N|T|S|G

NATIONAL TREE SAFETY GROUP

Common sense risk management of trees

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

This publication is also available on our website at www.ntsgroup.org.uk

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The National Tree Safety Group (NTSG) is a broad partnership of organisations that have come together to develop nationally recognised guidance on tree-safety management that is proportionate to the actual risk from trees. NTSG membership is open to all interested stakeholder organisations and groups. The NTSG can be contacted at www.ntsgroup.org.uk

The Health and Safety Executive was consulted in the production of this publication. It sets out sensible, proportionate, reasonable and balanced advice for people with responsibilities for managing the risk from trees.

Second edition

2024

www.NTSG.org.uk

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Foreword

There are many more trees in the UK than there are people. Most people on most days walk under or see trees in cities, towns, parks, gardens and alongside major roads.

Over the last thirty years evidence has grown dramatically that trees in the environment improve human well-being. People recover better in hospitals when surrounded by trees and children's learning is enhanced by outdoor activities in forest schools. Trees protect and enhance biodiversity and help the mitigation of carbon emissions and pollution. Consequently, a national and international sense of the existential importance of trees is growing. The public outcries in Sheffield and Plymouth over the removal of hundreds of street trees, ostensibly on safety grounds, is a highly visible case of this emerging trend.

The National Tree Safety Group was formed in 2007 to bring together a cross-section of stakeholders with a shared interest in tree safety to assist those who own and have responsibility for trees, including householders with gardens, rural landowners and farmers, large charities, public and private sector organisations, and local and national government.

At that time there was concern that a lack of clear guidance on how to address tree safety for duty holders could result in misunderstanding about tree risks and anxiety about their legal position, resulting in unnecessary damage to and loss of healthy trees.

The first edition of this guidance, which was published in 2011, supported a growing awareness among those duty holders of the need to check their trees and provided guidance on a widely accepted approach to managing risks from trees, based on sector-wide consultation. More than a decade on, we have taken stock of what has changed, such as the emergence of widespread tree disease, growing public activism and advocacy around the benefits of trees now reflected in Government policy, and a number of new legal cases.

There are reasons why trees require a specific and unique approach to safety management. As natural organisms they organically change from year to year. While tree diseases are not new, emerging pests and diseases have moved from being isolated problems to impacting a large percentage of the nation's stock of trees. As this document is about an overall approach and lays out the principles behind tree risk management, its scope is not prescriptive in

dealing with tree pathology and failure. However, the Scenarios (Section 7) include examples of how trees can be managed in practice in different types of ownership and use.

Safety and human health are paramount. In daily life we accept some level of risk, for instance, by driving a car or by playing contact sports. By comparison, the general risks from trees to the population as a whole are much lower. Very few of us ever experience the tragic consequences of a fatality or a serious injury as a result of tree failure. Ironically, the fact that such events capture headlines shows that they are unusual. Because of the importance of trees to society, the infrequency of tree failure events and the wide range of environments in which trees occur, great care needs to be taken to balance public benefit with the need for public safety.

Crucially, this does not absolve owners of trees from their legal duty of care and the need to prevent reasonably foreseeable risks of injury to people or property. Therefore, this guidance sets out a reasonable and prudent approach to managing the risks to the public, grounded in practical experience. This guidance does not specifically address the occupational risks of arboriculturists and foresters who work in some of our highest risk professions, a crucially important aspect of health and safety that the sector is working hard to address and improve.

In those rare incidents where serious and even fatal tree-related accidents occur, they will be investigated and may result in litigation. It is vital that the health and safety authorities and the courts can take into account authoritative, good tree-management practice, which is the purpose of this guidance.

Finally, I would like to thank all those whose hard work, time and energy has made this document possible, particularly the drafting group of Neville Fay, Simon Richmond, Jim Smith, Andy Tipping and Elaine Dick, and also Kathy Gostick from HSE.

Hilary Allison
Forestry Commissioner
Chair, National Tree Safety Group

NTSG

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Introduction

Trees are a fundamental component of most natural land-based ecosystems, and they provide vital greenspace in man-made and urban environments. In addition to their role in supporting biodiversity, they provide a wide range of benefits to people.

Trees and woodland can help to mitigate a cause of climate change (i.e. by sequestering CO2), as well as assisting with climate adaptation. Trees are an important part of the economy, providing timber and other forest products. The benefits to public health of exposure to nature are also increasingly recognised, as is the fact that such exposure brings communities together, playing a part in amenity, cultural values and aesthetic appreciation. The importance of trees is recognised in international, national and local government policies, and many non-governmental organisations (NGOs) have policies dedicated to conserving trees and their biodiversity.

There are more than 3 million hectares of woodland in the UK and, while not all trees are actively managed, there are very few places in the UK that are untouched by human activity. Tree management means many different things, depending on the context and underlying purpose. For example, a tree grown to supply timber is not regarded in the same way as a tree on a busy, urban street. The safety of people is undoubtedly an important consideration whether trees are managed for their cultural, amenity, heritage or environmental benefits, or for timber production or some other commercial interest. After all, trees are living organisms, they undergo natural processes of growth, development, shedding parts and eventually falling. This is a particular challenge of tree management as the approach taken must strike a balance between the societal and environmental benefits of trees, while taking into account the risks to people from individual trees.

At a societal level, we have become accustomed to thinking in terms of risk and public safety rather than of the benefits of related activities, which are generally taken for granted and therefore are less at the forefront of the mind. There has been widespread concern about how tree management addresses public safety, and a fear of litigation has caused many landowners to remove trees for ‘health and safety’ reasons. This fear can affect how landowners make judgements, shifting the focus away from the benefits and the overall extremely low risk involved. The tendency to remove trees from an unreasonable fear of them failing and causing harm disregards evidence that associated deaths

and injuries are rare: despite millions of people passing under trees every day, on average, fewer than five deaths each year are caused by trees. This does not mean that trees do not need to be managed for public safety. Rather, this guidance proposes that good management will consider both tree-related safety and tree-related environmental and social benefits.

The National Tree Safety Group (NTSG) has produced this publication in response to growing concerns regarding the unnecessary felling of trees. It aims to develop an approach that is proportionate to the actual risks from trees and recognises the importance of trees to society and the natural environment. Tree owners and managers are well placed to assess risk and take the necessary actions to reduce that risk to a reasonable level.

The NTSG believes that the evaluation of what is reasonable will fit into a tree-management strategy that considers the benefits that those trees bring. This calculation can only be undertaken in a local context, because trees provide many different types of benefit across a range of different circumstances and pose a range of risk levels, from negligible to significant. In criminal law the duty holder's responsibility is to ensure that risks are managed 'as low as reasonably practicable' (ALARP).[1] This is defined in the Court of Appeal judgment (Edwards v National Coal Board, [1949] 1 All ER 743) as '"reasonably practicable" is a narrower term than "physically possible"…a computation must be made by the owner in which the quantum of risk is placed on one scale and the sacrifice involved in the measures necessary for averting the risk (whether in money, time or trouble) is placed in the other, and that, if it be shown that there is a gross disproportion between them – the risk being insignificant in relation to the sacrifice – the defendants discharge the onus on them'.

A summarised version of this guidance publication is available to order or download from the NTSG website. Note that this full guidance publication should be consulted for detail and regarded as the principal reference.

Aim & scope

Managing the risk from trees is the responsibility of the duty holder. This guidance has been developed to support the duty holder, including householders, landowners and others involved in the management of trees, whether connected with streets, parks, public open spaces, businesses such as hotels or farms, private estates, woodland, commercial forestry, utilities or private gardens. This edition of the guidance integrates and updates issues concerning trees and their management for public safety, and the environmental, social and economic benefits trees provide.

This document brings together concepts from several other national and international guidance documents, such as those related to general tree surveying,[2] and covering specific issues connected with tree hazard assessment and management[3] and tree-related risk.[4] Several national and specialist organisations have also produced guidance for forestry[2] and nature conservation,[5–7] as well as for health and safety regulators.[8] There is also policy guidance for wider sector interests in trees, including for parks,[9] greenspaces[10] and access to the countryside.[11]

The guidance is based on a set of five key principles established by the NTSG for considering and managing tree safety in the public interest:

1. **Trees provide a wide variety of benefits to society.**
2. **Trees are living organisms and they naturally lose branches or fall.**
3. **The overall risk to public safety is extremely low.**
4. **Tree owners have a legal duty of care.**
5. **Tree owners should take a balanced and proportionate approach to tree risk management.**

Section 1 provides an overview of tree risk management. It outlines the general context in which tree risks and benefits are considered and the basis for making a balanced judgement.

Section 2 explores the wide-ranging benefits provided by trees in the UK and their contribution to our environment, health, wealth and well-being. Consideration of these benefits is important and forms a key part of this guidance. However, this does not override the duty holder's legal responsibilities for human safety.

Section 3 describes the natural features and characteristics of trees, as living organisms, which can, in some instances, create hazards that may pose unacceptable risks to people or property. The management of trees needs to strike a balance between maximising the benefits of trees (as described in Section 2) and managing risks from specific trees at a reasonable and tolerable level – the subject of the following sections.

Section 4 examines the specific risk to human safety from trees and provides a broad understanding of the contexts in which risks are considered, together with the reasonable protection of benefits and how these may be managed compatibly within the legal framework (as outlined in Section 5).

Section 5 sets out the legal framework in respect of an owner's and duty holder's liabilities for injury to others caused by the falling of a branch or tree in England, Scotland, Wales and Northern Ireland.

Section 6 outlines the basis for a balanced and proportionate approach to tree risk management that considers the role and function of trees as part of a wider complex ecosystem. While trees provide benefits and the overall risk is low, there is a clear responsibility for effective risk management, particularly where individual trees or groups of trees present a higher risk.

Section 7 outlines decision-making frameworks for duty holders followed by nine scenarios of different land holdings that illustrate reasonable and proportionate tree safety management.

1

An overview of tree risk management

The presence of trees in rural and urban landscapes provides many different benefits depending on the local and regional context and what the land is used for. Not all trees are managed and, even for those which are, such management is only one component of overall land management. The safety of people and property is one part of that management. It is therefore important to recognise that risk management can only be undertaken with an understanding of the value to people of trees in the setting within which they grow. This setting naturally includes their distribution in relation to people and property that might be harmed.

The law in relation to tree-related risk is covered by both criminal and civil law (see Section 5). Common sense principles of good management guide both criminal and civil contexts. Although risk is a feature of both criminal and civil law, the methodologies and approaches to risk assessment in criminal law have been specifically developed in the context of health and safety in the workplace.

Under civil law the duty of care is to take reasonable care to avoid acts or omissions that cause a risk of injury to persons or property. With regard to tree safety, the standard expected is that of the 'reasonable and prudent landowner'.

1.1 Tree risk management and criminal law

Under criminal law, the Health and Safety at Work Act 1974 (HSWA) sets out legal responsibilities for duty holders, that is, employers and the self-employed, for the safety of employees and members of the public who may be affected by what they do. HSWA (Section 3(1)) states that 'It shall be the duty of every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not exposed to risks to their health and safety.' This places a duty to protect people other than those at work from risks to their health and safety arising out of or in connection with the activities of people at work.

The *Management of Health and Safety at Work Regulations 1999* (MHSWR) specifies that 'every employer shall make a suitable and sufficient assessment of the risks to the health and safety of his employees to which they are exposed whilst they are at work; and 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.'[11]

The HSE approach focuses on the sensible and proportionate control of real risks. The courts have made it clear that: 'when the legislation refers to risks, it is not contemplating risks that are trivial or fanciful…' but rather 'material risk to health and safety, which any reasonable person would appreciate and take steps to guard against'.* Where the NTSG guidance refers to risk it is intended in the above sense of 'material risk'.

Forestry and arboricultural tree work are clearly hazardous occupations where risks to employees and the public require an appropriate level of risk assessment and control. Outside the context of those who are directly employed to work on trees, the risk to human safety comes from trees or branches falling on members of the public due, for example, to diseased trees, storm damage or other causes. This represents a significantly lower level of risk than tree-related occupation risk (see Figure 4.2, page 47). However, HSWA Section 3(1) includes both public duty holders, responsible for the management of trees along highways or within rural or urban open spaces, as well as other employers, including corporate and private enterprises, with incidental ownership and control of trees (e.g. trees on agricultural land, surrounding hotels or other commercial properties).

This guidance sets out to consider what is reasonable to do to manage these circumstances. It is important to emphasise that the Act does not require that risk must be completely eliminated but rather that duty holders manage risks as low as reasonably practicable (ALARP), which means that 'an employer does not have to take measures to avoid or reduce the risk if they are technically impossible or if the time, trouble or cost of the measures would be grossly disproportionate to the risk.' The law requires what good management and common sense would lead employers to do anyway: that is, to look at what the risks are and take sensible measures to tackle them.[12] In addition, a balanced and reasonable approach will avoid excessive interventions that result in the removal or reduction of trees, which in turn introduce the inherent risks to operators who carry out tree felling or pruning.

Those who control tree management require a clear appreciation of their legal duties. However, a tree management strategy needs to consider both the reasonable control of risks from tree failure along with other factors. Other broader concerns, such as climate change and flood mitigation, public health and well-being, along with consideration of ecology, landscape and aesthetic value, may also be taken into account. The decision-making objective is to adequately protect individuals from harm while avoiding unnecessary loss of benefits.

*R v Chargot (2009) 2 All ER 660 [27].

In some cases, risk management strategies involve multiple and complex considerations, for example, where nationally important trees with a high habitat value for protected species are present in settings with high visitor numbers.

The ultimate decision in such circumstances needs to be based upon a coherent and transparent method that is accountable and reasonable.

The management of risk, when properly organised, enables a duty holder, among other things, to:

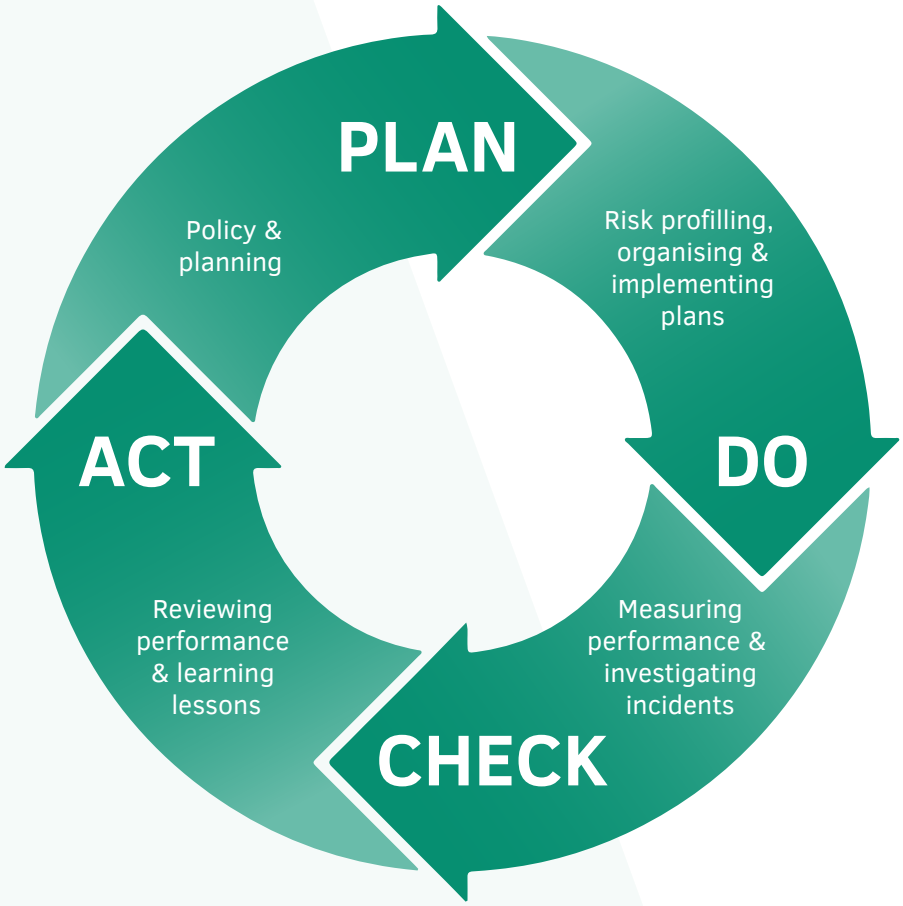
- increase the likelihood of achieving stated objectives;
- make the most of available resources;
- identify and control the risk;
- comply with relevant legal requirements;
- improve public confidence and trust.

At an international level, the International Organisation for Standardisation's document ISO 31000 provides guidance on risk management principles[13] and states that effective risk management needs to be capable of a proactive response to changing circumstances, in turn underpinned by transparency and stakeholder participation. In the UK, the Health and Safety Executive's *Managing for health and safety* (HSE 2005, updated in 2013 ('HSG65'))[14] also presents risk management as an inclusive process that is integral to strategic organisational aims. It states that risk management should achieve a balance between systems and a culture of organisational and personal awareness of health and safety issues that includes obligations, a practical understanding of risk, and the pitfalls of complacency and other obstacles to improvement practices. While a formal management system or framework can help manage health and safety, it is for the duty holder to decide whether to use one or not. In either case, the HSG65 advocates a common sense and practical approach, 'Plan-Do-Check-Act', which contributes to effective risk management.

Plan-Do-Check-Act is a four-step self-adjusting, cyclical approach summarised below and presented in Figure 1.1:

1. **PLAN: Setting objectives**
   What is involved in risk management, current and intended position.
2. **DO: Identifying risks and priorities**
   How to deliver.
3. **CHECK: Benchmarking delivery of risk management**
   How well aims are being delivered.
4. **ACT: Reviewing and learning from performance**
   What changes may be needed for improvement.

Figure 1.1 A model of the HSG65 framework for setting, managing and reviewing risk.



1.2 Tree risk management and civil law

Risk management under civil law, in non-work–related settings, involves an approach that reasonably weighs the benefits of an activity against the risks it poses. This approach recognises the inherent balancing considerations in risk decisions and is termed compensatory decision making.[1,15] This is in contrast to non-compensatory decision making that focuses on a single objective.

Notwithstanding a legal duty to ensure the reasonable safety of the public, safety is one of many management considerations. When it comes to tree management, sensible, appropriate decision making relies on and involves appreciation of other wider management objectives, such as safeguarding environmental benefits (a process for making such decisions is outlined in Figure 1.2).

In the context of tree-related benefits, this entails accounting for the value of a specific tree or a given set of trees through their contribution to their owner's environment, their surroundings and, more broadly, to society and the ecosystem (Section 2). Looked at in this way, trees are both a 'benefit generator' and also a 'risk generator'. Assessing and balancing the benefit with the risk requires understanding the values and outcomes that are desired in the local circumstances.

At some level, this process depends on identifying priorities and making assessments in light of personal knowledge and experience. As trees age and grow, the benefits they contribute increase (Section 3). But so too, in later life, the same qualities tend to contribute to an increased likelihood of structural failure. Managing such trees to safeguard the benefits accrued over time, while reasonably managing safety risk, calls for a strategy that involves compensatory decisions for the duty holder at various times throughout the lives of their trees.

Figure 1.2a Duty holder responsibilities under civil law: the tree risk management process.

The diagram (Figure 1.2a) aims to illustrate a compensatory approach to tree risk management for the duty holder under civil law. The diagram is set out as a cyclical series of actions, with considerations applicable to each, for ongoing responsible management. The key (Figure 1.2b on the opposite page) presents further details to help provide guidance and context to the considerations at each stage of the process. Throughout the process, 'consultation' and 'review' are essential components and duty holders must remember that others may contribute to the decision-making process: this could include local stakeholders, neighbours, relevant authorities or professional arboricultural advisors. Reviewing the outcomes and consequences of each stage will help to inform a continuously improving approach.

Figure 1.2b Key to colour coding and terminology in the tree risk management process.

BENEFITS

- Landscape / cultural / heritage / historical
- Aesthetic / amenity
- Environmental / habitat / biodiversity
- Climate / food control
- Health / air quality
- Social / mental well-being
- Economic / tourism / timber
- Soil conservation / water quality
- Noise abatement

OBLIGATIONS

- Legal / statutory
- National and local policy
- Duty holder responsibility
- Organisational governance and strategy
- Good practice guidance
- Ethical / public opinion
- Management / financial
- Neighbour relations

STAKEHOLDER CONSIDERATIONS

- Land use constraints
- Neighbourly relationships
- Public safety
- Employees
- Public use / type of user
- Reputation

MANAGEMENT AIMS

- Economic / tourism / timber
- Amenity / shade / privacy
- Environment / nature conservation
- Noise / pollution control
- Public access
- Landscape features

RISKS TO SAFETY

- Tree location in relation to occupancy
- Zoning according to targets and levels of occupancy
- Survey, checks, inspection, where applicable
- Likelihood of failure of tree or part of tree and potential for harm

RISKS TO BENEFITS

- Consider risks to the identified benefits from individual and populations of trees
- Consider risks to qualities, health and condition of trees, both in specific local context and more widely

RISK ASSESSMENT

- Analyse risk information (benefits and safety risk)
- Identify low safety risk areas with minimal resource requirements
- Identify unacceptable safety risks
- Assess benefits likely to be lost through risk management
- Determine safety risks that require prioritised management

BALANCE OF BENEFITS & RISK

- Compare the level of safety risk in relation to the benefits gained, to decide if and when further action is required
- Identify cost of reasonable risk control, resource, and capacity constraints
- Balance benefits and risk control to meet objectives
- Identify circumstances where risk management both safeguards human safety and reduces the risk of losing tree-related benefits
- Identify ‘red line’ decisions – where benefit loss would be unacceptable to the owner / duty holder or where public safety levels would be unacceptable within legal framework
- Prioritise risk management to inform allocation of resources

SAFETY ACTIONS

- Consider ways to manage areas where safety risks have been identified
- Consider feasibility options for safety risk reduction without tree intervention
- Prioritise remedial work for public safety

IMPLEMENTATION

- Manage tree stock taking into account the risks to trees while considering safety risks from trees, maintaining benefits in line with objectives and at a level appropriate to resources

MONITORING

- Set review intervals
- Be aware of significant changes to tree condition and / or circumstances
- Call upon expert help where appropriate
- Review overall approach to management and update as required
- Maintain records as appropriate

The concept of balancing the benefits of some object (e.g. a tree) or activity (e.g. fell walking) with its associated risks has emerged over recent years in a number of areas of public life. Many of these benefits are intangible and are shared across a relatively large number of people, and they are sometimes lost in the name of reducing risks. This relates in similar ways to the benefits and the value of play, sport and access to natural places.[11,16,17]

This balancing approach contrasts with the traditional approach to health and safety in criminal law, where the trade-off is often interpreted as being solely between the benefits of risk reduction that a safety intervention provides and the cost of the measure and difficulty of its implementation.

Under civil law, while one of the duty holder's goals is for the reasonable safety of people and property, this does not require the elimination of all risks, but rather to adopt a management strategy that reasonably weighs up and balances the risks and benefits. For example, where people choose to visit sites where there are trees, they do so to enjoy the benefits and accept a level of risk. In this way objectives may broaden to incorporate management for amenity, conservation, and environmental value*. The Visitor Safety in the Countryside Group (VSG) describes this benefit–risk assessment process in their guidance:

When measures to reduce the risk of personal injury are also likely to significantly reduce the benefits, we must ensure that they are sensible, proportionate and appropriate. As well as taking into account the likelihood that someone may be injured and the seriousness of the injury which may occur, we should also consider the benefits to the individual and society from the activity which gives rise to the risk.[11]

This is further supported by the recently published international standard, BS ISO 4980:2023, ***Benefit-risk assessment for sport and recreational facilities, activities and equipment***, which, outside of occupational health and safety, advocates taking account of activities for the public good through balancing the benefits with the risk in order to achieve risk acceptability.[18]

The compensatory approach has been developed to prevent unintended adverse consequences while balancing benefit and risk, so that no single factor unreasonably dominates risk management decision making. This helps to counteract societal bias, where fear of accidental harm may lead to a risk-averse approach, which in turn relegates benefits to unreasonably low levels of importance when considering management options.

