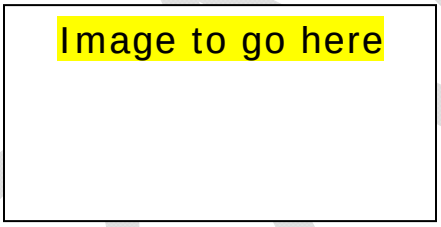
NATIONAL TREE SAFETY GROUP

BRINGING COMMON SENSE TO TREE MANAGEMENT



Guidance on trees and public safety in the UK for owners, managers and advisers

"Safety is but one of many goals to which we aspire; the mistake that is often made is to focus on safety as if it is the only goal.

Professor David Ball
Centre for Decision Analysis and Risk Management
Middlesex University

?? 2010
www.NTSG.org.uk

INSIDE FRONT COVER

THE NATIONAL TREE SAFETY GROUP

The National Tree Safety Group (NTSG) is a broad partnership of organisations that have come together to develop a nationally recognised approach to tree safety management and to provide guidance that is proportionate to the actual risks from trees. Its membership is open to all interested stakeholder organisations and groups.

NTSG membership

Professional bodies

Arboricultural Association
British Standards Institution
Centre for Decision Analysis and Risk Management, Middlesex University
Institute of Chartered Foresters
London Tree Officers Association
Quantified Tree Risk Assessment
Royal Institution of Chartered Surveyors
Tree Council
Visitor Safety in the Countryside Group

Tree owners / managers

British Holiday & Home Parks Association Ltd
Confederation of Forest Industries (UK) Ltd
Country Land and Business Association
English Heritage
Essex County Council
Forestry Commission
National Farmers Union

Organisations with heritage / conservation interests

Ancient Tree Forum
Campaign to Protect Rural England
English Heritage
Hampstead Garden Suburb Trust
National Trust
Woodland Trust

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Judith Webb and Harry Studholme
Chairs of the National Tree Safety Group

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(to be chosen and requested by Communications Group)

Chapter 1

INTRODUCTION

The National Tree Safety Group's aim is to develop a nationally recognised approach to tree safety management and to provide guidance that is proportionate to the actual risks from trees.

This guidance is based on a set of basic principles developed by the National Tree Safety Group (NTSG) for considering and managing tree safety in the public interest, which are set out in the position statement, *Managing Risk from Trees*. The overall approach is that a balance should be struck between risks and benefits. This document gives guidance supporting the NTSG position, which can be summarised as:

The NTSG believes that one fundamental concept should underlie the management of risks from trees. It is that the evaluation of what is reasonable should be based upon a balance between benefit and risk. This calculation can only be undertaken in a local context, since trees provide many different types of benefit in a range of different circumstances.

The NTSG position underpins a set of five key principles:

- Trees provide a wide variety of benefits to society
- Trees are living organisms and naturally lose branches or fall
- The risk to human safety is extremely low
- Tree owners have a legal duty of care
- Tree owners should take a balanced and proportionate approach to tree safety management.

Managing the risk is the responsibility of the owners and managers of the land (and the trees), but there are many different types of landowner and trees grow in many different situations. This guidance has been developed to support the work of all those involved in tree management – whether connected with streets, parks, public open spaces, businesses such as hotels or farms, private estates, woodland, commercial forestry or private gardens. The document structure reflects the NTSG's five principles.

Context

This document is intended to integrate and make current issues concerning trees and their management for human safety, bringing together several other guidance documents that impinge on this area. These are referred to further in Chapter 6.

The people responsible for managing risk may feel that they are being forced into making decisions without a clear knowledge of what is expected of them. This is especially difficult in sectors as diverse as forestry and arboriculture. Even if people know that their underlying duty is to do what is 'reasonable', they may have immense difficulty in knowing what 'reasonable' actually means within their particular context. In such situations, the fear of the consequences of making a bad decision may weigh heavily on them, especially in the aftermath of publicity surrounding an incident or court case. In these situations it is useful to have a benchmark for comparison.

This document is supported by a wide range of stakeholders involved in the ownership and management of trees. It seeks to provide guidance for inspecting and maintaining trees; guidance which is reasonable and proportionate to the low risk from trees, to the benefits of trees, and to the health and safety obligations of those responsible for trees. As such it is a valuable document that a court may refer to in any case involving personal injury or damage caused by a falling tree or bough. Courts already consider publications of this nature when addressing the duty of care.

Many valuable trees are being needlessly removed in the name of 'health and safety', due to the landowners' fear of litigation. In many cases the undoubted value of trees is not easy to express in monetary terms, since these values are not traded in markets. They are societal values, enjoyed by everybody. On the other hand, the costs of maintenance and the fear of litigation are all too readily apparent and personal. The NTSG position statement argues that it is reasonable to include societal values in the calculation of what is reasonable where a landowner or manager is acting in the public interest. The current position and the implications for developing a defendable approach to risk management are developed in this guidance document.

Trees provide a wide variety of benefits to society

Chapter 2 looks at some of the many benefits brought by the billions of trees in the United Kingdom and examines their contribution to our health, wealth and well being. The consideration of benefit before the examination of risk and legal obligation highlights the importance of context. The scale of what is reasonable cannot be developed in any other way.
The Health and Safety Executive (HSE) believes that:

"…public safety aspects can be addressed as part of the approach to managing tree health and tree owners should be encouraged to consider public safety as part of their overall approach to tree management."[1]

The overall approach to tree management can only be established if the advantages offered by the particular trees are evaluated in their own local context. People's safety is undoubtedly an important consideration, whether trees are managed for their cultural, amenity, heritage or environmental benefits or for timber production and other commercial interests, but it must be evaluated alongside the other benefits.

Trees are living organisms and naturally lose branches or fall

Chapter 3 develops the argument that overemphasising the possibility of a tree part failing and injuring somebody risks the removal of dead wood and other habitats that play a crucial role in maintaining some of the benefits of trees.

It is a particular challenge of tree management that, unlike man-made structures, it is entirely normal and natural for trees to shed parts and eventually to fall. This guidance and the NTSG position statement argue strongly that decisions about risk can only be undertaken by making judgments. Technical estimates of the likelihood of failure of tree parts are only part of the picture and, in many instances, it is not reasonable to even carry out an inspection.
This chapter reinforces the concept that management must focus on the role of the trees, the benefits that they bring in the particular context and, of course, the relationship of people and property to the risks posed.

The risk to human safety is extremely low

Chapter 4 outlines the HSE's decision-making framework, known as the Tolerability of Risk (ToR) Framework. It describes three levels: whether a risk is unacceptable, tolerable or broadly acceptable. There is an expectation that:

Both the level of individual risks and the societal concerns engendered by the activity or process must be taken into account when deciding whether a risk is unacceptable, tolerable or broadly acceptable.

A suitable and sufficient risk assessment must be undertaken to determine the measures needed to ensure that risks from the hazard are adequately controlled.

As control measures are introduced, the residual risks may fall so low that additional measures to reduce them further are likely to be grossly disproportionate

to the risk reduction achieved, though the control measures should still be monitored in case the risks change over time.

Research by the Centre for Decision Analysis and Risk Management (DARM) on behalf of the NTSG addressed point 1. It demonstrated that the overall risk to the public from falling trees was extremely low, representing about a 1 in 10 million chance of an individual being killed by a falling tree (or part of a tree) in any given year[2]. The research also showed that there is limited societal concern about risks of this type (although there may be adverse publicity in the immediate aftermath of an individual incident). The analysis indicated that it would be unlikely that adjustments to the current management regime would reduce the risk to health and safety in any significant way.

Tree owners have a legal duty of care

Chapter 5 provides tree owners in the United Kingdom with an outline of their obligations and potential liabilities for injury to others caused by the fall of a tree or branch. It is based on an evaluation of past court decisions. It is not intended to provide an exhaustive exposition of the law relating to trees or the ownership of land.

An owner of land upon which a tree stands has responsibilities for the health and safety of those on or near the land and potential liabilities arising from the fall of the tree under both the civil law and criminal law. The civil law gives rise to duties and potential liabilities to pay damages in the event of a breach of those duties. The criminal law gives rise to the risk of prosecution in the event of an infringement of the criminal law.

Chapter 5 also addresses the role of this guidance document within the legal framework.

Tree owners should take a balanced and proportionate approach to tree safety management

Chapter 6 develops the general approach to enhancing good practice in the sector. It recognises that trees are managed for a variety of reasons and therefore that the 'suitable and sufficient risk assessment' referred to by the HSE expectations would vary with context.

In general the risk from trees has certainly reached the situation where residual risks (those that remain after management for safety) are sufficiently low that further investment in additional measures is likely to be disproportionate to any safety benefit. As HSE itself notes (inter alia):

> *"any informed discussion quickly raises ethical, social, economic and scientific considerations, for example: How to achieve the necessary trade-offs between benefits to society and ensuring that individuals are adequately protected; the need to avoid the imposition of unnecessary restrictions on the freedom of the individual."*[3]

Chapter 6 shows that a sense of proportion is vital in this evaluation. This can only be achieved by considering the trees' place in a wider management context and the relationship of people to that context.

Chapter 7 presents a series of possible scenarios for risk management illustrating the themes in the Guidance. They are not definitive of any situation because managing risk is the responsibility of the owners and managers of the land but it is often helpful to see examples that are similar in scale or context. The list is not exhaustive but seeks to develop a realistic series of case studies as a guide to reasonable practice.

Chapter 2

THE BENEFITS OF TREES

Trees are fundamental to our well-being and quality of life. Their size, number and age make them one of the most visible and continuous aspects of our lives. Their beauty and majesty have inspired artists, poets and writers. Trees may be significant to us personally, marking historical occasions, commemorating a birth, family event or celebration of a life.

Trees are integral to natural ecosystems, providing a wide range of related benefits to humankind (ecosystem services), including mitigating the harmful effects of climate change. Trees are an important part of the economy, providing timber and non-timber forest products. They also bring communities together, playing a part in their cultural and spiritual values and aesthetic appreciation.

Their importance is recognised in international, national and local government policies, and many non-governmental organisations have policies dedicated to conserving trees and their biodiversity.

Trees in cities and towns

Around 85% of the UK population lives in urban areas, where the pressures of modern living are often most evident. Trees are an integral component of greenspaces in our towns and cities.

The Environment and Social Justice Review[1] argues that the quality of greenspace acts as a powerful indicator of whether an area is a good place to live, while the Cabinet Office Strategy Unit advocates urban greenspace and green infrastructure as a primary element affecting quality of life[2]:

> *"Trees bring people together. They contribute to a sense of place and play an important role in fostering social cohesion and reducing negative social behaviours."* [3]

Ninety-two percent of survey respondents in the Park Life Report[4] said they visit parks and greenspaces, and 97% believe that parks and greenspaces help to create a good place to live.
The Royal Commission on Environmental Pollution recognised the benefits that the natural environment provides in urban areas[5]:

> *"Our towns and cities have always relied on the natural environment to provide water, regulate climate and accept waste. Now, the natural environment offers opportunities for increasing flexibility and resilience in the face of new environmental and social challenges including climate change."*

By the 2080s, average annual temperatures in the UK may have increased by between 1°C and 5°C, with higher summer temperatures and milder winters. Increased winter rainfall and drier summers, particularly in the south and east, will be accompanied by more frequent storms, heat waves and other severe weather events.

The impact of climate change will be felt acutely in built-up areas where the 'urban heat island effect' will further increase temperatures. Concrete, brick, tarmac and other hard surfaces will also impede water infiltration, increasing the risk of surface water flooding. These effects are likely to increase significantly unless measures are taken to adapt to climate change.

The UK low carbon transition plan highlights the role of greenspace and trees in providing shade and shelter, which help adapt buildings to climate change and reduce their energy budgets[6].

- Each year 33 million people make 2.5 billion visits to urban greenspaces. Access to urban green space can increase longevity as well as engendering positive feeling about the local community[7]. Well designed tree planting can create a 'calmer and more social atmosphere' that enhances community security, and minimises concealment for anti-social activities[8].

- For every 1ºC increase in temperature above 21ºC, heat-related deaths increase by 3%[9]. An increase of 10% in urban green cover in high-density residential areas in Greater Manchester would decrease the expected maximum surface temperature in the 2080s by around 2.5°C (and up to 4°C). Conversely, removing 10% green cover would increase the expected maximum surface temperature by 7°C[10].

- Trees strategically placed around buildings can reduce energy consumption producing 10-50% savings in air conditioning costs[11] and 4-22% in savings from winter heating costs[12].

- Trees intercept precipitation and in urban areas can reduce the pressure on the drainage system and lower the risk of surface water flooding. Research by the University of Manchester has shown that increasing tree cover in urban areas by 10% reduces surface water run-off[13] by almost 6%[14].

- During 1999-2000, publicly-maintained street trees in Davis, California produced nearly $1.7 million in tangible benefits for residents – a net return of $3.78 for every $1 spent on their management[15].

Trees in the countryside

Trees are important in the countryside, for residents and for the many visitors. This importance is likely to grow as populations increase, towns and cities expand and the climate changes. Despite the centuries-long importance of trees, woods and forests to the UK economy, and a drive for afforestation during the last century, the UK remains one of the least forested countries in Europe.

Trees and woodland can help manage water quality and reduce the risk of flooding when planted at a river catchment scale. River basin management plans produced for England and Wales recognise the role of woodland planting in reducing the risk of surface water runoff, affecting the quality of rivers and streams[16].

- Woodland can reduce floods from hill slopes and in headwater catchments, and may have a marked impact on flood flows at a local level, particularly in the UK which has less than 12 % woodland cover[17].

- Each year the UK loses 2.2 million tonnes of topsoil to erosion[18]. Trees and woodland can help reduce soil erosion, protecting a vital resource and reducing the risks of surface water runoff. Runoff from farmland, brownfield and contaminated sites can lead to rivers and streams becoming clogged up and contaminated.[19,20].

- Soil infiltration rates were 60 times higher under young hedgerows and shelter belts than heavily grazed pasture in Mid Wales, with infiltration rates improving within two years of tree planting[21].

- Shade from trees next to water courses reduces the temperature and improves oxygen levels in the water, benefiting fish and other wildlife[22].

- Trees can play a vital role in adapting farming systems to climate change, including through providing shelter and shade for livestock and crops, and in managing surface water runoff and pollution of water courses.

- Trees provide shelter for crops, reducing wind and rain damage and water loss and encouraging crop pollination.[23] They may reduce the incidence and severity of some crops' pests and diseases[24]. Windbreaks of trees help increase crop yields, particularly during dry summers[25].

- Mature trees in the countryside provide a range of ecosystem services, including critical habitat for wildlife, particularly when growing scattered

through agricultural landscapes, supporting connected networks for colonising species[26].

- Based on savings to the engineering costs of flood control, the value of existing woodlands for flood alleviation is around £1,200 per hectare in a river catchment in south-east Northumberland[27].

Health benefits

Trees may offer important health benefits; yet removing trees seldom takes account of the risks to human health and well-being.

- Each year, 24,000 people in the UK die prematurely from the effects of air pollution[28]. Leaves and branches take fine, harmful particulates out of the air, reducing the risk of respiratory illness and saving health care costs[29,30]. Doubling the tree canopy cover in the West Midlands alone could prevent around 140 premature deaths per year[31].

- Trees and woodland can decrease sulphur dioxide, nitrogen dioxide and ozone concentrations in the air, benefiting human health[32]. Conversely the loss of mature trees can have significant human and economic costs.

