategies and other linked strategies such as Biodiversity Action Plans, Climate Change Adaptation Strategies or Action Plans, Play Strategies and Tree Strategies need to be formally adopted as part of the integrated policy documentation within Local Development Frameworks to achieve a balance between open space and built development and provide opportunities for retaining and planting large species trees.
- 7.7.3. All these strategies should identify existing and proposed standards for green space in line with the Forestry Commission's, Natural England's and The High Weald AONB Unit's Accessible Natural Greenspace Standard model (ANGSt)<sup>33</sup>, as well as ratios of green space to the built environment and should incorporate monitoring systems to measure changes.

## 7.8. Competing for space with utilities and buildings

- 7.8.1. Modern development requires services, additionally in recent times it has become accepted practice to reinstate original Victorian or Edwardian building lines when development takes place, these two issues cause difficulties in achieving adequate tree canopy cover in very urbanised areas.
- 7.8.2. **Guidance** The issue here is to recognise not only the three-dimensional nature of trees above and below ground, but also the fourth dimension in that trees, as living entities, grow and their requirements change over time.
- 7.8.3. Underground services should, wherever possible, be routed in shared service ducts, which allow for ease of both maintenance and upgrading access, and which avoid sterilising the availability of large underground areas for planting and root growth. This requires well-managed and early-stage co-ordination between diverse organisations and service providers. New or renewed services should be designed and constructed to accommodate or withstand potential tree root growth and subsoil movement. New trees to be planted near existing services may require special considerations regarding species selection, tree pit design and precise location.
- 7.8.4. Current guidance from the National Joint Utilities Group<sup>34</sup> strongly advises that there should be effective forward planning in terms of trees and that tree planting should be part of development so that trees and services can co-exist. The London Joint Utilities Group (LJUG) has agreed to contact London's tree officers and Transport for London to integrate, where possible, work on utilities and tree planting programmes.
- 7.8.5. Where existing trees are conflicting with underground services and service upgrades are scheduled anyway, it can be cost-effective to reinstate the services in ducting or using flexible plastic pipes. New services can be installed without damage to tree roots by following NJUG National guidelines<sup>34</sup>, using trenchless techniques, hand digging and through appropriate routing.

- 7.8.6. Modern utilities in plastic ducting can tolerate deformation by tree roots in ways that older utilities cannot, renewal of services may provide future opportunities for new tree planting.
- 7.8.7. Creating service tunnels in new developments (and existing streets) can resolve this issue as well as limiting disruption caused by maintenance.
- 7.8.8. Above and below ground structures and also building lines should be designed to accommodate the growth of existing or planned tree planting. However, planned trees should also be selected with mature forms, sizes and other characteristics that will complement existing nearby buildings and not cause avoidable disruption or unreasonable maintenance costs.
- 7.8.9. Strict adherence to traditional building lines may not be appropriate if this causes significant loss of tree canopy cover during and as a result of development
- 7.8.10. Where above ground conflicts arise, for example with cameras, lighting, signage or cables, skilled remedial tree work, such as crown lifting, reshaping or selective pruning will often resolve the issue.

## **7.9. Perception of structural damage risk**

- 7.9.1. Damage to property generally only occurs where the built infrastructure is constructed in a way that does not accommodate the presence of planted trees.
- 7.9.2. The actual incidence of tree related building damage is much lower than assumed. One study in a London borough identified only 0.05 percent of its building stock as being affected by tree related insurance claims annually.<sup>12</sup>
- 7.9.3. **Guidance:** When specifying tree planting on a new development a correlation should be made between the desired scale of tree species and the ability of the constructed buildings to tolerate the tree's mature presence.
- 7.9.4. On shrinkable soils this will mean providing foundations adequate enough to prevent movement during periods of drought for the trees selected. This can be achieved by noting the technical guidance detailed in appendix B.
- 7.9.5. Following this guidance will embed climate adaptation resilience into the development and mitigate inaccurate perceptions of trees being the sole cause of widespread property damage on clay soils.

## **7.10. Indirect pressure from insurance sector**

- 7.10.1. There is a tendency to be overly cautious and specify smaller trees in the vicinity of buildings to avoid potential future insurance claims and, often, simply to economise on marginal construction costs.

- 7.10.2. **Guidance:** If landscape designers, engineers, developers and planners work effectively together and follow well-documented guidance then new building will be able to accommodate the presence and growth of large trees nearby, including in areas of shrinkable clay soils.

## **7.11. Maintenance costs associated with large trees.**

- 7.11.1. Trees, as living organisms, incur maintenance costs as do built structures and fittings.
- 7.11.2. **Guidance:** While correct tree maintenance should be encouraged, if the built infrastructure is designed to accommodate the presence of trees, very frequent maintenance such as heavy pruning should not be required.
- 7.11.3. Tree maintenance procedures and costs should be included in the design process, this being set against projected added value conferred by the tree to ensure that proper provision is made for the total life value of the tree in the context of the development.
- 7.11.4. Climate adaptation pressures will over time, increase the value of the tree to the development proportionately with the tree's size.

## **7.12. Meeting the biological requirements of trees**

- 7.12.1. Frequently trees are retained and planted without an appreciation of the physical and physiological requirements that will enable them to thrive and grow to healthy maturity.
- 7.12.2. **Guidance:** Adequate expert advice on existing tree's requirements, choice of new species, supply and planting, pit preparation and, above all, aftercare is therefore essential when planning for both retention and new planting.
- 7.12.3. The culture of planting trees without adequate provision for their future care should be challenged by putting in place structures and procedures that inform decision makers of the need to think ahead when planting a living organism that has a potential lifespan measured in decades or centuries.