*Along with criminal-law HSWA, other legislation relevant to the management of trees includes the Occupiers' Liability Acts 1957 and 1984, Occupiers' Liability Act (Scotland) 1960, Land Reform (Scotland) 2003, the Countryside and Rights of Way Act 2000 (CRoW), the Wildlife and Countryside Act 1981, the Marine and Coastal Access Act 2009, as well as legislation relating to Sites of Special Scientific Interest, planning issues and Tree Preservation Orders.[7]

Practical experience and knowledge, applied to real circumstances, are crucial to balancing risk and benefit. When the process is abstracted from real circumstances the judgement may be influenced by trivial risks and an overreliance on formulaic approaches and organisational complacency. Quantitative approaches may well contribute to sensible risk assessment,[19] but sensible judgements to balance benefits and risks will inevitably rely on a measure of qualitative and descriptive processes and subjective judgement.[20] Tree owners and duty holders are responsible for their trees and management strategies need to be specific to each location. In satisfying that obligation they may obtain specialist advice regarding the inspection and maintenance of their trees. Section 7 gives examples of tree management arrangements for duty holders. Figures 7.1 and 7.2 describe the duty holder decision-making process under civil and criminal law.

2

The benefits of trees

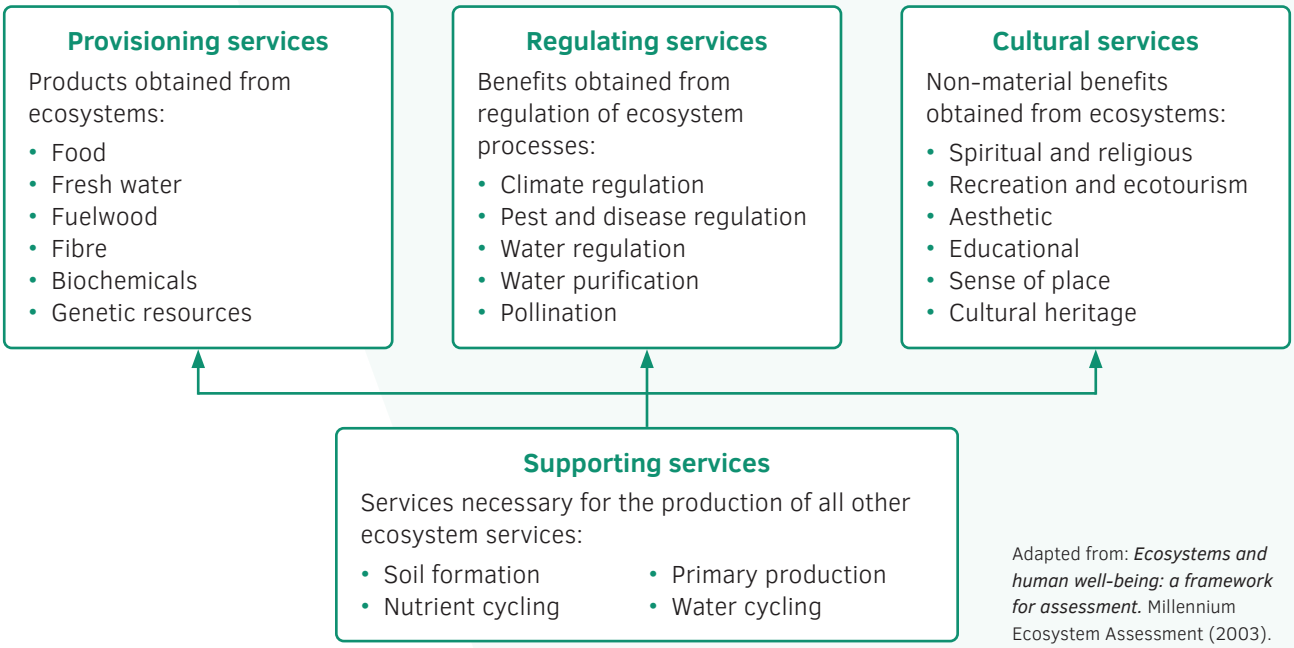
Trees provide an enormous range of social, economic and environmental benefits across the broad spectrum of urban and rural landscapes in the UK. Plans to sustain and maximise these benefits to enable us to tackle the climate emergency and biodiversity loss we are facing are outlined in the UK Government's 25 Year Environment Plan[21] and in the forest and tree strategies of England,[22] Scotland,[23] Wales[24] and Northern Ireland.[25]

Apart from marketable timber and timber products, the value of the benefits provided by trees has not been readily quantifiable in monetary terms. More than a decade ago, the UK's first National Ecosystem Assessment (UKNEA)[26] made the case for properly valuing the social and economic benefits of a healthy natural environment while continuing to recognise nature's intrinsic value. Such values can be expressed in terms of 'natural capital' and 'ecosystem services' – the links between nature and public well-being (Figure 2.1).

It is important to note that benefits do not override legal responsibilities for human safety.

The UKNEA concluded that while the natural world, its biodiversity and its ecosystems are critically important to our well-being and economic prosperity, these are consistently undervalued in conventional economic analyses and decision making. Almost a decade later, the permanent removal of tree cover seldom takes account of the negative impacts on public health and well-being and our natural environment remains fragmented and fragile.

Figure 2.1 Ecosystem services can be thought of as the processes by which natural ecosystems, including trees, woodlands and forests, provide resources (used either actively or passively) that sustain and benefit people.



Adapted from: ***Ecosystems and human well-being: a framework for assessment.*** Millennium Ecosystem Assessment (2003).

2.1 Trees for health and well-being

Trees and greenspace are good for us.[27,28] The quality of our local natural environment is one of the factors that shapes our health over a lifetime. There is a wealth of evidence on the positive effects that spending time in the natural environment has on the health and well-being of adults and children and this was evident during the 2020 national lockdown response to the COVID-19 pandemic. For example, access to nearby attractive greenspace and footpaths is likely to increase levels of walking, one of the simplest forms of physical activity that most people can enjoy.[29] In addition to the health benefits of increased levels of physical activity, such as a decrease in problems such as obesity, high blood pressure and cholesterol, choosing walking over other forms of transport reduces polluting vehicle emissions.[30,31]

Trees also improve air quality – their leaves and branches intercept harmful particulate matter and other airborne pollutants, reducing their concentration in urban areas.[32] This results in a reduction in the risk of pollution-related illness and considerable cardiovascular, respiratory and asthma-related health benefits.[33] This in turn reduces the cost of health care[34] – approximately 40 000 people in the UK die prematurely each year from the effects of outdoor air pollution.[35,36]

If every household in England had good access to quality greenspace then approximately £2.1 billion could be saved in health care costs each year.[37] London's greenspaces alone are estimated to reduce health care costs by £950 million per year due to improvements in residents' physical activity and mental health.[38]

In terms of our mental and emotional health, it has been demonstrated that contact with greenspace can reduce perceived levels of stress[39] and improve self-esteem and mood,[40] in addition to shortening rehabilitation[41,42] and hospital recovery times.[43] Quality natural features and trees in a city can benefit children's learning and development and improve the cognitive performance of those experiencing attention deficit disorder.[44]

The annual mental health benefits associated with visits to the UK's woodlands are estimated to be £185 million.[45]

2.1.1 The value of urban trees and woodland

The UK is densely populated, with nearly 90% of people living in towns and cities, where the pressures of modern living are often most evident. The

importance of trees is growing as populations continue to increase, towns and cities expand and the climate changes. By the 2080s, summer and winter mean temperatures in the UK are projected to increase by 3°C to 4°C, and by 2°C to 3°C, respectively.[46] Increased winter rainfall, drier summers and more frequent heatwaves are also expected. The impact of climate change will be felt most acutely in built-up areas where the 'urban heat island effect' will further increase air temperatures.[47,48]

Urban trees can help to reduce urban temperatures and the urban heat island effect in two ways: they provide shade for buildings and city streets, reducing the absorption of infra-red and releasing this heat at night; and they produce a cooling effect through the process of evapotranspiration.[49–51] Even a small tree planted in a UK city can provide up to 7 kW of cooling through evapotranspiration in the hottest months; this is higher than the cooling capacities of most residential air conditioners, which range from 1 to 10 kW.[52]

Trees bring many benefits to urban environments, but their proximity to people means that legal responsibilities must be recognised, and balanced management undertaken.

A 10% increase in the number of trees strategically placed around buildings can produce savings of 5–10% in heating and air conditioning costs.[52]

In some areas, tree planting can be used to mitigate increased flood risk, or to retain and recycle water naturally when we most need it. The hard, impervious surfaces found in towns and cities such as concrete and tarmac impede water infiltration, which increases the risk of surface water flooding. These effects are likely to increase in the future as the UK experiences more severe weather events. Trees intercept precipitation, and in urban areas this can help to reduce the pressure on the drainage system and lower the risk of surface water flooding and, if located within a permeable surface, can act as Sustainable Urban Drainage Systems (SUDS).

Urban forest in greater London was estimated to provide £132.7 million of annual benefits related to carbon sequestration, mitigation of some air pollutants and storm water alleviation.[53]

2.1.2 Trees in culture and community

Our natural environment gives us a sense of place, pride and identity. Trees and woodland enhance the visual quality and appearance of our landscapes and contribute to the diversity and distinctive character of our local communities. In addition to providing a setting and vital resource for recreational activities such as walking, viewing wildlife and mountain biking, access to greenspace engenders positive feelings about local community,[54,55] improves social cohesion and reduces crime.[56]

The size and number of trees and the great age they can attain make them among the most visible and continuous aspects of our lives. Their beauty and majesty have inspired artists, poets and writers for many centuries. Trees may also be significant to us personally, marking historical occasions, commemorating a birth, a family event or a celebration of a life. City dwellers can develop strong personal attachments to urban trees and often feel more relaxed in their presence.[56]

Approximately two-thirds (69%) of respondents to the UK Public Opinion of Forestry Survey 2021 had visited forests or woodlands in the last few years. Of those, 36% reported an increase in the number of visits in the last 12 months.[57]

2.2 Employment and the economy

For several centuries, trees have provided timber for house building and shipbuilding, as well as furniture-making, fibre for paper and cardboard, and biomass for renewable energy and heat. Trees and woodlands have an important role to play in supporting local enterprises and rural development that supports local and national growth. Employment is provided for foresters, arborists, consultants, tree officers and land managers, among others involved in the care of trees for the benefits trees provide, and their management for public safety. Secondary industries utilising timber and other forest products contribute significantly to employment and wealth. As part of the development of a low-carbon economy, wood and wood products now play a major role as a renewable resource and provide a sustainable alternative to fossil fuel-based materials such as concrete and steel.

UK forests were estimated to have removed the equivalent of 13.7 million tonnes of atmospheric CO_2 in 2015,[58] approximately 10% of UK household emissions.[59] If 200 000 new houses were built with timber, this could help store an additional 4 million tonnes of CO_2 each year.[60]

Investment in new and expanded woodland not only plays an important role in brownfield and urban land regeneration and economic development,[61] but also in attracting inward investment. The UK's sawmilling sector was anticipated to receive more than £100 million of investment from 2015 to 2020.[62]

Primary wood processors employ an estimated 7400 full-time members of staff and the UK's forestry and timber sector supports more than 42 000 jobs.[57]

4450 forestry businesses, 515 sawmilling businesses, 140 wood-based panel businesses and 235 pulp and paper businesses were registered for VAT and/or PAYE purposes in the UK in 2021.[57]

Trees and greenspace enhance property values. In London, greenspace area is the fifth most significant indicator explaining variations in house prices.[63] Furthermore, in northwest England, a city park can enhance property values of detached houses by almost 20%, whereas smaller local parks can increase the value of flats by more than 7% and non-detached houses by more than 9%.[64] Greenspace with good levels of tree cover is much less expensive to maintain than highly grassed areas. The annual maintenance costs of managing 1 ha of woodland in a greenspace can be up to £1200 less expensive than managing 1 ha of amenity grassland.[65]

2.3 Environment and biodiversity

Trees and woodlands help to mitigate the effects of climate change, protect soil and maintain water quality through the provision of ecosystems, many of which can be assigned a value.[66] They are also vital for most aspects of land-based biodiversity.

2.3.1 Climate change

Trees absorb carbon dioxide from the atmosphere and store carbon in wood as they grow. Planting well-maintained trees is one of the most efficient and inexpensive ways of taking carbon dioxide out of the atmosphere to tackle the climate crisis. Research has shown that planting trees and woodlands could make a significant contribution to meeting the UK's challenging emissions reduction targets. The Committee on Climate Change has recommended that we should be aiming to plant approximately 30 000 hectares of new woodland in the UK every year until 2050 to assist in efforts to meet Net Zero.[67]

Large urban trees can store significant quantities of carbon. On average, a single mature, large-stature tree is estimated to store 2500 kg of carbon.[68]

The sustainable harvesting of trees for timber transfers carbon into wood products where it is stored, often over long periods. These can be used as substitutes for materials whose production involves high emissions of greenhouse gases. Wood products can also be used directly as sources of energy to replace fossil fuels. Trees and woodlands also play an important role in helping society adapt to climate change, particularly in the urban environment, by providing shelter, cooling, shade and run-off control.

Trees play an important role in supporting the adaptation of farming systems to a changing climate, including through the provision of shade for livestock and crops, reducing wind and rain damage,[69] water loss[70] and encouraging crop pollination.[71] In some circumstances they may also reduce the incidence and severity of some crops' pests and diseases[72] and can help increase crop yields, particularly during dry conditions.[73] Trees also provide considerable benefits when they are integrated in agricultural and farming systems by providing critical habitat for wildlife, especially as they mature and help create connectivity between habitat remnants.[74]

2.3.2 Soil protection

Soil is essential for the delivery of a range of ecosystem services and functions, including food production, carbon storage and climate regulation, water filtration, flood management and support for biodiversity and wildlife.[75] Trees and woodland protect and stabilise soil and help to prevent erosion by slowing surface run-off and holding the soil in place. Run-off from farmland, brownfield and contaminated sites can lead to rivers and streams becoming clogged up and contaminated.[76,77] Trees in the landscape improve soil infiltration and fertility.

2.3.3 Water quality

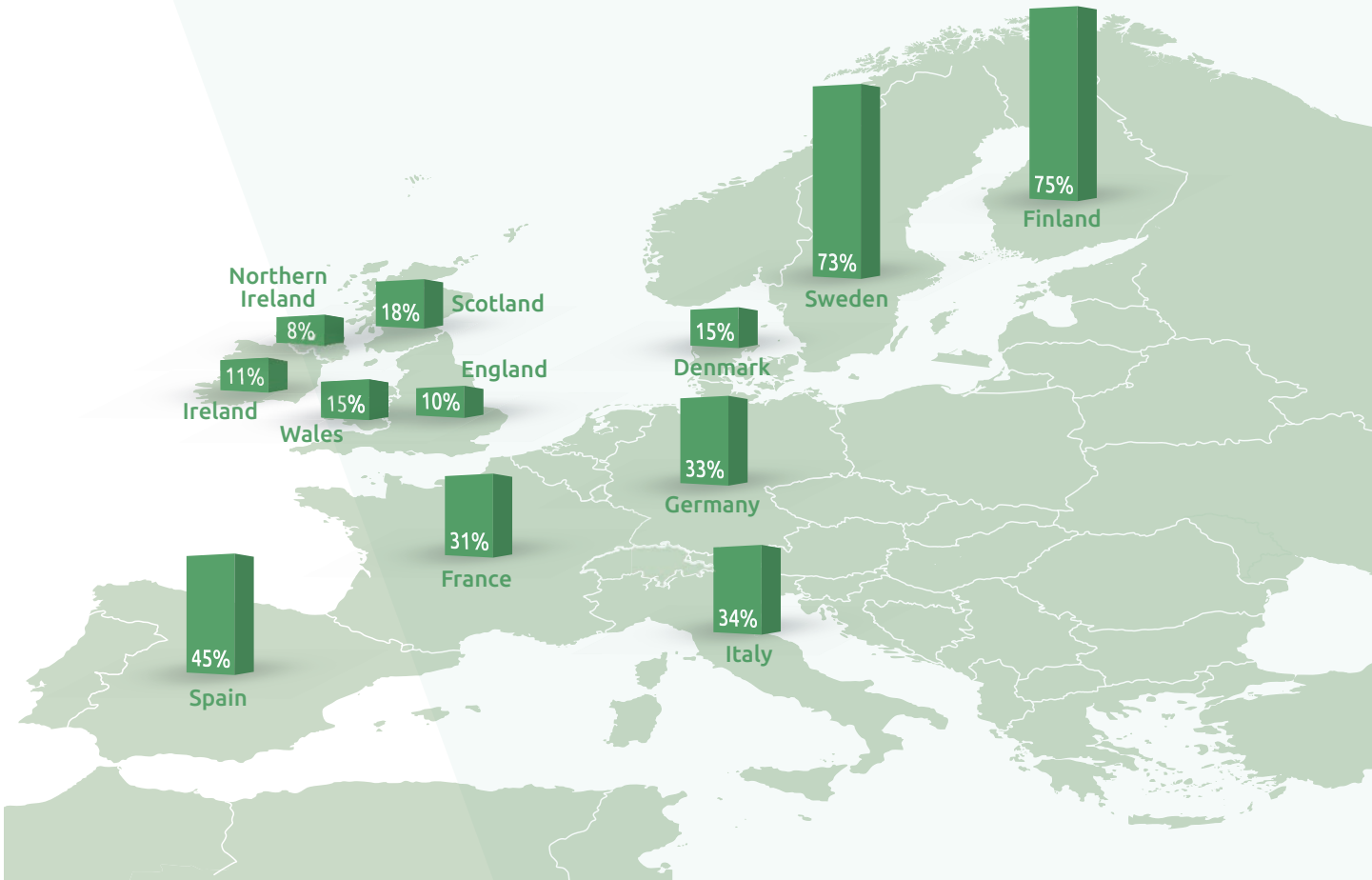
Trees reduce run-off by intercepting rainfall thus allowing the water to flow down the trunk and into the earth below the tree. Woodland can reduce floods from hill slopes and in headwater catchments and may have a marked impact on flood flows at a local level.[78] River basin management plans produced for England recognise the role of woodland planting in reducing the risk of surface water run-off and in retaining the quality of rivers and streams.[79]

2.3.4 Biodiversity

Trees are vital for biodiversity. The level and stability of ecosystem services generally improve with increasing levels of biodiversity. Trees are 'keystone species' in many ecosystems, which means that their importance is such that, when removed, the connections between the interdependent species within the ecosystem break down and long-established biological systems may be disrupted and harmed or even collapse.

The progressive loss and fragmentation of the natural forest that once covered most of the British Isles has left the UK with a much smaller proportion of woodland than many European countries. This has had a dramatic effect on native biodiversity. Some species of large mammals have completely

Figure 2.2 At approximately 13% forest cover, the UK is one of the least densely forested countries in Europe. This compares with 46% for Europe as a whole and 31% worldwide.



disappeared, while other groups such as fungi, lichens and invertebrates associated with old growth, wood pasture and parkland have become less diverse as the quality and extent of their habitat has declined.

Old or veteran trees are often the most valuable for biodiversity. These trees must be managed sensitively and with careful consideration of their requirements.

2.3.5 Ancient and veteran trees and deadwood

A tree may be regarded as ancient due to its great age relative to others of the same species. A veteran tree, although not yet necessarily ancient, has special habitat qualities that have developed over time. Ancient and veteran trees have important biological value and will likely also possess aesthetic interest and contribute to our cultural and historical heritage. They provide continuity in a changing world and are often associated with historical events or characters. Ancient trees, in particular, have special ecological importance and offer rare terrestrial habitats with a continuity that may span many centuries. Veteran habitats are home to rare fungi, invertebrates, lichens, birds and bats. Their structural complexity provides niches not found on young trees.[6,7,80] Veteran and ancient trees may also have potential for increasing hazard. However, even where they may occasionally present significantly elevated risks, the possibility of retaining higher risks should be considered where this can be reasonably managed due to the higher levels of benefit these trees provide.

‘Three hundred years growing, three hundred years standing, three hundred years decaying.’

Peter Collinson [1694-1768]:
On the life cycles of English oak and sweet chestnut.[81]

3

The nature of living trees

The capacity for long life and the ability to grow to a great height and size give trees their importance for humans as well as biodiversity. When trees are allowed to go through their natural life cycle, their biodiversity value increases as they age. Dead and decaying wood, shedding branches, holes and cavities, fallen trees and split branches all provide an important habitat supporting a diversity of dependent species. However, these natural features and characteristics may also present a hazard, which may or may not be risky to people.

3.1 Natural features and characteristics of trees

The natural features and characteristics of trees can lead to the perception that they are problematic and require intensive management. This is a particular challenge of tree management.[82]

3.1.1 Trees are natural shedders

Unlike man-made structures, trees undergo natural processes of growth, development, shedding of parts and eventually falling. Leaves and twigs are regularly shed. Branches die and live branches may become wind-damaged or prone to breakage, and occasionally fall to the ground. On rare occasions, roots can snap under wind load, allowing the entire tree to collapse. These types of structural tree failure are natural and can occasionally cause harm to people and damage to property.

3.1.2 Young trees' strategy is to grow tall

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 through photosynthesis. This energy supports not only growth, defence and seed production, but is also enough to attract and sustain the intricate life-supporting web of microorganisms, including mycorrhizal fungi, which are associated with their roots and that are essential for healthy tree growth and survival.[83]

3.1.3 Essential function of sapwood

Sapwood is fundamental to the tree's life-support system. It connects the tree's roots within the soil to the atmosphere, transporting water (via outer woody xylem vessels) to the uppermost crown leaves for sugars to be manufactured through photosynthesis (using sunlight, water and CO_2). These sugars are then transported throughout the tree (via phloem tissue, located just beneath the bark) for growth and storage. Sapwood transports immense amounts of water within the tree via the xylem, moving groundwater and releasing excess moisture into the atmosphere and onto the clouds,[83,84] inspiring the idea that trees are living 'fountains of the forest'.[84] Additionally, the outermost sapwood contributes to the tree's structural stability, responding to loads imposed by wind and gravity and changes in the body of the tree.

3.1.4 Factors affecting tree growth

Sapwood is laid down each year over the entire outer body of the tree, from the furthest small root to the topmost branch, like a veneer or skin, and can be conceived as a new plant, spread just beneath the bark, over its predecessor. We tend to visualise these woody layers as two-dimensional annual 'rings'. While useful for assessing tree age and performance, the ring is two-dimensional as it only views the trunk in sawn cross-section. The growth of rings can vary year by year and their width is influenced by tree health and growing conditions, as well as climatic or disturbance events. Rings are typically reduced after drought or flooding or when the tree suffers physical damage such as bark loss, compaction or removal of soil within the rooting zone, root damage or factors impacting soil health.[85]

3.1.5 Sapwood is key to tree growth and health

For sapwood to function, it needs the outer bark to 'lock in' water effectively. Thus, when wounding occurs and the seal of bark is broken, sapwood in the vicinity is disrupted and prone to drying out. This impairs the normal transportational and other life-support functions. After bark loss, the internal change in water conditions causes some of the underlying sapwood to become physiologically dysfunctional and eventually to die. The tree is generally able to accommodate such changes by growing around and incorporating the wound. Such circumstances favour the development of habitats in which different fungi may flourish, some of which break down and recycle woody tissue.[86]

3.1.6 Mature trees mostly comprise non-living wood

During the early growth years of young trees, the tissue under the bark is living sapwood, which contains conductive cells. Oak and sweet chestnut wood may continue like this for twenty or so years, after which the oldest (innermost/first year) 'ring' dies off, becoming the first ring of the 'heartwood'. Each year thereafter with such heartwood species, a new outer layer of sapwood is laid down and the next, innermost ring dies off, and becomes (non-living) heartwood. When the tree is about thirty 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 about fifty years, there are likely to be equal areas of sapwood and heartwood in the trunk cross-section. Thereafter, as the tree increases in age it will be mostly composed of a non-living inner heartwood core, which is encapsulated within the relatively narrow living sapwood. 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 seventy years. This is referred to as ripewood.