- Trees not only store carbon, but their removal of carbon gases, principally carbon monoxide, has considerable cardiovascular health benefits[33].

- Trees reduce stress and improve mental health, and can reduce hospital recovery time[34]. The quality of natural features and trees in the city helps reduce mental fatigue and stress[35], improves the concentration of those suffering from attention deficit disorder and benefits child development[36].

- A barrier of trees over 15m wide may reduce noise levels by 5-10 decibels and lessens nuisance by screening the perception of noise[37].

- Prison inmates in cells with a green outlook place fewer demands on health services[38,39].

Economic benefits

For centuries, trees have provided wood for house and ship building as well furniture; fencing, screening and baffling; paper and cardboard; animal bedding; renewable energy and heat. As part of the development of a low-carbon economy, wood and wood products now play a major role as a renewable resource and in the storage of carbon. Trees and woodlands have an important role to play in supporting commercial enterprises and rural development that contribute to local and national growth.

- A total of around 8.8 million tonnes of softwood and hardwood timber was produced in the UK in 2008.

- Forest industries significantly contribute to national employment and wealth. In 2005 they generated 167,000 jobs and £7.2 billion worth of gross value-added value[40].

- Processing companies currently invest around £100 million per year in sawmills, panel plants and paper mills, using home-grown timber.

- England's woodlands remove around one million tonnes of carbon from the atmosphere every year, equivalent to the annual emissions from 625,000 homes[41].

- By increasing our existing woodland cover by 23,000 hectares per year over the next 40 years, we can reduce the total annual greenhouse gas output by 10%.

- Using timber in the UK's new and refurbished homes could store an estimated additional 10 metric tonnes of carbon (equivalent to 36.7 metric tonnes of carbon dioxide emissions) by 2019.

- Investment in new and expanded woodlands plays an important role in brownfield and urban land regeneration, in economic development, and in attracting inward investment.

- Trees and greenspace enhance property values. For example, in London the area of greenspace is the fifth most significant indicator explaining variation in house prices[42]. In north-west England a city park can enhance property values by almost 20%[43], smaller local parks can enhance the value of flats by more than 7%, and larger dwellings by more than 9%.

Finally

These many research findings show just how much we rely on trees. They are essential to healthy environment and cohesive community, they cool hot places, condition the air we breathe and even contribute to psychological balance and human longevity. They are not, however, there just for us. They are also vital for biodiversity, and the next chapter describes their biodiversity contribution.

Chapter 3

TREES ARE LIVING NATURAL ORGANISMS

"Three hundred years growing, Three hundred years standing, Three hundred years decaying".
Peter Collinson (1776) on the life cycle of English oak and sweet chestnut.

Trees are long lived organisms

Their capacity for long life and the ability to grow to great height and size give trees their importance for humans, providing durable and useful materials, and protection from the elements. When allowed to go through their natural life cycle, trees provide habitat supporting a diversity of dependant species, and generally, as trees age, their associated biodiversity increases. Trees may be thought of as keystone species, in that their importance for biodiversity is such that, when removed from an ecosystem, the entire set of connections between inter-dependant species breaks down and systems collapse.

Trees are natural shedders

Unlike man-made structures, where trees are concerned it is entirely normal and natural for parts to break away and fall. Leaves and twigs are regularly shed. Branches die and live branches may become wind damaged or overextended, occasionally collapsing to the ground. On rare occasions, roots can snap under wind load causing entire tree collapse. These types of structural tree failure are natural and, in rare instances, can injure people and damage property.

Young trees' strategy is to rise above the competition

When young, a tree puts energy into attaining height above the surrounding competition, expanding and ascending its stem, forming a trunk to support a crown with branches that can bear sufficient leaf capacity to create carbohydrate energy from its leafy canopy. This in turn finances further crown expansion, growth, defence and eventual seed production.

Annual growth rings

In the early stages of growth, the trunk is mainly sapwood with an outer protective covering of bark. The sapwood is made up of woody vessels, conductive tubes formed in annual 'rings'. Layers of sapwood are laid down each year. While we tend to think of these as annual 'rings', they are only seen as rings if the tree is cut down and we look at the trunk in cross-section. In fact, this annual woody layer is laid down over the entire outer body of the tree, from the furthest small root to the topmost branch; like a veneer-skin, or a virtual new plant spread just beneath the bark. The growth of annual rings can vary year by year, their width being influenced by climatic events. They are typically reduced after drought or flooding or when the tree suffers physical damage such as bark loss, compaction, root damage or soil removal.

Essential function of sapwood

Sapwood is fundamental to all life processes in the tree. Its importance lies in connecting roots in the soil to the atmosphere, transporting water and nutrients (via outer woody xylem vessels) to the uppermost crown leaves for sugars to be manufactured through photosynthesis (using sunlight, water and carbon dioxide). These sugars are then transported throughout the tree (via phloem vessels, located just beneath the bark) for growth and storage. Sapwood channels immense amounts of water via the xylem, inspiring the idea that living trees are 'fountains of the forest'.

Why water is a key to understanding tree growth and health

For sapwood to function, it needs the outer bark to 'lock in' water effectively. Conversely, when the seal of bark is broken through damage, sapwood around the damage starts drying out, ceases to function and dies. The change in internal water conditions after bark loss and sapwood death creates habitat in which different fungi may flourish, some of which will decay and recycle wood. A common cause of

these changes is when trees shed branches after storms or from natural branch death when shaded from light, resulting in change in water activity around the dead or fallen branch; creating conditions ideal for stimulating local fungal activity.

Healthy, mature and old trees mostly comprise non-living wood

During early growth years, the wood under the bark is entirely comprised of living conductive vessels. For species like oak and sweet chestnut this may continue for a period of around 20 or so years, after which the oldest (innermost/first year) 'ring' dies off, becoming the first ring of the 'heartwood'. Each year thereafter, a new outer layer of sapwood is laid down and the next, innermost ring dies off, and is relegated to the non-living heartwood. When the tree is 30 years old its cross-sectional area is still mostly sapwood. But from then on the ratio of the area of sapwood to heartwood reduces. After 50 years or so, there are likely to be equal areas of sapwood and heartwood. After 200 or 300 years, the now large tree will be mostly composed of a non-living inner heartwood (or ripewood) core.

Crown retrenchment: controlling distances required to move water

When fully mature, while the annual new layer of sapwood is laid down over a trunk with still expanding girth, the foliar capacity of the crown may also start to naturally reduce in volume. At this stage, trees naturally diminish their height and spread. Some refer to this process as 'growing downwards', while others use the term 'crown retrenchment' as it describes how trees reduce supply lines (for water, nutrients and sugars) from their roots to upper crown leaves. The onset of crown retrenchment marks the beginning of the ancient phase, when trunks may also increasingly become hollow, producing a very rare habitat. Retrenchment is a survival strategy, and is potentially repeatable, enabling the ancient state to be the longest phase of growth.

A tree can be mostly non-living, even hollow, yet be very healthy

While a mature tree trunk is mostly composed of non-living heartwood and a small cross-sectional area of living outer sapwood, as long as the roots are able to function and the branches are not too shaded or damaged, it is likely that the life-giving functional sapwood can supply all the tree's needs. When old and large enough, the wood is colonised by an array of decay fungi, becoming veteran tree habitat. Though we mostly tend to be aware of birds, bats and larger mammals colonising trees, fungi are the key organisms involved in breaking down the constituents of wood, creating veteran habitat conditions suitable for a succession of organisms to gain entry and interact, each with their specialist life styles. Another feature of old hollow trees is that they are often found still standing after storm events, while nearby younger solid trees may be uprooted. One reason for this is because being older and having undergone crown retrenchment, they present lower wind resistance, compared to younger, taller trees. Old pollard trees may similarly withstand uprooting due to their reduced crown height, though they may be more susceptible to shedding large pollard branches.

Roots are vital and easily damaged

While it is easy to have some idea of how a tree functions above ground, much of the tree's life takes place within and around its root system, below ground. Highly complex ecosystems are associated with the soil-rooting environment where special interactions take place that are mostly still not well-understood. Roots are essential to tree survival for drawing water and nutrients from the soil and for anchorage. While trees have evolved slowly and gradually, they are not particularly adapted to impacts of human development, such as inhospitable urban soils or the effects of soil compaction from people and vehicles and from root severance from utility trenching. Being hidden from view, roots may be unintentionally damaged, leading to reduced tree stability and shortened life expectancy. Such damage tends to be hidden and progressive, often only being evident decades later as poor leaf condition.

How trees incorporate decay – compartmentalisation

While we may think of a dead branch on a tree as a sign of ill-health, in a great many cases this would be a wrong interpretation. Trees benefit by allowing branches to die and be shed so, when seeing this process, we may be witnessing an evolved survival strategy. Trees when wounded (such as from storm damage, torn or lost bark or decay) have a highly developed capacity to adapt by protecting the organism as whole. Trees incorporate decay into their roots, trunks and branches,

growing and developing healthy tissue around it. This capacity to 'compartmentalise' (wall off) decay and grow around dead and decaying wood, though not entirely unique to trees, has evolved to such an extent that old trees can have entirely hollow trunks and enormous branch cavities, with no detriment to their vitality, particularly when the outer living sapwood has not been unduly damaged or compromised.

> ***"If a healthy tree is defined as a plant without active infections, then there is no such plant as a healthy tree. Trees have hundreds, or even thousands, of active infections that are compartmentalised."***
> Alex Shigo

Trees do not need people

Six percent of British invertebrate fauna, as many as 1,700 species, depend on other species that in turn, depend upon decaying wood habitat for part of their life cycle. These habitats are naturally generated through the ageing process and are the very features that are commonly thought of as structural 'defects' and equated to hazards in trees. Although it may be important for human safety, it would be a fallacy to believe that any intervention is necessarily carried out for the benefit of the tree. Trees have their own inbuilt mechanisms for dealing with damage and decline. If trees were left to their own devices and allowed to go through their natural life cycle free from human intervention, tree failure of any nature would be irrelevant, being part of complex natural processes, integral to the way trees have evolved. It is only where there is a close association between humans and trees that tree failure takes on any significance, and that the concepts of hazards and risk from trees have any meaning at all. The following chapters explore the reality of the risks posed by trees, to arrive at a balance between conserving their important qualities while managing risks at an acceptable level.

Chapter 4

UNDERSTANDING THE RISKS FROM TREES

Real risks and public concerns

Trees grow in many different situations, with a greater or lesser level of interaction with people. Where it is appropriate to manage trees, this management seeks to enhance their significance (in terms of value, access and other benefits) and to reduce the undesirable impacts they can have (such as damage from roots, subsidence, and risk to human safety). Considerable concern and uncertainty about managing trees for safety has arisen in the last few years. This has largely been stimulated by a handful of court cases and other responses to incidents where a falling tree or branch has killed or injured a member of the public. Addressing these concerns requires information about the 'real' risk involved and the level of public concern.

Risk tolerability: a philosophy of risks, values, benefits and costs

Very simply, a hazard is something that can cause harm; here, the hazard is a tree. Risk is characterised by reference to potential events and consequences, or a combination of the two. It is often expressed as a combination of an event's consequences and the likelihood of it occurring. In this case, the consequences are death or serious injury and the important part of the assessment is the likelihood of either occurring. Levels of risk are judged against a baseline, which is usually the current overall maintenance regime for that hazard (the tree). When assessing a tree, owners and managers need to judge whether the management measures they adopt will fulfil society's reasonable expectations. 'Reasonableness' is a key legal concept when considering the risks of trees to the public and tree owners' obligations.

The Health & Safety Executive presented this expectation in its risk philosophy, outlined in the diagram below (see Figure 1).

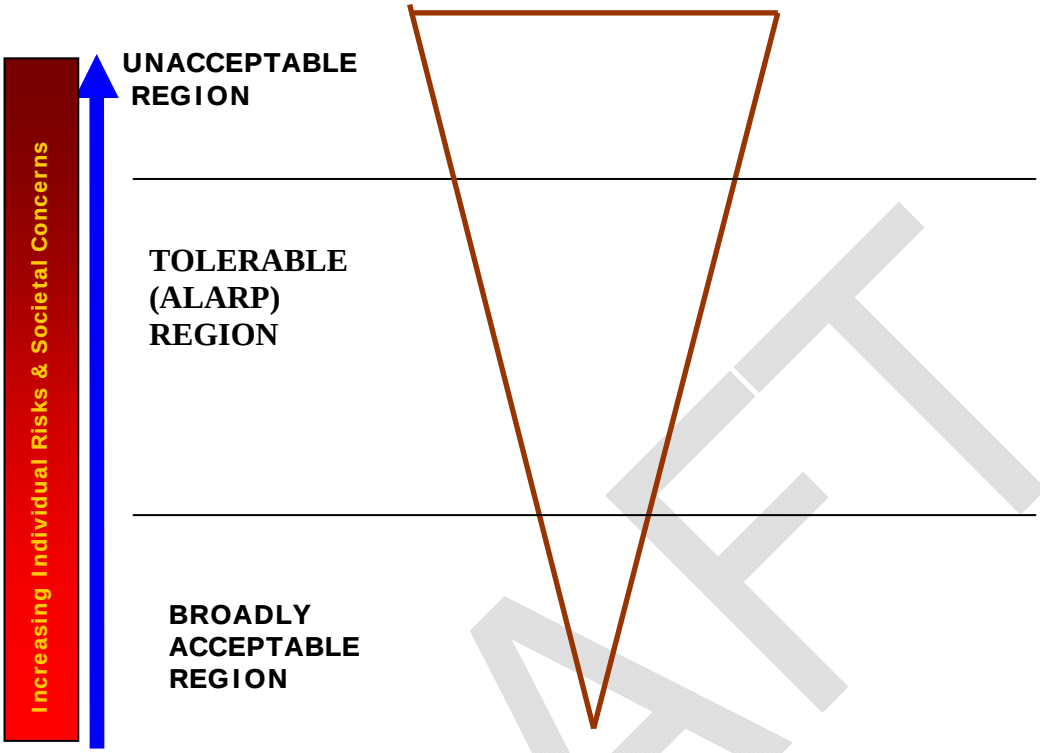

Figure 1: HSE framework for the tolerability of risk[1]

The HSE says that for practical purposes any activity or practice giving rise to risk in the upper zone would be prohibited unless exceptional reasons could be given. The bottom zone, in contrast, represents a level of risk which is taken as broadly acceptable. The HSE states:

> *"Risks falling in this region are generally regarded as insignificant and adequately controlled. We, as regulators, would not usually require further action to reduce risks unless reasonably practicable measures are available. The levels of risk characterising this region are comparable to those that people regard as insignificant or trivial in their daily lives."*

Hazards with risk levels falling in the intermediate band may be tolerated in order to secure the associated benefits, providing that:

- The nature and level of the risks are properly assessed and the results are properly used to determine control measures. The assessment of the risk needs to be based on the best available scientific evidence and, where evidence is lacking, on the best available scientific advice;

- The residual risks are not unduly high and kept as low as reasonably practicable (the ALARP principle[2]); and

- The risks are periodically reviewed to ensure that they still meet the ALARP criteria, for example, by ascertaining whether further or new control measures need to be introduced to take account of new knowledge or new techniques for reducing or eliminating risks.