## **7.13. Local authority tree strategies**

- 7.13.1. Should be formally adopted as Supplementary Planning Documents and recognised as components of a Local Development Framework, thus giving their content material weight in planning decision-making.
- 7.13.2. Should improve communication and awareness of tree issues generally between stakeholders.

- 7.13.3. Should integrate policy making and implementation in local authorities so that policies and actions of planning authorities and public estate owners and managers, are entirely compatible.
- 7.13.4. Should establish the case for more and better informed provision for trees in new development, including:
- Increasing canopy cover generally
  - Ensuring that buildings and infrastructure can accommodate large trees
  - Setting out references to good practice standards for tree planting, aftercare and management
  - Engaging land and property owners and the broader public in supporting tree planting and good tree management in both public and private spaces
  - The valuation of the local authorities tree stock in all the represented land use forms
- 7.13.5. Should incorporate a commitment from the local authority and encourage other public realm owners and managers to plant new trees and maintain existing stock to high standards.
- 7.13.6. Should endorse the Trees and Design Action Group's guidance and that of other tree groups to strengthen planning status of tree strategies.

## **7.14. Local authority planning powers**

- 7.14.1. Local planning authorities have a range of powers to require trees to be planted, retained, protected and managed, but these are not always fully utilised or enforced.
- 7.14.2. There is a statutory duty for a local planning authority, under Section 197 of the 1990 Planning Act, *"to ensure, whenever it is appropriate, that in granting planning permission for any development adequate provision is made, by the imposition of conditions, for the preservation or planting of trees"*.
- 7.14.3. It is also a duty for the authority, as it considers necessary, to make Tree Preservation Orders (TPO) on such trees. A TPO may be made in respect of new trees that are to be planted in the future (subject to their size) to comply with a condition, this TPO taking full effect immediately upon planting.
- 7.14.4. The Planning Acts also enable a local authority to make a TPO on any tree or trees which have a significant impact on their surroundings, particularly where this may be endangered. This makes it a criminal offence to damage or remove a protected tree.
- 7.14.5. Proposed works affecting any trees within a designated Conservation Area must be notified in writing to the local planning authority. The authority then have six weeks in which to decide whether to take action, such as issuing a TPO.

- 7.14.6. There are numerous references to the importance of providing for and protecting trees and landscape throughout government planning guidance, contained within Government Circulars (notably 11/95), Planning Policy Guidance and Planning Policy Statements. These high level policy documents are further amplified by a substantial body of good practice guidance issued by Central Government and other national bodies including the Commission for Architecture and the Built Environment, the Forestry Commission and Natural England.
- 7.14.7. Where existing trees are present, a local planning authority may refuse to register a planning application unless it is accompanied by a detailed tree condition survey.
- 7.14.8. Local planning authorities can and do routinely impose conditions on planning permissions requiring approval of details for the protection of existing trees, generally quoting the need to comply with British Standard 5837, and for any works to trees to comply with the recommendations of BS 3998. They may also require details of proposed services, foundation designs and method statements to be submitted and approved where there is a risk that these might conflict with existing or new tree plantings.
- 7.14.9. The conditions may be as specific as to require an engineered foundation design to accommodate the scale of the scheduled tree species proposed in a landscaping design when on a shrinkable clay soil.
- 7.14.10. Circular 11/95 recommends that a planning authority should require full details of proposed landscape design, including detailed specifications, methods and design drawings relating to tree retention, site preparation and new planting, to be approved and, separately, that these be implemented fully in accordance with the approved details prior to occupation. This recognises that quality control of materials and operations is vital when dealing with live plants.
- 7.14.11. The Circular also sets out model conditions requiring approval of proposals for maintenance and aftercare of newly planted landscape areas. It also advises on the need for management plans to be prepared, submitted and approved to ensure that the long-term design objectives of landscape treatment and tree planting are properly considered at the outset. Management plans provide valuable information for future owners or occupiers of a development and a mechanism for enforcement by the local planning authority if they are not adhered to.
- 7.14.12. BS5837, which is often quoted in planning conditions, sets out detailed recommendations for dealing with trees in relation to construction, from initial survey to post-completion stages.
- 7.14.13. BS 3998, also frequently referred to by planning authorities, sets out detailed recommendations for carrying out works to trees.

## **8. GUIDELINES ON INTEGRATING TREES INTO NEW DEVELOPMENT**

### **8.1. Higher density developments – less space for trees**

- 8.1.1. Consider the incorporation of large tree species at the earliest design stage for both infrastructure and structured landscapes.
- 8.1.2. Higher density developments generally have engineered foundations and so can be inexpensively modified to accommodate the presence of trees.
- 8.1.3. Consider species habit and future maintenance of the trees.
- 8.1.4. Whole site developments/structured landscapes - restricted scale of species.
- 8.1.5. Consider tree planting at the earliest stages so that physical and physiological requirements are engineered into the scheme at the right time.
- 8.1.6. Careful species selection suitable to site, planting conditions and future growth in relation to infrastructure.

### **8.2. Smaller private gardens & less green space**

- 8.2.1. Identify standards and ratios of green infrastructure to built environment.
- 8.2.2. Adopt relevant local authority strategies and guidance including Open Space Strategy , Biodiversity Action Plan, Climate Change Adaptation Strategy or Action Plan, Play Strategy and Tree Strategy.
- 8.2.3. Planning for trees at the early stages of design development.
- 8.2.4. Carry out tree survey of existing trees (if any).
- 8.2.5. Identify the optimal tree canopy cover for the development and consider layout, orientation and design details to allow for this.
- 8.2.6. Integrate professional design services, including structural engineering advice, to provide for larger structural trees where possible.
- 8.2.7. Provide relevant arboricultural advice for developers, planners and consulting team at the earliest stages in the design process to work the design around the concept of the tree's future size and presence.
- 8.2.8. Avoid retrofitting tree advice into the plan after all other infrastructure is agreed. This results in smaller trees being planted and is illogical and indefensible when the objective is to create sustainable developments and fulfil quality of life aspirations. Large trees, as part of an overall

sustainable landscape, need to be included at the earliest stages of the design proposals.