3.1.7 Crown retrenchment

After a tree becomes fully mature, a turning point is reached when its water-conducting capacity can no longer meet the physiological demands of an increasingly large crown. Compensatory patterns of twig growth then enable the crown to remain healthy while it eventually decreases in size, especially in height, following natural episodes of localised dieback or branch breakage. This process of 'crown retrenchment' is a developmental expression and is a stage of the natural ageing process occurring gradually over time. In contrast to crown dieback characteristic of a dying tree, which is often unrelenting, with sparseness of foliage, crown retrenchment typically maintains a healthy, viable crown with diminished height and with reduced sapwood transportation distances (for water, nutrients and sugars). The onset of crown retrenchment marks the beginning of the ancient stage of life, when trunk hollowing typically becomes well developed and often provides habitats for rare decay-dependent species. Where this natural evolved survival strategy occurs and conditions are favourable, further episodes of crown growth following branch breakage or localised dieback can sometimes enable the ancient stage to be the longest of a tree's life.[80,87]

3.1.8 Hollow trees can be healthy and structurally strong

A mature tree trunk is generally mostly composed of non-living wood, often with a small cross-sectional area of living outer sapwood. Provided the roots can function with healthy soil and mycorrhizal associations and the branches are not too shaded or damaged, functional sapwood supports the tree's

survival needs. When trees are old and large enough, they tend to be naturally colonised by a wide array of decay fungi, many of which digest and alter the wood quality. In this process, fungi are key organisms that create veteran tree habitats. The rate of decay and wood breakdown can be slow and generally takes place over many years, making conditions suitable for a succession of colonising organisms that establish and interact, each with their specialist lifestyles occupying different substrates.

Hollowing does not necessarily weaken old trees provided their height to diameter ratio is sufficiently low, and their capacity for adaptive growth remains sufficient to compensate for the loss of internal wood through decay.

These characteristics, together with relatively short stature and low wind resistance, are often found in ancient and other veteran trees, because of the continued increase in trunk girth after the crown has ceased to grow in height, having perhaps lost some height through natural retrenchment or management. Old hollow trees are often found still standing after storm events, while nearby solid-stemmed younger trees may be found uprooted.

Regrown pollard trees with reduced crown height may similarly resist uprooting, although some species may be more susceptible to shedding large pollard branches when management has lapsed over many years.

3.1.9 Trees naturally incorporate decay

> **'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 compartmentalized.'[88]**

We may think of a dead branch on a tree as a sign of ill health, but in the majority of cases this is an incorrect interpretation. Branch death and shedding are features of tree growth and ageing, and when occasional rather than extensive, they are normal and evolved survival strategies. Trees, when wounded (e.g. from storm damage), have a highly developed capacity to adapt by protecting the organism as whole. Dead branches, cavities and decay are normal features and a healthy tree generally responds by producing new wood where required for strength and support. Additionally, a tree has a capacity to compartmentalise (i.e. 'wall off') decay and grow new functional, healthy woody tissue around dead and decaying wood. This inherent response has evolved to such an extent that old trees can have trunks that are hollow throughout their length and enormous branch cavities, with no detriment to their health, particularly when the outer living sapwood has not been unduly damaged or compromised.

3.1.10 Roots are easily damaged

Roots are essential to tree survival, anchoring the tree and drawing water and nutrients from the soil enmeshed with billions of microorganisms, all of which have a role to play in healthy below-ground ecosystems.[89,90]

While it is easy to have some idea of how a tree functions above ground, much of the tree's life takes place below ground, within and around its roots. Here, special interactions take place, many of which remain poorly understood. Having evolved slowly and gradually over millions of years, trees and their roots are not particularly adapted to relatively rapidly changing human impacts and disruption that, for example, are found in some urban soils, or conditions that produce compaction, physical disturbance and severance (e.g. building works and utility trenching). Being hidden from view, roots are often unintentionally damaged and, in extreme cases, this can have severe consequences for anchorage and tree health. Such damage tends to be progressive, and while the first visible indications may occur soon after damage, they often only become evident some years or decades later, when the crown shows poor leaf condition and dieback.[91] Being underground, invisible and with growth patterns that do not obviously equate to the structure of the crown, small diameter roots can assume far greater significance than is commonly appreciated. Unlike damage to small branches, damage to small-diameter roots can have serious health and vitality consequences for the entire tree over time.

3.1.11 Trees live long lives

The tree is a highly evolved, resilient plant system that combines an ability to achieve self-supporting mass and to dynamically adapt to the forces of nature. Trees are specialised for survival over periods of time that far exceed human lifespans. Ageing in trees is typically accompanied by different expressions of rejuvenation, such as where new growth comes to occupy the space created as live growth dies back, declines or changes. Rather than in decades, tree lifespans are frequently measured in centuries and, in some cases, even in millennia. Given our relatively short lives compared with most species of trees, it is easy to see why tree longevity receives inadequate consideration in their management.[87]

3.1.12 Trees do not need people

As many as 2000 species of British invertebrate fauna (~6%) depend on other species that, in turn, depend upon decaying wood habitat for part of their life cycle.[92] These habitats are naturally generated through the ageing process and are the very features that are also commonly thought of as structural 'defects' and, by some, as equating to hazards in trees. It would be wrong to

believe that management intervention is generally necessary, either for safety or for the tree's benefit. Trees have their own inbuilt mechanisms for dealing with damage and decline. ***It is only where there is a close association between humans and trees that tree failure takes on safety significance, and that the concepts of hazards and risk from trees have any meaning.*** Sections 4 and 6 explore the reality of the risks posed by trees and ways in which to achieve a balance between conserving their important qualities while managing risks at a reasonable and acceptable level.

4

Understanding the risks from trees

From time to time, duty holders (for example tree owners, managers or local authorities) may feel under pressure to follow a risk-averse approach. It was in this context that the NTSG was originally formed to help reduce unreasonable pressure, through building an industry consensus regarding what constitutes a balanced understanding of risk and how this can be reasonably achieved.

Trees grow in many different situations that are subject to widely varying levels of public access or other human activity. Where appropriate, management should seek to enhance tree-related natural and societal benefits while reducing negative impacts such as risks to human safety and property. In those rare incidents when a tree falls and kills or severely injures a person, specific court cases, along with media interest, can generate public concerns that call into question how a duty holder is to arrive at rational judgements for reasonable public safety. Understanding what are the 'real' rather than imagined or unwittingly overstated risks is an important principle underpinning rational risk management.[82]

The inherent value and enjoyment derived from being exposed to nature and the experience of trees is impossible to fully comprehend or quantify. People accept a measure of risk from nature, whether managed or in the wild state. However, human safety needs to be considered and, while management should not seek to eliminate all risk, neither should people be exposed to an unacceptable risk of serious harm.

Where there is a duty holder under the guidance of the HSWA, it is generally accepted that tree safety management should reduce risk to a level that is as low as reasonably practicable (ALARP). This does not require the elimination of all tree-related risk or even to reduce risks to the *lowest level possible*, but rather involves striking a reasonable balance between the costs and the benefits of risk reduction. To arrive at a reasonable balance, risk controls should take into account the level of risks on one hand and, on the other, the potential costs – in terms of time, trouble or money – to reduce those risks to an acceptable level. This derives from a workplace legal judgment, Edwards v National Coal Board (as quoted in the Introduction, page 6).

The HSWA applies not only to employer–employee relationships but extends to the safety of those not directly employed or impacted by the nature of the duty holder's undertaking (e.g. a council maintaining its tree stock in an urban area). The majority of people apply good common sense and make

sound judgements about safety in everyday life; however, poor practice and inappropriate decisions do occur. A better understanding of tree-related risk, the elements of risk exposure and reasonable safety practice is required to assist duty holders in making sound, cost-effective risk-control decisions. Such an approach will contribute to the duty holder meeting their responsibility for reasonable, balanced and proportionate decision making, while simultaneously safeguarding the natural asset.

4.1 Considering risks and benefits

In seeking to understand how to make decisions that avoid unreasonable and unnecessary sacrifice of tree-related benefits, both risks and benefits need to be considered in the context of what is material, that is, those that are more than trivial or fanciful (Section 1.1). Risks need to be assessed and effectively managed, but this does not mean that safeguarding tree-related benefits that contribute to amenity, conservation and the environment should be neglected. Instead, where reasonably practicable, measures to control risks should be adopted that do not entail an unnecessary loss of benefits (Section 2). However, in some circumstances, adequate control of tree-related risks will necessitate tree reduction or removal and, along with this, unavoidable loss of benefits.

Integrating management of risk *to* and *from* trees provides the most cost-effective approach, because protection of the benefits gives motive and resources for management, while there is both a moral and legal obligation to assess and protect the safety of those who may be at risk from structural tree failure. There can be no grounds for avoiding these obligations, but it is important to emphasise that it is the likelihood of somebody being underneath the tree when it falls (or sheds a branch) that is the key to understanding the safety risk, just as much as the state of the tree itself. In some circumstances, where adequate control of tree-related safety risks necessitates tree intervention, this may result in an unavoidable loss of benefits. This would not be the case where risk assessment had shown there was a very low risk of serious harm.

The process of assessing the risks and benefits and making safety management judgements should consider the following factors:

- The level of risk of harm from observed hazards in the context of site circumstances and occupancy.
- The benefits.
- Ways to manage risks as low as reasonably practicable without disproportionately diminishing benefits.

For example, a large mature tree in an urban park that has been competently inspected is considered to present a level of risk to the public such that some management is required. It is recognised that people benefit from the tree as a natural feature, which is linked to the reason as to why they visit the park. Options for management include removing the tree, severe or light pruning, or avoiding treating the tree directly while reducing access to the vicinity. A poorly considered assessment of risk can lead to management decisions that result in either, on one hand, an unnecessary loss of amenity and habitat, or on the other, failure to properly control the level of risk to human safety.

4.2 Defining risk

The Royal Society of London proposes a general definition of risk as 'the probability that a particular adverse event occurs during a stated period of time' (The Royal Society of London, 1983, p. 22).[93]

The Health and Safety Executive define risk as '… the chance that someone or something that is valued will be adversely affected in a stipulated way by the hazard ('Reducing Risk Protecting People') (HSE, 2001, p. 6).[94]

Taking these two definitions together, risk refers to the likelihood (or probability, or chance) of a specified harm (injury, fatality or damage) occurring during an identified period of time.[94] This can be applied to overall, generalised risks or to specific risks in a particular place at a particular time.

From an organisational point of view, risk has been further defined as the effect of uncertainty on objectives (ISO 31000).[13] This recognises the fact that the world is an uncertain place and outcomes that we try to plan are often unpredictable with positive or negative results – or even both in some cases. The ISO 31000 introduction of the effects of uncertainty on organisational decision making draws attention to how we use systems when assessing and managing risks, and the need to be aware of the advantages and limitations of those systems.

The effect of uncertainty on objectives is important when considering an integrated approach to risk management. The objectives of tree management commonly include conservation, implicitly or explicitly, and relate to controlling risks to the trees themselves, along with tree safety. For example, consider the management of trees alongside a railway: an integrated approach will be driven by multiple objectives that, together with passenger safety, include the maintenance of environmental benefits and avoidance of unnecessary delays. Each of these objectives has a measure of uncertainty and this poses risks to the fulfilment of the organisation's objectives.

The assessment of tree-related risk considers the likelihood of death, injury or damage to property from tree failure. Risk occurrences may be expressed in terms of a 'source' (a tree or part of a tree), a 'potential event' (the loss of a branch), 'consequence' (type of harm to person or property) and a 'likelihood'. The final component 'likelihood' (or probability) is an essential element in risk assessment, which needs to examine both the probability of failure and the presence of targets.

With risks in relation to trees, we consider the likelihood of harm occurring within an *identified period of time*. To make reasonable decisions, a distinction is drawn between 'hazards' (things with the potential to harm) and 'risk' (the actual likelihood of the hazard causing harm). While we know that every tree must eventually fall, it is only by an evaluation of the period of time in which this is likely to happen and the chance that somebody will be underneath it that we are able to sensibly assess and respond to those risks that are sufficiently serious to warrant management. A common problem for those managing risk on a day-to-day basis is that they can lose sight of the risks and be drawn into seeing only the hazards.

Our systems and practices need to be geared to finding trees that pose a reasonably foreseeable risk of harm and, in particular, among those, the ones that may present an unacceptable risk. Systems (i.e. principles, methodologies, procedures, recording) need to be able to distinguish particular trees from the majority and to respond appropriately when they present specific risks. While systems are important, so is judgement. To avoid losing sight of the real objectives involved in managing trees for public safety we must guard against the complacency that can arise from habitual processes. We need to consider first the trees' location in relation to people and property, and then, where there is sufficient occupancy and proximity, assess their condition (this is explored further in Section 6).

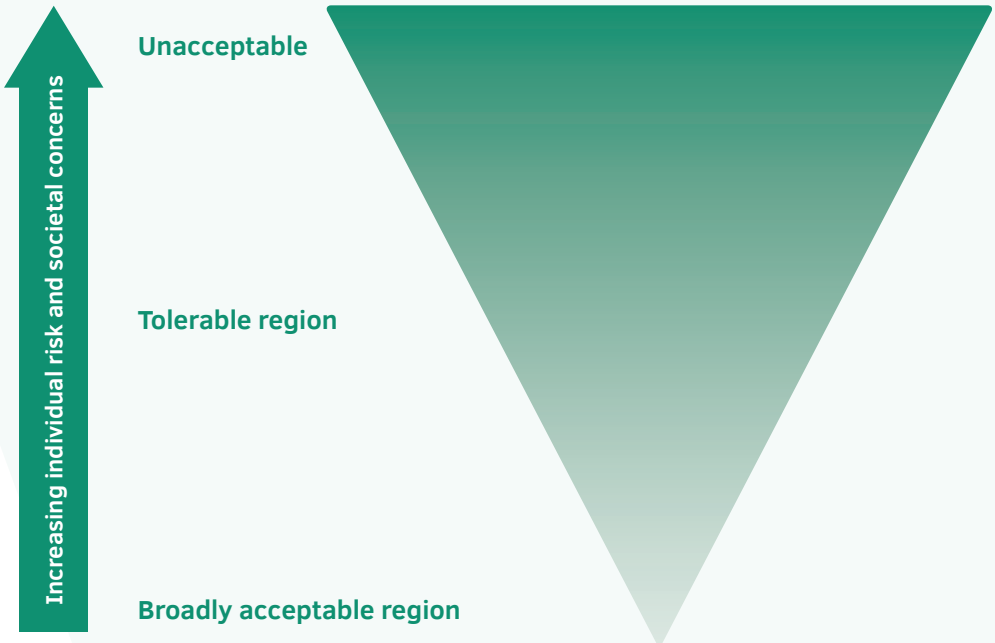
4.3 Risk tolerability

When assessing a tree, owners and managers need to judge whether the management measures they adopt will fulfil society's reasonable expectations. When considering risk tolerability there needs to be a reasonably judged understanding of the current risk, what level we aim to achieve and the effort this would entail. Reasonableness, which incorporates consideration of proportionality, is a key legal concept in both criminal and civil law when considering the risks from trees to the public and tree owners' obligations. When deciding what is reasonable, both local circumstances and the wider management objectives will influence risk management.

To illustrate the relationship between the likelihood of harm and the response expected of duty holders, the HSE developed the Tolerability of Risk (TOR) framework in their seminal document, ***Reducing Risk, Protecting People***.[94] The framework describes three regions of risk: ***unacceptable, tolerable*** or ***broadly acceptable***, defined by the annual risk, in terms of a ratio of one individual to the overall population dying as a result of exposure to a particular hazard. These regions are then used to inform management decisions.

In the TOR framework (Figure 4.1), the lighter zone at the bottom represents the broadly acceptable region. Risks falling into this region are generally regarded as insignificant and adequately controlled. The HSE, as regulators, would not usually require further action to reduce risks unless reasonably practicable measures are available. They state that '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. Nonetheless, we would take into account that duty holders must reduce risks wherever it is reasonably practicable to do so or where the law so requires it.'[4]

Figure 4.1 Tolerability of Risk (TOR) framework.



The same document states that the 'HSE believes that an individual risk of death of one in a million per annum for both workers and the public corresponds to a very low level of risk and should be used as a guideline for the boundary between the broadly acceptable and tolerable regions.'[94] The risk from trees in general is much lower than that figure, at around one in 15 million (Figure 4.2).

It would not be appropriate to rely on the overall low probability of fatality, based on national statistics, when considering the frequency and rigour of tree inspection. This will be informed by individual circumstances of the trees within a specific locality for which a duty holder has responsibility.

According to the principles of the TOR framework, risk management as applied to particular trees, would mean that:

- where trees present a ***broadly acceptable*** risk, no risk management intervention would normally be expected (unless there is another management objective);
- where trees present a ***tolerable*** level of risk, a risk-assessment process would support decisions with the aim of controlling risks as low as reasonably practicable within the context of the benefits those trees provide;
- where the risk is deemed ***unacceptable***, control measures would apply to deter, prohibit or otherwise reduce exposure of the hazard to achieve an acceptable level of risk (such as preventing access to the affected area, pruning or other tree work, or tree removal).

> **It is important to recognise that, while the overall risk from trees to society is extremely low, the risk posed by any particular tree can, in rare instances, be extremely high.[8]**

4.4 Level of risk in the UK

Risk management is context specific, that is, landowners and duty holders are required to make management judgements about the trees for which they are responsible in their locality. Nonetheless, to obtain an informed perspective on the risks, it is helpful to refer to national data.

Research on behalf of the NTSG[95] explored the overall level of risk to human safety from trees. The evidence demonstrated that the average individual fatality risk from a falling tree to the UK public during 1999–2008 was less than ***one in 10 million per year***.[96] Drawing on subsequent data over the longer period 1997–2021,[97] the level of risk was calculated to be ***one in 15 million per year***.

This overall low level of tree-related risk is likely to be due, in part, to the inspection, care and management by owners, duty holders and advisors across the UK over decades.

As previously mentioned, in those rare circumstances where tree risks may be extremely high and result in a serious accident, such events often attract media interest and influence public perceptions about threats from trees.[8,98–100]

However, NTSG-commissioned research found that there was no evidence of widespread public concern.[101] People normally regarded such risks to be among those ordinary, everyday risks of life. Given these low levels of overall societal risk, a sufficient reason is warranted when considering additional or alternative management that might result in a corresponding improvement in public health and safety. Nationally, while the management of trees needs to deal with specific high-risk trees, it also needs to respond reasonably to this, along with the demands generated by the widespread societal interest in the conservation and protection of trees.

The individual risk of death attributable to trees is 15-fold less than the threshold of one death in 1 million per year that the TOR framework suggests people regard as insignificant or trivial in their daily lives. Because trees present a very low overall risk to people, owners and duty holders should be confident about making strategic decisions that avoid unnecessary intervention, survey and cost. As already set out above, this in no way reduces their requirement to assess levels of occupancy and any related foreseeable risk to human safety from specific trees in particular contexts and take appropriate management action.

4.5 A comparison of risks of injury and death

From 2000 to 2010, with regard to non-fatal injuries, the number of accident and emergency cases attributed to being struck by trees (~55 per year) is very small compared with the number of leisure-related accidents (~2.9 million per year).

Footballs (262 000), children's swings (10 900) and wheelie bins (2200) account for far more accidents than trees.

Figure 4.2 Annual risk of death from various causes averaged over a specified population.

All causes
1 in 107
Office for National Statistics UK (2018): **616 014** deaths

Cancer
1 in 400
Cancer Research UK (2017): **165 000** deaths

Accidents/external causes
1 in 3100
Office for National Statistics (2017): **21 226** deaths in total population

Forestry & arboriculture – operators undertaking tree work
1 in 12 000
HSE AFAG paper[102] (2016–21): **15** fatalities[103] in an estimated workforce of 37 000 (average **3 per annum**)[104]

Transport
1 in 37 000
Department for Transport to June 2018: **1770** transport-related fatalities in year

Lung cancer from radon in dwellings
1 in 60 000
Public Health England (2010): based on an estimated **1100** deaths per annum in the UK

London marathon
1 in 72 000
Average risk per race (1986–2018)[105]

Workplace accidents
1 in 200 000
From HSE's workplace fatal injuries in Great Britain (2021–22): **123** fatalities in a 24.6 million workforce

Fire-related
1 in 260 000
Home Office: **253** fatalities (2018–19)

Falling trees & branches
1 in 15 000 000
Average **4.5 per annum** for the UK (1997–2022)[96,97]

Lightning
1 in 71 000 000
Average **less than 1 per annum** for the UK (2007–16)[106]

Note: Based on a table originally published by the HSE,[94] this is an updated version with contributions from D. J. Ball and J. Watt of Middlesex University's Centre for DARM, Mark Daniels (tree failure data – see ntsgroup.org.uk) and the authors.

4.6 The public perception of risk

In the decade since the first edition of the NTSG guidance, public interest in trees and their conservation has grown considerably. There are many examples of local concern following the removal or the threat of removal of trees on the grounds of health and safety. The strength of feeling regarding this could deepen as more people realise that trees of significant stature and numbers are threatened. Local authorities have a legal duty to consult over local public interest matters over which they hold control. In the instance of trees, this may promote debate among stakeholders including local residents, and enable a two-way communication process that considers the advantages and disadvantages of retention or removal.

The efforts of ongoing risk management by many professionals and landowners, along with factors such as the low likelihood of the public being around trees in extreme weather, contribute to the low overall level of risk from trees.

Similarly, as a consequence of the overall low risk of harm that they present, trees are not known to invoke societal concerns: on the contrary, there is more public desire for the retention and preservation of trees, and societal concerns are triggered when trees are felled, sometimes on alleged health and safety grounds or for infrastructure, development or other reasons.[96]

4.7 Strategic approach to tree management

There are many reasons for managing trees, including for public safety. Where trees are grown for timber, they are usually felled as part of routine operations before completing their natural life cycle. This also applies to other commercial operations such as public utilities that incorporate trees on their site. All trees contribute some level of social and environmental benefit and, where it is possible to retain them to complete their life cycles, they will continue to contribute these benefits.

While the scale and context may vary, having a reasonable management framework appropriate to the circumstances will inform a management policy. This may be either implicitly adopted or explicit and formal. The implementation of the policy will include sensible tree safety management, which will be one part of an overall tree-management strategy.

The vast majority of UK local authorities that employ Tree Officers have in-house arboriculturists to manage the tree stock. They, along with large tree-owning NGOs, have policies and systems to address responsibility for their legal duty of care and for ensuring a sustainably managed stock.

These systems include proactive tree inspections, systems for zoning according to occupancy levels, and managing tree work contracts that include replacement tree planting and maintenance following tree removal.

Organisations that maintain a tree strategy or management plan, part of which includes information regarding their risk-management plan for the trees they own, are better placed to demonstrate that they have fulfilled their duty of care. In the view of the NTSG, following an incident, the existence of a tree safety strategy that reduces the risk to as low as reasonably practicable should help protect the duty holder against litigation. It is important to note that this is an emerging area within the field of managing safety risks to the public.

5

Trees and the law

Note that the cases referenced throughout this section are indicated by superscript letters, full details for which are listed at the end of the section.

Tree owners have a legal duty of care. Under both the civil law and criminal law, an owner of land on which a tree stands has responsibilities for the health and safety of those on or near the land and has potential liabilities arising from the falling of a tree or branch. 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 a failure to discharge a duty under the Health and Safety at Work Act 1974.