An obvious question relating to the above concerns the precise likelihood of death associated with the boundaries between the three zones ie. how many deaths a year do there have to be before a risk moves from tolerable to intolerable? The HSE says that it is often unnecessary to specify these boundaries because good practice is often spelled out or implied in legislation, approved codes of practice (ACoPs) or other guidance. However, based on its experience, the HSE has proposed guidelines[3] for where these boundaries lie. This is very important when seeking to establish what a reasonable standard of control is.

Accordingly, the HSE has identified that an individual risk of death of one in a million per year for both workers and the public corresponds to a very low level of risk, and this should be used as a guideline for the boundary between the broadly acceptable and tolerable regions. It points out that this level of risk is extremely small when compared with the general background level of risk which people face and engage with voluntarily.

Research into deaths from falling trees

Guidance to help owners and managers make reasonable decisions about tree management needs to be backed up by reliable data on the actual level of risk posed by falling trees. Therefore, the National Tree Safety Group commissioned the Centre for Decision Analysis and Risk Management at Middlesex University to quantify the risk to the UK public of fatal and non-fatal injuries from falling or fallen trees and branches. The research identified 64 deaths during the ten years after 1 January 1999[4]. With a UK population of roughly 60 million, this leads to an overall estimated risk of about one death in 10 million people per year from falling or fallen trees and branches.

So far as non-fatal injuries in the UK are concerned, the number of accident and emergency cases attributable to being struck by trees (about 55 a year) is exceedingly small compared with the roughly 2.9 million leisure-related A&E cases per year. Footballs (262,000), children's swings (10,900) and even wheelie bins (2,200) are involved in many more incidents.

Significance of the identified risks

The individual risk of death attributable to trees is TEN TIMES LESS than the threshold of one death in a million per year which the HSE says people regard as insignificant or trivial in their daily lives. Because trees present a very low risk to people, owners and managers should be able to make planning and management decisions within this context and avoid unnecessary intervention, survey and cost.

The expectation of society and the courts reflects the fact that trees grow in many different types of location. By carefully considering how trees fit into a particular local context, owners and managers can better identify those areas and situations requiring some action. It will also help them ensure that any management is proportionate to a fair balance between the real risks and benefits.

A comparison of risks of deaths

Table 1 is reproduced from HSE's *Reducing risk, protecting people* with the risk of falling and fallen trees added for comparative purposes.

Table 1 Annual risk of death for various causes over entire population

Cause of death	Annual risk	Basis of risk and source
Cancer	1 in 387	England and Wales 1999
Injury and poisoning	1 in 3,137	UK 1999
All types of accidents and other external causes	1 in 4,064	UK 1999
All forms of road accident	1 in 16,800	UK 1999
Lung cancer from radon in dwellings	1 in 29,000	England 1996
Gas incident (fire, explosion or carbon monoxide poisoning)	1 in 1,510,000	GB 1994/95-1998/99
From trees	1 in 10,000,000 or less if high wind incidents are excluded	This study
From lightning	1 in 18,700,000	England and Wales 1995-99

The public perception of risk

One reason why trees fall into the 'low' level of risk category is because over past decades we have taken good care of our trees (where this is needed). As discussed in Chapter 3, it is the natural behaviour of trees to shed branches and ultimately fall down. This is going on all the time and people have simply learnt how to live beside them. However, it is well known in risk management that it is not simply the actual risk of some harm that troubles people and generates responses, but how they perceive that risk.

HSE refers to the role of perception in its Sector Information Minute (SIM)[5] as follows:

> *"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 public use. However the low level of overall risk may not be perceived in this way by the public, particularly following an incident."*

While it is not up to us to define 'open space', this refers to the fact that people can become more worried by falling trees after someone has just been killed by one.

Accidents from falling trees – newsworthiness

It can be reliably predicted that if a falling tree kills a member of the public, there will be a passing story in the local, and occasionally national, media. This is because unusual events, such as tree-related deaths, are more likely to be newsworthy than commonplace accidents, even though the latter pose a far greater risk and cause much more harm overall.

This newsworthiness does not imply a greater statutory duty to control the hazard, or that it would be in the public interest to attempt to do so. There might be a stronger case for this were trees likely to kill large numbers of people in one accident or were they to arouse societal concerns[6], but there is no evidence that this is the case. It is hard to imagine and in most circumstances also exceedingly unlikely, that a tree could cause ten or more fatalities, or somehow be involved in some major disaster.

Likewise, trees are not known to invoke societal concerns as a result of the risk of harm that they pose. In fact, there is far more evidence of a true public societal concern being sparked when trees are felled, the concern being a public desire for the retention and preservation of trees.

There are many records of local outrage following the removal or threat of removal of trees, sometimes on alleged health and safety grounds. This sense of outrage could increase as more people realise that trees of significant stature are being lost,

especially in urban areas, and that these same trees have many benefits. As the House of Lords Select Committee on Economics has put it[7]:

"…the most important thing government can do is to ensure that its own policy decisions are soundly based on available evidence and not unduly influenced by transitory or exaggerated opinions, whether formed by the media or vested interests."

Evaluation of what is reasonable

The Health and Safety Executive believes that: "… public safety aspects can be addressed as part of the approach to managing tree health and tree owners should be encouraged to consider public safety as part of their overall approach to tree management."[8] This is a useful position to establish, even though it is almost certainly not necessary to agree that 'tree health' is the only relevant criterion in managing trees. This statement suggests that HSE accept that human safety is to be considered within a wider management context rather than in isolation[9]. The courts have frequently referred to this trade-off in civil cases.

The first stage of an evaluation, therefore, should focus on the context and role of the trees themselves. In the context of the low level of risk noted already, the HSE SIM further states that:

"Given the large number of trees in public spaces across the country, control measures that involve inspecting and recording every tree would appear to be grossly disproportionate to the risk."

What is inherent in this evaluation is a sense of proportion. This can only be achieved by considering the trees' place in a wider context and people's relationship to that context.

Managing the risk from trees

Exposure to an element of risk is an unavoidable consequence of all environments where trees are part of leisure activities. In such circumstances, tree management[10] aims to offer people the chance to encounter acceptable risks as part of a stimulating and beautiful environment. People enjoy what they perceive to be 'natural' or 'unmanaged' countryside, valuing trees that have been subject to minimal or no intervention, and are prepared to accept a degree of risk because of the pleasure they derive from visiting or participating in leisure activities in these environments. Therefore it is argued that, although tree management should not expose people to significant likelihood of death, permanent disability or life-threatening injuries, it may occasionally be unavoidable. This is only tolerable in the following conditions:

- The likelihood is extremely low
- The hazards are clear to users
- There are obvious benefits
- Further reducing the risks would remove the benefits
- There are no reasonably practicable ways to manage the risks.

For example, a mature tree in a city park presents a low but irremovable risk of falling on somebody, even if it is frequently inspected and treated. This risk is usually tolerable. The likelihood is typically low and people benefit from the retention of a feature that is inextricably linked to why they visit the park. This risk cannot be further reduced without removing the tree and taking away the benefits.

In its position statement, the NTSG argues that it is reasonable to expect sufficiently large organisations that own or manage trees to develop a formal policy (in line with practice in other sectors). This policy should strike a balance between the risks and the benefits. The balance should be based on a risk assessment involving a risk-benefit trade-off between safety and other goals, which should be spelt out in the policy. Where trees are grown for timber, the policy usually includes felling trees as part of routine operations – as may be the case for other commercial operations and public utilities that incorporate trees on their site. On the other hand, 'non-commercial' trees frequently have social and environmental value and are important to human health and well-being. The NTSG argues that, wherever possible, the presumption should be that such trees be retained.

Such a reasonable policy, articulating the benefits of trees, should carry as much weight in protecting the policy-maker against litigation following an incident as any factory's reasonable risk management policy. It is important to note that we are dealing with an emerging area within the field of managing safety risks to the public. The way that courts take benefit into account in civil and criminal cases is discussed in Chapter 5.

Things to remember

Research to date supports the position that the risk from trees in most instances is no more than a routine and recognised risk of life, which most people accept without question.

In other words, planning decisions about the management of trees in general should proceed on a rational, cost-effective basis as trees do not invoke additional concerns about perceived risk.

Public safety is not the only concern when deciding how to manage trees. Other broader concerns, such as ecological, landscape and aesthetic value, should be taken into account.

Chapter 5

WHAT THE LAW SAYS

This section is not intended to provide an exhaustive exposition of the law relating to trees or the ownership of land[1]. Rather it is intended to give tree owners in England, Wales, Scotland and Northern Ireland an outline understanding of their obligations and potential liabilities for injury to others caused by the fall of a tree or branch, as derived from past decisions of the courts, and to address the role of this guidance within the legal framework.

The legal framework

An owner of land upon which a tree stands has responsibilities for the health and safety of those on or near the land and potential liabilities arising from the fall of the tree under both the civil law and criminal law. The civil law gives rise to duties and potential liabilities to pay damages in the event of a breach of those duties. The criminal law gives rise to the risk of prosecution in the event of an infringement of the criminal law.

The civil law

The owner of the land upon which a tree stands, together with any party who has control over the management of the tree, owes a duty of care at common law to all people who might be injured by the tree. The duty of care is to take reasonable care to avoid acts or omissions which cause a reasonably foreseeable risk of injury to persons or property.

If a person is injured by a falling / fallen tree or bough, potential causes of action arise against the tree owner in negligence for a breach of the duty of care, in the tort of nuisance and, where the injured person was on the land of the tree owner at the time of the injury, under the Occupiers' Liability Acts of 1957 or 1984 (OLA 1957, OLA 1984) (for Scotland see the Occupiers' Liability (Scotland) Act 1960).

Negligence

The dutyholder

This is the person who has control of the management of the tree whether as owner, lessee, licensee or occupier of the land on which the tree stands. The relevant highway authority is responsible for trees on land forming part of the highway.

The person to whom the duty is owed

This is any person who can be reasonably foreseen as coming within the vicinity of the tree and being injured by a fall of the tree or a bough from the tree. Those using highways, footways, public footpaths, bridleways and railways are likely to come within striking distance of trees on adjacent land. In public spaces, and semi-public spaces such as church yards and school grounds, those working in or visiting them can be expected to come within the vicinity of trees. On private land visitors and employees can also be expected to come within the reach of trees. So also trespassers may, in certain circumstances, be expected to come within the vicinity of trees on private land.

The duty owed

This can be stated in general terms as being a duty to take reasonable care for the safety of those who may come within the vicinity of a tree. The courts have endeavoured to provide a definition of what amounts to reasonable care in the context of tree safety and have stated that the standard of care is that of "the reasonable and prudent landowner"[2]. The tree owner is not, however, expected to guarantee the safety of the tree. He has only to take reasonable care such as could be expected of the reasonable and prudent landowner.

The duty owed under the tort of nuisance is owed by a tree owner to the occupier of neighbouring land. The duty, however, is no different to the general duty owed under the tort of negligence.

A highway authority has a potential liability for fallen trees and boughs for which it is responsible by virtue of section 41(1) of the Highways Act 1980 which gives rise to a duty "to maintain the highway". It is open to question whether the duty extends to the maintenance of highway trees[3]. However, assuming the duty does so extend, the highway authority may, by section 58, defend itself by proving "that the authority had taken such care as in all the circumstances was reasonably required to secure that part of the highway to which the action relates was not dangerous for traffic". The duty under section 41(1) is, therefore, little different to that which arises under the common law in negligence. Similarly, the duty to maintain trees planted under section 96 of the Highways Act 1980 only requires the highway authority to take "reasonable" care. A highway authority also has the power under section 154(2) of the Highways Act 1980 to require trees growing on land adjacent to the highway, which are dead, diseased, damaged or insecurely rooted, to be removed by those responsible for the trees and, in default of removal, to take action itself to have the trees removed. A failure to utilise the power in any particular case is unlikely to give rise to liability in the light of *Stovin v Wise*[4]. Similarly, it will not assist a person responsible for a tree growing adjacent to a

highway to blame the highway authority for failing to require him to remove a tree which is found to have been dangerous.

It is a fundamental responsibility of the duty holder, in taking reasonable care as a reasonable and prudent landowner, to consider the risks posed by his trees; to inspect trees, which pose a risk, for apparent defects; and to take reasonable steps to remove or control any significant risk posed by an observed defect. Such steps may, for example, include felling the tree, removing a branch, continued monitoring of the defect, placing a warning close to the tree, or moving a footpath away from the tree.

The level of knowledge and the standard of inspection which must be applied to the inspection of trees is of critical importance. It is at this point that the balance between the risk posed by trees in general terms, the amenity value of trees and the cost of different types of inspection and remedial measures becomes relevant.

The standard of inspection

This has not been defined by the courts to any finer degree than the standard of "the reasonable and prudent landowner". The courts have recognised that this test sounds simpler than it really is: “it postulates some degree of knowledge on the part of landowners which must necessarily fall short of the knowledge possessed by scientific arboriculturists but which must surely be greater than the knowledge possessed by the ordinary urban observer of trees or even of the countryman not practically concerned with their care”[5].

In individual cases the courts have endeavoured to apply the general standard to the facts of each case[6]. However, it is difficult to identify from the cases a clear and generally applicable indication as to the depth of knowledge which the reasonable and prudent landowner should bring to the inspection of a tree, or as to the regularity and type of inspection to be carried out. In general terms, the courts appear to recognise that the standard of inspection expected is greater for those with the resources and expertise which can be applied, although one must also recognise the unfairness which would be involved in a claimant finding himself unable to establish liability for the fall of a tree simply because it stood on a homeowner’s land rather than on land belonging to a local authority. At one end of the spectrum is the local authority[7], followed by large landowning organisations[8], large estates[9], corporate bodies[10], smaller landowners such as farmers; and, lastly, by homeowners with some trees upon their land[11], who are at the opposite end of the spectrum. The homeowner is expected to observe and act upon obvious defects in those trees which pose a risk, or to engage someone who is capable of such observation. Once aware of an obvious defect he would be expected to obtain the advice of a person with appropriate expertise as to how to deal with the risk posed by such a defect (unless, of course, the homeowner possesses sufficient expertise himself).

The question arises as to what is an “obvious” defect. There is no definition of this term. However, it might well include the following defects, obviously apparent upon visual inspection and which ought to be within the knowledge of the reasonable and

prudent landowner: a dead or hanging branch of the tree, decay, a significant split or crack, fungal growth, instability, discolouration of leaves, die back of branches, and dead or loose bark. It will often be a matter of degree as to whether a particular defect is in fact “obvious”.

The larger landowner can rely upon inspections by employees who have had instruction in the identification of obvious signs of instability and defect. This approach accords with that taken by the HSE Sector Information Minute of 2007.

This guide, published by the National Tree Safety Forum, is intended to give further guidance as to the standards to be applied by landowners and those employed by, or acting on behalf of, them when inspecting trees. It does so by highlighting the limited risk posed by trees and by drawing attention to the considerable benefits which trees provide to our society.

The Occupiers’ Liability Act 1957

The Occupiers’ Liability Act 1957 provides for the liability of an occupier of land when an accident occurs on the land to a person who is a ‘visitor’ to the land. The occupier owes a duty to the visitor to “take such care as in all the circumstances of the case is reasonable to see that the visitor will be reasonably safe in using the premises for the purposes for which he is invited or permitted by the occupier to be there”[12]. The duty of care under the Act is effectively the same as that at common law in respect of the torts of negligence or nuisance.