### **8.3. Short development cycles and short tree lives**

- 8.3.1. Large growing trees may be planted, but can be lost before reaching maturity when a site is redeveloped. This can be avoided by planting large growing trees in locations that do not compromise the site's redevelopment footprint.
- 8.3.2. Local planning authorities should strengthen protection for trees on development sites through TPOs, Tree Strategies/policies and effectively enforced planning conditions. This means carrying out adequate site surveys to ensure that existing trees are protected and that proposed new trees can actually be planted and sustained in the long term.
- 8.3.3. If no trees exist on a site, opportunities should be sought to plant trees that will become the structural trees of the future.
- 8.3.4. Newly planted trees forming part of a landscape plan required under planning conditions should be protected by TPOs rather than simply placing reliance upon the condition for any long-term retention.

### **8.4. Townscape suitability and capacity for trees**

- 8.4.1. By no means all parts of a townscape can or should be expected to accommodate trees but, where substantial areas of the built environment are without trees, additional emphasis should be placed on seeking opportunities, e.g. in open spaces or streets, where trees can be incorporated.
- 8.4.2. Where existing townscape has few mature trees, particular attention should be given to their careful protection, management and eventual replacement.
- 8.4.3. It is important to design in context and anticipate changes over time as trees grow.
- 8.4.4. Trees can play a key role as landmarks and in creating local identity.
- 8.4.5. Trees provide a quality of life counterpoint to the built environment, delivering nature in the city, maintaining contact with seasonal change and enabling views of gardens in the sky for the many people living or working at upper levels.
- 8.4.6. There does not appear to be a "townscape methodology" and attitudes to trees in townscape are often subject to changing design ideas.

## 8.5. Competition for space above and below

- 8.5.1. Tree canopies and roots have to compete for space above and below ground with utility services and buildings. The issue here is to recognise not only the three-dimensional nature of trees above and below ground, but also the fourth dimension in that trees, as living entities, grow and change over time.
- 8.5.2. Underground services should, wherever possible, be routed in shared service ducts, which allow for ease of both maintenance and upgrading access, and which avoid sterilising the availability of large underground areas for planting and root growth. New or renewed services should be designed and constructed to accommodate or withstand potential tree root growth and subsoil movement. New trees to be planted near existing services may require special considerations regarding specie selection, tree pit design and precise location.
- 8.5.3. Current NJUG guidance<sup>34</sup> strongly advises that there effective forward planning in terms of trees and anticipates that tree planting should be part of development so that trees and services should co-exist. In addition London Joint Utilities Group (LJUG) has agreed to contact tree officers in London boroughs and Transport for London to integrate, where possible, utilities work and tree planting programmes.
- 8.5.4. Where existing trees are conflicting with underground services and the services are scheduled for upgrading it can be cost-effective to reinstate the services to avoid such conflicts in concrete ducting or using flexible plastic ducting etc).
- 8.5.5. New services can be installed without damage to tree roots by following NJUG's national guidelines<sup>34</sup>, using trenchless techniques, handdigging and through considerate routing.
- 8.5.6. Modern utilities in plastic ducting can tolerate deformation by tree roots in ways that older utilities cannot.
- 8.5.7. Upgrading of this equipment may provide future opportunities for new tree planting.
- 8.5.8. Equally service tunnels in new developments (and existing streets) can resolve this issue as well as limiting disruption caused by maintenance.
- 8.5.9. Above and below ground structures and also building lines should be designed to accommodate the growth of existing or planned tree planting. However, planned trees should also be selected with mature forms, sizes and other characteristics that will complement existing nearby buildings and not cause avoidable nuisance or unacceptable maintenance costs.
- 8.5.10. Strict adherence to traditional building lines may not be appropriate if this causes significant loss of tree canopy cover during and as a result of development.

- 8.5.11. Where above ground conflicts arise, for example with cameras, lighting, signage or cables, skilled remedial tree work, such as crown lifting, reshaping or selective pruning will often resolve the issue.

## **8.6. Perceptions of structural damage risk**

- 8.6.1. Obtain advice from London Tree Officers Association document A Risk Limitation Strategy for Tree Root Claims.<sup>12</sup>
- 8.6.2. Ensure the engineering requirements to accommodate tree planting in relation to building foundation design are complied with. For example, on clay soils, the possibility / desirability of tree planting either at the development stage or during the lifetime of the building should drive foundation design, rather than this precluding early or future planting. (see appendix B).
- 8.6.3. Indirect pressure from the insurance sector should be dealt with through expert investigation in the case of existing trees. In the case of new planting, the insurance industry should have a shared interest in ensuring that new buildings are constructed to appropriate standards to minimise risk of structural or other damage from trees.
- 8.6.4. If those specifying trees are properly informed and their advice is followed by all concerned at the design stage, then it is not anticipated that the planting of trees would create issues with adjacent structures.
- 8.6.5. The overall perception would then be that trees are a welcome addition to developments rather than a potential liability.
- 8.6.6. However in all situations the satisfactory long term maintenance of the tree planted is a key element in the successful co-existence of trees and the built environment.