This section sets out the legal framework in respect of an owner's liabilities for injury to others caused by the falling of a tree or branch in England, Scotland, Wales and Northern Ireland. There are slight differences in terms of how the law in each country deals with trees and liabilities with respect to safety and the duty of care arising from tree-related incidents (see the Acts below). In general, due to a lack of case law in Scotland and Northern Ireland, much of the case law cited is from England and Wales. The advice given below 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.[107]

5.1 The role of this guidance within the legal framework

This document, supported by a wide range of stakeholders involved in the ownership and management of trees, sets out the health and safety obligations of those who are responsible for trees. It also provides guidance on the checking, inspection and maintenance of trees that is reasonable and proportionate to the generally low risk posed by trees, and to the benefits of trees. This document may be presented to a court for consideration as supporting documentation in any case involving death or personal injury caused by a falling tree or branch. Reported judgements already demonstrate that courts will consider publications of this nature when addressing the duty of care.

The first edition of this NTSG publication was considered by the High Court in the case of *Stagecoach South Western Trains v Hind* [2014] EWHC 1891 (TCC), along with the HSE Sector Information Minute (SIM 2007).[8,a] In the case of *Witley Parish Council v Cavanagh* [2018] EWCA Civ 2232, the court focused its attention on the 2000 Forestry Commission Practice Guide, *Hazards from Trees: A General Guide*.[3,b]

It must, however, be appreciated that the guidance in 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.

5.2 The criminal law

The Health and Safety at Work Act 1974 (Section 3(1)) states that 'It shall be the duty of every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not exposed to risks to their health and safety'. This places a duty to ensure, so far as is reasonably practicable, that in the course of conducting their undertaking, members of the public are not put at risk (see also Section 2 of the Act in respect of employees and Section 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.

Whether a particular activity is part of the conduct of the undertaking is determined by the facts of each case (R v Associated Octel Co. Ltd (1996) 4 All E R 846). Although not decisive in every case, whether the duty holder can exercise control over both the conditions of work and where the activity takes place is important. See also: Scope and application - Health and Safety at Work Act 1974 - Section 3: Enforcement (www.hse.gov.uk/enforce/hswact/scopeapplication.htm)

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 that can be taken to reduce a risk. The courts have, in general, 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.[c]

The Management of Health and Safety at Work Regulations 1999 require every employer or self-employed person, 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, or a self-employed person, to undertake a risk assessment of the tree stock on the land that 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 HSE and, in some instances, local authorities. The HSE has provided guidance for its inspectors and local authority enforcement officers in connection with the inspection of trees.[6]

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). While there have been six prosecutions under HSWA, there have been no prosecutions for manslaughter in respect of falling trees.

5.3 The civil law

The owner of the land on which a tree stands, together with any party who has control over the tree's management, 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 that cause a reasonably foreseeable risk of injury to persons or property.

If a person is injured by a falling/fallen tree or branch, potential causes of action may arise against the owner or occupier of the land on which the tree was standing at the time of the incident – where the injured person was on that land, under the Occupiers' Liability Acts of 1957 or 1984 (OLA 1957, OLA 1984) or, otherwise, in negligence, for a breach of the general duty of care, and in the tort of nuisance. For Scotland, see the Occupiers' Liability (Scotland) Act 1960. For Northern Ireland, see the Occupier's Liability (Northern Ireland) Act 1957 and Occupier's Liability (Northern Ireland) Order 1987.

5.4 Negligence

5.4.1 The duty holder

The duty of care is owed by the person who has control of the tree's management, 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.

5.4.2 The person to whom the duty is owed

This is any person who can be reasonably foreseen as coming close enough to a tree that they might be injured or otherwise harmed by a fall of the tree or a branch from the tree. Those using highways, footways, footpaths, bridleways, railways and canals are likely to come within striking distance of trees on such land or on adjacent land. In public spaces, and semi-public spaces such as churchyards and school grounds, those working in or visiting them can be expected to come within range of falling trees or their falling parts. On private land, visitors and employees – and even trespassers – can be expected to come within the range of trees.

5.4.3 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'.[d] The tree owner is not, however, expected to guarantee that the tree is safe, and only has to take reasonable care, such as could be expected of the reasonable and prudent landowner. Such a landowner does not have to take all possible safety measures, only those measures that are reasonable.

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 branches 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.[e] However, assuming that 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, in respect of trees planted under Section 96 of the Highways Act 1980, the highway authority is required only to take 'reasonable' care. A highway authority also has the power under Section 154(2) of the Highways Act 1980 (see also the s. 91 Roads [Scotland] Act 1984) to require trees growing on land adjacent to the highway that 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.[f] 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 that is found to have been dangerous (i.e. to have posed a significant hazard).

It is the duty holder's fundamental responsibility, in taking reasonable care as a reasonable and prudent landowner, to consider the risks posed by their trees. The level of knowledge and the standard of inspection that must be applied to the inspection of trees are 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.

5.5 The standard of inspection

The courts have not defined the standard of inspection more precisely than the standard of 'the reasonable and prudent landowner'. They acknowledge that this standard is harder to define in a real-life situation than it at first seems. It relies on the landowner possessing a degree of knowledge about trees that is less than that held by a professional arboriculturist, but greater than that of an ordinary urban layperson or even a resident of the countryside with no direct responsibility for their care or knowledge of tree defects.[g]

In individual cases, the courts have sought to apply this general standard to the facts of each case.[h] However, there is no clear and unambiguous indication from the courts in regard to the extent of the knowledge about trees a landowner is expected to bring to tree inspection or as to the type and regularity of inspections. Regular inspections should be carried out so that apparent defects can be identified and an appropriate response undertaken. Once made aware of a defect in a tree or trees, the courts expect a landowner to obtain the advice of a person with appropriate expertise on what action to take in respect of the risk presented (unless, of course, the landowner has sufficient expertise themselves). To some degree the courts appear to indicate that the standard of inspection is proportional to the size of and resources available (in terms of expertise) to the landowner.[i–m]

In Section 6, a hierarchy of inspections is set out, with each type of inspection defined. This hierarchy is not one that has been formulated by the courts, but is one that is considered by the NTSG to be consistent with the general principles set out by the courts. The decisions of the courts do, however, often depend on the particular facts of each case.

The following guidance was given by the High Court in 2014[n] (in ***Stagecoach South Western Trains v Hind***) in respect of a householder whose tree grew adjacent to a railway (Case A), and has subsequently been applied by the Court of Appeal[o] in ***Witley Parish Council v Cavanagh***, in which a parish council owned a tree adjacent to a busy road (Case B). The principles relating to a landowner's duty in respect of trees were summarised as follows:

a. 'The owner of a tree owes a duty to act as a reasonable and prudent landowner.

b. Such a duty must not amount to an unreasonable burden or force the landowner to act as the insurer of nature. But he has a duty to act where there is a danger which is apparent to him and which he can see with his own eyes.

c. A reasonable and prudent landowner should carry out preliminary/informal inspections or observations on a regular basis.

d. In certain circumstances, the landowner should arrange for fuller inspections by arboriculturists. This will usually be because preliminary/informal inspections or observations have revealed a potential problem, although it could also arise because of a lack of knowledge or capacity on the part of the landowner to carry out preliminary/informal inspections. A general approach that requires a close/formal inspection only if there is some form of 'trigger' is also in accordance with the published guidance referred to in the Stagecoach Judgment (paragraphs 53–55).

e. The resources available to the householder may have a relevance to the way in which the duty is discharged.'

The householder in Case A was found not to have been negligent in circumstances where she had some knowledge of trees, had carried out informal visual observations, and had caused tree surgeons to carry out works to her trees, but had not identified decay in the trunk of the tree in question because it was covered by ivy; the tree otherwise appeared to be entirely healthy. Conversely, the parish council in the circumstances of Case B was found to be negligent where it had not arranged for a formal two-yearly inspection of a large mature tree that could fall onto a busy road. Had the inspection been carried out, in the opinion of the Court, it would have identified a fungal bracket some 300 mm above ground level that had appeared shortly after the last inspection and, which, it was argued, was indicative of internal decay.

Of fundamental importance in deciding upon an inspection regime is the extent of the risk posed by the tree in the event of it failing. If it is unlikely to harm a person, then the frequency of inspections can be of a low order or, in a woodland setting or areas where there is no access, it may be decided not to undertake any inspections. Whereas, if there is a high risk of injury to people, then the frequency of inspections should be greater. Similarly, the greater the

risk then the more important it becomes to ensure that the person inspecting has sufficient knowledge to identify defects that are capable of being seen. A dutyholder with a large landholding can rely on inspections undertaken by contractors or employees, suitably trained or experienced, who have a working knowledge of trees and their defects, but who need not be an arboricultural specialist (see footnote[a] and other cases[p]). A householder with a reasonable knowledge of trees and the ability to identify obvious or apparent defects, and dangers, can rely upon informal and regular inspections.[q] An 'obvious' or 'apparent' defect, or sign of instability, can reasonably be described as one that can physically be seen and which can also be identified as a potential defect or sign of instability.

5.6 Breach of duty

For liability to be established in negligence there must have been a breach of the duty owed by the landowner to the injured person. In cases where there has been a failure to inspect the tree at all, the court will have to consider whether the defect that caused the tree to fail would have been apparent to the inspector if an inspection had been carried out.[r] In other words, the court must be satisfied that there has been a breach of duty that caused the injury or damage consequent upon the failure of the tree.

Where a tree has been inspected in accordance with a tree-management policy, and the issue concerns whether the inspection was carried out with reasonable care in those particular circumstances, then, if the inspection was carried out by a trained/qualified tree inspector, the test is that of an ordinarily skilled tree inspector. Such a test has been applied in three cases in which the inspector was acting on behalf of a large organisation (Bowen v National Trust [2011] EWHC 1992 (QB), Parker v National Trust [2021] EWHC 1589 (QB) and Hoyle v Hampshire CC [2022] EWHC 934 (QB)).

5.7 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 (for Scotland, see The Occupiers' Liability [Scotland] Act 1960; for Northern Ireland, see the Occupier's Liability [Northern Ireland] Act 1957). 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/she is invited or permitted by the occupier to be there.'[s] 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, the Countryside and Rights of Way Act (CROWA) 2000 or the Marine and Coastal Access Act 2009 is not classed as a 'visitor' within the meaning of OLA 1957.[t] They cannot, therefore, bring a claim under the OLA 1957. However, they may still potentially bring a claim in negligence or, if appropriate, under OLA 1984.

5.8 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 their 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. For Northern Ireland, see the Occupier's Liability (Northern Ireland) Order 1987.

The duty under Section 1 of the Act to a person on 'access land' in the exercise of a right to roam conferred by Section 2(1) of CROW A 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.[u]

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), or from any river, stream, ditch or pond,[v] providing that the occupier does not intentionally or recklessly create the risk.[w]

5.9 Warning notice

A warning notice that warns of a specific hazard posed by a tree (or trees) may be sufficient to absolve an occupier from liability in that they may, by such notice, have taken all reasonable care for the visitor's safety in the circumstances.[x] However, in general, a landowner should not rely upon warning signs alone to protect against a hazard. 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,[y] save where the access to the land is given for educational or recreational purposes (unconnected with the purpose of the business).[z]

5.10 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. While the Act reinforces the importance of being able to balance the amenity, health and other intrinsic biodiversity values of trees against the risk posed by a tree, it is uncertain whether it will materially alter the courts' approach to claims arising from falling trees. The Act only applies to civil claims and not to criminal prosecutions. It is, however, of note that in the County Court decision of Colar and Singh v Highways England the Judge stated 'There are compelling biodiversity and aesthetic reasons to have our main carriageways lined up with trees. The courts should not seek to interpret the duties to which a highway, or another public, authority is subject in a way which may undermine the importance of those reasons. While this 'public interest' consideration must always be in a judge's mind, so must the principle that these duties are important duties, designed to protect the public. They must be performed and discharged properly and while, of course, they are delegable, there must be an element of monitoring retained by the highway authority to ensure that they are discharged properly.'

Cases:

a. The HSE Sector Information Minute (SIM): Management of Risks from Falling Trees (2007) sets a standard for public authority landowners below which there may be criminal liability. The relevance of the HSE SIM to civil liability has been questioned by the Court of Appeal in Witley Parish Council v Cavanagh [2018] EWCA Civ 2232, while also being found to be relevant in the Court of Appeal judgement in Micklewright v Surrey County Council [2011] EWCA Civ 922, and in the High Court in Stagecoach South Western Trains v Hind [2014] EWHC 1981 (TCC).

b. Forestry Commission Practice Guide, Hazards from Trees: A General Guide (2000) (mention that 2024 revision is in press?)
c. Hampstead Heath Winter Swimming Club v The Corporation of London [2005] EWHC 713 (Admin) paragraph 65 (contrast with s. 1 of the Compensation Act 2006 in respect of civil claims).
d. Caminer v Northern & London Investment Trust Limited [1951] AC 88.
e. Chapman v Barking and Dagenham LBC [1997] 2 EGLR 141.
f. [1996] AC 923.
g. Caminer v Northern & London Investment Trust Limited [1951] AC 88 at 100.
h. 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 28 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 13 July 1998 (1st instance [1997] 2 EGLR 141); Poll v Viscount Asquith of Morley 11 May 2006; Corker v Wilson 10 November 2006; Atkins v Sir James Scott 14 August 2008; Selwyn-Smith v Gompels 22 December 2009.
i. Chapman v London Borough of Barking CA 13 July 1998.
j. Quinn v Scott [1965] 1 WLR 1004.
k. Poll v Viscount Asquith of Morley 11 May 2006; Atkins v Sir James Scott 14 August 2008.
l. Caminer v Northern & London Investment Trust Limited [1951] AC 88.
m. Corker v Wilson 10 November 2006; Selwyn-Smith v Gompels 22 December 2009.
n. Stagecoach South Western trains v Hind [2014] EWHC 1981 (TCC).
o. Witley Parish Council v Cavanagh [2018] EWCA Civ 2232.
p. Micklewright v Surrey County Council [2011] EWCA Civ 922; Atkins v Scott (14 August 2008; Aldershot & Farnham County Court; HHJ Hughes QC); Maclellan v Forestry Commission (15 October 2004; Nigel Wilkinson QC; Bristol District Registry).
q. Stagecoach South Western Trains v Hind [2014] EWHC 1981 (TCC); Corker v Wilson (10 November 2006; Mayor's and City of London Court; HHJ Simpson QC); Selwyn-Smith v Gompels (22 December 2009; Swindon County Court; Recorder Adrian Palmer QC).
r. Micklewright v Surrey County Council [2011] EWCA Civ 922.
s. See also the Occupiers' Liability (Scotland) Act 1960.
t. s. 1(4) Occupiers Liability Act 1957.
u. s. 1A Occupiers' Liability Act 1984.
v. s. 1(6A) of the Occupiers' Liability Act 1984.
w. s. 1(6C) of the Occupiers' Liability Act 1984.
x. s. 2(4) Occupiers' Liability Act 1957.
y. s. 2(1) Unfair Contract Terms Act 1977.
z. s. 1(3) Unfair Contract Terms Act 1977.

6

Reasonable, balanced tree risk management

> **In general, civil law imposes duties upon owners of land with trees (and any party who has control over tree management) to take care for the safety of people and property within the vicinity of those trees according to the standard of a reasonable and prudent landowner.**

The legal framework for those responsible for trees is discussed more comprehensively in Section 5.

In criminal law, the Health and Safety at Work Act 1974 (HSWA) imposes responsibilities on duty holders for the safety of employees and others affected by their activities. This includes tree owners and managers, as they are the people best placed to assess the risk and take the necessary action to reduce it to a reasonable level. The HSWA obliges them to reduce the risk as low as reasonably practicable (ALARP). The law does not require the creation of a 'risk-free' environment. Section 3 of the HSWA, referring to duty holder liability for those affected by the undertaking, only applies where there is a 'material risk' (i.e. more than trivial, fanciful or hypothetical).

Duty holders should assess the risks arising from their tree stocks and adopt reasonable measures to keep those risks as low as is reasonably practicable, including the frequency and level of detail for surveying their trees and the level of competence of those involved.

This section explores how these responsibilities can be met from a practical point of view.

When considering safety, what constitutes a 'suitable and sufficient risk assessment' referred to by the HSE will vary with context and take account of the trees, their condition, health and setting.[108]

> **'Public safety aspects can be addressed by tree owners as part of their approach to managing tree health. A sensible approach will ensure the maintenance of a healthy tree stock, the sound management of the environment and will usually satisfy health and safety requirements.' (HSE 2001)[94]**

Regarding the general low level of risk, the HSE states that 'Given the large number of trees in public spaces across the country, control measures that involve inspecting and recording every tree would be disproportionate to the risk. Individual tree inspection is only likely to be necessary in specific circumstances, for example, where a particular tree is in a place frequently visited by the public; has been identified, for example, as having structural faults that are likely to make it unstable, and a decision has been made to retain it with these faults.' (HSE 2013)[8]

Individual safety inspection and recording will apply to relatively few trees. However, regular assessments, including tree surveys such as those undertaken by local authorities and other managers of trees, operate across populations for a variety of reasons, which also include safety.

Among the many reasons why trees are managed, the safety of people and property is a fundamental consideration. When dealing with safety in regard to particular trees, what is required is a reasonable understanding of the actual risks posed by them together with an appreciation of their importance locally to people and the environment.

> **In a private garden, there is no presumption that it is reasonable to expect owners to do anything other than look for and react to obvious structural defects that pose a risk to people or property.**

When trees are managed primarily as a commercial crop, the focus is on planting, maintaining and harvesting them for the income they provide. In a simple model of a commercial forest, benefit can be equated to financial profit in the same way as in a factory or on a farm. In this case, one might expect a formal health and safety policy to address workforce and visitor safety including public rights of way. Where the level of risk to the public is low, much of the investment in risk control will be focused on worker safety. Whether low or otherwise, the management of risk of harm will be at the expense of profit. Such risk calculations are common to commercial operations with trees on their sites, including, for example, golf courses, railways and zoo parks.

However, the evaluation is more complicated when it comes to considering the risk to the public from trees that do not form part of a commercial asset in urban and rural environments. In many cases, such trees are looked after by local government, public bodies, NGOs, farms and large estates, and the cost of their overall management includes management for reasonable safety.

When it comes to the many benefits trees provide, these are enjoyed not only by their owners but also by the wider community, including those in their immediate locality. Despite this, when it comes to the duty of care and the associated costs of managing the risks posed by those trees, these are borne solely by the owner.

The NTSG recognises that it is inappropriate to claim that because trees provide benefits and the overall risk is low, there is no responsibility for their risk management. Instead, when considering specific trees, an approach to the assessment and management of risk is needed that both achieves reasonable safety and the avoidance of disproportionate costs and unnecessary tree losses.

Legal obligations, individual tree circumstances and the benefits those trees provide, all contribute to the context in which risks are managed. In situations where trees are extremely unlikely to fall on people or property (i.e. they pose a negligible likelihood of harm), tree-related risk controls will be unnecessary unless circumstances change. However, in those contexts where trees are considered to pose a significant risk, it is important to identify the elements of a suitable and sufficient risk assessment. The HSE SIM 2007 states that an 'overall assessment of risks from trees – identifying groups of trees by their position and degree of public access…will enable the risks associated with tree stocks to be prioritised, and help identify any checks or inspections needed.'[8] As trees are managed for a variety of reasons, what constitutes a 'suitable and sufficient risk assessment' will vary. Effective management will be informed by local context, tree condition, size and quality (Figure 1.2.)

6.1 Balance and proportionality

> **'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.' (HSE, 2001)[94]**

Proportionality is pivotal in this evaluation and can only be achieved by considering the place of trees in a wider management context and people's relationship to that context.

While tree safety checks, inspections and risk management are usually only a small part of an organisation's wider remit of responsibility, these may have implications for broader tree management. For example, carrying out tree safety checks, potentially leading to closer inspection, is identified as necessary within the guidance for highway authorities as part of their overall responsibility for public safety.[109]

6.2 Responsible management

Landowners who already sensibly manage their trees can be reasonably confident that there is no need for radical change driven by a fear of the law, although they may find this guidance useful when reviewing management practice. Responsible management should seldom result in large-scale tree

removal and/or pruning for safety reasons. No tree can be guaranteed to be safe. As long as we retain trees, we cannot achieve zero risk, but the risks can be managed to ensure that the residual risk is low.

A disproportionate response to the actual risks posed by trees introduces a different category of risk that can lead to unnecessary intervention, including tree loss. This can particularly affect trees alongside roads and within public places. Such a response risks losing the benefits provided by trees to the environment, landscape and society. These considerations need to be reasonably balanced with underlying legal responsibilities for managing trees in relation to public safety.

6.2.1 Essentials of a reasonable, balanced approach

The number of trees for which landowners are responsible varies enormously, as do the means available for their management. The NTSG guidance offers a framework for landowners to manage their trees reasonably, enabling them to establish a proportionate approach to practical tree management for the reasonable safety of visitors and passers-by. This approach is based on achieving a balance between the benefits that trees provide and the risks they pose to public safety. A proportionate approach will not require excessive risk management or undue intervention.

6.2.2 Defendable good practice

A key element of good practice is to ensure that trees that are valued are not unnecessarily lost. Good practice involves checks, potentially leading to closer inspections, and interventions as necessary for safety reasons while maintaining the quality of the tree stock. Good practice procedures do not need to be complicated; they can contribute informally to day-to-day practice or be incorporated within a formal proactive strategy. However, the overall low risk from falling trees must not obscure the reality that some trees nonetheless require safety management. Embedded in good practice is the duty for reasonable care: being reasonable involves taking actions proportionate to the risk of the particular circumstances. Good practice can include reactive and proactive aspects: while duty holders may need to react to events that have caused trees to become dangerous as they arise, it is also prudent to proactively plan the management of risks to maintain them as low as reasonably practicable (Figures 7.1 and 7.2).

6.2.3 Management strategies

A strategy is a plan for achieving stated objectives and it is a core aspect of good practice. At its simplest a strategy may be implicit. The effectiveness of a

strategy will likely be evident in the condition of the trees. Explicitly formulated strategies, typically for large tree populations, are expressed through documents that describe and record past and planned management practice. If reasonably carried out, the strategy should contribute to meeting the duty of care, without the need for an overly bureaucratic approach or excessive paperwork.

6.3 What is meant by 'hazard', 'harm', 'risk', 'defect' and 'obvious defect'?

6.3.1 Hazard

A hazard is an object, situation or condition with the potential to cause harm in particular circumstances. When applied to trees, any part (whether root, trunk or branch) that might fail and cause harm is a hazard. The consideration of safety involves looking at the likelihood of a particular hazard resulting in actual harm. Assessing hazards is an innate biological function that underpins human behaviour and survival. For most people this may be an intuitive process where obvious tree hazards are concerned; in other cases, specialist knowledge and methods may be required.

6.3.2 Harm

Harm is an adverse impact on something or someone. While societal or environmental harm may arise from tree loss, for the purposes of the NTSG guidance in relation to structural failure of trees, harm refers to injury or damage to people or property arising from a falling (or fallen) tree or branch. In the technical literature covering tree-related risk from falling parts, individuals or property that might be harmed are termed 'targets' and the area within a tree's potential falling impact range is referred to as the 'target area'[3] or target zone'. In this guidance we use these terms interchangeably.[2,3,4,8,97,110]

6.3.3 Risk

The assessment of risk from falling parts of trees considers the likelihood of tree failure and the character and severity of its consequences. As discussed in Section 4, risk is defined as the likelihood (probability or chance) of an adverse event occurring during a stated period of time and of someone or something of value being adversely affected in a stipulated way by a specific hazard (Section 6.3.1). Although all trees are potentially hazardous, the risk of harm at any given time is relative to the number and type of targets (e.g. people, buildings, cars and horses) within the falling impact range of the tree and the size and condition of the parts that are likely to fail. When considering risks from trees, the target area can be characterised according to the nature of occupancy

(e.g. pedestrians or vehicles). This is typically 'zoned' according to the level of usage (see the 'Occupancy' and 'Zoning' sections, page 71). If there is low occupation within the falling distance of the tree, there will be a low risk of harm from structural failure. This is more likely to be the case in rural and remote areas and less likely in urban tree populations. Large trees may present a higher level of risk than small trees in a high-use zone, but may represent a low or even negligible risk (regardless of defects) if they are growing in an area that is rarely used or that is inaccessible.

