Rainfords Arboriculture — 19 Derby Drive, Rainford, St Helens, WA11 8EX
robert@rainfordsarb.co.uk — 07841 128366

RAINFORDS
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TREE RISK SURVEY REPORT
Larchwood Ave., Bedhampton, Havant PO9 3QW

Site Address	Larchwood Ave., Bedhampton, Havant PO9 3QW
Client	UK Landscapes
Rainfords Reference	RA.TCS.304
Survey Date	9th March 2026
Report Date	27th March 2026
Produced By	Robert Rainford BSc (Hons) MArborA

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1. Introduction

1.1 Instruction

Rainfords Arboriculture have been instructed by UK Landscapes to carry out a tree survey and risk assessment to the trees located at Larchwood Ave., Bedhampton, Havant PO9 3QW.

The site was visited and trees surveyed on 9th March 2026, the weather was dry and overcast with good visibility.

1.2 Purpose of the Report

This report provides an analysis of the trees mentioned regarding their current condition and provides realistic management measures appropriate for the site. This report can be used to support a planning application for tree works. During the planning process this document will be publicly available; the aim is to present information clearly and concisely for the layman.

1.3 Author Profile

Robert Rainford has been active in the arboricultural field since 2011, specialising in tree surveys and inspections. He completed his Bachelor's degree (BSc) with Honours in Arboriculture from Myerscough College in 2012. Initially, Robert gained practical experience in the industry for several years before transitioning to focus on tree surveys and inspections in 2015 while maintaining his hands-on practical work. Throughout his career he has served both as a self-employed professional and has worked for prominent landowners, including Local Authorities.

Robert has been entrusted with tree management and assessments for various tree populations since achieving his Level 6 qualification. In addition, he has acquired several certifications and competencies, including practical NPTC tickets for industry-specific tasks, Lantra Professional Tree Inspection, and Subsidence Awareness and Investigation training, which have enhanced his skills in report writing.

1.4 Limitations of the Report

Due to the changing nature of trees and other site circumstances, this report and any recommendations made are limited to the inspection timescales laid out in the Tree Data Appendix A. Any alteration to the site could change current circumstances and may invalidate this report and any recommendations made.

Trees are dynamic structures that can never be guaranteed safe; even in good condition they can suffer damage under average conditions. Regular inspections help to identify potential problems before they become acute.

Any implications concerning buildings and their foundations within the area are beyond the scope of this report. A structural engineer would need to be consulted and any such analysis dealt with separately. General comments may be noted for obvious structural damage that may be attributable to trees discussed within this report.

1.5 Provided Documents

No plans had been provided prior to site attendance.

1.6 Mapping

Maps were produced for this report using Google Maps and QGIS to give a site layout and boundary. Tree positions were recorded using GPS during the field survey.

1.7 Justification of Works

Any works identified as part of the tree survey and contained within this report are based on maximising the tree's Safe Useful Life Expectancy (SULE), considering its current situation and proximity to people or property.

2. Tree and Site Assessment

2.1 Site Overview

The site is located at Larchwood Ave., Bedhampton, Havant PO9 3QW and comprises an Asda supermarket with associated car parking. The trees subject to this survey are situated along the east boundary of the car park. The surrounding area is residential in character.

The tree stock on site is dominated by common ash (Fraxinus excelsior). The primary concern prompting this survey is the presence and progression of ash dieback (Hymenoscyphus fraxineus) within the population, along with ash canker affecting individual specimens.