A person visiting land by virtue of the National Parks and Access to the Countryside Act 1949 or the Countryside and Rights of Way Act 2000 (CRoWA) is not classed as a ’visitor‘ within the meaning of OLA 1957[13]. Such a person cannot, therefore, bring a claim under the OLA 1957. However, he / she may still potentially bring a claim in negligence or, if appropriate, under OLA 1984.

The Occupiers’ Liability Act 1984

The Occupiers’ Liability Act 1984 provides for an occupier’s liability to people other than visitors, in particular trespassers, in circumstances where the occupier knows of the potential presence of such people on his land and of the risk posed to them by features of the land such as trees, and the risk is one against which, in all the circumstances, the occupier may reasonably be expected to offer them some protection.

The duty under section 1 of the Act to a person on "access land" in the exercise of a right to roam conferred by s. 2(1) of CRoWA 2000 will be determined having regard to the fact that the existence of the right ought not to place an undue burden upon the occupier, and having regard to the importance of maintaining the character of the countryside[14].

The duty under OLA 1984 is also limited in that no duty will arise in respect of risks resulting from any natural feature of the landscape (which will include a tree), nor from any river, stream, ditch or pond[15], providing that the occupier does not intentionally or recklessly create the risk[16].

Warning signs

A warning sign which warns of a specific danger posed by a tree (or trees) may be sufficient to absolve an occupier from liability in that he may, by such notice, have taken all reasonable care for the safety of the visitor in the circumstances[17]. However, in general, a landowner would be well advised not to rely upon warning signs alone to protect against a danger (for example, fence off the danger if at all possible). Furthermore, a business occupier cannot by reference to any contract term, or to a notice, exclude or restrict his liability for death or personal injury resulting from negligence or a breach of duty under OLA 1957[18], save where the access to the land is given for educational or recreational purposes (unconnected with the purpose of the business)[19].

The Compensation Act

Section 1 of the Compensation Act 2006 provides that:

"A court considering a claim in negligence or breach of statutory duty may, in determining whether the defendant should have taken particular steps to meet a standard of care (whether by taking precautions against a risk or otherwise), have regard to whether a requirement to take those steps might-

(a) prevent a desirable activity from being undertaken at all, to a particular extent in a particular way, or

(b) discourage persons from undertaking functions in connection with a desirable activity".

The term 'a desirable activity' is not defined by the Act and is likely to be construed so as to give a wide meaning to the term. It is likely, therefore, that it includes an activity such as the growing of trees. Whilst the Act reinforces the importance of being able to balance the amenity, health, and other intrinsic bio-diversity values of trees against the risk posed by a tree, it is doubtful whether it will materially alter the approach of the courts to claims arising from falling trees. The Act only applies to civil claims and not to criminal prosecutions.

The criminal law

The Health and Safety at Work Act 1974 (section 3(1)) places a duty on employers to ensure, so far as is reasonably practicable, that in the course of conducting their undertaking, members of the public and employees are not put at risk (see also s. 3(2) in respect of self-employed persons). The acts of felling or lopping a tree clearly fall within the scope of this duty. It is also likely that the growing and management of trees on land falls within the scope of the duty if such operations fall within the employer's undertaking.

The duty is subject to the words 'so far as is reasonably practicable'. This proviso requires an employer to address the practical and proportionate precautions which can be taken to reduce a risk. Hitherto the courts have been unwilling to take into

account environmental or aesthetic values when considering whether a step is reasonably practicable, confining the consideration to whether a precautionary step can "practically" be undertaken[20]. The HSE itself lends support to a cost / benefit approach. However, it is doubtful whether the courts will follow such a path given the specific wording of the Act. The emphasis remains on the balance of risk and the reasonable practicability of precautionary measures.

The Management of Health and Safety at Work Regulations 1999 requires employers, and self-employed persons, by regulation 3 to “make a suitable and sufficient assessment of the risks to the health and safety of persons not in his employment arising out of or in connection with the conduct by him of his undertaking”. This requires an employer, and a self-employed person, to undertake a risk assessment of the tree stock on the land which forms part of the undertaking.

Breach of the duty under the Act, or the regulations derived from the Act, can give rise to a criminal prosecution against the employer. Enforcement of the Act is vested in the Health and Safety Executive and, in some instances, local authorities. The HSE has provided guidance in connection with the inspection of trees in the Sector Information Minutes (SIM) *Management of Risks from Falling Trees* (HSE, 2007)[21].

The responsibilities under criminal law primarily arise in respect of employers, self-employed persons and those who control a business undertaking. However, responsibilities under criminal law can also, in exceptional circumstances, arise in respect of manslaughter by corporate undertakings or individuals leading to a police investigation and possible prosecution (see the Work Related Death Protocol 2003). There has been no prosecution for manslaughter in respect of falling trees.

The role of this guidance

This guidance, supported by a wide range of stakeholders involved in the ownership and management of trees, seeks to provide guidance for the inspection and maintenance of trees which is reasonable and proportionate to the low risk posed by trees, to the benefits of trees, and to the health and safety obligations of those who are responsible for trees. As such it is a valuable document which a court may consider in any future case involving personal injury caused by a falling tree or bough. Reported judgments already demonstrate that courts will consider publications of this nature when addressing the duty of care.

It must, however, be appreciated that guidance such as this document will not in itself determine a court's judgment in an individual case. First, all cases are sensitive to their own facts. Second, a court will always reserve to itself the decision as to whether a tree owner has acted as "a reasonable and prudent landowner". This guidance can, however, inform the court in the making of that decision.

Chapter 6

REASONABLE, BALANCED TREE SAFETY MANAGEMENT

Introduction

How this guidance relates to other documents

There are many documents offering guidance for managing trees in the context of public safety. These tend to be aimed at professionals such as those involved in general tree surveying[1], and to cover specific issues connected with tree hazard assessment and management[2] and tree-related risk[3]. Some national and specialist organisations have also produced guidance including for forestry[4] and nature conservation[5,6] and for health and safety regulators[7]. There is also policy guidance for wider sector interests in trees, including for parks[8], green spaces[9] and access to the countryside[10].

While tree safety inspection and management may be but a small aspect of an organisation's wider remit, its guidance may have implications for tree management. For example, tree inspection is naturally encompassed within the guidance for highway inspectors as part of their overall responsibility for public safety[11]. And although guidance devised for the play sector[12] does not refer specifically to trees, it may nonetheless be highly relevant to the formulation of play safety policies.

These examples, though by no means exhaustive, demonstrate the scope of advice and guidance already brought to bear on tree safety management. Because the range of advice is not necessarily proportionate to the risk and does not necessarily take account of the benefits that trees provide, the NTSG has drafted this stakeholder-supported document, based on wide consultation, to provide an integrated approach to reasonable tree safety management.

Extremely low risk of harm

HSE guidance on the standard of tree risk management and the DARM research commissioned by the NTSG on behalf of landowners confirm in Chapter 4 that the real risk of serious harm from trees in the UK is 'extremely low'[13]. Indeed the levels of risk are so low that they are "comparable to those that people regard as insignificant or trivial in their daily lives", near the bottom of the spectrum of what the HSE considers as acceptable risk:

"Risks falling into this region are generally regarded as insignificant and adequately controlled. We, as regulators, would not usually require further action to reduce risks unless reasonably practicable measures are available. The levels of risk characterising this region are comparable to those that people regard as insignificant or trivial in their daily lives. They are typical of the risk from activities that are inherently not very hazardous or from hazardous activities that can be, and are, readily controlled to produce very low risks." [14]

Legal requirements

The law requires only that people should 'take reasonable care to avoid acts or omissions which cause a reasonably foreseeable risk of injury to persons or property'[15]. What does this mean in practice? Chapter 5 outlines the legal background surrounding tree owners' responsibility for the safety of their trees. The generally agreed standard to be achieved is that of a 'reasonable and prudent landowner'.

Responsible management

Landowners who already sensibly manage their trees can be reasonably confident that there is no need for any radical rethink driven by a fear of the law, though they may find this guidance useful when reviewing management practice. Responsible management should seldom result in large-scale tree removal. No tree can be guaranteed to be safe. As long as we retain trees, we cannot achieve a zero risk. Moreover, a disproportionate response to the actual risks posed by trees leads to excessive intervention, particularly alongside roads and public places. Disproportionately responding to risk itself runs the risk of diminishing the landscape and depriving the wider community of the enjoyment of trees and their benefits.

Essentials of a reasonable, balanced approach

The number of trees for which owners are responsible varies enormously, as do the means available for their management. This guidance offers a framework for tree owners to reasonably manage their trees against the background of the reasons why the trees are important. Such a framework allows the owner to establish a proportionate approach to practical tree management for the reasonable safety of visitors and passers-by. The approach is based on achieving a balance between, on the one hand, the benefits trees provide to the environment and to people, and, on the other hand, risks posed to public safety. This is a non-defensive approach involving a proportionate response to risk. It is defendable in law and does not require excessive risk management or undue intervention.

Low risks and common sense

Overall, the way trees are managed in the UK's towns, cities and countryside contributes to the acknowledged low risk of anyone dying or being injured by a fallen or falling tree or branch. The normal practices that have prevailed over the past decades have, in large measure, been reasonable and proportionate. This is not all down to expertise and experts, but reflects people's common-sense knowledge acquired over the ages about natural things and awareness of the threats they pose.

Defendable practice

A key objective for most owners and managers is to maintain a defendable position at the least possible cost while avoiding undesirable loss of valued trees. Defendable management is consistent with a duty of care based on reasonable care, reasonable prediction and reasonable practicability. Landowners and managers who know how important their trees are tend to take an interest in them: including their setting and how people use their land, the benefits that trees bring and their structural features. It is reasonable that decisions regarding tree safety are considered against a background of the general low risk from falling trees. Being reasonable involves taking actions proportionate to the risk. This inevitably involves a judgment for owners, duty holders and advisers. Reasonable tree management has both reactive and proactive elements. While the owner or manager may need to react to events involving dangerous trees as they arise, it is also prudent to have forward-looking procedures to keep tree-related risks at an acceptable level. Such procedures do not need to be complicated.

Hazard, risk and obvious defects

What is a hazard?

Simply put, a hazard is a situation or condition with the potential to cause harm. With regard to trees this means that any part of the tree – its trunk, branches or crown – that might structurally fail, collapse and fall onto and cause harm to someone or onto property is a hazard. As all trees have this potential they and their components are hazards.

Risk is the likelihood or probability of harm from a particular hazard

Although all trees are potentially hazardous, the level of risk is relative to the number of people and the presence of valuable property that could be harmed or damaged in the event of root, branch or trunk failure[16]. The extent of risk is therefore both relative to the number of people within the falling distance of the tree and the degree of harm that could be caused should the tree structurally fail. The area where trees grow can be characterised according to the level of pedestrian, vehicle or other use – and 'zoned' in terms of their level of usage. Therefore, if the tree were to collapse and no one was within reach of it, then there would be no risk. So, a large tree presents a negligible risk regardless of whether or not it is hazardous, if it is growing in an area where few people go.

What is a defect?

The term 'defect' can be misleading, as the significance of structural deformities in trees (variations from a perceived norm) can be extremely variable. Indeed, deformities can be a response to internal hollowing or decay, compensating for loss of wood strength and providing mechanical advantage, allowing the tree to adapt to wind and gravitational forces. With inadequate understanding, so-called *defects* may be erroneously confused with *hazards* and, furthermore, hazards with *risk* – so unless the risk of harm arising from a hazard is properly taken account of, management can be seriously misinformed, potentially leading to costly tree intervention.

What is an 'obvious defect'?

The courts and specialist literature often apply the term 'obvious' when referring to tree defects that an owner or adviser should be aware of. Obvious defects are likely to be so apparent that most people whether specialist or not, would recognise them. While obvious defects may include external indications of potential structural failure, they will take many forms, not all of which are significant hazards. Defects only pose risks where there is a likelihood of harm. An obvious risk defect might be a large tree that is clearly breaking up over a well-used road. A person doing a safety inspection is on the lookout for obvious defects posing a serious and present risk, particularly where the danger is imminent.

Key steps in tree safety management

The essentials

A reasonable and balanced approach forms the basis of a policy for sensible tree safety management. By a 'policy' we mean a plan that guides management decisions and practice, in a reasonable and cost-effective way, typically covering four essential aspects:

- Zoning: appreciating tree stock in relation to people or property
- Tree inspection: assessing obvious risky tree defects
- Managing risk at an acceptable level: identifying and prioritising safety work according to level of risk
- Managing risk at an acceptable level: carrying out essential works.

A policy may not necessarily be supported by records. It may be self-evident through general prudent practice and behaviour. Alternatively, a policy may be explicitly formulated and expressed through documents relating to management practice. If reasonably carried out, the policy should meet the duty of care required by law, without the need for a bureaucratic approach or excessive paper work. In the event of an accident, documents may provide supporting evidence.

Keeping records

Records, including maps, provide the basis for safety management reviews and, in the extremely rare event of an accident, can be important proof of reasonable tree management. It is not necessary to record every tree inspected; however, records of trees posing a serious risk and requiring treatment are useful, as is a record of how they have been treated. When inspections are carried out, records can demonstrate that the owner or manager has met a key component of their duty of care. Other useful ways of demonstrating reasonable assessment and management of trees include recording recommendations for work and when tree work has been carried out.

Zoning

Zoning is a practice whereby landowners and managers define areas of land according to levels of use. This practice prioritises the most used areas, and by doing so contributes to a cost-effective approach to tree inspection, focussing resources where most effective. Zoning contributes to sensible risk management and a defendable position in the event of an accident. It may be reasonable to decide that no areas require inspection. Classifying levels of use in this way only requires a broad assessment of levels of use. Generally a minimum of two zones, high and low use, may be sufficient. High use zones are areas used by many people every day, such as busy roads, railways and other well-used routes, car parks and children's playgrounds. While owners and managers may think it appropriate to use a more sophisticated approach, designating three or more zones, in the event of an

accident whichever system is adopted may require justification according to the standard set.

What to consider and who should do the work

As a first step in tree safety management, the trees' location is key to understanding what risks, if any, may be associated with them. The assessment should consider all the trees on the property and determine which are in areas of high public access, or could fall onto areas of public use or onto property that could be damaged. Normally, the best person to do an initial assessment is someone familiar with the land, how it is used and what trees are present. Typically this could be the landowner, occupier or land manager.

Trees within falling distance of roads, railways etc.

Amongst the relatively few accidents from falling trees, the greatest risk to public safety is normally from trees within falling distance of where people move at speed in vehicles. However, even trees in well-used areas pose an overall level of risk to public safety that is extremely low. On average over the past decade, four people a year have died from roadside trees falling onto vehicles or from collisions with fallen trees, mainly because:

- risk of harm from falling trees is related to the force of impact
- the likelihood and extent of harm is influenced by speed at which vehicles may impact
- risks are *higher* when vehicles are travelling at speed in high winds.

It is both the high usage of roads and the speed at which people travel along them that makes this the most likely way that people will be killed by trees[5].

Not all trees alongside all roads pose a significant risk

Not all roads are busy roads and not all roadside trees are large enough to kill or injure if they fall. It is nonetheless reasonable that certain roadside trees, particularly those alongside busy public roads, should be inspected. This also applies to trees alongside railways, where the train speed and number of people who could be affected in one incident increases the level of risk.