## **8.7. Responding to an increasingly litigious climate**

- 8.7.1. The purpose here is to ensure that reasonable and proportionate standards of safety and avoidance of negligence are properly observed, whilst recognising that no expert will provide a guarantee that any tree is safe. The following points should be observed:
- Taking a realistic approach to tree risk assessments, recognising the benefits against potential hazards
  - Putting the scale of risk into perspective
  - Adopting a sensible risk management approach
  - Establishing inspection regimes to agreed standards relative to context
  - Adopting effective strategies for whole tree population management

## **8.8. Future maintenance costs and large trees**

- 8.8.1. Long term maintenance funding should be built into planning permissions through approved management plans and S.106 agreements where appropriate.
- 8.8.2. Adequate local authority funding for future whole-life tree maintenance on adopted roads and public spaces should be allowed for in new developments.
- 8.8.3. The added value that large landscape trees confer to new developments should be stressed (See Section 2).
- 8.8.4. Trees are living entities and successful healthy planting and growth in the urban realm can only be achieved through adequate long term care.

## **8.9. Meeting the biological needs of trees**

- 8.9.1. It is the Trees and Design Action Group's belief that most of these barriers to the planting and retention of large species trees in new developments can be overcome by appropriate and effective design informed by sound multi-disciplinary expert advice (including arboricultural advice). What is vital is for a commitment and the necessary inputs to be incorporated into the earliest stages of the planning and development process.
- 8.9.2. The benefits provided by trees in developments are now well understood. Less well understood are the practical steps necessary to achieve these benefits. It is now generally accepted that it is the larger species trees that have attained maturity that confer the greatest benefits in urban situations.
- 8.9.3. Information on the types of tree that will survive in London and other UK urban areas, new tree planting advice, succession etc. Is contained within the the Right Trees for London's Changing Climate website [www.right-trees.org.uk](http://www.right-trees.org.uk) (used across the UK).
- 8.9.4. Design objectives should be combined with informed tree selection i.e. certain species or varieties of trees become more vulnerable to disease or embody inherent characteristics making them unsuitable for some contexts or locations., Good practice advice on tree selection can be found within the GLA's "Right Place, Right Tree" website (see link above).
- 8.9.5. Trees are living organisms and therefore need special care and attention from within the construction and development industry, in both planting, post-planting aftercare and long term management. Good practice guidance on these matters, e.g. as set out in relevant British Standards and National Building Specifications (see appendix B) will give a tree the best possible chance for establishment and reaching maturity.

## 9. SECTION TWO: GUIDELINES FOR ASSESSING THE VALUE OF URBAN TREES

### 9.1. Financial benefits of integrating trees into new development

- Increased property values <sup>7,8,9</sup>
- Reduced localised temperature extremes through evapo-transpiration -UHI effect<sup>3</sup>
- Climate Change adaptation <sup>10,12</sup>
- Reduction in fuel bills for heating and cooling <sup>13</sup>
- Positive perception of prospective purchasers
- Maturity of landscape confers a premium for development <sup>9</sup>
- Contribution to local character and sense of place <sup>9,12</sup>
- Ameliorated air quality, removing dust and particulates. <sup>4,5,6</sup>
- Reduced costs for maintenance or remedial works <sup>12</sup>
- Micro-climate benefits (e.g. wind speed reduction, shade) <sup>3</sup>
- Water run-off attenuation <sup>22</sup>

### 9.2. Summary of three valuation methods

- 9.2.1. There are a number of tree valuation methods currently being used and developed in the UK. Amenity tree valuation methods have been used world wide for many years with varying degrees of success and professional acceptance.
- 9.2.2. In the UK the use of these methods has usually been restricted to the valuing of trees for purposes of planning, insurance, compensation or litigation. Increasingly there is a call for local authorities and other large scale tree owners to place a value on their tree stock in the same way they currently value other assets such as building stock, street furniture, equipment and land.
- 9.3. For many years local authority tree officers resisted the move to value the tree stock they managed as they were understandably sceptical about how these valuations might be used. This was particularly so for officers responsible for managing protected trees on private development sites and local authority trees associated with sites that may be earmarked for development. The complex issues relating to Section 106 agreements in the context of planning gain were perceived to impact negatively on important amenity trees that were ascribed a definitive monetary value.
- 9.3.1. However, in today's world if an asset, commodity or resource is not ascribed a monetary value (benefiting an individual or the community at large) it is frequently perceived as having no value and therefore loses out considerably in the context of policy making and budget allocation.

- 9.3.2. One important aspect that until recently appeared to be lacking in most valuation methods is the inclusion of an environmental/social element that recognises the contribution trees make in rural and urban areas to biodiversity and more recently, to the health and well being of residents and visitors. The CAVAT method seeks to address the latter in a rudimentary way by using a Community Tree Index that relates tree value to population density derived from Office for National Statistics data.

## **9.4. The methods**

### **9.4.1. Helliwell Method for Amenity Valuation of Trees and Woodlands**

- 9.4.1.1. The Helliwell method is perhaps the most well known system in the UK and has been used for many years as a method for ascribing values to amenity trees and woodlands. It was first produced on behalf of The Tree Council by Rodney Helliwell in 1967 and first published in the Arboricultural Journal. It has been used extensively in the courts and by planning authorities to value amenity trees in the UK. It has most recently been updated and revised in 2008 and published by the Arboricultural Association.
- 9.4.1.2. The calculation of the value of the tree is made following a specific assessment process and by multiplying various factors (location, size, form, condition etc.) that are given numerical values and are then themselves multiplied by a base line monetary figure that is index linked. Values therefore remain current and updated in line with inflation.
- 9.4.1.3. The values given are calculated to give the tree's intrinsic amenity value expressed in pounds sterling. The process involves a period of assessment and recording of the various factors followed by the calculation procedure. The time taken to undertake this process obviously varies with each tree, the experience of the assessor and the particular circumstances.