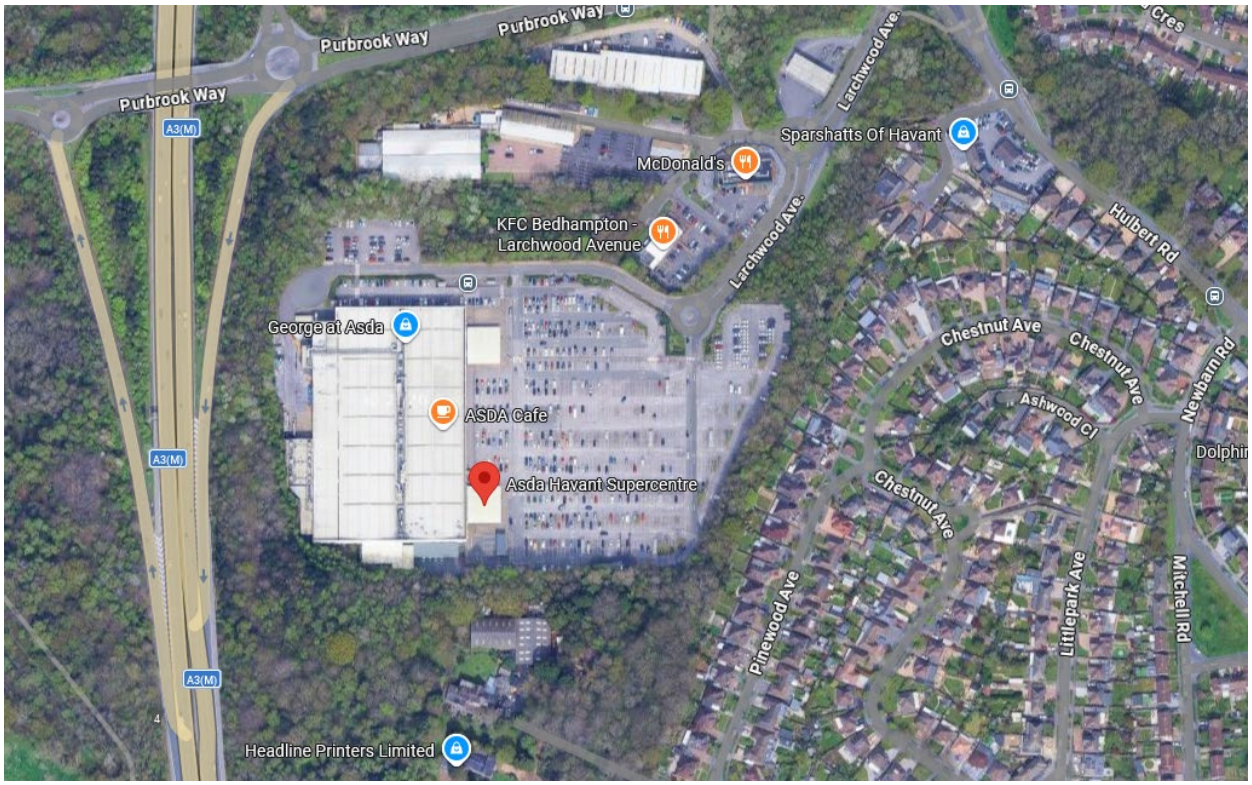

Figure 1: Site in Context of Area, from Google Maps

2.2 Inspection Method

The site was inspected from ground level, accessing trees where possible. Where 360° visibility could not be obtained, binoculars were used to aid inspection. Trees with significant or notifiable defects are recorded within this report for further works or investigation as necessary.

The trees were inspected visually from ground level; no aerial inspections were made.

All trees have been assessed and risks quantified using Quantified Tree Risk Assessment (QTRA). This allows the assessor to quantify known risks, provide a banded risk assessment level, and aid in management decision making. Further information on the QTRA methodology is provided in Appendix C.

Thresholds	Description	Action
	Unacceptable Risks will not ordinarily be tolerated	• Control the risk
1/1,000		
	Unacceptable (where imposed on others) Risks will not ordinarily be tolerated	• Control the risk • Review the risk
	Tolerable (by agreement) Risks may be tolerated if those exposed to the risk accept it, or the tree has exceptional value	• Control the risk unless there is broad stakeholder agreement to tolerate it, or the tree has exceptional value • Review the risk
1/10 000		
	Tolerable (where imposed on others) Risks are tolerable if ALARP	• Assess costs and benefits of risk control • Control the risk only where a significant benefit might be achieved at reasonable cost • Review the risk
1/1 000 000		
	Broadly Acceptable Risk is already ALARP	• No action currently required • Review the risk

Figure 2: QTRA Risk Thresholds

2.3 Tree Assessment

A total of 5 individual ash trees and 1 group were assessed during this survey. All trees on site are common ash (Fraxinus excelsior) and the survey was specifically focused on the condition of these trees in relation to ash dieback (ADB) and associated defects.

Group 1 (G1)

A group of ash trees inspected for ash dieback. Ash canker is also present within the group. The trees display a variety of ADB stages. Two trees at the south side of the group adjacent to the car park, opposite the first junction, have stage 2 infection. One tree in poor condition is located approximately 20 m north of the previously stated trees. One ash tree has a large canker affecting more than 50% of the circumference of the stem. A large tree set back from the car park within the group has stage 3 ADB but presents a low risk due to its position.