Rural footpaths do not normally need inspecting

Severe weather normally deters people from using rural footpaths. Pedestrians walk at low speeds and are likely to be reasonably aware of their surroundings as they do so, seeing and/or hearing signs of actual tree failure and therefore being more likely to get out of the way of a falling tree. Therefore, it is reasonable that trees along most footpaths have low associated risks and do not require special tree inspection.

Trees in other well-used areas need inspecting

It is reasonable to inspect trees in falling distance of other well-used areas, such as car parks, gardens open to the public or urban public spaces. Zoning according to the levels of public use helps to decide which areas pose higher risks than others

and how to reasonably allocate tree inspection resources. Inspection will vary according to the circumstances of the site and the owner's policy, influenced by levels of use and the importance of their trees. Even in well used areas, inspecting and recording each tree is not considered reasonable (see types of inspection). Trees with structural faults, but valued for their habitat or amenity interests, that are retained in frequently used areas may require specific assessment and management. On the other hand, trees in well used natural woodland or rough woodland surrounding housing or a public park may only warrant an informal or non-onerous prioritised system of assessment to identify trees warranting closer assessment.

Trees in infrequently used areas

The risk of death or serious injury from trees in infrequently used areas is so low that it is reasonable that these should receive no or only informal inspection. Owners may need to respond to any reports of problems.

Tree inspection

Insert flow chart 1

The next step, following zoning according to levels of public use, is to identify which trees require assessment. This is carried out on site simply by no more than walking or driving around the areas with trees (see Formal Inspections section below). The selection of a tree for closer inspection is influenced by its size, condition and the level of use within its falling distance. A sensible judgment is required so that the landowner does not waste resources. For example, groups of young trees near well-used areas may be generally considered to pose low risk and not warrant further inspection.

The term inspection covers a whole range of activities, from a superficial quick, visual 'check' to a detailed, device-assisted inspection. Inspections are carried out by non-specialists through to specialists trained to different levels of competence and experience. While technology can assist in inspecting important trees under exceptional circumstances, normal, day-to-day observation is the most useful source of information and provides the principal basis of tree assessment. The interested, non-expert, caring tree owner or observant passer-by plays a tremendously important part in maintaining the acknowledged low level of threat posed by trees in the UK. The level of resources allocated to tree inspection is influenced by the number and quality of trees and the type and level of surrounding use. There are three main types of tree inspection, informal, formal and detailed inspection, as outlined below.

Informal inspections

The contribution of informal inspection to sensible maintenance of reasonable safety should not be underrated. People with a commonsense connection with their environment and familiarity with local trees and their surroundings are generally aware of dangerous situations. In an informal inspection, owners or managers do

not go out of their way to assess the trees, but notice their health and condition as they pass by, identifying structural weakness or actual failure that pose an imminent threat to public safety and that would be patently apparent to a non-expert. Reports by staff or members of the public of any problems are an integral part of informal inspections and can be acted upon. Whilst it is not necessary to record these reports and actions, keeping records may help the management process. This process forms the basis of background information and evidence in the very unlikely event of an incident.

Formal inspections

In a formal inspection, someone visits the tree with the specific purpose of performing an inspection, which is not incidental to other activities. The spectrum of formal inspection ranges from survey work for tree inventories, to health and condition assessments. These may be carried out through 'drive-by' and 'walk-over' inspections, ground-based visual checks, aerial assessment or device-based investigation. Drive-by and walk-over inspections are accepted types of reasonable risk assessment depending on the circumstances. Drive-by inspections are a reasonably practicable means of tree safety assessment for tree-lined roads and other high use areas with vehicle access. Drive-by inspections can assist in deciding where tree management, walk-over or detailed inspection might be appropriate. Walk-over inspections may not identify hidden features, such as fungal fruiting bodies tucked in the roots of the tree. Simple formal inspection through ground level visual checks in the course of walk-over surveys provides a useful, cost effective means of identifying clear and present signs of imminent instability. This is an important means of identifying when pressing action is needed, including further specialist inspection.

Detailed inspections

The need for detailed inspection typically only applies to individual, high value trees giving high priority concern in well-used zones. Given that most trees pose an extremely low risk, it is unreasonable to expect that every tree in a given area should receive a detailed inspection; to do so would be grossly disproportionate to the benefit gained in risk reduction. Detailed inspections are therefore unusual, typically reserved for trees valued for their heritage, amenity or habitat and which are suspected of posing a high level of risk, as already identified through owner interest or a previous formal or informal assessment. The detailed inspection will normally be prioritised according to the level of safety concern, and will usually entail an initial ground-level, visual assessment by a competent specialist looking at the exterior of the tree for signs of structural failure. In a few special cases, further detailed investigations may be required, involving soil and root condition assessments, aerial inspections of upper trunk and crown, or other procedures to evaluate the nature of suspected decay and defects, including using specialist diagnostic tools.

Who can do tree inspections

Insert diagram 2

Who can do an informal inspection

People with a common-sense connection with their environment and local familiarity with trees are suited to carrying out informal inspections. Typically this does not require a specialist with knowledge of trees, but rather those closely associated with a property, such as the owner, gardener, other staff or agent, who understand the way the property is used (areas most and least frequented) and the extent of the danger, should a tree be found that is unstable. However reports of problems by staff or members of the public are also an integral part of informal inspections and can be acted upon.

Who can do a formal inspection

Formal inspections do not necessarily require specific qualifications but do require general tree knowledge and the ability to recognise normal and anomalous appearance and growth for the locality. Inspectors need the capacity to assess approximate tree height and falling distance from the tree to the area of use. They also need an ability to recognise obviously visible signs of serious ill health or likely short-term significant structural problems, such as substantial fractured branches or a rocking root plate which, were they to cause tree failure, could result in serious harm.

Who can do a detailed inspection

Detailed inspections require an appropriately competent person, experienced in the field of investigation that is to be carried out. For example, if the rooting environment is identified to be a likely problem the inspector might be required to demonstrate competence in soil assessment; similarly with a tree inspector concerned with structural stability and their ability to demonstrate sound arboricultural competence and experience and knowledge in tree risk management, as with biodiversity etc. Whoever is commissioning the detailed inspection should satisfy themselves as to the suitability of the inspector's qualifications and experience. Professional bodies who can offer guidance are listed in the contacts section at the end of this document. A specialist involved in conducting a detailed tree inspection should be able to demonstrate the reasonable basis for allocating risks according to priority, and identify cost-effective ways of managing those tree related risks.

Risk acceptability, prioritising treatment and inspection frequency

Imminent and non-imminent risks

When inspecting trees for public safety, the inspection primarily looks for external features indicating mechanical (structural) defects that pose a significant risk to

public safety, concentrating on risks that are either *imminent* or reasonably foreseeable *in the near future*. The inspection will not normally identify trees that fall outside these categories for action. Inspections that look beyond these categories will normally assess qualities other than structural defects, eg. habitat features.

Imminent risk to public safety

Imminent risk of serious harm is a risk of such immediacy and consequence that urgent action is required irrespective of the consideration of time, effort or money. In most cases imminent risks are likely to be clearly observable in the course of informal or formal inspection and must be dealt with immediately; whether by means of tree work, eg. felling or through site management. For example, where a large tree is found with an obviously lifting root plate or actively separating heavy branch within falling distance of a busy road, this may involve stopping / diverting traffic or felling, crown weight reduction or branch removal. Most imminent risks have a reasonable likelihood of being identified by non-specialists and specialists.

Non-imminent risks posed by trees to public safety in the near future

Risk of serious harm in the near future is non-imminent and can be reasonably managed at an acceptable level by a planned cost-effective response. Action will be needed when inspections identify trees posing risks in the near future. Once identified, the response may involve prioritised treatment of the tree or site to manage the risk within the near future at an acceptable level, or further specialist assessment to clarify the measure of risk and treatment.

Risks not requiring a response in the near future

Where trees are identified as not posing a risk in the near future, there is no specific requirement for additional management. Existing informal and/or formal inspection procedures should be sufficient.

Special trees

Informal and formal inspections both have a reasonable likelihood of identifying trees posing a risk of serious harm in the near future. Important trees that owners want to retain, eg. for heritage, habitat or visual amenity, but which may pose a significant risk, are likely to require specialist detailed inspection to manage them without serious loss of quality.

Frequency of inspection

Informal tree inspections contribute significantly to public safety, being important for deciding when action is needed and when more formal assessment is appropriate. Guidance relating to inspection frequency varies greatly; there is no uniformly accepted frequency appropriate to all situations. The decision is a judgment for the owner, agent or adviser applying sensible reasonable behaviour in taking account of the site circumstances as a basis for good practice. Examples are given in Chapter 7 in connection with several types of land holding and circumstances.

General tree features to look out for when inspecting trees

General note for tree inspectors

Safety inspection needs to consider features that might affect the structure and their significance as hazards. The inspector is looking for features that indicate serious, significant decline in tree health, or structural weakness. Inspectors need to act within their level of competence and be careful in their judgment not to draw the wrong conclusions.

Obvious features indicating imminent serious structural failure

Such features are surprisingly few, and include:

- Actively lifting root plate
- Heavy limb actively splitting or breaking away from the tree
- Stem fractured, moving and opening enough to 'pinch'.

Obvious features that may indicate structural failure

It is inappropriate to react to tree defects as though they are all imminently hazardous. Growth deformities and other defects do not necessarily indicate structural weakness. When noting features that might indicate a likelihood of weakness or collapse, it is important that concern for risk of failure is restricted to events likely in the near future. There is a wide range of tree features and the scope for interpreting their significance is complex, particularly when considering the likelihood of non-imminent failure. For example, anomalies in tree growth may indicate internal decay and hollowing; but anomalies in form may be attributable to the tree having compensated for the decay, by mechanically adapting to natural processes.

Features that may indicate possible structural failure include:

- Cracks and splits in main stem or heavy branches
- Decay across large cross-sectional area of trunk or large branch
- Broken or hanging heavy branches
- Weak forks with bark trapped between heavy stems
- Dead trees
- Disease

- Decline in health eg. small or discoloured leaves, die-back of branches
- Damage from construction and development
- Fungal fruiting bodies
- Significant amounts or sizes of deadwood.

Interpreting tree features

The following features persist for many years in a vast number of standing trees. In some cases they may indicate a tendency to failure. When noting such features, careful judgment and relevant knowledge is important in assessing their significance:

- Tight forks with bark trapped between the two stems with incipient cracks and splits; while this can indicate a structural weakness, a high proportion of such trees remain intact throughout their lives;
- Old wounds with decay and trunk hollowing may indicate impaired strength; trees often accommodate these with continued growth;
- Decay across a large cross-sectional area, resulting in the circumference of the trunk or large branch being breached, may warrant investigation; often such circumstances are manageable and do not require urgent treatment;
- Heavy broken branches and dead trees; dead trees may in some cases be cost-effectively reduced and retained as a habitat feature, even where close to high use areas. Treatment of broken branches should be prioritised according the level of risk;
- Dead wood and fungal fruiting bodies; inspectors automatically interpreting these features as hazards tend to be overreacting. As with other external signs of possible structural weakness, these features are often diagnosed as more risky than they actually are. Both need to be competently assessed, in order to avoid unnecessary and costly intervention.

Management

General management

Management options are guided by the overall aims defined in a site's policy. In general, choosing which measures to use to keep the level of risk as low as reasonably practicable while conserving the tree, involves weighing up the costs and benefits involved. Trees bestow a wide range of benefits (see Chapter 2) and these should be considered along with the risks the tree may pose. One cost-effective way to reduce the risk without the costs involved in tree maintenance is to manage how the area within the tree's falling distance is used.

Managing the area within falling distance of trees

Where important trees are found to have significant risks, the availability of resources will influence investment in tree conservation. When a tree risk assessment has identified a situation requiring action, there are ways to separate or direct people and cars etc. away from the area onto which the tree may fall. This manages the risk without directly interfering with the tree, saving investment in tree surgery that might otherwise reduce habitat, landscape or other tree values, for instance by moving a bench from beneath the tree.

Reducing risks by managing access

Where there is a significantly heightened level of use in the area within falling distance of the tree, it may only be necessary to keep people away for a limited time in particular circumstances. Where special events, at various times of the year, greatly increase the number of people in the area within falling distance, appropriate tree safety management options should be considered. A large number of people on a site in very wet conditions can compact soil and harm tree roots. Though the effects of root damage can be slow to develop, they increase risks of future tree failure.

Balancing risk with benefits

Outdoor activity increases in fine weather, with people remaining longer in certain areas. In summer, it can be easy to reduce risk from falling branches by the simple practice of not mowing under the trees' drip-line. However, within the play sector there is a strong recognition that it is important for children to get 'back to nature', including trees. Decisions need therefore to balance benefits with risks when considering segregation of trees and people.

Ways to reduce risks in well-used areas include:

- Deterring informal parking beneath trees; damage to roots may not be apparent for many years and increases risk of failure;
- Re-locating facilities such as play equipment, seats, picnic tables, barbecues, information boards, commemorative plaques, hides, fishing platforms, horse jumps, feeding centres etc.;
- Re-routing paths and tracks;
- Redesigning mown paths in areas of long grass, a proven method of directing people from high-risk zones;
- Placing structures and assembly points beyond the falling range of trees.

Simple means of reducing risk by deterring access include:

- Placing horizontal logs or deadwood
- Planting or allowing brambles and thorny shrubs to grow
- Letting grass grow
- Leaving brushwood around the tree
- Temporary exclusion in inclement weather conditions
- Using signs to warn of risks
- Changing the area's use eg. to hay meadow and for grazing.

Managing the trees for habitat and amenity value

When all the options for managing the area within falling distance of the tree have been explored or where public exclusion from the area is neither desirable nor practical, remedial tree work will be necessary. It is advisable to undertake the minimum work necessary to reduce risk to an acceptable level and management options should be discussed with the person carrying out the work. Where biodiversity and habitat have high value, a range of treatment options may be appropriate to retain maximum habitat balanced with the need for adequate safety. With high value trees, felling will be a last resort after taking into consideration all other options. Even when felling is specified, upright dead trees can often be retained for habitat value as 'monoliths'. Felled trees and trunks may also be left on the ground to provide important deadwood habitat.

Insurance

As stated previously, it is impossible to eliminate all risk. Even if all the advice and guidance contained in this document is followed, there will always be a risk. Violent storms and unpredictable events can result in tree failures leading to harm. Insurance provides for such eventualities, as it does in other spheres of life. Owners are advised to have insurance appropriate to their circumstances and to ensure that anyone who advises them, or does work to trees, is also appropriately and adequately insured.

Chapter 7

EXAMPLES OF HOW TO APPLY THIS GUIDANCE

This chapter contains some scenarios detailing suggestions of how to carry out the safety component of a management plan in a reasonable and proportionate way. These are not exhaustive and do not cover specific circumstances, but they should be sufficient for most organisations to find their application.

They are:

1. Householder
2. Farm / private estate
3. Business
4. Local authority – rural
5. Local authority – city council
6. Large private estate
7. Large private historic house and estate open to the public

Example 1: Householder

General description	
Mrs Jones owns a detached home on the outskirts of town. It sits in 0.2 hectares of garden, in which grow several trees and shrubs. Some are on or near the boundary. Two trees in the front garden overhang the council-owned pavement and quiet, residential road.	
Ownership / control of management	
Responsibility	As the owner of the land Mrs Jones has responsibility and a duty of care.
Arboricultural competence	Mrs Jones is a keen gardener but has no specific arboricultural knowledge and therefore is regarded as 'a lay person'.
Holding	
Land area	0.2 hectares
Number of trees	Seven trees, including a mature walnut and two large apple trees.
Access	
Private access: There is no public right of way over the land. Two trees overhang the council road and several smaller shrubs grow next to a little-used footpath to one side of the garden.	