### **9.4.2. The Council of Tree and Landscape Appraisers (CTLA) "Guide for Plant Appraisal" The Depreciated Replacement Cost Method**

- 9.4.2.1. The CTLA method originated in the USA in 1957 as a method for valuing tree stock that was based on recognised methods of financial asset appraisal rather than solely by assessing visual amenity.
- 9.4.2.2. It uses an economic model of assessment normally used in other sectors for valuing assets, infrastructure and building stock. Part of this method is to include an element for depreciation (The Depreciated Replacement Cost DRC), as in most economic models asset depreciation is a recognised principle and is easily integrated into financial planning.

- 9.4.2.3. In terms of creating a base value for the tree it follows two linked approaches. For smaller trees it advocates a straight-forward replacement cost: i.e. the value is the complete cost of replacing the subject tree including, purchase at the nursery, delivery, installation and maintenance with an element of depreciation if appropriate.
- 9.4.2.4. For larger trees it advocates the Trunk Replacement Method (TRM) which calculates the cost of replacement using figures for cost per square centimetre of trunk extrapolated from nursery prices and then multiplied by the trunk surface area of the subject tree. This figure is also adjusted for depreciation if appropriate. Therefore the final value for a given tree is expressed as a formula covering trunk area, species characteristics, specimen condition and location with a correction for depreciation.

### **9.4.3. Capital Asset Value for Amenity Trees (CAVAT).**

- 9.4.3.1. The CAVAT method was first published by the London Tree Officers Association in 2007 on behalf of its author Chris Neilan the Landscape Officer for Epping Forest District Council.
- 9.4.3.2. The method is relatively new in the UK but has been adopted by the London Tree Officers Association as the system it recommends for valuing street tree stock. It was piloted in three London boroughs (Barnet, Southwark and Islington).
- 9.4.3.3. CAVAT uses a calculation of tree replacement cost based on the average surface area cost of trunk per square centimetre. Unlike other methods CAVAT also incorporates an element designed to record the social value of the tree through the Community Tree Index. This index is derived from population density statistics and is pragmatically based on the premise that the more people who interact with an urban tree the more valuable the tree is likely to be to the community in which it stands. The baseline figure is index linked and then used in conjunction with the trunk diameter to arrive at a figure for the value of the tree.
- 9.4.3.4. This figure is then adjusted by various factors such the tree's functional value (crown size), life expectancy and others variables that are adjusted by the operator during the assessment stage.
- 9.4.3.5. CAVAT is different from the two other systems mentioned here as it has two approaches. There is a quick method designed for assessment of large scale tree populations and a more comprehensive method for detailed assessment of individual trees.

## 9.5. Guidelines for tree valuation

- 9.5.1. Recognise the challenges and benefits of using tree evaluation systems, particularly in light of increased awareness of economic, social and environmental factors.
- 9.5.2. Appreciate the limitations of each system and select the system that best fits the requirements of a specific situation.
- 9.5.3. Planting expensive very large mature or semi-mature tree stock to achieve instant impact may be counterproductive to the achievement of a valuable, sustainable and climate change resilient landscape.
- 9.5.4. It may be more cost effective to plant smaller less costly standard trees that establish faster and use the cost savings to enhance adjacent foundations and infrastructure.
- 9.5.5. Extrapolated tree valuation may be used to market properties by demonstrating future appreciation of property resale values to initial purchasers as a result of a maturing landscape.
- 9.5.6. Advantages of a recognised tree valuation method.
- 9.5.7. Introduces a benchmark standard in the process of assessment of tree value.
- 9.5.8. Draws together relevant organisations to consider and publish the most appropriate systems for a particular set of circumstances.
- 9.5.9. Highlights benefits to developers of valuing trees and building these values into their cost/benefit analysis at the design stage.
- 9.5.10. Highlights future value appreciation as the planted trees grow and develop.
- 9.5.11. Choice of valuing system
- 9.5.12. Helliwell is generally used for establishing the value of individual high amenity trees. CTLA is generally used for valuing multiple trees in private ownership and for establishing the value of a tree to the private owner. CAVAT is generally used as a management tool for valuing publicly owned trees to establish value to the community. It is also used in establishing tree value in connection to structural damage claims so that site investigations are commensurate with the value of the tree. This has been agreed with the insurance sector through the Joint Mitigation Protocol (2008).
- 9.5.13. Tree valuation is an extremely useful management tool to inform actions relative to individual trees and is most powerful when valuing whole populations.

## 9.6. Conclusions

- 9.6.1. In assessing these methods it is apparent that they all have similarities in terms of methodology. This is to be expected as any system that seeks to create a value for something as variable as a tree and its relationship to its environs is likely to reach similar conclusions in approach.
- 9.6.2. However, it is clear that different methods for valuing trees will always come up with different values. Indeed, even the same methods used by different operators may arrive at different values. This is mainly due to the subjective element of assessment that is inherent in all these methods. This variability may be addressed with adequate training in a particular method's use.
- 9.6.3. None of the above methods has yet been able to quantify effectively the biodiversity and social/cultural value of trees in terms of financial benefit to the community. It is perhaps these elements that are the most profound in terms of a tree's intrinsic value to society. The choice of which method to use will be determined by the specific circumstances although all are equally valid. It is vital however, for all interested parties in one particular set of circumstances to agree with the use of the chosen method and to accept the resulting valuation.
- 9.6.4. An excellent example of this is the agreed use of CAVAT by the insurance, loss adjusting, local authority and private arboricultural sectors in implementation of the Joint Mitigation Protocol.
- 9.6.5. Further work is being undertaken by the Forestry Commission through Forest Research, its scientific research branch to investigate the feasibility of quantifying the social/cultural value of trees and making a comparative study of each of the above methods.
- 9.6.6. At present the use of any of the three methods could be used to ascribe a value to the tree resource within a development. The CTLA and CAVAT methods may also, by extrapolation, be used to predict added value to a development from newly planted trees once they have become established and grown in size. This could be an extremely effective tool for justifying expenditure on new planting and off-setting any additional costs associated with foundation and infrastructure enhancements to accommodate large species trees.
- 9.6.7. Quantifying the value that trees bring to a development allows designers and developers to assess cost against benefits effectively in their decision making processes. These extrapolated tree values may also be used in marketing a new development by demonstrating appreciation in property resale values to initial purchasers resulting from a maturing landscape.