Tree 1

Common ash with ADB stage 2 infection. The tree is approximately 20 m in height with fair structural condition but poor physiological condition. Overall condition is assessed as poor.

Tree 2

Common ash with ADB stage 2 infection. Approximately 20 m in height with fair structural condition and poor physiological condition. Overall condition is assessed as poor.

Tree 3

Common ash with ADB stage 2 infection. The tree is in poor condition both physiologically and structurally. Approximately 20 m in height. Overall condition is assessed as poor.

Tree 4

Common ash displaying ash canker. Approximately 20 m in height with poor structural and physiological condition. Overall condition is assessed as poor.

Tree 5

Common ash with ADB stage 3 infection. The tree is set back from the car park within the group. Approximately 20 m in height with poor structural and physiological condition. Overall condition is assessed as poor. Due to its position set back from the car park, the risk to persons and property is low.

Group 1 – Survey Photo

Group 1 – Survey Photo

Group 1 – Survey Photo

Group 1 – Survey Photo

Group 1 – Survey Photo

Tree 1 – Survey Photo

Tree 2 – Survey Photo

Tree 3 – Survey Photo

Tree 4 – Survey Photo

Tree 4 – Survey Photo

Tree 5 – Survey Photo

Tree 5 – Survey Photo

2.4 Recommendations

A summary list of recommendations is shown below, with full tree data held within Appendix A.
All identified works should be carried out by competent arboricultural contractors holding appropriate qualifications and insurances, in accordance with BS 3998:2010 Tree Work — Recommendations. Works should aim to manage risk to a level that is as low as reasonably practicable (ALARP), consistent with the Safe Useful Life Expectancy (SULE) of each tree.

Prior to the commencement of any tree works, a check for nesting birds and other protected species should be carried out in accordance with the Wildlife and Countryside Act 1981 (as amended). Tree works should not be undertaken during the main bird nesting season (March to August inclusive) unless a prior inspection has confirmed the absence of active nests.

Tree 1 (T1) – Felling recommended. ADB stage 2 infection adjacent to car park. Priority: Moderate (90 days).

Tree 2 (T2) – Felling recommended. ADB stage 2 infection adjacent to car park. Priority: Moderate (90 days).

Tree 3 (T3) – Felling recommended. ADB stage 2 with poor structural and physiological condition. Priority: Moderate (90 days).

Tree 4 (T4) – Remove damaged stem affected by ash canker. Priority: Moderate (90 days).

Tree 5 (T5) – No action required. ADB stage 3 but set back from car park with low risk to persons and property.

2.5 Discussion

The surveyed trees on this site is entirely composed of common ash, a species currently under significant pressure from ash dieback (Hymenoscyphus fraxineus). The disease is widespread across the UK and there is no effective treatment. Affected trees undergo progressive crown dieback and structural deterioration, which in the context of a car park with high footfall and vehicle traffic presents a risk that requires active management.

Three trees (T1, T2, and T3) are at stage 2 ADB and are located adjacent to the car park where they pose a risk from potential branch or stem failure. These trees are recommended for felling. Tree 4 has ash canker affecting more than 50% of the stem circumference, compromising its structural integrity. Removal of the damaged stem is recommended.

Tree 5, whilst at stage 3 ADB, is set back from the car park and the risk to people and property is low. No action is required at this time, though the tree should be monitored at subsequent inspections.

Given the prevalence of ADB within this population, the remaining group trees should continue to be monitored at regular intervals. Disease progression is unpredictable and trees that are currently low risk may deteriorate and require intervention in future inspection cycles.

2.6 Conclusion

The site at Larchwood Ave., Bedhampton, Havant PO9 3QW was visited on 9th March 2026 and a total of 5 individual trees and 1 group were inspected in dry and overcast conditions. The overall health of the tree stock was assessed to be poor, primarily due to the prevalence of ash dieback and ash canker within the population.

Intervention and risk management work recommendations have been laid out in Section 2.4 Recommendations. All identified works should be carried out by suitably qualified and experienced arboricultural contractors in accordance with BS 3998:2010 Tree Work — Recommendations.

Re-surveys must be carried out at regular intervals to maintain obligations under the Occupiers' Liability Act 1957 and 1984, to ensure risks are minimised and kept within acceptable tolerances. The site was assessed to be within the Broadly Acceptable risk banding under QTRA for the majority of the tree stock. Re-surveys are recommended to be carried out not exceeding three-year timescales, or as specified in the individual tree inspection cycle recommendations in Appendix A.