The benefits of trees
Mrs Jones enjoys her garden and the trees in it. As well as providing colour, shade and ornamental interest, they give her some privacy from the road and neighbouring properties. She enjoys harvesting the fruit and nuts and also appreciates the wildlife they attract. She also understands the contribution that her trees make to the wider environment, in terms of the 'pleasant leafy neighbourhood' and how this increases the value of her property.
Natural living organisms
Mrs Jones knows that if the two trees overhanging the road were to fall or lose a limb, passers-by and road users could be affected. The road is regularly used by local, residential traffic; occasionally people walk by on the pavement throughout the day. As far as safety is concerned, she classifies these two trees as the most important in her garden, but not of high risk. The shrubs at the side of the garden are not seen as important, in terms of risk to the footpath users, although she recognises that she has an obligation to keep their growth under control. The remaining trees are considered to be of low importance.

Reasonable, balanced tree safety management	
Management	Mrs Jones checks her trees as part of her general care for her house and garden. If she detects anything unusual about them, she calls a local tree surgeon, who can tell if she needs to get remedial work done. There is no regular frequency to this process.
Competence	Because she has no specific arboricultural knowledge herself, Mrs Jones uses a recommended tree surgeon she feels comfortable with for such advice and for any work required.
Records	Mrs Jones does not keep any formal record of her ad hoc observations, but does keep records of correspondence and invoices for any advice or work carried out.
Reasonableness	Mrs Jones doesn't normally worry about her trees but is occasionally concerned that in strong winds a tree could fall onto a nearby building. She has given this thought and within the range of costs she has for her property as a whole she considers her expenditure on her trees to strike a reasonable balance, maintaining them in good health while meeting a duty of care to others. She feels relaxed that she has a 'policy' for the trees that does not cost a great deal while addressing the normal issues about which she might be concerned in the course of the year.

Example 2: Farm / private estate

General description	
Mr Nicholson owns a mixed arable and livestock farm, with farmhouse and farm buildings, barns and yards. The land is made up of pasture and arable fields, some steep wooded ground, two small areas of managed woodland shelterbelts, plus many individual hedgerow trees, some of which are next to public paths and highways. He employs a farm manager, one other permanent worker on the land and sub-contracts work at busy times.	
Ownership / control of management	
Responsibility	Mr Nicholson is the owner of the farm and therefore has overall responsibility for managing its affairs. His farm manager, Chris, reports to him and has day-to-day responsibility for organising the activities of staff and sub-contractors. Chris is also responsible for ensuring the health and safety of employees and visitors, including members of the public who may be affected by any aspect of the farm's activities ('those affected by his undertaking').
Arboricultural competence	Both Mr Nicholson and Chris are experienced in a wide range of agricultural activities, and Chris holds a certificate of competence to use a chainsaw. As such, he and Mr Nicholson both have a basic understanding of tree identification and can recognise most obvious signs and symptoms of tree features that might indicate structural weakness.
Holding	
Land area	250 hectares
Number of trees	Approximately 7,000
Access	
Although the farm is not formally open to the public, a minor B road runs across the land, which is also bordered for half a mile by a busy A road. A well-used public footpath crosses four fields on the farm. The tree-lined access driveway from the main public road to the farm buildings is frequently used by Mr Nicholson and his family, the farm's employees and regular business visitors.	

Benefits of trees
Mr Nicholson takes his responsibility as a 'guardian of the countryside' seriously. He recognises the many benefits of having trees on his land, including the sustainable supply of firewood for his household, ad hoc supply of timber for fencing and other minor construction works, as well as shelter for livestock and reduction of wind and water erosion. The trees along the busy main road reduce the amount of noise from traffic, and those along the driveway provide an

attractive, shaded approach to his home. He is also aware that the trees enhance the capital value of his farm.

Natural living organisms

Mr Nicholson has lived on the farm all his life and has witnessed the growth and decay of trees here and elsewhere. One of the veteran oaks in the pasture is completely hollow and he remembers playing in the tree as a child. He has seen mature trees suffering storm-damaged, broken branches and observed the subsequent re-growth without the need for any human intervention. Equally, he and Chris vividly remember discovering one of the avenue chestnuts that had fallen across the drive during a stormy night.

Reasonable, balanced tree safety management

Management	Mr Nicholson and Chris have used a map to divide the land into two types: areas where the trees should be formally inspected, and areas where an informal inspection will suffice. For the first formal inspection the trees alongside both the A road and the B road will be inspected. All other areas will be covered by the informal inspection regime. All farm staff are instructed to look out for any signs of tree problems anywhere on the farm, and report to Chris. Chris has made clear he wants to know immediately of any serious, obvious problems such as a tree that has become unstable. Chris undertakes the first formal inspection of the trees alongside the two roads. He finds one tree where the root plate is lifting and another where a large branch has badly split. He arranges for the first to be felled immediately and for the second to have the branch removed immediately. He finds three other trees that he has serious concerns about but which he would like to keep, so he arranges for a qualified arboriculturist to have a look at them to advise as to what, if any, work is required to prevent imminent risk of collapse. Having carried out this initial inspection and completed the remedial work required, unless there is a change in circumstances the trees in these areas will be subject to the same informal inspection regime as the other trees on the farm until the situation is re-assessed in five years time.
Competence	The farm staff's general working knowledge is considered adequate for identifying any areas for concern. However if any trees are identified that Chris is worried about but is uncertain about how best to deal with, he calls in a local tree specialist.

Records	The results of Chris's formal inspection of the roadside areas are kept in a file in the farm office along with the results of the arboriculturist survey and a note of the remedial work carried out. As part of the informal survey regime, Chris keeps a note of any trees reported to him by the public or other farm staff and records his response to those reports in the file in the farm office.
Reasonableness	These records are considered important in that, in the unusual circumstance where he might have to show a reasonable system exists, he can demonstrate 'the conduct to be expected from a reasonable and prudent landowner'.

Example 3: Business

General description	
Mrs Freeman owns and manages The Grange Hotel, a large Georgian building set back from a busy main road in well-manicured grounds with many mature and specimen trees. The hotel has 30 bedrooms and two function rooms, plus a popular restaurant and bar. Residents and other visitors are encouraged to enjoy the walkways and lawns in the gardens. The driveway from the road leads past the hotel main entrance to a large, tree-lined car park at the rear.	
Ownership / control of management	
Responsibility	As the hotel owner Mrs Freeman has overall responsibility for managing the hotel's affairs. She employs five full-time hotel staff, including a deputy manager, two duty managers and chef plus additional part-time kitchen, waitress and service staff. There is also a full-time head gardener and his part-time assistant. As far as the trees are concerned, she relies on the head gardener's advice but recognises that she carries ultimate legal responsibility.
Arboricultural competence	Mrs Freeman herself is not a great tree lover and is not knowledgeable in arboricultural matters. She would be regarded as a 'lay person'. Bill, the head gardener, on the other hand, cares very much about the trees and all the horticultural works for which he has responsibility. However, despite his considerable experience, he has no formal qualifications.
Holding	
Land area	5 hectares
Number of trees	Approximately 700
Access	
The public has full access to all the grounds. At the front of the hotel, there are about 30 mature trees alongside the main road, a busy thoroughfare with both vehicular and pedestrian traffic. There is regular traffic on the driveway and in the car park.	

Benefits of trees
Although not particularly keen on trees herself, Mrs Freeman is an astute businesswoman and is well aware that fine trees and her well-kept gardens add considerably to the enjoyment of visitors and the appeal of her establishment. Her customers frequently compliment her on the fine, and in some cases rare, tree species, highlighted by the immaculately tended lawns and flower beds. She

understands that these benefits and value are balanced against the risk-reduction costs associated with maintaining the safety and health of her tree stock.	
Natural living organisms	
Bill is constantly in the garden, so he will soon notice if a tree has changed in appearance and become unsafe. He can also observe them through the seasons, allowing different views. When trees have lost their leaves in winter, he can observe the structural framework of trunk and branches more readily, while in spring and summer he can judge vigour and health. There are certain fungi that will only fruit for a limited period in the autumn, which would not necessarily be spotted by an annual inspection regime.	
Reasonable, balanced tree safety management	
Management	While the trees along the roadside are in an arguably higher usage area than the others on the site, Mrs Freeman and Bill have agreed that a formal, five-yearly inspection regime should cover all the trees on the property. Bill's initial inspection of all of the trees revealed six that caused him some concern and one in particular that he identified as potentially dangerous, and he was uncertain about the best way to proceed. Bill called in a qualified arboriculturist who advised him that this one tree should be felled immediately; another should have a branch removed. The rest needed no work at the moment although the arboriculturist said it may be prudent to remove the public seating from under two of them and either allow the grass to grow up or plant flower beds under them. In the course of his other duties, Bill also keeps a general eye on the trees each day and would notice any significant change to their condition. Mrs Freeman is satisfied that Bill is sufficiently knowledgeable about the grounds, their use and the trees to identify obviously hazardous changes in trees, such as broken, hanging branches or partially uprooted trees following a storm. However, she engages an arboricultural contractor to inspect any trees that Bill is concerned about. The contractor provides a written report on these trees, detailing any remedial work required, prioritised according to his view of the level of concern for public safety.
Competence	While Bill has no formal qualifications, his experience and regular presence on site mean he is more than capable of identifying imminent hazards. Employing a fully competent and approved contractor, eg. by the Arboricultural Association, for those trees where Bill is not sure of his diagnosis, gives Mrs Freemen the confidence that a reasonable maintenance system is in place from the point of view of tree health and public safety.

Records	The five-yearly written survey is updated as necessary and kept on record along with invoices and correspondence records of any work carried out. Bill also keeps a note of his observations and comments as and when they arise as part of his normal record keeping in relation to the care of the gardens.
Reasonableness	While recommended works should be carried out within a specified time scale, sometimes for economic and other practical reasons all work may not be completed precisely on time. As higher priority trees having recommended works take precedence over lower priority trees, Mrs Freeman considers her policy and practice to provide a reasonable balance between the costs of risk control and benefits gained from risk reduction, while also maintaining large trees with other values, despite some being old with holes in branches and hollow trunks; features which she has been told are important for wildlife.

Example 4: Local authority – rural

General description	
Willingshire County Council serves 1.4 million people concentrated in large towns. However, more than 70% of its land area is rural, devoted to agriculture, divided among 250 parish councils containing numerous villages and hamlets. The county council employs a principal tree officer and six tree officers responsible for the sustainable and safe management of its trees.	
Ownership / control of management	
Responsibility	The county council has direct responsibility for trees: • On highway land, in seven district areas, for roads and rights of way • In 580 schools • In nine country parks • In 40 social service properties • In other numerous owned or managed parcels of land. The tree team provides an advisory and contract management service, working in partnership with 15 arboricultural contractors. A third of the land area is shrinkable clay soil. Each year people make insurance claims against the country council totalling about £750,000. The majority relate to subsidence allegedly caused by trees, with the others relating to 'slips and trips'. Many are spurious claims, and the final pay outs are a fraction of this amount.
Arboricultural competence	All seven tree officers, as well as the team manager, are qualified to a minimum of National Qualification Framework Level 3, equivalent to AA Technician's Certificate. Two tree officers are chartered members of the Institute of Chartered Foresters. They occasionally seek additional expertise and capacity from independent arboricultural consultants.
Holding	
Land area	35,000 hectares
Number of trees	Approximately 500,000
Access	
The vast majority of the county council's land is accessible, with a network of 7,500km of highway, 6,300km of footpaths, bridleways and byways, 600 hectares of accessible woodland, many open spaces and nine country parks. Much of the estate is in frequent use by the public.	

Benefits of trees	
The county council practises a tree management regime according to its sustainability, biodiversity and climate adaptation policies, recognising the wide and many benefits trees provide. Supported by an adopted tree strategy and policy statement, the council seeks to manage its diverse tree stock in a sustainable and safe manner, something most residents notice and appreciate.	
Natural living organisms	
The tree stock varies considerably in age and species, from newly-planted and self-sown saplings to trees over 500 years old. The council appreciates the importance of a wide age profile among its trees. It recognises that weather, development, construction and water table movements all subject trees to stresses and strains, physical and physiological damage, both above and below ground. The authority understands that despite these rigours, most trees respond, adapt and survive, by reactive growth and retrenchment, layering and natural regeneration. Part of the skill in managing the stock is to recognise these variables, carefully balancing the benefits of the trees with risks posed by them.	
Reasonable, balanced tree safety management	
Management	The authority's finite resources are allocated to ensure it reasonably meets its duty of care by demonstrating a defendable, pro-active tree management regime. Tree officers carry out a formal inspection of the trees in its schools every three years. The authority is considering moving towards the same regime for its highway trees over the next five years. Currently, highway trees are formally inspected each year, by highway inspectors who have received initial, basic tree survey training and who refer concerns onto the tree officers. Other land is categorised according to frequency of use and rated high, medium and low. Competent arboricultural staff survey high use areas every three years. They survey medium areas more reactively and informally, with the aim of every five years. They inspect the lowest category less intensively, with 'walk over' surveys following severe gales, or where tree failures are reported.
Competence	The seven tree officers carry out the pro-active survey work and respond to public enquiries, with each tree officer being responsible for a geographical area.
Records	The tree officers use a 'fit for purpose' GIS-based computer management system to inspect and audit its tree stock, capturing data electronically on site. This system also allows the

	tree officers to record the wider benefits of trees, assign them a monetary value, and to record hazard and risk assessment data.
Reasonableness	Surveys have shown that Willingshire's residents value trees and their open spaces. As a responsible local authority, Willingshire County Council is proud of its tree management strategy, which incorporated the views of a range of stakeholders, including residents as it was being drafted. This has ensured that the strategy has community support and ownership. The council is also committed to fulfilling its duty of care, ensuring its residents, visitors and staff live, work and play in a reasonably safe environment. Despite reduced public funds, the county council demonstrates its commitment by allocating resources to its specialist staff, its tree strategy and software management system.

Example 5: Local authority – city council

General description	
Woodstow City Council covers the city centre, the outlying suburbs and an area of rural responsibility in the Green Belt. The overall population is around 200,000. The city council employs one arboricultural manager, Mr Alan Moore and three tree officers. They proactively manage all street and park trees and respond to over 2,000 public queries a year. A separate council officer in the planning department deals with tree preservation orders and development issues.	
Ownership / control of management	
Responsibility	The local authority has responsibility for all municipal property and services within the city boundary, including trees. This includes: • Highways: 25,000 street trees • Parks: 120 different open spaces covering 345 hectares and one municipal golf course • Housing: 6,000 trees on council estates and individual gardens • Schools: 102 schools • One cemetery and seven closed churchyards. The council contracts out tree work to approved companies and Alan and his team manage a budget of more than £500,000 for all tree management and maintenance requirements including planting. The city is built on a shrinkable clay soil and tree officers spend much of their time dealing with subsidence issues.
Arboricultural competence	Alan and his team manage the city council's tree stock in relation to amenity, public, political and environmental interest, building-damage risk and public safety. They are all qualified in arboriculture and have different levels of experience. Details of all the public trees are held on a specialised database, as the authority's insurance department requires evidence of management.
Holding	
Land area	7250 hectares
Number of trees	Approximately 300,000
Access	
The city is accessible to all, including visitors. Many of the parks are Victorian in design and many city trees date from that time. In the suburbs there is an ageing tree stock of mostly plums and hawthorn, many with recognised defects.	
Benefits of trees	
The city is proud of its parks and the public interest in street trees is well	

documented. The council published a tree strategy outlining its approach to its different responsibilities. One aim is to increase street tree cover by 2% a year for ten years. Funding is in place to achieve this target. Because its tree strategy aims to proactively manage and maintain a healthy, sustainable tree population for public benefit, the council considers that its tree risk management policy is reasonable and cost-effective and is compatible with all its other tree-related policy objectives.