## APPENDIX A

### References (numbered within text)

1. **The London Assembly, Environment Committee** Chainsaw Massacre May 2007, A Review of London's street trees, ,.
2. **Chris Britt & Mark Johnston** Trees in Towns II, 2008, A new survey of urban trees in England and their condition and management., Research for Amenity Trees No.9 published by the Department for Communities and Local Government.
3. **Gill, SE., Handley, JF., Ennos, AR & Pauleit, S (2007)** Adapting Cities for Climate change: the role of the green infrastructure. *Built Environment* 33 (1) pp 115-133
4. **Forest Research**, Particulate Pollution 2007.
5. **Stewart H, Owen S, Donovan R, Mackenzie R, Hewitt N, Skiba U and Fowler D, (2003)**. Trees and Sustainable Urban Air Quality: Using Trees to Improve Air Quality in Cities, Lancaster University, Lancaster
6. **Broadmeadow MSJ and Freer-Smith PH (1996)** Urban Woodland and the Benefits for Local Air Quality, Research for Amenity Trees No.5 HMSO, London.
7. **Anderson LM and Cordel HK (1988)** Influence of Trees on Residential Property Values in Athens, Georgia: A Survey Based on Actual Sales Prices, *Landscape and Urban Planning* 15: 153-164.
8. **Morales DJ (1980)** The Contribution of Trees to Residential Property Value: *Journal of Arboriculture* 6 (11):305-308.
9. **CABE Space (2005)** Does money Grow on Trees? Commission for Architecture and the Built Environment, London
10. **Greater London Authority** ,The London Climate Change Adaptation Strategy, 2008
11. **defra**, A Strategy for England's Trees Woods and Forests. 2007 London
12. **London Tree Officers Association** A Risk Limitation Strategy for Tree Root Claims 2007.
13. **Huang YJ, Akbari H, Taha H and Rosenfeld AH (1987)** The Potential of Vegetation in Reducing Summer Cooling Loads in residential Buildings, *Journal of Climate and Applied Meteorology* 26 (9): 1103-1116.
14. **Kennedy CJ and Southwood TRE (1984)**. The Number of Species of Insect Associated with British Trees: A Re-analysis, *Journal of Animal Ecology* 53: 453-478.
15. **Fuller RJ (1995)** Bird Life of Woodland and Forest, Cambridge University Press, Cambridge.
16. **Kirby KJ and Duke CM (1993)** Dead Wood Matters: the Ecology and Conservation of Saproxylic Invertebrates in Britain, *English Nature Science No.7* English Nature, Peterborough.
17. **Speight MCD (1989)** Saproxylic Invertebrates and their Conservation, *Nature and Environment Series No.42*, Council of of Europe, Strasbourg.
18. **Corbet GB and Harris S (eds) (1991)** handbook of British Mammals, 3<sup>rd</sup> Edition, Blackwell Scientific Publications Oxford.
19. **Stearns F (1972)** The City as Habitat for Wildlife and Man, in Detwyler R and Marcus MG (eds) *Urbanisation and Environment*, Duxbury Press Belmont California.
20. **De Graaf RM and Wentworth JM (1986)** Avian Guild Structure and Habitat Associations in Suburban Bird Communities, *Urban Ecology* 9: 399-412.

21. **Botkin DB and Beveridge CE (1997)** Cities as Environments, Urban Ecosystems 1: 3-19.
22. **Soltis D (1997)** Loss of Trees Increase Stormwater Runoff in Atlanta, Water Engineering and Management 144: 6.
23. **National Urban Forestry Unit (1999)** Trees and Healthy Living, National Conference, Wolverhampton, UK, National Urban Forestry Unit, Wolverhampton.
24. **Mudrak LY (1982)** In the Environmental Benefits of Vegetation at a Global Local and Personal Level: A Review of the Literature, Green Releaf, Horticultural Trades Association and Royal Botanical Gardens, Kew.
25. **Ulrich RS, Simmons RF, Losito BD, Fiority E, Miles MA and Zeison M (1991)** Stress Recovery During Exposure to Natural and Urban Environments, Journal of Environmental Psychology 11: 201-230.
26. **Moore EO (1981-82)** A Prison Environment's Effect on Health Care Demands, Journal of Environmental Systems 11(1): 17-34.
27. **Kuo, F.E & Sullivan W.C (2001):** Environment and Crime in the Inner City – does vegetation reduce crime. *Environment and Behavior* Vol. 33 No 3 pp 343-367
28. **MIND Ecotherapy (2008)** [www.mind.org.uk/ecominds](http://www.mind.org.uk/ecominds)
29. **Forestry Commission England**, A Woodfuel Strategy for England, 2007
30. **Shaw, R., Colley, M., and Connell, R. (2007)** Climate change adaptation by design, a guide to sustainable communities TCPA.
31. **London Tree and Woodland Framework**, Forestry Commission and Greater London Authority 2005.
32. **defra:** An introductory guide to valuing ecosystem services 2007
33. **Patrick McKernan & Matthew Grose (2007):** An Analysis of Accessible Natural Greenspace Provision in the South East (ANGSt) **Natural England, The Forestry Commission & The High Weald Area of Outstanding Natural Beauty Unit.**
34. **National Joint Utilities Group:** Volume 4- Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees 2007