6.3.4 Defect

A tree defect is a condition or feature that would predispose a tree, or part of a tree, to structural failure. Not all unusual growth patterns or physical deformities are defects. In many cases, variations from a perceived norm may indicate adaptive and even strengthening responses and further assessment may be required to understand the nature of the feature and whether or not it represents a significant hazard. Deformities do not necessarily imply weakness and can be a normal adaptive response compensating for stresses that might otherwise result in breakage. Signs that might indicate a structural (although not necessarily hazardous) defect include heavy dead parts, splitting, weak or malformed branch attachments or forks, bark and wood fractures, soil cracks, root plate lifting, advanced decay, certain fungal fruit bodies, large old wounds and severe root damage. Combinations of defects can elevate their importance. Disease and declining health associated with waterlogging, extreme drought and soil compaction may, in turn, cause hidden defects that contribute to the impairment of structural strength and stability. So also may environmental changes, such as, for example, development impacts and sudden loss of surrounding protection from nearby trees.

6.3.5 Obvious defect

An obvious defect is a feature of a tree that can be easily seen and recognised as likely to present a structural hazard. Such defects could signify an impairment that may deteriorate over a long period of time or in rare cases indicate imminent structural failure. The courts and specialist literature often apply the term 'obvious' to tree defects that are apparent to a reasonable and prudent duty holder, and are likely to be recognised as such by most non-specialists. While obvious defects may include external indications of potential structural failure, they take many forms, not all of which are hazards that pose a risk of significant harm. Therefore, when considering the nature of a defect it is important to consider the immediate context and the likelihood that harm might arise from tree failure.

An example of an obvious defect that poses a serious risk of harm is a large tree over a busy road with a clearly failing substantial branch or root plate. The person conducting the safety inspection is looking for such obvious defects, particularly where harm could occur imminently. The duty holder is not expected to guarantee that any particular tree is safe but, when concerned and uncertain, should seek appropriate specialist advice. Features recognisable as structural defects frequently confer material habitat and wildlife benefits, and may harbour rare species (Section 3). Where there is a low risk of harm, the artificial creation of defects, termed 'veteranisation' features, may even be encouraged as a nature conservation management practice.

6.4 Framework for managing trees for public safety

A framework for decision making provides a sensible foundation for judicious care of trees, taking both positive values and potential adverse impacts into balanced consideration. Tree risk management is an important part of this. A clear framework contributes to reasonable and proportionate decision making. There is no single universally adopted tree risk management system. This is not surprising given the diverse considerations to be taken into account, such as the setting (including occupancy and zoning). A framework for tree risk decisions should be based on local priorities, taking account of the objectives for managing the particular tree/s and the target area. The initial observations will inform the nature, priorities and rigour of risk assessment. Depending on the context and scale of the tree asset, the framework may or may not be explicitly documented; however, record-keeping and formal review may serve an important role in management and proof of practice.

6.4.1 The context in which trees grow

Risk assessment is essential for reasonable tree safety management. Good management practice seeks to align the objectives of tree safety with other objectives considered important for trees in the context of their local setting, and social, landscape and environmental values. Such considerations, along with the allocation of available resources, are integral to making sensible management decisions that provide for reasonable public safety without the unnecessary loss of valuable and important trees (Figure 1.2). Understanding the context in which the trees grow and contribute to their setting is necessary if management is to discharge not only the safety duty but also avoid unnecessary tree loss or undue harm to the wider environment.

6.4.2 Occupancy

Occupancy, in relation to tree safety, refers to targets and describes the level of use by people and/or the presence of valuable property within the target areas of trees (see 'Harm' and 'Risk', page 68). If there is no current or foreseeable occupancy within the target area then there is low risk of harm from trees. An understanding of occupancy does not require tree expertise but, importantly, typically relies on local knowledge of the site. Such knowledge might also include an appreciation of tree size and how many people or structures could be affected at various locations. As circumstances change over time it may be necessary to revisit and review the trees and the levels of occupancy. Judgement and knowledge of the site are required to use the level of occupancy as a determinant of risk assessment.

6.4.3 Zoning

Zoning is a means of defining areas of land around trees according to levels of occupancy. It is useful for prioritising the allocation of resources to where risks are likely to be highest (i.e. areas of high occupancy). In some circumstances, just two zones, high and low use, may be considered sufficient.[6] Zoning is particularly useful where a new risk-management regime is being proactively implemented following a long period of little or no management input. Typically, high-use zones are frequented by many people every day, such as busy roads, railways or other well-used routes, car parks, or areas where people regularly congregate, or places where property may be affected. At some sites, duty holders (who may include landowners and managers) may deem it appropriate to designate more than two zones, ranging from intensely used areas, to areas with intermediate levels of use, to areas where occupation is so low that visiting and checking trees is deemed unnecessary. Areas in high-use zones where trees are considered liable to storm breakage may be identified for closer attention following high winds. It is important that whatever zoning system is adopted it is applied consistently. While multiple zones may be adopted for certain sites, the more zones that are included then the greater the complexity of the tree risk management system.

6.5 Tree safety assessment

Use of the terms 'check' and 'inspection'

Although most trees present an extremely low safety risk, there will be specific trees that present a high risk and, therefore, because a key objective of risk management is to cost-effectively deploy available resources, it is important to apply the appropriate type of assessment according to the context.

Criminal law guidance on the assessment and management of tree safety is provided in the HSE SIM 2007 (2013)[8] (addressed to HSE field operations directorate (FOD) inspectors and local authority enforcement officers). The guidance refers to the need, where appropriate, for 'routine checks' to be undertaken by a competent person (i.e. one with 'a working knowledge of trees and their defects, but who need not be an arboriculture specialist' (Appendix 1 of HSE SIM 2007 (2013))[8]. In a frequently visited zone this should involve proactively undertaking a quick visual check for obvious signs that a tree is likely to be unstable. Such check procedures identify instances when further, closer assessment, referred to in the SIM as 'inspection', may be required. Distinguishing when checks are appropriate and when closer inspection is required contributes to avoiding a disproportionate response to risk.

Civil law judgements tend to refer to 'tree inspectors' and 'tree inspection' and do not, in general, distinguish between checks and inspection (see 'Trees and the law', page 50).

The term 'inspection' is also widely used in other guidance and in tree safety training, as a generic term that incorporates the notion of visual checking (e.g. UK Roads Liaison Group code of practice[109] and Lantra and Arboricultural Association tree inspection courses).[111]

The term 'check', while referred to in the HSE SIM,[8] is more widely used than in the specific context cited in the HSE guidance, in that it is what we all do whether professionally or as 'lay people' with an interest in trees and their safety. The NTSG guidance recognises that both terms, 'check' and 'inspection', are respectively valid in the appropriate context. This guidance adopts the term 'check' in the specific sense applied by the HSE SIM. Checking can be undertaken both informally (as an unscheduled activity) and formally (as a planned, scheduled activity), whereas 'inspection' is a formal procedure. The term 'tree inspector' is used to describe those involved in formally checking and inspecting trees, when undertaken. However, the term 'tree checker' is not commonly adopted.

6.5.1 Informal and formal procedures

In modern arboriculture there are various approaches to tree risk assessment. There is no universally accepted prescription for meeting reasonable duty of care that covers all eventualities. Tree risk assessment procedures will vary according to the situation, site circumstances and local priorities. Procedures can be broadly classed as informal or formal.

6.5.1.1 Informal procedures

Informal procedures are a normal part of tree safety management that are typically carried out in the course of other activities. What lies behind the notion of 'informality' is that the procedure is unscheduled. Informal observation of trees relies on common sense, for example, incidentally noticing an obvious sign of a major defect likely to lead to structural failure that could result in serious consequences. Because informal observation is a commonplace, frequent activity with a low demand on resources, it plays an important and often underappreciated societal role in tree safety, contributing to reasonable and balanced risk management. It is integral to everyday risk control, including where formal proactive procedures are also adopted.

Informal procedures often take the form of checks undertaken by non-specialists such as the duty holder or delegated persons who are responsible for managing or maintaining property. Non-specialists who undertake informal procedures generally will observe trees alongside their other daily tasks, looking out for any obvious deterioration in tree health or condition that might indicate a noteworthy structural weakness or requirement for a closer inspection. At sites where trees pose a low risk, informal procedures will often be sufficient.

Choosing to manage tree safety by informal observation is not a reason for doing nothing. Reports of safety problems arising from informal observations need to be followed up; this may result in no further action being required or could lead to closer inspection and remedial measures. To ensure that informal observations are appropriately acted upon, it can be helpful for the duty holder to record noted hazards and how they have been dealt with.

6.5.1.2 Formal procedures

In a formal procedure, the inspector visits the tree with the specific purpose of performing an assessment that is not incidental to other activities. They are therefore generally planned, specified and proactive. Such procedures include drive-by and walk-over checks, as well as inspections undertaken at various levels. Tree inventories and health and condition appraisals also fall within the scope of formal procedures.

With regard to safety assessment, formal procedures generally start with a visual check. They should be performed by someone with a sound working knowledge of trees at a level of proficiency appropriate to the context, with provision, when in doubt, to call upon further expertise. For example, highway authority tree inspectors should be trained in safety assessment of roadside trees, which may, in some cases, lead on to further inspection and/or detailed investigations. Formal procedures may employ drive-by and walk-over methods, or may involve detailed inspections including aerial, root and soil investigations and the use of specialist diagnostic tools, with the type and extent of investigation being informed by initial observations and an assessment of condition.

6.5.1.3 Formal checks and inspection

The HSE SIM[8] suggests that the method of making checks in tree risk assessment contributes to reasonable tree safety management. Formally conducted checks should be undertaken by someone with sufficient experience to recognise obvious features in trees that might pose a significant risk to people and property. If the visual check reveals no cause for concern, then no further action is triggered, and the next check is scheduled. If the check raises concerns, the duty holder should take appropriate measures (such as further assessment or an intervention to appropriately reduce risk).

Formal visual checks involve brief observations of trees that take account of health and structural features and rapid changes in condition, noting variations from generally held acceptable norms. It is not reasonably practicable to view every part of every tree. The level of detail to which trees are inspected should be based on context (site circumstances and history) and observations of reasonably accessible parts.

Because visual checks are typically brief in comparison with closer inspection, the number of trees covered will be far greater and, as such, visual checking is an important aspect of cost-effective safety management, particularly where populations of trees are involved.

A visual check first requires a general view of the tree and its surroundings, and this will inform the extent to which the tree is inspected. A population of trees at varying stages of maturity adjacent to a country road might first be checked from the road, looking for features indicating hazards or ill health. This may lead to a closer viewing and, in specific circumstances, where there is a significant degree of uncertainty, will likely lead to a more detailed inspection.

Ground-level visual checks provide a useful, cost-effective means of determining whether an urgent response may be required when there are clear

and present signs of instability. This is an important way of identifying the need for high-priority remedial action or further detailed assessment. It is generally possible to identify the most serious tree problems from ground-level visual checks.

6.5.1.4 Drive-by assessment

Formal drive-bys involve a driver accompanied by an observer who checks trees within falling distance of the highway for defects or other features that are likely to present an obvious hazard and that may prompt further investigation or require direct intervention. 'Drive-bys' (or 'driven checks') are typically formal procedures and are carried out from a slow-moving vehicle to check trees alongside roads. Drive-bys may be undertaken reactively such as after storms or form part of planned proactive procedures. In many circumstances, particularly in rural areas, drive-bys are the principal method of undertaking high-volume, large-population roadside tree risk assessment due to capacity and the cost-benefits they confer. Together with walk-overs, drive-bys contribute to a reasonable strategy for roadside tree risk management. They are widely used in checking trees through observing crown condition and are a principal means of identifying Chalara ash dieback. Drive-bys are often undertaken by highway inspectors who have a basic training in checking trees. Others involved in drive-bys might include owners, tree specialists and land workers familiar with the site. Where there is no roadside footway, drive-bys are generally the main method of initial assessment for highway trees, which in certain situations may be supplemented by further checks where it is necessary to stop and take a closer look.

Drive-bys can help to determine where walk-over assessments are necessary. One of the disadvantages of drive-bys is that only defects visible from the vehicle can be noted, and serious defects that cannot be seen from the road but which may be obvious from other viewpoints may be missed. Exclusively relying on drive-by inspections along busy routes and in urban areas is unlikely to be sufficient. A sufficient strategy will provide for drive-by inspections to be supplemented by walk-over checks and inspections where appropriate.

6.5.1.5 Walk-over assessment

Walk-over assessments primarily involve checking trees and are undertaken on foot. They are an effective method for checking trees over a wide area (or along a considerable length of road) from accessible viewpoints to identify if there is a need for further investigation or safety management. The time devoted to each tree, when undertaking checks, is brief, taking minutes (or even seconds) rather than hours. The procedure, based on visual tree assessment, involves viewing a tree in the context of its overall condition and its setting. The initial

check may identify issues calling for a closer assessment of the base, trunk and crown. This may involve tapping and probing tree features that can be reached from ground level. It may not be possible to observe each tree from every aspect (due to undergrowth, ivy, hedges, walls or property boundaries). Before progressing to a higher level of inspection, a judgement is needed as to the likely importance of additional information that might be gained. Walk-over assessments make a significant nationwide contribution to reasonable, cost-effective tree risk management where large numbers of trees are involved (including roadside populations where risk is potentially highest).

6.5.2.6 Detailed inspection

Detailed inspection is a more highly specialised assessment than the visual check and is commonly prompted by concerns raised by informal observations or formal checks or inspections. Fortunately, in the great majority of instances a reliable management decision can be made from a simple visual check. Detailed inspections typically initially entail a close visual tree assessment by a competent tree specialist, generally from ground level unless otherwise specified. Detailed inspections usually start by focusing on the exterior of the tree for any signs which might indicate serious ill health and/or likelihood of impaired structural condition. In special cases they may involve inspecting soil and root condition, aerial inspections of the upper trunk and crown or other procedures to evaluate the nature of suspected decay and defects and may also require the use of specialist diagnostic tools. Detailed inspections are time-consuming and relatively expensive, and it is rare that they are warranted for all trees in a given area, unless specific concerns have been highlighted, as to do so would normally be unreasonable and disproportionate to the benefit gained in risk reduction. In general, detailed inspection is reserved for individual trees of concern, including high-value trees with special heritage, amenity or habitat qualities in well-used zones.

Depending on the context and circumstances, the duty holder will have views on the importance placed on the tree/s which may influence risk management decisions, including the use of conservation works as an alternative to tree removal. Such decisions may rest on detailed inspection to clarify what intervention options (if any) there may be. It should be noted that some types of work could involve making changes to a tree's environment rather than to the tree itself. Duty holders will need to consider this advice to make judgements about priorities and manage the tree-related risks as low as reasonably practicable.

6.5.1.7 Tree inventory recording

Tree inventories involve systematic tree checking and recording details of selected individual trees, without necessarily focusing on tree safety issues. Inventories of tree populations are compiled for different objectives, including risk management, health condition, tree-benefit assessments, tree population studies and asset management. When conducted for safety reasons, they provide a basis for scheduling and prioritising remedial work, including details of further inspections, and for monitoring condition and management history. While initially relatively expensive per tree, tree inventory systems are auditable and can be cost-effective over time. Many tree populations are recorded on bespoke databases using handheld devices with global positioning systems (GPSs) for recording and mapping all trees and/or groups of trees within the falling range of roads and other frequently used public areas. Nowadays most local authorities and corporate landowners use tree inventories in support of broad tree policies and strategic tree management. Computerised tree inventories may be adopted as a basis, not only for tree risk assessment and management, but also for calculating and modelling the ecosystem service benefits that trees provide. Tree inventories can also provide a full history in the event of tree failure-related insurance claims and may be used for the response of public organisations to Freedom of Information requests.

6.5.2 Negative recording

Negative recording (also sometimes referred to as ‘negative reporting’) describes the inspection procedure for recording only those trees with hazards identified to be of safety concern, typically following walk-over and drive-by assessments. When considering tree safety, keeping records of every individual tree inspected within a tree population is seldom necessary and is generally not reasonably practicable, being disproportionate in terms of effort involved compared with the reduction in risks this would provide. The negative recording procedure involves looking at the trees at an appropriate level of detail (given their size, general condition and location). If there are trees that have the potential to present significantly elevated risks, a closer look is taken. Details of such trees would be recorded along with inspection dates, the name of the inspector and the identity of those sections of the tree population under assessment, together with recommendations and priorities for remedial work, and those trees that warrant further investigation.

6.5.3 Who can carry out tree risk assessments?

Those who carry out tree risk assessments need to be mindful of their limitations when considering foreseeability, how this is relevant to management decisions, the timing of future inspections and contractual arrangements.

6.5.3.1 Who can carry out informal procedures?

Informal procedures may be carried out by people who are sufficiently familiar with the trees in their locality to notice changes in their condition and those with a working knowledge of trees and their defects.[6] In both cases the informal observer should be capable of making common sense judgements about the trees and their condition. Typically, this need not be a tree specialist, but may be an individual closely associated with a property, such as the landowner, gardener, or another employee or agent who understands the way the property is used (e.g. areas most and least frequented). Members of the public can also make an important contribution to informal observations. Those carrying out informal checks should take into account the falling reach of the tree/s. When a tree is found with obvious defects (e.g. extensive basal decay or showing signs of uprooting) and is in a well-frequented area, this should be reported and acted upon, if necessary by engaging a tree specialist for advice.

6.5.3.2 Who can carry out formal procedures?

Formal checks and inspections require general tree knowledge and an ability to recognise normal and abnormal appearance and growth for the species and locality, although specific qualifications are not necessarily required. Those carrying out formal checks and inspections should be able to assess approximate tree height and falling reach from the tree to the area of use and know when a detailed inspection is required. They must also be able to recognise visible signs of serious ill health and significant structural problems, such as substantial fractured branches or a rocking root plate, which, were it to cause tree failure, could result in serious harm. Detailed inspections are formal procedures that involve investigations by an appropriate, competent expert with relevant experience. Specialists involved in conducting detailed tree investigations should be able to demonstrate a reasonable basis for categorising risks according to priority and also identify cost-effective ways of managing tree-related risks. The level of proficiency required will be determined by the circumstances of the trees, their number, age, size and condition, the site and levels of use. Decisions regarding the extent to which specialist advice should be engaged and the nature of that advice will be informed by the duty holder's responsibility (see 7.1 and 7.2).

6.5.3.3 Competence and training

Those commissioning formal procedures should satisfy themselves as to the suitability of the inspector's competence and experience and the adequacy of their insurance. Examples of competence levels are given in the scenarios (Section 7) with respect to different types of land holding and circumstance. For both non-specialists and specialists, training courses endorsed by arboricultural and forestry professional bodies are available, and these have

been designed to develop competence in identifying tree-related risks and understanding the basis for managing these risks in a reasonably practicable way. Courses also include comprehensive tree-inspection guidance for tree specialists. Professional bodies providing accreditation schemes for professional arboricultural advice and training information are listed in the 'Contacts and useful sources of information' section.

6.6 Tree risk assessment

6.6.1 Risk acceptability, prioritising treatment and check and inspection frequency

When checking and inspecting trees for public safety, the primary objective is to look for external features indicating mechanical (structural) defects that pose a significant risk to people or property within a stated period, particularly those trees that pose the most serious and imminent risk. Tree safety inspection will usually make provision for when to carry out the next check. Tree size, condition and location inform the risk-assessment process, and how we make decisions on reasonable foreseeability, which in turn help determine future re-inspection intervals.

The need for re-inspection results from the potential of a tree and its surroundings to change in ways that could increase the risk of harm. By assessing the current state of the tree and its surroundings, it is possible to gain some idea of the potential for risk to increase. A suitable frequency of inspection can then be decided.

6.6.1.1 The framework for assessing categories of tree risk

Individual trees may pose a foreseeable risk and the purpose of the common sense approach is to identify trees where that risk is significant and to manage them in a reasonable and cost-effective way. For the legal term 'reasonably foreseeable' to be meaningful there needs to be a timescale, albeit one that may be imprecise. When considering tree-failure risk with potentially serious consequences, the sooner that such an event is thought likely to occur, the greater the confidence we may have in determining the level of priority for management.

6.6.1.2 Risk of imminent harm

A risk of imminent serious harm is one of such immediacy and likely consequence that urgent action is required. Such unacceptable tree risks are rare and, while remediation will require immediate and sometimes costly action, they are not normally managed according to cost–benefit criteria.

Where unacceptable tree-failure risks are considered imminent, they are generally so obvious that they can be readily identified by non-specialists and specialists alike (see 'Competence and training', page 78). Tree risks that must be dealt with immediately will generally involve felling, branch removal or site management. For example, where a large tree with a lifting root plate or an actively separating heavy branch is found within falling distance of a busy road, this may involve stopping or diverting traffic and carrying out remedial work as soon as is reasonably practicable.

6.6.1.3 Risk of non-imminent harm posed by trees

The risk of non-imminent, serious harm can normally be managed by means of a planned response, taking into account the nature and level of public use and the level of risk. Assessment of the risk of harm and of how soon it could occur will determine the priority and character of remedial treatment required to manage the risk and may involve direct intervention or further competent assessment.

6.6.1.4 Risks not requiring a response in the near future

Where trees are identified as posing an insignificant risk, there is no specific requirement for safety management, but they should be subject to periodic review.

6.6.1.5 Special trees

Special trees are those of high value due to their heritage (natural, historical, cultural) and/or amenity importance including ancient and veteran trees. Duty holders and landowners are responsible for their conservation and management. Informal and formal procedures may identify trees posing a significant risk of serious harm. Special trees that owners want to retain for heritage, habitat or visual amenity (such as those that are ancient or veteran), but which may present a risk, will likely require specialist detailed inspection and management to avoid loss of the benefits they provide. Access to competent professionals can be found in 'Contacts and useful sources of Information'.

6.6.1.6 Frequency of assessment

Informal observations of trees contribute to public safety and therefore are important for deciding when action is needed or when more formal assessment is appropriate.

With regard to formal inspection, guidance relating to assessment frequency varies greatly. There are no uniformly accepted frequency intervals that are considered appropriate to all situations. The decision on the level of frequency

will be based on the judgement of the tree owner, agent or adviser, taking into account the site circumstances, good practice and legal precedents. This will include considering zoning land based on the frequency of public access, while also taking into account tree condition to inform the level of risk and management priorities. In areas of very low occupancy and where there is no surrounding high-value property, formal assessment is unlikely to be required. However, such circumstances may need to be reviewed from time to time.

When circumstances change dramatically around a tree, such as when new public areas, paths, roads or housing are installed near trees, the impact on zoning needs to be assessed. Hazardous defects generally take many years to develop, but in exceptional circumstances the structural condition of a tree may weaken abnormally, for example, following a storm or when accelerated due to disease (such as may occur with Chalara ash dieback) or root damage resulting from development works. Different tree species deteriorate at different rates and vary in their propensity to break and shed branches. The frequency of checks and the intervals between them should be reviewed according to site circumstances taking changes into account, for instance, when the levels of surrounding public use increase or decrease. Extreme weather events have major impacts on our trees and are likely to become more frequent with climate change. Weather alerts contribute to risk management in the immediate lead up to storms, indicating when it is prudent to control access to trees. Depending on storm severity, it may be prudent to prioritise post-event rapid checks and monitor trees in high occupancy zones. The specific circumstances will dictate the need and type of post-event inspection, for example, conducting drive-bys or walk-overs in pre-determined areas such as alongside busy roads and railways, and where large trees are close to children's play areas, seeking out those that pose a significant risk.

Examples of scenarios (Section 7) are provided to assist with making decisions depending on the type of land holding and circumstance.

6.6.1.7 Seasonal timing of checks

There are no specific rules about the best time of year to check trees. For deciduous trees, after autumn leaf fall the lack of foliage within the crown sometimes makes it easier to observe signs of potential tree failure. On the other hand, checking trees when they are in full leaf has the advantage of more easily seeing and assessing foliar condition and crown health. Crown foliar decline can be temporary or may indicate more serious ill health and/or deteriorating root condition. Each time of year has advantages and disadvantages. Those assessing trees need to take into account the influence of the seasons on the visibility of tree features, symptoms of health and decline and indicators of structural condition.