Natural living organisms

Under Alan's influence, staff throughout the city council's departments have become increasingly aware of the role Woodstow's tree stock plays in their overall environmental policy. This has led to the increased maintenance of dead wood, both in living and dead trees and managing tree safety issues in more innovative and responsible ways.

Reasonable, balanced tree safety management

Management	Due to the risk of subsidence in the area, street trees are inspected and managed on a three-year cycle. This obviously includes highlighting any trees found in a poor condition. Schools and parks are inspected every two years and housing trees every four. The areas described above are proactively managed throughout the year. Parks are inspected in the spring, so works can take place before the summer holidays and when the ground is firm. The proactive system can be complicated. For example, school trees are inspected during the summer holidays, but this depends on appointments made with caretakers. Similar complications arise from inspections in social housing gardens. The tree officers record all tree inspections and any emergency work carried out. If they remove a street tree, they assess the location for replanting to keep in line with the council's stated strategic increase in its tree stock. Storm clear-up is also managed sustainably with replanting paid for by emergency funding. Colleagues in the highways and housing departments and school caretakers assist by reporting dead trees or trees with fungi growing on them.
Competence	The tree officers carry out the main survey work. They look after all areas of public land in the city, with each officer responsible for a specific area.
Records	The tree officers keep records using the software system designed for the purpose.
Reasonableness	Woodstow City Council is committed to following its published tree strategy, which the council cabinet accepted as policy. Tree safety is only one element of managing trees, but Alan and his

	team are aware of the importance of having a proactive system. In recent years, a change in the way they manage trees in less formal parkland has seen an increase in 'monoliths' and standing dead timber and Alan has explained the research and rationale behind this. This has lead to an increase in biodiversity and has saved money. The tree officers' knowledge of the district and the tree stock has helped save countless trees under threat from subsidence claims and vociferous residents. The tree strategy explains unambiguously the council's attitude towards trees in the city. Whilst these systems are in place, there are still over 100 incidents of tree failure a year in the city, though these are usually the trees in the suburbs, mostly small ornamental trees which were all planted at the same time and are coming to the end of their lives.

Example 6: Large private estate

General description	
The Jolly Estate has been in the Henry family since 1850, the current owner, Sir William Henry, was brought up there and took over the running of the estate from his father ten years ago. The estate is predominantly arable but with some grass land and 600 hectares of woodland. The woods, park and gardens contain several important veteran trees. Approximately 2000 hectares are farmed in hand with the remainder tenanted; all the woodland and all the trees are retained and managed by the estate. The estate also retains the shooting rights over all of the land. The garden of the main house is open to the public during the summer and several events, a craft fair, a caravan rally and a summer concert are held in the park. The estate employs a farm manager, John and three farm staff, a head keeper and two under keepers, a woodman, a head gardener and an under gardener. An external forestry agent is employed to assist with the management of the woods. The estate is divided by several public roads notably the busy A47 which runs through it from north to south.	
Ownership / control of management	
Responsibility	As estate owner Sir William has overall responsibility for managing its affairs. His farm manager reports to him and has day-to-day responsibility for managing the in-hand farm. Lady Henry has a keen interest in the garden and the head gardener reports to her. Sir William has asked John to take on the day to day responsibility for the safety of trees on the estate.
Arboricultural competence	John the farm manager is experienced in a wide range of agricultural activities and the woodman, one of the gamekeepers and the gardeners have certificates to use a chainsaw. John, the woodman and the head gardener can identify the most common trees and can recognise the obvious signs that a tree may be hazardous. All the adults on the estate are believed to be capable of recognising when a tree poses an immediate risk and their involvement is an integral part of the tree safety management. The external forestry agent advises on most tree related issues and determines if tree safety work is required; if he feels the issue is beyond his level of competence he will recommend a suitably qualified arboriculturist.
Holding	
Land area	5000 hectares
Number of trees	Approximately 450,000

Access

The estate is divided by several public roads, notably the busy A47, which runs through it from north to south. The estate is criss-crossed by footpaths, some of which run alongside or through, the woodland. The garden is open to the public during the summer months and the park is used for three public events.

Benefits of trees

Sir William has known the estate all his life, has lived there for much of it and values his trees and woodlands. The trees and woods are important to him, they enhance the landscape where he lives and provide valuable habitat for pheasants and other wildlife. As such he sees investment in their maintenance as a good use of funds. In the winter, he and his friends see shooting as an important leisure activity, but he also enjoys seeing the other wildlife when walking his dog during the rest of the year. Some of the veteran trees also give him a link with his past; he remembers climbing in them with his brother and looks forward to showing his grandchildren the 'secret' hollow oak in the corner of the garden. Most work that his trees and woodlands need costs him money, and he is prepared to invest a reasonable amount in his trees. He does hope, however, that some of his woodlands will soon start to produce a small income, with the renewed interest in wood as a renewable fuel.

Natural living organisms

Having lived on the estate for most of his life Sir William is well aware of how the trees and woods have changed over the years. He remembers the middle cover being felled and replanted and now the trees are 12 metres tall. He remembers the elms that used to grow in all the hedgerows and many of the woods, but are now all gone. He remembers the great storm of 1987, when many trees blew over, but many more lost branches; the scars and cavities resulting from that night can still be seen on many of the larger trees. And he remembers when, three years ago, for no obvious reason, on a still sunny day in August the big beech that stood on the main lawn suddenly lost a huge branch; fortunately no one was underneath it at the time. These memories help him to understand that trees are living things and as they grow it is part of their nature to lose branches, develop cavities and eventually fall into a long, slow decline. He also recognises that often trees can recover from quite severe damage and live for many years with these features without being a danger to anyone.

Reasonable, balanced tree safety management

Management	Until recently the estate had no formal tree safety management plan, relying on staff and others to report problems and dealing with them as they arose. Although Sir William was not aware of anyone being killed or injured by a falling tree or branch on the estate, two years ago he decided that it would be prudent to adopt a slightly more pro-active formal approach. In a meeting with John, the head gardener and the woodman

	they used an estate map to identify the areas that they thought merited a more formal inspection. For this first formal inspection they decided to include the A47, all the public roads, the garden, the visitors' car park and the park. They decided to continue with the existing informal system on the rest of the estate. Sir William also wrote a letter to all the staff telling them that he had asked John to lead on the estate's tree safety plan and to report any trees that they were concerned about directly to John. John and the woodman carried out the first formal tree inspection during the winter of 2008, when the leaves were off the trees. They inspected the trees alongside the roads and in the park. This was mostly a drive-by inspection, stopping for a closer look at some of the bigger, older trees that were more likely to have problems, and walking where the trees were closer together or where a wood grew alongside the road. The head gardener and the under-gardener inspected the trees in the garden and the car park. The roadside tree survey found three trees requiring attention and as they were not considered to be important for landscape or environmental reasons one was felled and the other two had limbs removed. No trees in the park needed attention. However, they decided the park's five veteran trees needed protection, and, in future, event organisers would be instructed not to place marquees or other structures under or close to these trees. In the garden in addition to the 'secret' hollow oak, in a corner not used by the public, they found an old lime tree with a large cavity in it. Lady Henry was very keen to keep the tree, so, after speaking to the forestry agent, John employed an arboriculturist to inspect it. He reported that the cavity was not affecting the tree's structure. He recommended no work for now and another inspection in three years time. Following the initial inspection and remedial work, Sir William decided that, unless there was a change in circumstances, the trees alongside the A47 and the lime tree in the garden would be formally re-inspected in three years time and those in the other areas in five years. Until that time the trees in these areas would be subject to the same informal inspection regime as the other trees on the estate.
Competence	to recognise the significance of most tree features. When a greater level of expertise is required the forestry agent recommends a suitable arboriculturist.
Records	The results of the formal inspection are kept in a file in the estate office along with the results of the arboriculturist report and a note of the remedial work carried out. John also keeps records of any trees reported to him and the action that he took.

Reasonableness	Sir William believes that, in the unlikely event of an accident involving one of his trees, the system he has put in place is sufficient to demonstrate 'the conduct to be expected from a reasonable and prudent landowner'.

Example 7: Large private historic house and estate open to the public

General description	
The Duke of Endsleigh-Bootle's family has owned the Lockington Estate for several centuries. The estate comprises mixed arable and pasture agricultural land, woodland, grazed parkland (including a deer park) and extensive ornamental pleasure gardens. The 70 hectares of mostly native mixed broadleaf woodland includes ancient semi-natural woodland and wide shelter belts alongside several kilometres of roads. Scattered throughout the parkland, gardens and woods are veteran trees. Some pre-date the Capability Brown 18th century landscape planting. Part of the deer park and parkland is a site of special scientific interest (SSSI), designated for its species rich beetle population dependant on old trees, dead and decaying wood habitat. Within the SSSI is a large lake surrounded by open grown mature and veteran trees, an area recognised for its bat population. The ornamental gardens surround the main house and include several hectares of arboretum, first planted in the early 19th century. The estate farmland is tenanted, although the main estate manages the trees. Three car parks serve the main house, ornamental gardens and restaurant, and the farm shop. The small zoo is regularly visited by schools with strong ties to the estate, which has a 'life-long learning' policy. The regionally renowned gardens, open to the public during summer, sometimes receive several coach loads of visitors a day. The estate holds several popular summer events including a carnival, jazz festival and balloon fiesta. For the past three years a television gardening programme has followed the seasonal cycle in the ornamental grounds through the eyes of the head gardener. The park and some of the woodland is open throughout the year.	
Ownership / control of management	
Responsibility	The entire estate is owned by a limited company with the Endsleigh-Bootles as principal shareholders. The general manager has overall responsibility for implementing policy, and strategic and operational decisions. She supervises the house and grounds, visitor facilities and estate teams. Departmental heads are responsible for the house and the estate, the gardens, and visitor facilities and catering. An estate manager is responsible for tree safety management in the park, arboretum and surrounding land, and the head gardener is responsible for the ornamental gardens.
Arboricultural competence	An external tree consultant has advised the family and its management company on its trees for the past eight years. She meets annually with the estate manager and head gardener to review their policy, discuss any tree related problems and to make suggestions for changes. She is aware that the owners are concerned to retain as much of the valued tree cover and manage their related risks at the lowest cost. She has guided the tree inspection method and organised a one-day training session for all estate and garden staff who carry out tree inspections in the course their duties. On her advice the head

	warden, who makes tree management decisions and instructs contractors on remedial tree work, has attended a three-day external course in tree inspection. When specific high value trees are identified to pose risks in the course of estate workers' inspections where further specialist advice is required, the external consultant is brought in to assess and make remedial recommendations; her advice has been sought on seven occasions in the past five years, resulting in the removal of one tree in this period. The 'landscape team' are trained and experienced in chain saw use. However, tree surgery work is largely contracted out. Under these arrangements the estate team carries virtually all tree inspection. On the advice of Natural England a two-yearly course is run on the management implications of the valued habitat, also in conjunction with the external consultant.
Holding	
Land area	2,600 hectares
Number of trees	Approximately 150,000
Access	
The estate is divided by several public roads, notably the busy 'B' road which runs through it and provides access to the car parks. Several public footpaths and bridleways cross the estate, and there are also some permissive paths. The park and some of the woodland are open throughout the year. The gardens around the main house are open to the public from March until October. The large public events such as the carnival take place on the main parkland area around the lake.	

Benefits of trees
The estate's overall policy on forestry and woodland management, and associated management plan recognise the benefits of its trees. The landscape contribution of trees, including the remnants of early Victorian tree planting around the house and ornamental gardens, is strongly valued, as are the mature trees in the arboretum. It is considered particularly important that ancient trees in areas enjoyed by the public be retained with the minimum loss of dead wood. Part of the woodland has SSSI status and the natural cycle of life, decline and death of trees is recognised to support the rich wildlife interests. The significant number of veteran trees have been surveyed, to reduce risk of losing them. Two mature avenues of trees, one lime and one beech, provide majestic approaches to the house and have historic merit. The trees are valued for the overall visitor experience and are formally recognised by schools as an educational benefit. The woodlands are mainly valued for their biodiversity and contribution to the mature landscape character and have limited timber production value.

Natural living organisms

The family has long appreciated the values of trees, particularly old ones, and employs key staff with relevant historic, cultural and wildlife expertise. The estate is concerned to minimise the loss of its old and veteran trees and to maintain the rich species variety and age range of its tree population, and is committed to enhance this habitat for future generations. The estate accepts that as part of the natural ageing process trees may drop branches or uproot. In some locations, action is taken to delay this natural outcome, whilst in other places it is allowed to take its course. Decisions to intervene are weighed against the context of where the trees are and the costs of intervention. Where practicable, the preferred way of dealing with the increasing risks from old trees is to manage access and, failing that, to carry out the minimum of remedial work. While managing old trees can be demanding and expensive, the overall estate conservation policy is to balance the range of interests, to ensure and enhance the benefits for wildlife, historic values and public enjoyment, whilst managing risk at an acceptable level.

Reasonable, balanced tree safety management

Management	The estate's tree safety policy is part of its overall health and safety policy. Procedures were reviewed under the guidance of the external consultant following the SSSI designation. The policy aims to ensure a balanced, proportionate approach to tree inspection; grading the estate into zones based on levels of use (high, medium and low) to guide the frequency and type of inspection. Tree inspections are carried out according to the zone priorities, based on walk-over surveys by nominated staff, with problems reported to the estate manager. Carefully vetted local tree surgeons with long term knowledge of the estate are employed for any tree surgery. Two members of staff do drive-by inspections of the estate roads, noting trees that may require closer inspection. These are either inspected by staff capable of recognising structural problems, a competent tree surgeon or, particularly where high value trees require detailed specialist assessment, the external consultant is brought in. Tree safety decisions are balanced with other policy objectives including habitat conservation and access. Valued trees with structural problems in high use areas are more frequently inspected than those in less used areas. Some access routes are about to be changed, in order to reduce tree-related risk by restricting levels of use, particularly where there is greatest nature conservation interest. Staff call in the external consultant from time to time to review trees noted to require a second opinion.
Competence	The estate relies on the experience of its staff, backed up by training and occasional support and advice from the external consultant. Several employees have attended a one-day course on tree inspection techniques and identifying tree diseases. Another has attended a three-day course on advanced tree inspection.
Records	Records of formal inspections and remedial work are kept in files in the estate office. The costs of training and capital investment are

	being weighed against the benefits of implementing long-term plans to record tree positions, inspections and remedial work on a field computer, and to maintain these records on a central computer. In the meantime it has been decided to maintain a written log of all inspections, keeping records only for those trees warranting detailed inspection or remedial works.
Reasonableness	The estate believes that its system which implements a reasonable approach to managing risks at an acceptable level meets current HSE and other external guidance. It believes that eliminating risk is not achievable and that people retain some personal responsibility for their own actions. The failure of individual trees is still possible (indeed very occasionally happens), and in unlikely circumstances can cause injury, but the system allows the estate to demonstrate compliance with legal requirements as a reasonable and prudent landowner, compatible with its wider objectives that reflect public benefit from trees.