## APPENDIX B

### TDAG 10 Point Action Plan

The Trees and Design Action Group has set out in its Mission Statement and terms of reference a 10 Point Action Plan covering the following issues:

1. **To ensure integrated solutions to the urban realm:** joined up thinking is essential so that actions are congruent.
2. **Policies and Tree Strategies:** it is essential that the London Tree and Woodland Framework and borough tree strategies are underpinned by legislation. The inclusion of appropriate trees will then become one of the requirements of planning and should mean that trees shown in planning applications are delivered. This may require more funding at the early stages to undertake the necessary research and site investigations to ensure that trees can be planted where shown on drawings and so avoid “surprises after planning” when it is often discovered that trees cannot, in fact, be planted as shown
3. **Evidence based understanding and research:** it is important that research used by the group and recommended to others has been verified and is appropriate for UK conditions.
4. **Education & Public Awareness:** there are many tree myths around and it is important to counter-act these. This is where, for example, initiatives such as the Joint Mitigation Protocol between the London Tree Officers Association and the Insurance industry on the value of trees (CAVAT) should be helpful in highlighting the value of the tree and reducing the rush to blame trees for every incidence of subsidence in building foundations. Trees are not the sole cause of building subsidence.
5. **Value (Economic, environmental and social), Funding and Revenue:** one value of trees has been identified above. In economic terms the presence of trees is seen as increasing property values and more research on this is to be welcomed. As supporters of urban trees we see many possibly more important values in trees, especially the effects on increasing health and well-being for both people and the environment, but increased economic value is an indicator that everyone can easily subscribe to and so this may be the best indicator at this stage to both protect and promote trees.
6. **Three dimensional urban realm:** there are a series of contradictions that need to be resolved to ensure that trees can actually be planted. For example, underground services. Why have underground services and access to them been allowed to expand to such an extent under our urban roads and footways that there are increasingly few opportunities for finding space to plant larger structural trees? Why is there not more investment in service tunnels to contain services? Why has so much pavement width been lost to roads, that there is not sufficient room along

many streets for trees and pedestrians? Not only do we have difficulty in understanding our three – dimensional urban spaces in terms of space underground, but we do not appear to understand the space needed for tree canopies to spread above ground and, of course, the fourth dimension which is that trees are living elements which grow and increase in size over time both above and below ground.

7. **Development cycles:** Trees live more than the 30 year development cycle. Many trees are planted on structured landscapes and so can only be regarded as semi-permanent as they will be removed when wholesale redevelopment of a site takes place. It would be encouraging if development sites identified areas where trees can be planted in terra firma in locations which enable them to survive subsequent redevelopment cycles and so grow to maturity.
8. **Density:** the pursuit of increasingly high densities often means that there is less open space for planting trees. However climate change adaptation strategies could determine ratios of built to natural environments on development sites and also stipulate tree canopy cover requirements.
9. **Public realm management and funding for aftercare and maintenance:** this is a major issue for both the public realm and the care and management of trees. To be effective this may need a funding source beyond the revenue gained from borough residential ratepayers.
10. **Townscape:** the visual impact of trees is subjective. There is no methodology or criteria for considering trees in the townscape and it would be helpful to explore this issue and develop specific guidance. There are many issues and one that is current is the question of “viewpoints” and how trees may or may not obscure or change views of important buildings .It is interesting to note the way in which reactions to this have changed over time. In his seminal work, Gordon Cullen<sup>1</sup> described “discovery” or the unfolding of views as the pedestrian moved past trees to see the building beyond. It is important to remind people that neither we nor our eyes need to be static and that we are able to move in various ways throughout the public realm, so our viewpoints are constantly changing.

## APPENDIX C

### Technical and Good Practice Guidance:

**Institution of Structural Engineers, Subsidence of Low Rise Buildings 2000**, 2nd Edition, A Guide for Professionals and Property Owners.

**Town and Country Planning Act 1990.**

**Roberts, J., Jackson, N. & Smith, M. 2006-Tree Roots in the Built Environment 2006** – Research for Amenity Trees No 8. Published by Department for Communities and Local Government. London. 488pp. ISBN13 978 0 11 753620 3 / ISBN10 0 11 753620 2

**Phillip. J Craul.(1992) Urban Soil in Landscape Design.**ISBN 0-471-80598X

**Crilly, M., Desiccation in Clay Soils**, (1996) Building Research Establishment, Digest 412.

**British Standards Institute British Standard 1377, Soils Classification Parts 1-9.**

**BSI, British Standard 5837 Trees in Relation to Construction,**

**BSI, British Standard 3998, Tree Work.**

**Town & Country Planning Association, Climate Change by Design - a Guide for Sustainable Communities TCPA 2007.**

**National House Building Council, Building Near Trees**, Chapter 4.2.

**National Building Specifications- general specifications**

**Building Research Establishment, Digest 240 Part 1 Low rise buildings on shrinkable clay soils.**

**BRE Digest 241 Part 2 Low rise buildings on shrinkable clay soils.**

**BRE Digest 251 Assessment of damage in low rise buildings**

**BRE Digest 298 Low rise building foundations: Influence of trees in clay soils.**

**BRE Digest 352 Underpinning.**

**BRE Digest 361 Why do buildings crack?**

**BRE 383 Site investigation for low rise buildings: soil description.**

**BRE 386 Monitoring, building and ground movement by precise levelling.**

**BRE 412 Desiccation in clay soils.**

**BRE Good Repair Guide 2 Damage in buildings caused by trees.**

**BRE Good Repair Guide 1 Cracks caused by foundation movement.**

**BRE Good Building Guide 53 Foundations for low rise buildings.**

**BRE Information Paper 4193 A method for determining the state of desiccation in clay soils.**

**BRE Information Paper 7/06: pruning trees to reduce water use.** Summaries of Research, conclusions and recommendations.