6.7 Practical management

6.7.1 Decisions for owners and duty holders

Owners and duty holders are usually familiar with their properties, and their local knowledge means that they are typically best placed to assess the levels of occupancy at various locations, which will in turn determine if a visit to check trees is necessary. There is no need to engage a tree advisor to do this when this relates to the use of the land and not to any technical tree matters. In urban forest management, where large populations of people enjoy close proximity to trees, and where risks need to be identified and managed, sensible pruning and crown management and, in some cases, felling, will normally resolve risk-control issues. In general, duty holders who employ their own specialist advisors, such as local authorities who employ tree officers, or landowners (or tree officers) who may commission advice from a tree specialist, should consider that advice, but they are not obliged to act upon it. Duty holders' decisions on how to respond to advice will be informed by matters such as their management priorities, attitude to risk, the resources available and the importance of the trees. The options may include pruning, whole or part tree removal or conservation measures. The input of the tree advisor normally ceases with the delivery of their advice; how that advice is acted upon resides with the duty holder, and it is important that they check that specifications are appropriate for the purpose and that planning and other legal constraints are properly observed and complied with.

For information on how to choose professional advisors and tree work contractors, please see 'Contacts and useful sources of useful information'.

6.7.2 Considering the risk of harm to trees from safety management

On larger sites with public access, management options are guided by general policy or overall aims appropriate to the site circumstances. These options are frequently defined in a documented strategy. In general, choosing which risk-control measures to use while conserving a tree involves assessing the costs and benefits. In some instances, the options to reduce risks from trees may include tree works. In other cases, remediation that avoids pruning or other management trauma may be practicable, with the additional benefit of not incurring significant costs, for example, controlling site access within the falling reach of trees (as practised in parks, parklands and arboreta with public access and high visitor levels).

For sites where special events such as festivals or funfairs greatly increase the number of people within the falling distance of trees, an additional check of the

trees should be conducted prior to events to identify obvious defects or safety concerns that might warrant closer inspection and any necessary intervention.

Restricting access is a risk-control option that reduces risk and also reduces potentially detrimental soil compaction from footfall and vehicles. Reducing impacts on the soil and roots is particularly important in wet conditions and such detrimental effects are liable to increase the risk of tree decline and of structural failure in the long term.

Ways to reduce risks by site management for special sites, trees and events include deterring access through:

- signage and information to communicate to visitors which areas they are allowed in and those which they are not;
- fencing or bunting to encourage people not to access areas that are not for visitor access;
- deterring vehicle access and parking beneath trees;
- locating facilities such as play equipment, seats, picnic tables, barbecues, information boards, commemorative plaques, hides, fishing platforms, horse jumps and feeding centres where you want people to be;
- rerouting paths and tracks;
- placing assembly points beyond the falling range of trees;
- redesigning mown paths in areas of long grass to influence behaviour to reduce occupancy by:
  - planting brambles and thorny shrubs
  - leaving grass unmown beneath the tree;
- temporary exclusion (e.g. in adverse weather conditions);
- installing temporary fencing or permanent exclusion at certain sites (to manage the target area from the risk of falling tree parts while also reducing adverse effects of trampling and compaction).

6.7.3 Managing trees for habitat and amenity value

When trees with high value present significantly elevated risks and all the available options for managing the area within the falling distance have been exhausted, or where public exclusion from the area is neither desirable nor practicable, then remedial tree work may be necessary. If a tree has obvious habitat or amenity value, consideration should be given to undertaking the minimum work necessary to control significant risks. Management options to optimise habitat and amenity value should take into account the opinions of local stakeholders. Where biodiversity and habitat have a high value, a range of treatment options may be appropriate to optimise habitat retention in balance with adequate safety. Such work might be specified not only for human

safety, but also to help prevent the tree from dying prematurely because of major failure. With high-value trees, felling will be a last resort after taking into consideration all other options. Even when felling is specified, it may be possible to remove or truncate a tree's crown and retain the upright, dead or heavily reduced stem for habitat value. Felled trees and trunks may also be left on the ground to provide important deadwood habitat. In some instances, one option might be to reduce the risks from structural failure through veteranisation methods, combining a reduction in weight while promoting and accelerating deadwood habitat.[107] Such management will benefit from the specialist knowledge and expertise of practitioners experienced in this field (see 'Contacts and useful sources of information', page 128).

6.7.4 Reducing risks by providing information and interpretation

Providing information to the public can also play an important part in managing risks. Explanation and interpretation of the risks and chosen management options are also helpful in increasing public understanding of the issues. This can include the use of information board signs and notices at points of entry, in car parks and within the site. Social media can play a useful role in public information, including advising when sites are restricted or closed in severe weather.

6.7.5 Record-keeping

While individual trees commonly shed branches and even uproot, accidents resulting in personal injury are rare. It is not a legal requirement to keep written records of tree risk management, but maintaining an audit trail can greatly assist in demonstrating responsible management. Record-keeping does not need to be over-elaborate. Records, together with maps, provide a basis for safety-management reviews and monitoring and help to ensure arrangements are being implemented and, in the event of an accident, can contribute to establishing proof of reasonable tree management.[6] It is not necessary to record every tree that has been checked or every tree on a site; however, records of trees presenting a serious risk and requiring treatment are useful, as are details of the remedial work which took place. When checks and inspections are carried out, records can demonstrate that the landowner or manager has met a key component of their duty of care. Digitised databases are useful for storing details of inspections and work, suspected significant defects and photographs across the range of tree stocks. In the event of an incident, documents and other records such as photographs help to provide supporting evidence of reasonable care.

6.7.6 Insurance

Even if all the advice and guidance on tree risk assessment and management in this document were followed, wherever trees are retained there will be an element of risk to people or property. Common sense management of the risks from trees calls for a reasonable and balanced approach; nonetheless, events may result in tree failures leading to harm. It is for this reason that the role of insurance plays a part for landowners and other duty holders, who are advised to insure against the consequences of serious tree-related accidents and to ensure that anyone who advises them, or carries out work on their trees, is adequately insured. It should be noted that it is not possible to insure against criminal liability.

7

How this guidance can be applied

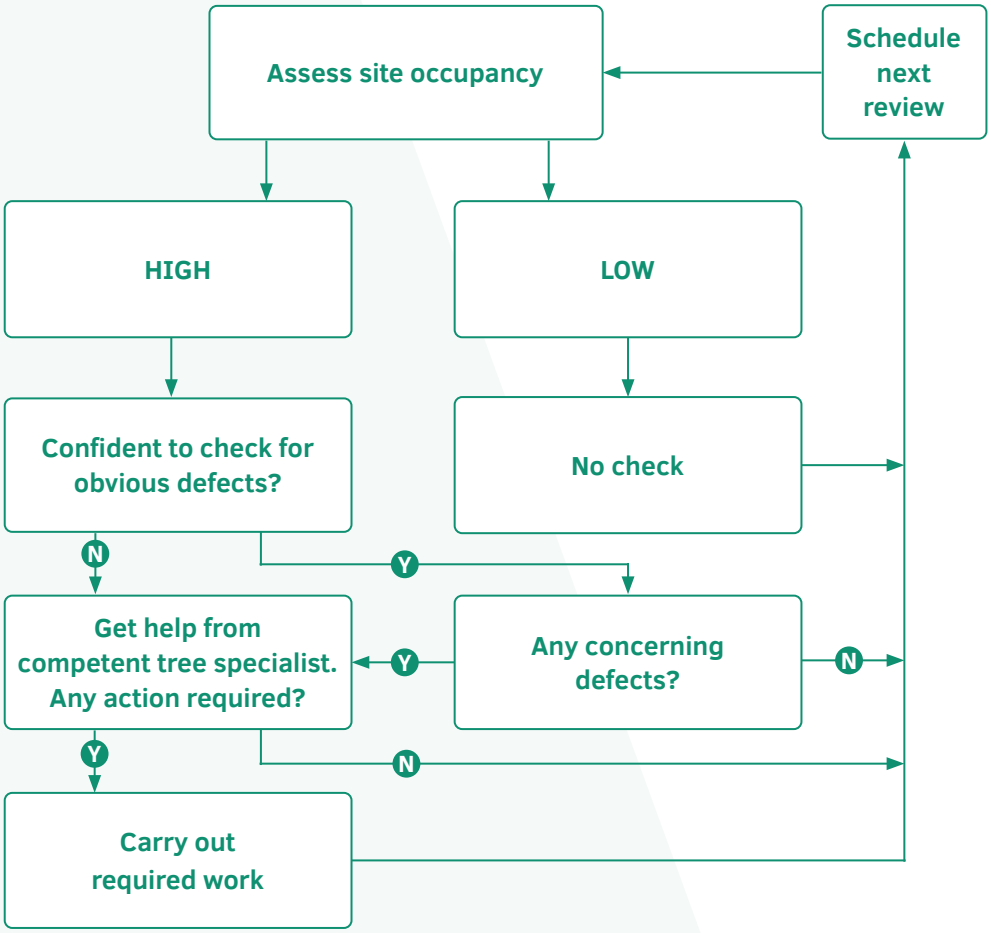
This section outlines a decision-making framework for those responsible for trees, in the form of two flowcharts with explanatory notes, supported by nine scenarios indicating how tree safety can be managed in a reasonable and proportionate way. Figures 7.1 and 7.2 should be read in conjunction with the principles of balancing benefit and risk (see Section 1, Figure 1.2, page 16).

7.1 Decision making for duty holders without HSWA responsibilities (e.g. homeowner/ occupier)

7.1.1 Duty under civil law

Homeowners with responsibility for trees have a duty under the civil law, Occupiers Liability Acts (OLAs) and under the law of negligence, to take reasonable care to avoid causing a reasonably foreseeable risk of harm (Section 5). Figure 7.1 outlines a decision-making framework for managing tree risk. In practical terms, the homeowner needs to check for obvious structural features in trees that could cause harm were they to fail (Section 6). If confident in their ability to identify obvious defects, the homeowner/occupier may carry out the checks. If unsure and concerned, advice from a competent tree specialist should be sought. Based on the outcome of the tree assessment, the homeowner will need to make a reasonable and prudent judgement on how best to manage the trees, taking into consideration the level of their knowledge, the assessed risk and the value placed on the tree along with other constraints (see also Figure 1.2, page 16).

Figure 7.1 Homeowner/occupier decision framework under civil law (after Barrell[113]).

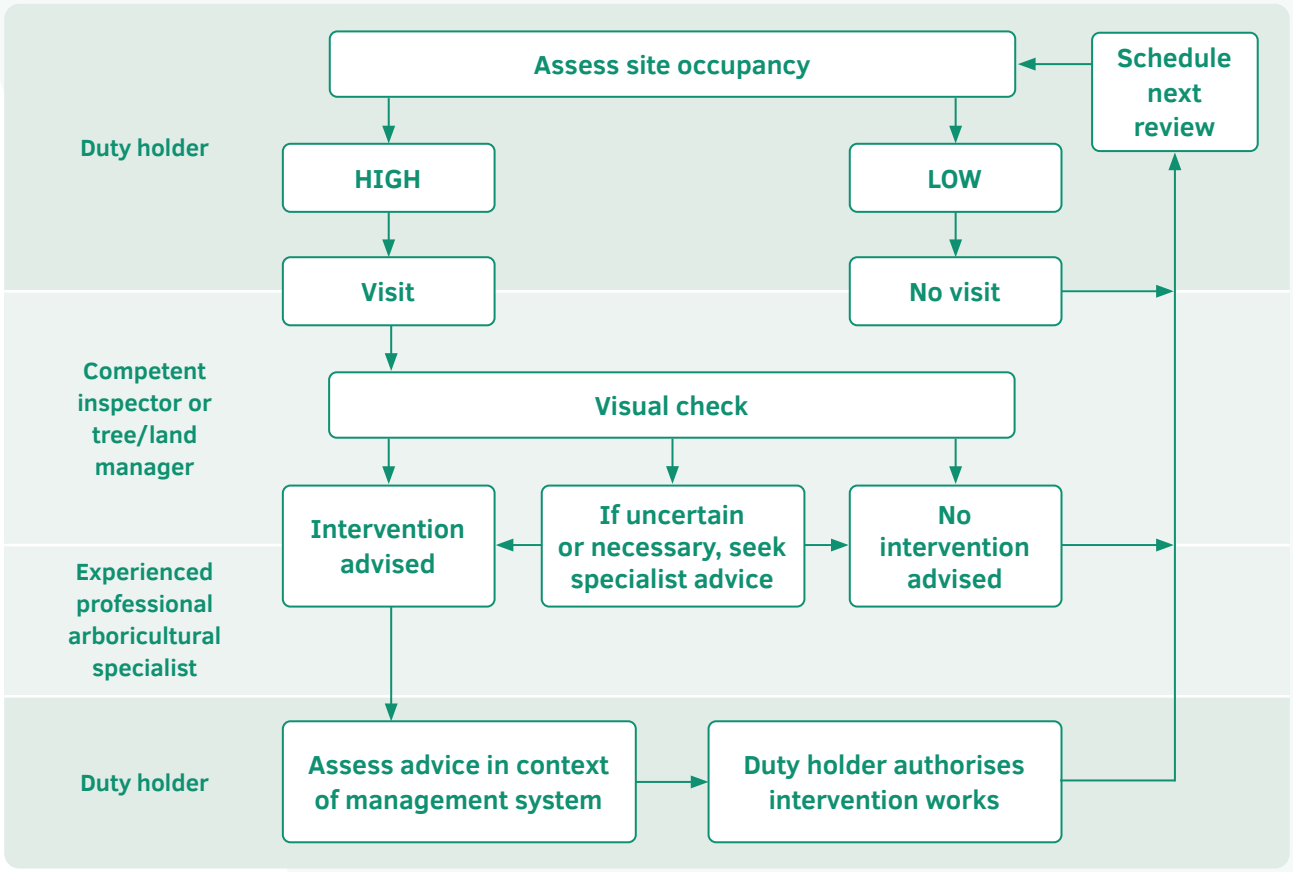


7.1.2 Duty under criminal law (HSWA)

If you are a duty holder with obligations under HSWA (either as an employer or a self-employed person), you have a responsibility to take reasonable care to manage risks as low as reasonably practicable (ALARP) (Sections 1, 4 and 5). The duty holder is likely to have knowledge of the level of occupancy of the land, so there is no automatic requirement for a tree expert to assess whether it is necessary to check the trees. If the occupancy is so low (see 'Zoning', page 71) that it is deemed unnecessary to assess the trees then all that is needed is for a future review to be scheduled. Where there is a higher level of occupancy and / or valuable property within the trees' potential impact range, then a formal process for checking should be in place (see for example, Scenarios 4, 5 and 8).

In practical terms, the process of assessing the risk and reacting to the findings can be shared between the duty holder and the tree inspector (Figure 7.2). However, it is necessary for the duty holder to ensure that the instructions given to the inspector are clear and sufficient to satisfy the duty holder's responsibility under the HSWA, and to take reasonable steps to check that such instructions are carried out. Once the inspector has fulfilled their role, it is up to the duty holder to decide if and how to implement the recommendations.

Figure 7.2 Duty holder decision-making framework under criminal law (Health and Safety at Work Act) (after Barrell[113]).



7.2 Common scenarios

The following nine scenarios are indicative examples to assist duty holders, who should look for the closest scenario matching their own circumstances:

1. Householder
2. Business – restricted or limited public access
3. Business – open to the public
4. Local authority – district or borough council
5. Local authority – county council
6. Local authority – city council
7. Large private estate with public access
8. Large open space open to the general public
9. Small site with mature trees growing next to the railway

These scenarios are not intended as recommendations but to provide examples of reasonable, balanced tree risk management strategies based on balancing the benefits and the risks when making decisions. The strategies are considered to be reasonable in the particular circumstances described. However, each situation will be unique and the indicative examples of reasonable decisions illustrated in these scenarios, such as management structures, personnel and frequency of inspections, are not intended to be prescriptive for a particular type of duty holder. All those responsible for trees must assess their own situation.

Scenario 1

Householder

0.2 ha 7 (inc. 1 mature walnut and 2 large apple trees)

Scenario 1 is a privately owned detached home and garden, which has several trees and shrubs; some are on the boundary. Two trees in the front garden overhang the council-owned pavement and a quiet, residential road.

Ownership/control of management

Responsibility | The owners have responsibility and a duty of care.

Arboricultural competence | The owners are keen gardeners and although they have no specialist tree knowledge, they have some experience, having looked at, thought about and cared for trees over a number of years.

Access

Private access: there is no public right of way over the land. Two trees overhang the public road.

Benefits of trees

The owners enjoy their garden and the trees in it. As well as providing colour, shade and ornamental interest, the trees provide some privacy from the road and neighbouring properties. The owners take pleasure in harvesting the fruit and nuts and also appreciate the wildlife they attract. They understand the contribution that their trees make to the wider environment, in terms of the 'pleasant leafy neighbourhood' and how this increases the value of their home.

Natural living organisms

The owners know 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 traffic; occasionally people walk by on the pavement throughout the day. As far as safety is concerned, they see these two trees as the most important in the garden and, although they do not consider them to be of concern, they recognise that they have an obligation to prevent them from impeding access along the footpath and road. If their property were adjacent to a busier thoroughfare, they

understand that this would require a higher level of responsibility. The remaining trees are considered to be of low importance.

Strategy

Management

The owners check their trees as part of their general care for the house and garden, paying particular attention to the trees on the boundary that could impact the road if they fail. While there is no regular frequency to this process, they recognise that, based on their knowledge of their trees, checks should from time to time be undertaken with sufficient frequency to identify significant hazards that may develop and cause harm. They also recognise that the benefits the trees provide to them and the wider community have to be balanced against any disbenefit or risk. If they detect anything unusual about them, such as an obvious defect that causes safety concern, they call a local tree surgeon, who can tell if any remedial work needs to be done.

Competence

As reasonable and prudent landowners responsible for trees, they are able to recognise and understand the significance of visually obvious defects and are able to carry out their own inspection that may result in needing to obtain further advice. When needed, they use a recommended tree surgeon who can advise them and undertake any work required.

Records

They do not keep any formal record of their ad hoc observations, but they do keep records of correspondence and invoices for any advice or work carried out.

Evaluation

They do not normally worry about their trees but are occasionally concerned that in strong winds parts of a tree could fall. Within the range of costs they have for their property as a whole they apportion a budget for managing their trees. In doing so they aim to strike a balance between maintaining them in good health and condition while meeting their duty of care to others. They believe that they have an informal but effective plan for the care of their trees, which is affordable.

Scenario 2

Business – restricted or limited public access

90 ha Approximately 7000

Scenario 2 relates to 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. The farm owner employs a farm manager and another permanent worker on the land, and subcontractors work at busy times.

Ownership/control of management

Responsibility

The owner of the farm has overall responsibility for managing its affairs. His farm manager reports to him and has day-to-day responsibility for organising the activities of staff and subcontractors. Part of the manager's job description is to care for the health and safety of employees and visitors, but the owner recognises his ultimate responsibility.

Arboricultural competence

The farm owner and manager are experienced in a wide range of agricultural activities, with the manager holding a certificate of competence to use a chainsaw. Both he and the owner have a basic understanding of tree identification and can recognise tree features that might indicate structural weakness.

Access

A minor B road runs across the land, which is also bordered for half a mile by a busy A road. The tree-lined access driveway from the main public road to the farm buildings is frequently used by the owner, his family and friends, the farm's employees and regular business visitors.

Benefits of trees

The owner 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

The owner 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. He has seen mature trees suffering storm-damaged, broken branches and has observed the subsequent regrowth without the need for any intervention. He also managed the situation after one of the avenue trees had fallen across the drive during a stormy night.

Strategy

Management

All farm staff are instructed to look out for any signs of tree problems anywhere on the farm and report them to the manager. He has made it clear he wants to know immediately of any serious, obvious problems such as a tree that appears unstable. In the past this has highlighted a tree with its root plate lifting and another near the road with a large branch that was badly split. The manager arranged for the first to be felled and the second to have the branch cut back. The manager undertook the first formal inspection of the trees alongside the two roads. He found three trees that he had serious concerns about but which he wanted to keep, as they are large mature trees that provide visual screening and reduce noise and pollution to the farmhouse. He arranged for a qualified arboriculturist to have a look at them to advise as to what, if any, work was required to manage the risk of failure. Having completed this initial inspection and arranged for the required remedial work to be carried out, unless there is a change in circumstances, the farm manager has arranged that the trees in these areas will be subject to the same informal inspection regime as the other trees on the farm, and has planned further formal inspection of the roadside trees for three years' time.

Competence

The farm staff's general working knowledge is considered adequate for identifying any areas of significant concern. However, if the manager is uncertain about how best to deal with any of the trees on the property, he calls in a qualified arboriculturist.

Records

The results of the manager's formal inspection of the roadside areas are kept in a file in the farm office along with the results of the arboriculturist's survey and a note of the remedial work carried out. As part of the informal survey regime, the manager 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.

Evaluation

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'.

Scenario 3

Business – open to the public

5 ha Approximately 700

Scenario 3 relates to 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.

Similar considerations could apply to a wide range of situations where the visiting public make up the core element of the business. This could include holiday camps, sports and leisure complexes or shopping centres, and places of worship.

Ownership/control of management

Responsibility

The hotel owner, a businesswoman, has overall responsibility for managing the hotel's affairs. The business employs five full-time hotel staff members, including a deputy manager, two duty managers and a chef plus additional part-time kitchen, waitress and service staff. There is also a full-time head gardener and his part-time assistant. The owner relies on the head gardener's advice in respect of any work needed to the trees, but recognises that she carries the ultimate legal responsibility. Because of the nature of the business, the emphasis on this duty of care is appreciated and actively discharged by the owner towards her employees, guests and the general public.

Arboricultural competence

The owner is not knowledgeable in arboricultural matters. She would be regarded as a lay person. However, as a reasonable and prudent landowner responsible for trees, the owner employs staff able to recognise and understand the significance of obvious structural defects in trees and be able to carry out a visual check that may result in obtaining further advice. The head gardener cares very much about the trees and all the horticultural works for which he has responsibility. Although he has no formal arboricultural qualifications, he has considerable experience of trees and their problems.

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

The hotel owner is an astute businesswoman and is well aware that fine trees and well-kept gardens add considerably to the enjoyment of visitors and the appeal of the establishment and, therefore, the success of her business. Customers frequently make compliments about the fine and, in some cases, rare, tree species positioned in well-managed, landscaped grounds. She understands that these benefits and value are balanced against the costs associated with maintaining the trees in good condition and managing any significantly elevated risks.

Natural living organisms

The head gardener spends a considerable amount of time in the garden, so he soon notices if a tree has changed in appearance or has some other problem that might suggest that it could be unsafe. He also observes them through the seasons in different stages of growth and dormancy.

Strategy

Management

The owner and head gardener have agreed that a formal, five-yearly inspection regime should cover all the trees on the property, with a three-yearly inspection of trees alongside the road. In the course of his other duties, the head gardener keeps a general eye on the trees and notices any significant change to their condition. The owner is satisfied that the head gardener 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. The head gardener's initial check of all of the trees revealed six that caused him some concern and one in particular that he thought might be potentially dangerous. He discussed these trees with the hotel owner and she engaged a qualified arboriculturist to inspect any trees that the head gardener was concerned about. The arboriculturist provided a written report on these trees, detailing any remedial work required, prioritised according to his view of the level of concern for public safety. Between them, the hotel owner and the head gardener decided to undertake the recommended work using a professionally accredited contractor. This report and invoices for the work are filed in the head gardener's office.

Competence

The head gardener has no formal qualifications but his experience and regular presence on site mean he is more than capable of identifying immediate hazards. Employing a fully competent contractor (see 'Contacts and useful sources of information', page 128) for those trees where the head gardener is not sure of his diagnosis gives the hotel owner confidence that a reasonable maintenance system is in place from the perspectives of both tree health and public safety.