REFERENCES AND FOOTNOTES

Chapter 1

1. Health and Safety Executive. (2005). *Management of the risk from falling trees*. HSE Sector Information Minute, SIM 01/2007/05.

2. Risk assessment is usually done in relation to a hypothetical person (a hypothetical type of individual who is deliberately assumed to have some fixed relation to the hazard under consideration) – in this case an ordinary member of the public undertaking normal activities.

3. Health and Safety Executive. (2001). *Reducing risks, protecting people – HSE's decision making process*. HSE Books: Sudbury.

Chapter 2

1. Lucas, K., Walker, G., Eames, M. Fay, H. and Poustie, M. (2004). *Environment and social justice: rapid research and evidence review.* Policy Studies Institute, London.

2. HM Government. (2009). *Quality of Place: Improving the Planning and Design of the Built Environment*. Cabinet Office Strategy Unit.

3. Newton, J. (2007). *Well-being and the natural environment: a brief overview of the evidence*. Unpublished report toDEFRA. www.surrey.ac.uk/resolve/seminars/Julie%20Newton%20Paper.pdf.

4. Greenspace. (2007). *The Park Life Report*. The first ever public satisfaction survey of Britain's parks and green spaces. Greenspace, Caversham, Reading, UK.

5. RCEP. (2007). *The Urban Environment.* Royal Commission on Environmental Pollution. Norwich: Stationery Office.

6. HM Government. (2009). *The UK low carbon transition plan – national strategy for climate and energy,* TSO (The Stationery Office), London.

7. Takano, T. et al. (2002). Urban residential environments and senior citizens' longevity in megacity areas: the importance of walkable green spaces. *Epidemiol Community Health* 56:913-918.
8. Wagner, J. (2003). *Trees: Positive effects on human behavior*. isa-arbor.com.

9. Hajat, S. et al. (2002). Impact of hot temperatures on death in London: a time series approach. *Journal of Epidemiol Community Health*. 56: 367-72.

10. Gill S., Handley J., Ennos R. and Pauleit S. (2007). Adapting Cities for Climate Change: the Role of the Green Infrastructure. *Built Environment* 33(1): 115-133.

11. McPherson, E.G., Nowak, D.J. and Rowntree, R.A. (1994). *Chicago's urban forest ecosystem: results of the Chicago Urban Forest Climate Project*. Gen. Tech. Rep. NE-186. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station.

12. Jo, H.K. and McPherson, E.G. (2001). Indirect carbon reduction by residential vegetation and planting strategies in Chicago, USA. *Journal of Environmental Management* 61: 165-177.

13. Run-off refers to the movement of water over the surface of the ground (rather than infiltrating into it).

14. Gill, S. (2009). The essential role of trees – adapting cities to climate change by managing high temperatures and reducing pressure on drainage systems. In proceeding *Trees and Urban Climate Adaptation: a social agenda for liveable cities,* 19 November 2009.

15. Maco, S.E. and McPherson E.G. (2003). A practical approach to assessing structure, function, and value of street tree populations in small communities, *Journal of Arboriculture* 29(2): 84-97.

16. Environment Agency. Water for life and livelihoods: River Basin Management Plans. Available at: www.environment-agency.gov.uk/research/planning/33106.aspx [Accessed 15 April 2010].

17. Calder, I.R., Harrison, J., Nisbet, T.R. and Smithers, R.J. (2008). *Woodland actions for biodiversity and their role in water management.* The Woodland Trust.

18. POST. (2006). *UK Soil Degradation*. Postnote No. 265. London: Parliamentary Office of Science and Technology.

19. Nisbet, T., Orr, H. and Broadmeadow, S. (2004). *A Guide to Using Woodland for Sediment Control*. Forest Research, Farnham, Surrey.

20. De Munck, C.S., Hutchings, T.R., and Moffat, A.J. (2008). Impacts of climate change and establishing a vegetation cover on water erosion of contaminated spoils for two contrasting United Kingdom regional climates: a case study approach. *Integrated Environmental Assessment and Management* 4(4): 443-455.

21. Carroll, Z.L., Bird, S.B., Emmett, B.A., Reynolds, B. and Sinclair, F.L. (2004). Can tree shelter belts on agricultural land reduce flood risk? *Soil Use and Management* 20(3): 357-359.

22. Forest Research. *The role of riparian shade in controlling stream water temperature in a changing climate*. www.forestresearch.gov.uk/ripariansh ade.

23. Smith, B.D., and Lewis, T. (1972). The effects of windbreaks on the blossom-visiting fauna of apple orchards and on yield. *Annals of Applied Biology* 72(3): 229-38.

24. Hodges, L. and Brandley, J.R. (1996). Windbreaks: An Important Component in a Plasticulture System. *HortTechnology.* 6(3): 177-81.

25. Sudmeyer, R., Hall, D. and Jones, H. *The effect of tree windbreaks on grain yield in the medium and low rainfall areas in Western Australia.* Department of Agriculture and Food, Western Australia. www.agric.wa.gov.au/PC_91078.html?s=1001.

26. Gibbons, P. et al. (2002). The future of scattered trees in agricultural landscapes. *Conservation Biology* 22(5): 1309-19.

27. *Greening for Growth. Business Case for the Environment Research Study: Summary of Principal Findings.* (2003). RSK Environment Ltd, Helsby.

28. HM Government (1998). *UK Environmental Accounts*. HMSO, London.

29. Peachey, C.J., Sinnett, D., Wilkinson, M., Morgan, G.W., Freer-Smith, P. and Hutchings, T.R. (2009). Deposition and solubility of airborne metals to four plant species grown at varying distances from two heavily trafficked roads in London. *Environmental Pollution* 157: 2291-2299.

30. Nowak, D.J. (1999). Impact of urban forest management on air pollution and greenhouse gases. *Proceedings of the Society of American Foresters*.

31. *Trees: Relief for the City.* Green City Initiative, C/O P.O. Box 252, Carlisle, CA6 6YA.

32. Broadmeadow M.S.J., and Freer-Smith, P.H. (1996). Urban woodland and the benefits for local air quality. *Research for Amenity Trees* No 5, HMSO London.

33. Department of the Environment. (1996). *Urban Woodland and the Benefits for Local Air Quality*. Research for Amenity Trees No. 5. London: Department for Communities and Local Government.

34. Ulrich, R.S. (1984). View through a window may influence recovery from surgery. *Science Journal* 224: 420-421.

35. Ulrich, R.S., Simons, R.F., Losito, B.D., Fiorito, E., Miles, M.A. and Zelson, M. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology* 11: 201-230.

36. Kaplan, R. and Kaplan, S. (1989). *The Experience of Nature: A Psychological Perspective*. Cambridge University Press, Cambridge.

37. Dobson and Ryan. (2000). *Arboricultural Practice Note 6*. Arboricultural Advisory and Information Service, Tree Advice Trust, Farnham.

38. Moore, E.O. (1981-82). A prison environment's effect on health care service demands. *Journal of Environmental Systems* 11(1): 17-34.

39. West, M.J. (1985). *Landscape views and stress response in the prison environment.* Unpublished masters thesis, Department of Landscape Architecture, University of Washington, Seattle.

40. *The economic contribution of the forest industries to the UK economy*. A report for Confor and the Forestry Commission June2006. Available at: www.confor.org.uk/Upload/Documents/22_Economic_contribution_of_the_forest_industries_report_June_2006.pdf [Accessed 15 April 2010].

41. Forestry Commission. *England's trees, woods and forests – delivery plan 2008-12*. Available at: www.forestry.gov.uk/pdf/eng-etwf-delivery-plan.pdf/$FILE/eng-etwf-delivery-plan.pdf [Accessed 15 April 2010].

42. GLG Economics (2003). *Valuing Greenness: Green spaces, house prices and Londoners' priorities*. Greater London Authority (GLA), London.

43. NWDA (2008). *The Economic Value of Green Infrastructure*. Northwest Regional Development Agency, p19.

Chapter 3

1. Rayner, A.D.M. (1998). Fountains of the forest: the interconnectedness between trees and fungi. *Mycological Research* 102:1441-1449.

2. For other species that do not have a distinct heartwood, such as beech, the time when the oldest 'rings' die off is less obvious and can be gradual, perhaps up to 70 years.

3. Shigo, A. (1989). *A New Tree Biology*. Shigo and Trees, Associates.

4. Butler, J., Alexander, K.N.A. & Green, T. (2002). *Decaying Wood: An Overview of its Status and Ecology in the United Kingdom and Continental Europe*. USDA Forest Service Gen. Tech. Rep. PSWGTR-181.

Chapter 4

1. Health and Safety Executive. (2001). *Reducing risks, protecting people – HSE's decision making process*. HSE Books. Sudbury.

2. ALARP is shorthand for 'as low as reasonably practicable.'

3. These are not rigid benchmarks and should be interpreted with common sense.

4. Of these, 18 people died during windy weather. This is probably an underestimate of the number of wind-related cases. Although over those ten years there was roughly one death every two months, on 27 October 2002 five people were killed during windy weather and on 18 January 2007 three people were killed. It would therefore seem that the mean annual death rate is 6.4, but this falls to about 4.6 if high wind events are excluded.

5. Health and Safety Executive. (2005). *Management of the risk from falling trees*, HSE Sector Information Minute, SIM 01/2007/05.

6. Societal concerns have been defined by the HSE as: "… the risks or threats from hazards which impact on society and which, if realised, could have adverse repercussions for the institutions responsible for putting in place the provisions and arrangements for protecting people, eg. Parliament or the Government of the day."

7. House of Lords Select Committee on Economic Affairs. (2006). *Government policy on the management of risk*, Vol. 1 para 34.

8. Health and Safety Executive. (2005). *Management of the risk from falling trees*, HSE Sector Information Minute, SIM 01/2007/05.

9. The HSE have endorsed the trade off between risk and benefit in the context of children's play.

10. The word ‘managed’ does not imply that specific activities to inspect and treat trees are always appropriate. In many remote or wilderness areas, for example, a reasonable policy might be to leave the trees alone completely.

Chapter 5

1. For a more extensive analysis of the law relating to trees see *The Law of Trees, Forests and Hedgerows* by Charles Mynors, Sweet & Maxwell (2002), which is being revised.

2. Caminer v Northern & London Investment Trust Limited [1951] AC 88.

3. Chapman v Barking and Dagenham LBC [1997] 2 EGLR 141

4. [1996] AC 923

5. *Caminer v Northern & London Investment Trust Limited* [1951] AC 88 at 100

6. Noble v Harrison [1926] 2 KB 332; Shirvell v Hackwood Estates [1938] 2 All ER 1; Cunliffe v Bankes [1945] 1 All ER 459; Brown v Harrison (1947) 63 TLR 484; Lambourn v London Brick Co. Ltd (1950) EG 28th July 1950; Lane v Trustees of the Tredegar Estate [1954] EGD 216; Quinn v Scott [1965] 1 WLR 1004; Knight v Hext [1980] 1 EGLR 111; Chapman v London Borough of Barking & Dagenham CA, unreported 13th July 1998 (1st instance [1997] 2 EGLR 141); Poll v Viscount Asquith of Morley 11th May 2006; Corker v Wilson 10th November 2006; Atkins v Sir James Scott 14th August 2008; Selwyn-Smith v Gompels 22nd December 2009.

7. Chapman v London Borough of Barking CA 13th July 1998.

8. Quinn v Scott [1965] 1 WLR 1004.

9. Poll v Viscount Asquith of Morley 11th May 2006; Atkins v Sir James Scott 14th August 2008.

10. Caminer v Northern & London Investment Trust Limited [1951] AC 88.

11. Corker v Wilson 10th November 2006; Selwyn-Smith v Gompels 22nd December 2009.

12. See also the Occupiers' Liability (Scotland) Act 1960.

13. s. 1(4) Occupiers Liability Act 1957.

14. s. 1A Occupiers' Liability Act 1984.

15. s. 1(6A) of the Occupiers' Liability Act 1984.

16. s. 1(6C) of the Occupiers' Liability Act 1984.

17. s. 2(4) Occupiers' Liability Act 1957.

18. s. 2(1) Unfair Contract Terms Act 1977.

19. s. 1(3) Unfair Contract Terms Act 1977.

20. Hampstead Heath Winter Swimming Club v The Corporation of London [2005] EWHC 713 (Admin) para. 65 (contrast s. 1 of the Compensation Act 2006 in respect of civil claims).

21. Health and Safety Executive (2005) *Management of the risk from falling trees*, HSE Sector Information Minute, SIM 01/2007/05.

Chapter 6

1. Fay, N., Dowson, D & Helliwell, R. (2005). *Tree Surveys: A Guide To Good Practice.* The Arboricultural Association.

2. Lonsdale, D. (2000). *Managing hazards from trees: A general guide.* Forestry Commission, London.

3. Ellison, M.J. (2005). Quantified tree risk assessment, used in the management of amenity trees. *Journal of Arboriculture* 31: 57-65.

4. Lonsdale, D. (2000). *Hazards from Trees – A General Guide*. Forestry Commission, Edinburgh.

5. Davis, C., Fay, N. & Mynors, C. (2000) *Veteran Trees: A Guide to Risk & Responsibility*. English Nature.

6. RSPB (2006). Code of Practice 50, Tree Safety Management.

7. Health & Safety Executive (2007) *Management of Risks from Falling Trees* Sector Information Minute, SIM 01/2007/05, HSE Field Operations Directorate, Sudbury.

8. Royal Parks, Section Twenty-One – Tree Management.

9. Commission for Architecture in the Built Environment. (2007). *Living with risk: promoting better public space design*. CABE, London.

10. Visitor Safety in the Countryside Group. (2005). *Managing Visitor Safety in the Countryside – principles and practice*. VSCG, Nottingham.

11. Department for Transport. (2005). *Well maintained highways: code of practice for highway maintenance management.*

12. Play England. (2008). *Managing Risk in Play provision: Implementation Guide*. DCSF.

13. Health and Safety Executive. (2005). *Management of the risk from falling trees*. HSE Sector Information Minute, SIM 01/2007/05.

14. Caminer v Northern & London Investment Trust Limited [1951] AC 88.

15. Health and Safety Executive. (2005). *Management of the risk from falling trees*. HSE Sector Information Minute, SIM 01/2007/05.

16. In technical literature about tree risk, the people or property that might be harmed are commonly termed ‘targets’ and the area within the tree’s

potential falling distance is referred to as the ‘target area’. We have avoided using these terms as they imply intention and that when a tree or branch falls, causing damage, it is the result of a single traceable action, which it seldom is. The imagery could obscure understanding of events.

17. Of the small total number of people killed by trees (averaging 6.4 a year) 68% between February 1999 and October 2008 were killed on roads (from falling trees or colliding with falling trees).

CONTACTS

This section will be completed for the final draft.

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Other key contributors to the document include Richard Stead, St John's Chambers, Bristol; Tony Hutchings, Forest Research; Mark Daniels, The National Trust; Mike Townsend OBE, BSC (Hons), MA, FICF, Senior Advisor, The Woodland Trust; and all NTSG Management Committee members.

Document Editor: Catharine Stott, Bristol..

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