**Driscoll R and Skinner , Subsidence Damage to Domestic Buildings BRE 2007**

**Communities and Local Government Tree Preservation Orders: A Guide to Law and Good Practice** (The Blue Book).

**Communities and Local Government Building Regulations Part A.**

**National Joint Utilities Group Volume 4.** 2007

**Planning Policy Guidance**-Communities and Local Government.

**Planning Policy Statements**-Communities and Local Government

**Government Circular 11/95**- HMSO (CLG)

Joint Mitigation Protocol-JMP Group-published by **The London Tree Officers Association**

## APPENDIX D Further Reading

**Trees in Towns Research for Amenity No.1.** Land Use Consultants, Published by the Department of the Environment 1993.

**Action for London's Trees, Investing in a leaf capital,** Task Force Trees a special programme of the Countryside Commission, 1994.

**The London Tree Survey 1993.** Matthews, R. Mottram, N. Ward, K. (Cobham Resource Consultants), Wright, H. (The Oxford Forestry Institute), Halsall, L Hodge, S. Houston, T. Knott, K. Mobbs, D. Forestry Authority Research Division, (1994), Published by the Countryside Commission.

**Trees in Your Ground 2005** The Tree Council,

**Trees Matter!** National Urban Forestry Unit 2005

**A Strategy for Urban Forestry** NUFU 2004

**The London Trees and Woodlands Framework, 2005.** Forestry Commission and Greater London Authority under the steerage of The London Woodland Advisory Group, Published by the Greater London Authority.

**Joint Mitigation Protocol.** The JMP Group ( May 2007).

**England Trees, Woods and Forests Strategy,** defra 2007.

**Trees; Their use, Management, Cultivation and Biology, a Comprehensive Guide.** By Bob Watson

**Climate Change Risks in Building - an introduction.** CIRIA 2005 ISBN 0-86017-638-X

**Chainsaw Massacre - A Review of London's street trees.** London Assembly 2007.

**Your Home in a Changing Climate. Retrofitting Existing Homes for Climate Change Impacts.** Three Regions Climate Change Group 2008.

Treework Environmental Practice Conference XI: **Trees – the key to climate proofing our cities** 10th July 2008.

**An Introductory Guide to Valuing Ecosystem Services** defra 2007.

**Trees in Towns II, A New Survey of Urban Trees in England and their condition and management.** Chris Britt & mark Johnston. Department for Communities and Local Government.

**A Risk Limitation Strategy for Tree Root Claims,** London Tree Officers Association 2007.

Shaw, R., Colley, M., and Connell, R. (2007) **Climate change adaptation by design, a guide to sustainable communities.** Town and Country Planning Association

**Trees Matter: bringing lasting benefits to people in towns.** Trees for Cities et al.

Hiemstra, Schopemaker- van der Bijl & Tonnejck: **Trees: relief for the city.** (2008) Plant Publicity Holland

## APPENDIX E

### Case Studies

#### Development and Value

The Case Studies below are available as separately downloadable documents from the Forestry Commission's London Region Website

[www.forestry.gov.uk/forestry/INFD-7KDEHU](http://www.forestry.gov.uk/forestry/INFD-7KDEHU)

Case Study No.1	New housing – Accordia, Cambridge
Case Study No.2	Valuing Green Infrastructure – Arlington Business Parks
Case Study No.3	Valuing Green Infrastructure – Queen Square, Bristol
Case Study No.4	Social housing – Chillingworth Road, Islington
Case Study No.5	Domestic housing – St Georges Avenue, Islington
Case Study No.6	High value housing – Canonbury Park South, Islington

*INTENTIONALLY BLANK*



## Trees and Design Action Group

Contact for enquiries:

Jim Smith,  
London Trees & Woodlands Framework Manager,  
Forestry Commission  
7th Floor, Riverwalk House,  
157-161 Millbank,  
London SW1 4RR

[www.forestry.gov.uk/forestry/INFD-7KDEHU](http://www.forestry.gov.uk/forestry/INFD-7KDEHU)

### **Organisations and individuals who have contributed to the TDAG include:**

4D Landscape Design  
Alan Simson, Leeds Metropolitan University  
Atkins Global  
Barcham Trees  
Barrell Tree Care  
Bennetts Associates  
Building Research Establishment  
Bristol Street Trees  
CABE Space  
Canary Wharf Group  
Capita Lovejoy  
City of London  
City of Westminster  
Design for London  
Dr Mark Johnston, Myerscough College  
English Heritage  
Environment Agency  
Forestry Commission  
Greater London Authority  
Grosvenor  
Land Securities  
Landscape Institute  
London Borough of Hackney  
London Parks & Green Spaces Forum  
London Tree Officers Association  
London Tree and Woodland Framework  
Mouchel  
National and London Joint Utilities Group  
Natural England  
Norwich City Council  
Peter Osborne, Independent Insurer  
Places for People  
Royal & Sun Alliance  
South Oxfordshire District Council  
Thames Water  
The Royal Parks  
The Tree Council  
Transport for London  
Trees for Cities  
Treework Environmental Practice  
Urban Design London  
Willerby Landscapes  
Wood for Good  
Zurich Municipal