Records

The written survey is updated as necessary and kept on record along with invoices and correspondence records of any work carried out. The head gardener also keeps a note of his observations and comments in a diary as and when they arise as part of his normal record-keeping in relation to the care of the gardens.

Evaluation

While works are recommended to be carried out within a specified timescale, the hotel owner considers them to be advisory. Sometimes, for economic and other practical reasons, all work may not be completed when scheduled. Trees with higher priority recommended works take precedence over trees with lower priority recommended works. She considers her management strategy and practice to provide a reasonable balance between the costs of risk control and benefits gained from risk reduction. This management strategy allows the retention of large trees with other values and benefits, despite some being old with holes in branches and hollow trunks, features which she values as important for wildlife.

Scenario 4

Local authority – district or borough council

1514 ha Approximately 137 000

Scenario 4 relates to a borough authority that is a mixture of urban and rural areas. The council serves 148 000 people, who are mainly concentrated in one large town at the centre of the borough. However, more than 60% of its land area is rural, divided among 23 parish councils containing numerous villages. The borough council employs two tree officers responsible for the sustainable and safe management of its trees, including management of oak processionary moth (OPM) in partnership with the Forestry Commission; different approaches to OPM management are being trialled to balance the public health risk, biodiversity impacts and finite budgets. A third tree officer is employed by Planning Services solely for dealing with tree-related planning matters.

Ownership/control of management

Responsibility

The borough council has direct responsibility for trees on all council-owned land, unless leased out to third parties on fully repairing and insuring leases. The council is responsible for:

- 53 countryside sites, many of which are traversed by or adjacent to busy roads;
- 67 parks and other publicly accessible sites;
- 6000 trees on council housing land, including within the curtilages of individual council-owned properties;
- 11 closed churchyards;
- 13 allotment sites;
- two large cemeteries;
- a large crematorium site with mature landscaping and hundreds of trees of remembrance;
- multiple plots licensed to third parties as garden or grazing land;
- numerous other small council-owned parcels of land with trees on it.

The tree team provides a surveying, advisory, conservation management and contract management service, working in partnership with seven local arboricultural contractors.

Arboricultural competence

Both tree officers responsible for tree risk management hold arboricultural qualifications to a minimum of Regulated Qualifications Framework (RVQ) Level 4, with one holding both Level 5 and Level 7 qualifications and veteran tree management VETcert qualifications. They occasionally seek additional expertise and capacity from other independent arboricultural, ecological and soil management consultants.

Access

The vast majority of the borough council's land is accessible, with much of it designated as public open space. Countryside sites total 800 ha, including 283 ha of registered common land and 380 ha of accessible woodland. The land is traversed by a busy local road network, and by a network of approximately 35 km of footpaths, bridleways and byways and by a river navigation. Much of the estate is in frequent use by the public.

Benefits of trees

The borough council practises a tree-management regime according to its limited resources while recognising the wide and many benefits that trees provide. The council seeks to manage its diverse tree stock in a sustainable and safe manner, investing in tree risk management, but also in planting and establishment and promoting long-term tree health and longevity. This is something many residents notice and appreciate. The council has a tree strategy and a tree risk management policy in place and sets out its general approach to the management of its trees on the council's website.

Natural living organisms

The tree stock varies considerably in age and species, from newly planted and self-sown saplings to significant populations of ancient and veteran trees, some of which are older than 1500 years. The council appreciates the importance of a wide age profile among its trees. It recognises that weather, development, construction, pollution and other factors 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. Many ash trees in high occupancy areas are increasingly showing symptoms of Chalara ash dieback and the council actively monitors the health and condition of these trees. Part of the skill in managing the stock is to recognise all these variables, carefully balancing the benefits of the trees with the risks posed by them.

Strategy

Management

The council strategy recognises that people, in general, play an important role in tree safety management, including non-specialists and the public, who alert the authority to tree problems. The authority's finite resources are allocated to meet its duty of care as far as is reasonably practicable through a defendable, proactive tree-management regime. The economic climate has affected the council in the last decade and resources have had to be carefully considered and prioritised. Funds saved by taking an informed, proportionate approach to risk management, using a risk of harm assessment method as a guide, leave some funds available for investment in planting and establishment, and for maintaining the health of mature trees, woodland and soil. By making this investment, the council aims to enhance its trees' capacity to respond and adapt to changes in their environment and their structural condition.

Given the significant number of trees for which the council is responsible, tree inspection frequency is determined by a system of zoning, whereby land is categorised in terms of high, medium or low occupancy, according to the level of occupancy by people, and/or value of property, within striking distance of trees. Highway engineers and other non-arboricultural staff, who have received training in basic tree inspection, carry out informal checks and formal drive-by checks. Any concerns arising from these checks are escalated to the tree team.

The tree officers schedule walk-over checks of trees in the high occupancy zones, most of which are next to highways or on housing land, on a three-yearly cycle. They check trees in medium occupancy zones every five years. In both of these occupancy zones, where necessary, they identify specific trees for more frequent assessment based upon position, size and condition. Trees in low occupancy zones are managed reactively using informal procedures.

The council recognises the particularly high value of large mature or veteran trees and its policy is to conserve all such trees for as long as they can be safely retained. Where such a tree is adjacent to a busy highway or elsewhere in a high occupancy zone, it is retained provided the associated risk of harm is assessed as being within the tolerable region.

High value trees in high occupancy zones with structural features that might deteriorate rapidly are singled out for annual checks; these include ash trees with advanced symptoms of Chalara ash dieback.

Trees on housing land are inventoried and individual trees deemed to require proactive management have return inspections scheduled for between one and five years, depending on zoning and the size and condition of the tree. The council recognises that due to their location these trees have the most potential for conflict with people. In this context the tree inventory is an effective management tool to reduce the burden of enquiries and requests for non-essential tree inspections, while also ensuring that an appropriate level of proactive management is in place for all trees that require it.

The council recognises that oak processionary moth (OPM), which is spreading rapidly through the borough, poses an immune-system health risk to people living near to infested oak trees. To ensure that the risk is kept low enough to avoid a future case for felling such trees, the council has identified and surveys all these trees each year for OPM nests and endeavours to remove all the nests found. Extra funds are currently being made available for this strategy because the council recognises the value of its extensive oak tree and woodland habitat to local people and nature. However, this funding is subject to review should priorities change. On other publicly accessible sites where OPM is likely to be present, people are alerted to this with clear signage, and if nests low down on trees are reported to the council near public rights of way or other thoroughfares, then they will be removed.

Competence

The two tree officers carry out the proactive survey work and respond to enquiries from the public concerning essential tree management. Enquiries about specified, non-essential tree 'issues' that the council does not manage are referred by customer service representatives to information on the council's website. OPM surveying is carried out by an independent ecologist.

Records

The tree officers use a fit-for-purpose geographic information system (GIS)-based computer management system to inspect and audit its tree stock, capturing data electronically on site. Residents' enquiries about tree-related hazards are logged and categorised so that they can be followed up where appropriate.

Evaluation

Surveys have shown that the residents value trees and their open spaces. 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 being challenged by reduced public funds, the borough council has demonstrated its commitment by allocating resources to its specialist staff, the development of a tree strategy, an ongoing programmed inspection regime and software management system.

Scenario 5

Local authority – county council

6460 ha Approx. 240 000 mapped trees + 400 ha of woodland

Scenario 5 relates to a county council with a significant urban or peri-metropolitan component. The county council provides services to approximately 1 million residents. One-half of the county is heavily developed and includes a large portion of the overall population in large and medium-sized market towns. The other half is predominantly rural and sparsely populated, with most of the land managed for agriculture.

The county council is responsible for trees on its own land and for ensuring the safety of the public highway and can intervene if trees on adjacent private land are identified as posing a threat. Within the county, trees on district, borough, town and parish council land are the responsibility of the respective councils and are managed according to their policies; a joined-up approach is sought where appropriate and regular meetings of district and borough council tree officers are held to share experiences and best practice. The county council employs one arboricultural manager to oversee management of its highway trees, one estates officer to manage trees and woodlands across its rural estate, and a countryside management team to manage a prominent woodland nature reserve, the rights of way network and to provide land-management advice to staff and landowners, including support to address risks associated with pests, diseases and other factors affecting tree health.

Ownership/control of management

Responsibility

The county council is responsible for managing trees:

- on 5000 km of highway land in 10 district areas (delivered in seven districts through agreements by district councils);
- on 3200 km of rights of way in 10 district areas;
- on 4500 ha of rural estate land, much of which has public access;
- on a variety of other council-owned property assets;
- in 400 schools.

The arboricultural manager oversees contract management for the survey and maintenance of trees on highway land that is delivered by seven district council tree officers through agency agreements and by a dedicated highways contractor. The estates officer oversees tree survey and maintenance of the

county council's rural woodlands and agricultural land, which is outsourced to an approved contractor. The countryside management team manage a prominent woodland nature reserve in-house and outsource surveys of the rights of way network to an approved contractor.

Arboricultural competence

The arboricultural manager has arboricultural qualifications at Level 5 of the Regulated Qualifications Framework (RQF), plus a professional tree inspector qualification, and 30 years' experience. The estates officer has attended tree inspection training and has 14 years' experience of woodland management. The countryside management team comprises access and land management specialists who have attended tree inspection training.

Access

Much of the county council's land is accessible, with a 5000 km highway network, 3200 km of footpaths, bridleways and byways, 400 ha of accessible woodland and council buildings that are accessible to residents and staff. Much of the estate is in frequent use by the public.

Benefits of trees

The county council places great value on its trees and woodlands and the contribution they make to local services, improved air quality, flood-risk mitigation, carbon storage, forage and habitat for biodiversity, landscape and place. Residents are encouraged to visit and enjoy woodlands and green spaces. The county council acknowledges the local importance of individual trees for the benefits they provide to people and nature, particularly veteran trees, which require careful management to enhance their longevity while maintaining acceptable levels of risk. Where possible, the county council adopts management approaches that mitigate the risks from individual trees without diminishing the benefits provided by the overall treescape.

Natural living organisms

The county council recognises that a tree's benefits and the management it requires will fluctuate throughout its lifespan. Consequently, management that promotes the health, longevity and resilience of the wider treescape as a collective, and which takes the various tree populations into account, is an effective strategy for ensuring the continued provision of countywide tree-related benefits. To make the best use of tree budgets and optimise tree benefits, where practicable the county council adopts proactive resource management of its trees and woodlands through traditional and conservation forestry principles and sustainable urban forestry, which include endeavouring to diversify the age and species profile of its tree asset, improving local habitats and promoting biodiversity. In recognition of the increasing pressures upon tree health posed by pests, diseases and a changing climate, the county council added tree health to its corporate risk register and instructed the development of a county-wide Tree Resilience Strategy

in partnership with other local stakeholders. The county council has significant incidence of Chalara ash dieback and some instances of acute oak decline. It has developed a Chalara ash dieback strategy to plan for and manage levels of intervention as the disease has spread widely through the county. Investigating for signs of Chalara ash dieback is part of the scheduled survey regime, which also includes a drive-by survey of the highway network to identify signs of dieback in roadside ash on both highway and adjacent private land across the county and record this for targeted action. The county council communicates actively with neighbouring authorities with Chalara ash dieback to control risks appropriately while avoiding unnecessary loss of ash-dependent habitat. The county council monitors national guidance and initiatives in relation to tree pests and diseases and their impacts on their tree populations. Increased focus on biosecurity and treescape resilience is being incorporated into woodland restoration and new woodland planting initiatives.

Strategy

Management

The county council's tree management varies across its estate, reflecting its diverse land holdings, and zoning supports survey and management decisions. Highway engineers and other non-arboricultural staff are trained in basic tree inspection so that informal and formal checks can inform the need for further inspection. Zoning is dictated by land type, levels of use and proximity to population centres. Occupancy zones are categorised using either a 'high/medium/low' or 'high/low' classification system. The urban highway tree asset is zoned according to a high/low occupation classification, while the county council's rural highway trees are zoned as 'high/medium/low', to account for the wider range of management contexts, based on road classification. The urban highway trees are subject to walk-over checks, supplemented by drive-by checks following severe weather events. The rural highway asset trees are checked by means of regular scheduled drive-bys, supplemented by walk-over checks when required. The frequency of surveys of trees and woodlands in other rural areas is planned accordingly with all trees in high and medium occupancy zones proactively receiving formal walk-over assessments on a schedule set by the arboricultural manager. Individual trees identified as potentially representing a significant hazard receive a more detailed inspection. A more reactive and informal approach is taken to trees in low occupancy zones, and in some remote areas no formal checks are carried out. Managing risk from trees on the county council's rural land holdings is often achieved through the adoption of forestry principles, which incorporate the felling of potentially high-risk trees into routine forestry operations. Because of the county council's desire to retain individual trees in urban settings to maintain the local benefits they provide, managing risk from highway trees is often achieved through arboricultural techniques that mitigate risk while leaving the tree in situ. The arboricultural manager has begun to introduce sustainable urban forestry principles to both diversify tree species and age distribution, and to safeguard existing valuable tree assets for the long-term resilience of the tree population.

Competence

Proactive surveys of the highway network tree stock are outsourced to seven district councils and a dedicated highways contractor. Proactive surveys of the rural estate and rights of way network are outsourced to approved contractors (see 'Contacts and useful sources of information', page 128). Proactive surveys of the woodland nature reserve managed by the countryside management team are conducted in-house. All surveyors are adequately trained and qualified.

Records

Residents' enquiries about tree-related hazards and any queries arising from informal checks are logged and categorised so that they can be followed up as appropriate. Trees on the county council's highway and rural estate land are recorded on separate purpose-built tree-management systems that allow trees to be plotted on-site, using GIS-based software. Those trees that pose a risk are plotted for future inspection and management. The plan is for both systems to be integrated into one consolidated GIS-database system.

Evaluation

The county council's finite resources are allocated to ensure it reasonably meets its duty of care by demonstrating a practicable and defendable approach to tree management. This involves prioritising resources, so that higher occupancy zones and individual trees that present a sufficient risk to warrant a higher level of assessment receive an appropriate level of inspection. Where possible, the county council follows sustainable principles for both forestry and urban forestry in seeking to incorporate treescape management that balances survey and maintenance costs with the need to retain and enhance the benefits that its treescapes provide.

Scenario 6

Local authority – city council

8600 ha Approximately 300 000

Scenario 6 relates to metropolitan authorities, including London boroughs, which contain a large conurbation. This example council is responsible for managing land in the city centre, the outlying suburbs and some rural land in the green belt. The overall population is approximately 300 000. The city council employs one arboricultural manager and four tree officers. They proactively manage all street and park trees and respond to more than 2000 public queries each year. Two separate council officers in the planning department deal 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 845 ha and one municipal golf course
- Housing: 8000 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 the manager and his team manage a budget of more than £600 000 for all tree-management and maintenance requirements, including planting. The city is built on shrinkable clay soil and the tree officers spend a substantial amount of time dealing with subsidence issues.

Arboricultural competence

The manager and his team manage the city council's tree stock in relation to amenity, public, political and environmental interests, building-damage risks and public safety. The manager is a chartered arboriculturist and the team is qualified from RQF Level 4 to Level 6 with 3–30 years' experience of managing trees. Highway engineers and other non-arboricultural staff are trained in basic tree inspection so that informal and formal checks can inform the need for further inspection. Details of all the public trees are held on a specialised database, as the authority's insurance service requires evidence of management in the event of either personal injury or subsidence claims.

Access

The city attracts many visitors, who, together with residents, enjoy the public spaces. 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 ornamental species, 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 has a published tree strategy outlining its approach to its different responsibilities. One aim is to increase street tree cover by 2% each year for 10 years. Funding is in place to achieve this target, although this is under review. Because its tree strategy aims to proactively manage and maintain a healthy, sustainable tree population for the public's benefit, the council considers that its tree risk management policy is reasonable and cost-effective and that it is compatible with all its other tree-related policy objectives.

Natural living organisms

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

Strategy

Management

Because of the risk of subsidence in the area, many mature street trees are pruned on a three-year cycle, during which they are also inspected for their condition. The remaining population of street trees and those in schools and parks are also inspected every three years. Those trees found to be in a poor condition are managed accordingly. Specific trees are identified for more frequent assessment based upon position, size and condition. The areas described above are managed proactively throughout the year, balancing the benefits the trees provide with the need for proportionate risk control. Tree queries raised by residents are logged and processed, along with information from informal and formal checks carried out by non-arboricultural staff. 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 opportunities to keep in line with the council's stated strategic increase in its tree stock.

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, although they work together to carry out surveys of parks and schools for both safeguarding and support.

Records | The tree officers keep records using the software system designed for the purpose.

Evaluation | The 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. The manager 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 retaining, managing and monitoring standing dead trees. This has led to an increase in biodiversity and has also saved money. The tree officers' knowledge of the district and its tree stock has helped save numerous trees under threat from subsidence claims and vociferous residents. The tree strategy explains unambiguously the council's intentions with respect to managing trees in the city. While these systems are in place, there are still more than 100 incidents of tree or branch failure each year in the city, although these are mostly either small ornamental trees that were all planted at the same time and are coming to the end of their lives, or trees which have been damaged by vehicles.

Scenario 7

Large private estate with public access

5000 ha Approximately 450 000

Scenario 7 could relate to a wide range of large landholdings where public access is the norm. This could include country estates, amenity woodlands, waterways and heritage land. In this instance, we have used a private estate open to and widely visited by the public. The estate has been in the family for generations. It is predominantly arable but with some grassland and 600 ha of woodland. There is a historic house, ornamental gardens, plus woods and parkland that contain many important veteran trees.

Approximately 2000 ha are farmed in hand with the remainder tenanted; all the woodland and all the trees are retained and managed by the estate. The main house and its garden are open to the public throughout the year. Three car parks serve the main house, ornamental gardens, restaurant and the farm shop. During the summer, several events take place in the grounds, including a craft fair, a caravan rally, a carnival, a jazz festival and a 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 seasonally some of the year. The estate employs a general manager, who has overall responsibility for implementing policy and strategic and operational decisions. Departmental heads are responsible for the house, the estate, the gardens, visitor facilities and catering. The estate's general manager is responsible for day-to-day tree safety. The estate also employs two gardeners, a farm manager, three members of farm staff, a head gamekeeper, two underkeepers and a woodman. An external forestry agent is employed to assist with management of the woods. The estate is divided by several public roads, notably a busy A road that runs through it from north to south.

Ownership/control of management

Responsibility

The estate owner has overall responsibility for managing its affairs. The general manager reports to him and the department heads have day-to-day responsibility for managing their respective responsibilities. The strategic responsibility for the safety of all trees on the estate is held by the estate's general manager. As a reasonable and prudent landowner responsible for trees, he also recognises he is the duty holder, employing experienced staff who are

able to understand the significance of obvious defects in trees, in the context of their location. They have received basic training to carry out visual checks and, where necessary, obtain further advice.

Arboricultural competence

The farm manager is experienced in a wide range of agricultural activities, and the woodman, one of the gamekeepers and the two gardeners have certificates to use a chainsaw. The woodman and the head gardener can identify the most common trees and can recognise the obvious signs that a tree may be hazardous. The external forestry agent advises on most tree-related issues and decides if tree safety work is required; if he feels the issue is beyond his level of competence then he will recommend a suitably qualified arboriculturist (see 'Contacts and useful sources of information', page 128).

Access

The estate is divided by several public roads, notably the busy A road. The estate is criss-crossed by footpaths, some of which run alongside or through the woodland. The house and garden are open all year round and the park and woodlands are open for part of the year. During the summer months, the park is used for public events.

Benefits of trees

The owner has known the estate all his life and has lived there for much of it; he values his trees and woodlands. The trees and woods are very important to him, they enhance the landscape where he lives and provide valuable habitat for game birds and 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 during the rest of the year. Some of the veteran trees also give him a link with his family's heritage and presence in the area. Most of the work that his trees and woodlands require costs him money and he is prepared to invest a reasonable amount in his trees.

Natural living organisms

Having lived on the estate for most of his life, the owner is well aware of how the trees and woods have changed over the years. He has experienced trees being felled and replanted, many of which are now of significant size. He observed that during the great storm of 1987, many younger trees blew over, while some of the older veteran trees stood firm despite losing branches. The scars and cavities resulting from this can still be seen on some of the larger trees. Recently, a mature beech lost a huge branch; fortunately, no one was underneath it at the time. These events help the owner to understand that trees are living things and that as they grow it is part of their nature to lose branches, develop cavities and eventually enter a long period of slow decline. He also recognises that trees can frequently recover from quite severe damage and live for many years with those features without being a danger to anyone.

Strategy

Management

Until recently, the estate had no formal tree safety management plan, relying on staff and others to report problems, then dealing with them as they arose. Although no one had been killed or injured by a falling tree or branch on the estate, two years ago the owner decided that it would be prudent to adopt a proactive approach.

In a meeting with the estate's general manager, head gardener, farm manager and woodman, an estate map was used to identify the areas that they believed merited more formal inspection. For the first formal inspection they decided to include the A road, 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.

The owner also wrote a letter to all staff informing them that he had asked the general manager to lead on the estate's tree safety plan and instructed them to report any trees that they were concerned about directly to him.

The general manager and the woodman carried out the first formal tree checks. They checked the trees alongside the roads and in the park. This was mostly a drive-by visual check, stopping for a closer look at some of the bigger, older trees that were more likely to have problems, walking where the trees were closer together or where a wood grew alongside the road. The head gardener and the undergardener checked 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 some of the park's veteran trees needed protection, and that in future, event organisers would be instructed not to park or place marquees or other structures underneath or close to these trees. Two of the trees were specifically selected for protection with fencing.

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. The owner was very keen to keep the tree, so, following discussion with the forestry agent, the general manager employed an arboriculturist to inspect it. The arboriculturist reported that the cavity was not affecting the tree's structural integrity and he recommended carrying out no work just now and undertaking another inspection in three years' time.

Following the initial checks and remedial work, the owner decided that, unless there was a change in circumstances, the trees alongside the A road and the lime tree in the garden would be formally checked again 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 regime as the other trees on the estate.

Competence

Employees are able to recognise features that might signify a serious structural defect. However, following guidance from the forestry agent, the estate's manager arranged for key members of staff to receive training in basic tree survey and inspection. When a greater level of expertise is required, the forestry agent recommends a qualified arboriculturist and in the case of ancient and veteran trees, a qualified VETcert specialist (see 'Contacts and useful sources of information', page 128).

Records

The results of the formal checks are kept in a file in the estate office along with the results of the arboriculturist's report and a note of any remedial work carried out. The general manager also keeps records of related training and any trees reported to him, and the action(s) that he took.

Evaluation

The estate owner 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'.

Scenario 8

Large open space open to the general public

Three sites totalling 300 ha More than 25 000

Scenario 8 concerns a collection of urban open spaces including parks, grassland and 170 ha of secondary and ancient woodland where public access is largely unrestricted. Four areas are locked at night. There are a number of ponds, including swimming ponds, areas of amenity sports fields, five cafes and four car parks. The parks and woods contain many important ancient/veteran trees and landscape trees that were planted during the 19th century. During the year, several large events take place on the site, including cross-country championships, park runs, art fairs, funfairs and a circus.

Ownership/control of management

Responsibility

There are three separate sites that are managed by a single responsible ownership body. The Site Manager has overall responsibility for the running of the sites, implementing policy and strategic and operational decisions. Responsibility for the safety of all trees is held by the Arboricultural Manager, and is delegated to the Tree Officer. All tree-related issues are generally managed internally.

Arboricultural competence

The Arboricultural Manager, Tree Officer and Tree Team Leader are qualified in arboriculture and have different levels of experience. Some team members are qualified in veteran tree management (see 'Contacts and useful sources of useful information', page 128) and attend relevant conferences and events on arboriculture and ancient and veteran trees. A small in-house team of qualified and experienced arborists assists with various duties.

Access

The main site is divided by busy A and B roads and a railway track runs along the southern-most boundary of the site. All three sites have busy roads and bus stops adjacent to one or more external boundaries. A variety of access tracks criss-cross the site, ranging from tarmacked vehicle tracks to informal desire paths. Other target areas include lockable play and education areas, car parks, sports areas and swimming ponds. The sites host public events throughout the year. The largest

area is open all year round with 24-hour unrestricted access to most of the site. In accordance with the local Extreme Weather Protocol, some park areas are locked during poor weather.

Benefits of trees

The trees and woodlands form a significant part of the open space as an amenity, habitat and education facility. The importance of public access to semi-naturalised open space, including trees and woodlands within an urban environment, is considered to be highly important. The specific retention and proactive management of deadwood on living and dead trees, alongside other conservation works, actively contributes to increased biodiversity on site and an enhanced visitor experience. Groups of students, tree professionals and members of the public are regularly taken on tours of the site to demonstrate the type of tree management undertaken and to share learning opportunities. To ensure that the tree management on the site is evolving, active international collaboration takes place with professionals from various relevant tree and conservation disciplines. The site also hosts walks for the public and even international visitors and occasional interns.

Natural living organisms

The tree-management team are aware that trees and woodlands are dynamic adapting organisms. They have experienced some of the cycles of planting, ageing, decline, decay and death that all organisms undergo and the value they provide to people and wildlife in all their life stages.

Long-term management has demonstrated that while all tree failures cannot reasonably be prevented, a balanced and proportional approach to tree risk management can provide an acceptably safe natural environment for the public to derive benefit and enjoy. In recent decades, the management of new pests and diseases, particularly Massaria disease of plane, oak processionary moth and Chalara ash dieback, has become increasingly important.

Strategy

Management

As part of a wider group under local authority control, the local tree policy is informed by the Open Spaces Department policy. The approach to tree management has evolved significantly over recent decades. Previous attitudes to the removal of any dead or dying trees and parts of trees have been replaced by a zoned, risk-based approach that is mindful of habitat retention and creation. When occasionally required, access to specialist decay detection equipment assists in taking an informed approach to risk management. The site has also developed a separate focused programme of veteran tree management.

Occupancy zones have been identified so that that areas are inspected according to the level of usage. High and medium occupancy-zone trees are inspected annually and lower-usage areas are inspected on a two- or three-yearly basis.

A database that is used to record all tree failures shows that there are, on average, 80 failures a year across the land area. This is used by the tree team for discussion to review management decisions.

As well as formal inspections, the team perform many unrecorded informal checks throughout the year, both while performing daily duties and after significant weather events. Rangers and park keepers and, occasionally, public visitors also report failures and obviously defective trees. The tree safety system is audited annually by an independent tree safety consultant.

Competence

Survey work is undertaken by in-house qualified and experienced arborists with access to decay-detection equipment when necessary.

Records

The dates of formal checks and inspection are held on the database, scheduled according to occupancy zones. Remedial tree work is prioritised and recorded on the software system. Records of minor works are delegated to a crew work list. The survey software system provides the framework for management of trees according to levels of risk and for maintaining records over time.

Evaluation

The site managers recognise that the threat trees pose to public safety is generally low. In the event of an accident involving one of the trees, the system in place is sufficient to demonstrate 'the conduct to be expected from a reasonable and prudent landowner'. The Open Spaces management is committed to following its tree safety policy, but tree safety is only one element of managing trees. Long-term staff site knowledge of the tree stock and the condition of the trees allows a balanced approach to safety and habitat retention.

Scenario 9

Small site with mature trees growing next to the railway

0.15 ha Hedgerow that also contains five individual trees

There are some 7 million properties, businesses and land holdings that border the railway in Wales, Scotland and England. Aerial survey data suggest that there is an average of one tree (taller than 3 m) per property. The property in scenario 9 is the headquarters of a local scout group with a 30 m-long boundary adjacent to a busy commuter railway line, upon which passenger and freight trains travel at up to 160 km per hour. The boundary fence, at its closest point, is approximately 9 m from the nearest rail.

The boundary comprises a 1.8 m-high chain-link fence with concrete posts, which is owned and maintained by the Railway Authority. Adjacent to the fence on the scout group landholding is a 'wild and woolly' hedge of mixed shrub species including hawthorn, hazel and elder. At irregular intervals along the boundary are five trees, including a semi-mature Lombardy poplar that is 15 m tall with a large proportion of the tree canopy growing within the railway property.

Ownership/control of management

Responsibility

The land was bequeathed to be used by the Scouts and so, as the owner of the land, the Scout Group committee have responsibility and a duty of care. The Railway Authority have responsibility for the safety of their land.

Arboricultural competence

The owners may have access to parents of members with specific arboricultural competence, but this would only be on an ad hoc basis and so the owners would be regarded as lay people.

Access

The Scout Group land is only accessible by those people authorised to access the headquarters, with the entrances protected by locked gates when no activities are taking place. The majority of activities take place on weekday evenings for up to three hours when about 30 Beavers, Cubs and Scouts, plus leaders, can be present. There are occasional private events when the headquarters are hired out. The open space to the rear of the headquarters is regularly used for various activities and in all weathers.

Benefits of trees

In addition to the chain-link fence, the trees and the hedgerow provide a significant boundary and help to create an air of seclusion that is useful in outdoor scouting activities. Nature and the outdoors are a fundamental part of many aspects of scouting and the benefit of access to this small but invaluable resource is recognised by this group, especially when compared with neighbouring groups and those in more urban areas. The various species within the hedge provide an easily accessible source of material, not only for the nature-based activities such as identification, insect hotels and nature art, but perhaps more importantly for the children as a source of fuel for their campfires.

Strategy

Management

Risk assessments, required as part of scouting activities, will look at the potential risk posed by the trees depending on the activities that are taking place. The laypeople involved in scouting would be able to notice dead limbs, significant decay or other aspects of concern should activities be carried out beneath the trees (note that this is similar to the type of check that would be conducted if the scouts were carrying out activities or camping in the vicinity of any trees). These risk assessments will be reviewed during activities should, for example, the weather conditions deteriorate.

The physical management of the trees and other vegetation is undertaken on an ad hoc basis by working parties of non-specialists and, other than when the risk assessments are being reviewed, the trees are not formally checked by the Scout Group.

The railway boundary fence is inspected annually by the Railway Authority and the trees and vegetation on railway property are subjected to a check once every three years. The trees on the Scout Group land are visible from the railway and railway personnel would be expected to report any concerns with the tall trees. In this instance information would be presented to the Scout Group so that they can develop and implement their tree safety plan.

Competence

There is no formal arboricultural knowledge within the Scout Group. However, those involved in running the scouting events are familiar with the need for informal monitoring of the trees, as part of the Scout Group's duty of care.

Records

While there is no formal record-keeping of specific tree inspections by the Scout Group, they have notes of their tree safety plan, which was developed together with the Railway Authority. They also keep invoices of completed tree work. The Railway Authority maintains records of their tree inspections.

Evaluation

The current position and condition of the trees belonging to the Scout Group pose little current threat to the users of the scout facility or the railway. Nevertheless, the Scout Group recognises that trees could present a risk to the safe operation of the railway and that managing trees next to railway lines can also pose challenges. To safeguard the future of the trees, a combined approach to management is required and, through consultation with the Railway Authority, they can plan and implement any required arboricultural activities. The Railway Authority is able to advise on the communication requirements for work and what should be included within the Scout Group's tree safety plan.

The Scout Group, in preparing their tree safety plan, takes advice from the Railway Authority and keep notes of when assessments are made of the trees. If there are concerns about the safety of the trees, the Scout Group seeks the advice of a qualified arboriculturist and notifies the Railway Authority. As such, in the event of an accident involving one of the trees, they believe the system put in place would be that of a reasonable and prudent landowner. Records of liaison with the Railway Authority to ensure that they specifically consider the trees during routine checks would provide further useful information, enabling trees to be retained and continuing to provide benefits to the scouts.

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Contacts and useful sources of information

NTSG partner organisations

*Organisations offering access to professional accreditation schemes and industry training and information.

Ancient Tree Forum – www.ancienttreeforum.org

The Ancient Tree Forum (ATF) raises awareness of the value of old trees, lobbies for their protection, records their locations, provides advice on their management, trains those who look after them, and provides opportunities for people to enjoy them. The ATF together with Arboricultural Association (below) are involved in training and certifying people in the VETcert programme for the assessment and management of ancient and veteran trees.

Arboricultural Association* – www.trees.org.uk

The UK's professional body for Arboriculture. It provides advice to Government, sets industry standards and provides guidance on good practice for arboricultural consultancy and practical tree work. It also provides directories of Approved Contractors, Registered Consultants and is the certifying body in the UK for VETcert specialists (www.vetcert.eu/certified-specialists).

British Holiday & Home Parks Association – www.bhhpa.org.uk

The British Holiday & Home Parks Association is the only organisation established exclusively to serve and represent the interests of the parks industry in the UK.

British Standards Institute – www.bsigroup.com

The British Standards Institute (BSI) is the UK national standards body. Its role is to help improve the quality and safety of products, services and systems by enabling the creation of standards and encouraging their use.

Campaign to Protect Rural England – www.cpre.org.uk

Campaign to Protect Rural England (CPRE) is a countryside charity. It works to promote a thriving, beautiful countryside and green spaces that are accessible to all, rich in nature and that play a crucial role in responding to the climate emergency.

Confor – www.confor.org.uk

The Confederation of Forest Industries (Confor) aims to support sustainable forestry and wood-using businesses through political engagement, market promotion and supporting our members' competitiveness.

Country Land and Business Association – www.cla.org.uk

The Country Land and Business Association (CLA) is a membership organisation for owners of land, property and businesses in rural England and Wales. It aims to safeguard the interests of landowners, and those with an economic, social and environmental interest in rural land.

English Heritage – www.english-heritage.org.uk

English Heritage is a registered charity that cares for and protects an internationally important collection of more than 400 historic buildings, monuments and sites.

Forestry Commission – www.gov.uk/forestrycommission

The Forestry Commission is a non-ministerial department of the UK Government and the forestry authority for England. Its aim is to increase the value of woodlands to society and the environment.

Forestry England – www.gov.uk/forestrycommission

As an agency of the Forestry Commission, Forestry England has, for more than 100 years, been growing, shaping and caring for more than 1500 of England's forests for the benefit and enjoyment of all, for this generation and the next.

Forest Service – www.daera-ni.gov.uk/forestry

Forest Service is an agency of the Department of Agriculture, Environment and Rural Affairs in Northern Ireland. It aims to supply timber, provide public access to forests and protect forest environments, enhance plant health and standards of production, and work with partners to deliver public services and promote economic development.

Institute of Chartered Foresters* – www.charteredforesters.org

The Institute of Chartered Foresters (ICF) is the Royal Chartered body for foresters and arboriculturists in the UK. It is the only UK body to offer the Chartered Forester and Chartered Arboriculturist titles.

London Tree Officers Association – www.ltoa.org.uk

The aim of the London Tree Officers Association is to promote, support and enhance the urban forest and those who manage it.

National Farmers' Union – www.nfuonline.com

The National Farmers' Union (NFU) is a representation body for agriculture and horticulture, with members covering two-thirds of the agricultural land in England and Wales.

The National Trust – www.nationaltrust.org.uk

The National Trust is the biggest conservation charity in Europe and aims to protect and care for places so people and nature can thrive. It looks after the nation's coastline, historic sites, countryside and green spaces, ensuring everyone benefits.

Natural Resources Wales – www.naturalresourceswales.gov.uk

Natural Resources Wales (NRW) was formed in April 2013, largely taking over the functions of the Countryside Council for Wales, Forestry Commission Wales and the Environment Agency in Wales, as well as certain Welsh Government functions.

Royal Institution of Chartered Surveyors – www.rics.org

The Royal Institution of Chartered Surveyors promotes and enforces the highest professional qualifications and standards in the development and management of land, real estate, construction and infrastructure.

Scottish Forestry – www.forestry.gov.scot

Scottish Forestry is the Scottish Government agency responsible for forestry policy, support and regulations.

The Tree Council – www.treecouncil.org.uk

The Tree Council brings together everyone with a shared mission to care for trees and our planet's future. We inspire and empower organisations, government, communities and individuals with the knowledge and tools to create positive, lasting change at a national and local level.

Visitor Safety Group – www.vscg.org

The Visitor Safety Group (VSG) is committed to protecting and enhancing the environment. It explores how safe access to the countryside can be created in ways that do not spoil the landscape and heritage, or lessen the visitor's sense of exploration and adventure.

Woodland Trust – www.woodlandtrust.org.uk

The Woodland Trust is the largest woodland conservation charity in the UK concerned with the creation, protection and restoration of native woodland heritage.

Glossary

- **Ancient tree:** A tree that has developed beyond maturity into the ancient life phase and/or is old in comparison to other trees of the same species. Ancient trees have special ecological importance as they are rare in themselves with rare terrestrial habitats that may span many centuries. Such attributes confer irreplaceable conservation value.
- **Annual rings:** A layer of woody vessels laid down annually as the tree grows. In cross-section these are seen as a series of rings. The distance between the rings is indicative of the rate of growth from year to year.
- **Arboricultural inspector:** A professional (arboriculturist/arborist) trained to assess trees for risk and other purposes, capable of identifying discoverable tree conditions that may affect safety.
- **Benefit–risk assessment:** An assessment that makes a balancing comparison (qualitative and/or quantitative) of the benefit accrued when a risk may be incurred or tolerated.
- **Biodiversity:** Biological diversity represented as the variation in and between living organisms and the complexity and interaction between them and their habitats and environments at macro and micro scales.
- **Check:** A non-detailed tree observation taking account of health and stability features and rapid changes in condition, noting variations from generally held acceptable norms.
- **Civil law:** The branch of law dealing with disputes between individuals and organisations.
- **Climate adaptation:** Changes to human activity expressly designed to accommodate and/or mitigate the harmful impacts of climate change.
- **Climate change:** Changes in the world's climate created by natural or anthropomorphic causes.
- **Compartmentalisation:** The internal physiological response in trees following physical injury, that serves to maintain functional integrity of conducting vessels and to limit air-ingress and the spread of internal decay.
- **Compensatory approach:** The approach taken when making benefit–risk assessments that recognises a balance between multi-objective outcomes is necessary. No single objective dominates the benefit–risk decision-making process unreasonably.
- **Compensatory decision making:** A strategy that weighs positive and negative attributes of considered alternatives.
- **Cost–benefit assessment:** An assessment that makes a balancing comparison (qualitative and quantitative) between the benefit accrued and the cost incurred to provide said benefit. In relation to HSE risk

management, it involves weighing the costs of a proposed control measure against its risk reduction benefits.

- **Criminal law:** The branch of law dealing with prosecutions by the state of individuals or organisations charged with a criminal offence.
- **Crown retrenchment:** The natural process a tree goes through in the transition from peak maturity to the ancient phase and/or, sometimes, to accommodate local environmental changes, when it rebalances its crown to root volume ratio to create a more viable water and nutrient translocation system. A larger tree can retrench into a much smaller canopy volume and continue to survive in the longer term. The process takes place over decades or centuries and can reoccur.
- **Deadwood:** Woody material in a tree that is no longer physiologically active but remains attached to the tree until it falls due to weather conditions or due to the presence of decay that affect its structural integrity. Deadwood is important as microhabitat for wildlife.
- **Defect:** A condition or feature that would predispose a tree, or part of a tree, to structural failure.
- **Detailed inspection:** A close visual assessment conducted by a competent specialist initially from ground level, often instigated following concerns raised by an informal observation or formal inspection. Detailed inspections may involve further exploration of the tree above and below ground and can include the use of diagnostic equipment.
- **Dieback:** A condition where the peripheral branches of a tree die from the ends of the branch back towards the main branch structure and stem.
- **Drive-by inspection** (or drive-by or driven check): Carried out from a slow-moving vehicle to check trees alongside roads.
- **Duty holder:** The entity with responsibility for tree safety.
- **Ecosystem:** A complex network or interconnected ecological system consisting of communities of interacting living organisms within a shared physical environment.
- **Ecosystem services:** The services and benefits derived from the natural world that provide, support and regulate benefits to human populations such as clean air, clean water and food, and which can also include human well-being and enjoyment of natural spaces.
- **Evapotranspiration:** The evaporation of water from the surface of leaves.
- **Formal procedures:** Planned, specified and proactive activities related to tree safety inspection and assessment.
- **Greenhouse gases:** Gases released into the atmosphere by natural or anthropogenic processes that contribute to global warming by trapping solar radiation.
- **Greenspace:** Land around urban and suburban areas that is covered in vegetation and that provides an interruption to urban sprawl.

- **Habitat:** The immediate physical environment of a single species required to support a population of individuals.
- **Harm:** An adverse impact on something or someone.
- **Hazard:** Any source of potential harm.
- **Heartwood:** The non-living inactive internal wood of a tree that was formerly alive and growing whose contribution is subsequently to provide structural support.
- **Highway inspector:** An engineering professional primarily trained in highway matters; may also be trained to identify obvious tree conditions that may affect safety.
- **Hollowing:** The process that occurs in trees when decay organisms progressively remove the internal heartwood (or ripewood) of a tree in its trunk (stem), major limbs (branches), where the core is removed more-or-less surrounded by physiologically active sapwood in living trees or by dead sapwood in non-living trees. Hollow trees are valuable as wildlife habitat.
- **Keystone species:** A species that other species in an ecosystem depend upon, whose loss would be detrimental to their biological communities and therefore has a disproportionally important functional role in its environment.
- **Natural capital:** The world's stock of naturally occurring assets that underpins and provides all the ecosystem services available: geology, air, soil, water and all living organisms.
- **Negative recording**: (also referred to as negative reporting) Procedure for reporting only those trees identified to be of safety concern, usually following walk-over and drive-by assessment.
- **Obvious defect:** A defect that is easily seen and recognised as likely to present a structural hazard.
- **Occupancy:** The level of use by people and/or the presence of valuable property within the falling distance of trees.
- **Particulate matter:** The very small particles in suspension in air that cause air pollution and negative impacts on human health. Predominantly PM10s and PM2.5s from anthropogenic hydrocarbon combustion, but can also be naturally occurring from wildfires, pollen and fungal spores.
- **Plan-Do-Check-Act model:** A four-part guide to managing risk in a changing environment.
- **Pollard trees:** Trees whose crown framework has been cut once, though often on a repeated and regular basis, that promotes regrowth which emanates from the main trunk or pollard points. Pollarding may take place at various heights depending on the desired wood products and/or amenity effect.
- **Red line benefits:** Those benefits identified as accruing from the presence of the tree that are considered to be non-negotiable and whose loss is unacceptable.

- **Risk:** The likelihood of harm arising from a particular hazard.
- **Risk assessment:** The overall process of risk identification, risk analysis and risk evaluation.
- **Risk management:** Coordinated activities to understand, direct and control risk.
- **Risk-management process:** The systematic application of management policies, procedures and practices to the activities of communicating, consulting, establishing the context, and identifying, analysing, evaluating, treating, monitoring and reviewing risk.
- **Root plate:** The mass of woody structural and fine roots that spread out from the base of the tree to provide physical support, water and nutrient uptake for the above-ground parts of the tree.
- **Sapwood:** The layer of wood containing active transporting vascular structures between the heartwood and outer bark.
- **Significant risk:** An estimated level/magnitude of risk likely to warrant proactive management.
- **Site occupancy:** The level of use (by people and/or property) on a site that influences the potential for harm if a tree fails.
- **Special trees:** Trees of high value that may be of heritage (natural, historical, cultural) and/or amenity importance.
- **SUDS (Sustainable Urban Drainage Systems):** SUDS relieve the pressure on traditional drainage by intercepting and slowing stormwater rainfall entering the system, often using green infrastructure features as an integral part of the design to filter and store water.
- **Target:** In a tree risk context, a person or property that could foreseeably be harmed by a falling tree or tree part.
- **Target area:** The area within a tree's potential falling impact range.
- **Tolerability of risk framework:** Visual presentation of the level of general annual risks of death, in terms of a ratio of one individual to the overall population dying as a result of exposure to a particular hazard.
- **Trained tree inspector:** An individual with specific responsibility for inspecting or checking trees. This could be an arborist with specific training and practical experience of working with trees, or an allied professional, such as a highway engineer, who has received targeted training on tree hazard identification, but does not have working experience with trees.
- **Tree inventory:** A systematic tree inspection and recording of selective individual tree details for a population of trees, without necessarily focusing on tree safety issues.
- **Tree management:** The range of activities applied to the care and maintenance of trees according to different objectives.

- **Tree strategy:** A plan or framework that a landowner produces to articulate and document how they will look after the trees under their control and what those processes are.
- **Urban forest:** The collective term for all trees in and around a town or city landscape, ranging from trees in private gardens, streets, parks, open spaces and water courses to urban woodland.
- **Urban forestry:** The systematic and integrated approach to the management of the urban forest.
- **Urban heat island effect:** The rise in air temperatures within a city compared with those recorded in a neighbouring rural location caused by built infrastructure trapping heat from the sun.
- **Utilities:** Modern utility apparatus infrastructure used to provide services such as telecommunications, gas, electricity and water to human settlements.
- **Veteran tree:** A tree that is typically within or beyond the mature stage and exhibits characteristics associated with significant age. Veteran trees may be of high cultural and historical heritage value and/or ones of great ecological importance for their niche habitat with associated diverse populations of plants and animals. Where these characteristics are found in combination, individual trees become even more important. These ecological attributes confer irreplaceable conservation value.
- **Veteranisation:** The deliberate intervention to accelerate natural processes in trees that create wood-decay habitats, which otherwise take decades or centuries to develop. Specialist techniques are used to physically wound tree tissues which encourage decay organisms, prematurely creating cavities, hollows and decayed timber for biodiversity and wildlife colonisation.
- **Visual check:** A non-detailed, fairly rapid assessment of tree health and condition through visual observation. Visual checks apply to both informal and formal procedures and may prompt further, closer inspection.
- **Visual tree assessment:** A tree inspection method using observation of visual signs, to aid diagnosis of tree health and structural condition within its immediate setting.
- **Walk-over assessment:** An on-foot method for checking trees from accessible viewpoints to identify the need for further inspection or management.
- **Zoning:** A means of defining areas of land around trees according to levels of occupancy.

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NTSG Drafting Group

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NTSG position statement

The National Tree Safety Group (NTSG) was formed in 2007 in response to concerns over the unnecessary removal of trees. One of our aims is to develop a nationally recognised approach to tree risk management and to provide guidance that is reasonable and proportionate to the actual risks from trees. We believe that what is reasonable with respect to tree risk management should be based upon an evaluation of benefits and risk. This judgement can only be undertaken in a local context because trees provide different types of benefit across a wide range of circumstances.

One of the outcomes stipulated in our original terms of reference was to produce a set of basic principles for considering and managing tree safety in the public interest. Five key principles now underpin our work:

1. **Trees provide a wide variety of benefits to society.**
2. **Trees are living organisms and they naturally lose branches or fall.**
3. **The overall risk to public safety is extremely low.**
4. **Tree owners have a legal duty of care.**
5. **Tree owners should take a balanced and proportionate approach to tree risk management.**

Neither the law nor regulators require the NTSG or any other body to develop a single policy that states how safety should be managed in all circumstances. Management of the risk is the responsibility of those who own and manage the land upon which trees grow. The NTSG believes that duty holders, when considering what constitutes tree management that is reasonable in their particular circumstances, will benefit from the development of a coherent risk philosophy being adopted across the sector.

However, we believe that it is reasonable to expect sufficiently large organisations that own or manage trees to develop a formal policy (in line with good practice in other sectors), which should be based on a risk–benefit

assessment of safety and other goals. Our guidance is that, wherever possible, given their social and environmental value and their importance to public health and well-being, amenity, heritage and veteran trees should not be felled. This policy, articulating the benefits of trees, should carry as much weight in protecting the policymaker against litigation following an incident as any reasonable risk management policy in a workplace setting.

The NTSG is an inclusive organisation with representatives from governmental and non-governmental organisations and professional and corporate bodies involved in the management of trees, and our membership is open to all stakeholders with responsibility for trees. You can find out more about us at ntsgroup.org.uk.

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