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4. Appendices

Appendix A — Tree Data

Individual Tree Data

Tree ID	Common Name	Scientific Name	Tag Number	Stem Diameter [mm]	Tree Height [m]	Crown Spread Radius (m)	Life Stage	Physiological Condition	Primary ID	Structural Condition	Overall Condition	Comments	Recommendations	Work Priority	QTRA Risk Numeral	QTRA Risk Category	Inspection Cycle	Last Inspection
1	Common ash	Fraxinus excelsior			20		Early mature	Poor	4856	Fair	Poor	Tree 1, ADB stage 2	Felling recommend.	Moderate - 90 Days	1/1m	Tolerable	N/A	9/3/2026
2	Common ash	Fraxinus excelsior			20		Early mature	Poor	4858	Fair	Poor	Tree 2, ADB stage 2	Felling recommend.	Moderate - 90 Days	1/1m	Tolerable	N/A	9/3/2026
3	Common ash	Fraxinus excelsior			20		Early mature	Poor	4859	Poor	Poor	Tree 3, ADB stage 2 tree in poor condition	Felling recommend.	Moderate - 90 Days	1/1m	Tolerable	N/A	9/3/2026
4	Common ash	Fraxinus excelsior			20		Early mature	Poor	4861	Poor	Poor	Tree 4 ash canker.	Remove damaged stem.	Moderate - 90 Days	1/1m	Tolerable	N/A	9/3/2026
5	Common ash	Fraxinus excelsior			20		Early mature	Poor	4863	Poor	Poor	Tree 5 ADB stage 3. Set back from car park.	No action required.	N/A	1/1m	Tolerable	N/A	9/3/2026

Group Data

Primary ID	Group ID	Common Name	Life Stage	Physiological Condition	Structural Condition	Overall Condition	Comments	Recommendations	Work Priority	QTRA Risk Numeral	QTRA Risk Category	Last Inspection	Inspection Cycle
790	1	Common ash	Early-mature	Mixed	Fair	Fair	Group of Ash inspected for ash dieback. Ash canker is present also in group. Trees in variety of stages of ADB. 2 trees with stage 2 infection at south side of group adjacent car park opposite first junction in car park. Removal recommended. 1 tree in poor condition approximately 20m north of previous stated trees in group. Removal recommended. 1 ash tree with large canker impacting >50% of circumference of stem. Remove of stem recommended. Large tree set back in from car park in group with stage 3. Low risk tree.	Fell 2 tree to south of group with stage 2 adb. Fell one ash tree in poor condition and remove damaged stem with ash canker. See tree for location and photos attached.	Moderate - 90 Days	1/1m	Tolerable	9/3/2026	Low - 3 Years

Appendix B — Site Map

Appendix C — QTRA Practice Note

QTRA Quantified Tree Risk Assessment

Simply Balancing Risks With Benefits

Quantified Tree Risk Assessment

PRACTICE NOTE

VERSION 5

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V5.3.7 (GB) 2023-01

Quantified Tree Risk Assessment Practice Note

"When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind"

William Thomson, Lord Kelvin, Popular Lectures and Addresses [1891-1894]

1. INTRODUCTION

Every day we encounter risks in all of our activities, and the way we manage those risks is to make choices. We weigh up the costs and benefits of the risk to determine whether it is acceptable, unacceptable, or tolerable. For example, if you want to travel by car you must accept that even with all the extensive risk control measures, such as seat-belts, speed limits, airbags, and crash barriers, there is still a significant risk of death. This is an everyday risk that is taken for granted and tolerated by millions of people in return for the benefits of convenient travel. Managing trees should take a similarly balanced approach.

A risk from falling trees exists only if there is both potential for tree failure and potential for harm to result. The job of the risk assessor is to consider the likelihood and consequences of tree failure. The outcome of this assessment can then inform consideration of the risk by the tree manager, who may also be the owner.

Using a comprehensive range of values[1], Quantified Tree Risk Assessment (QTRA) enables the tree assessor to identify and analyse the risk from tree failure in three key stages. 1) to consider land-use in terms of vulnerability to impact and likelihood of occupation, 2) to consider the consequences of an impact, taking account of the size of the tree or branch concerned, and 3) to estimate the probability that the tree or branch will fail onto the land-use in question. Estimating the values of these components, the assessor can use the QTRA manual calculator or software application to calculate an annual Risk of Harm from a particular tree. To inform management decisions, the risks from different hazards can then be both ranked and compared, and considered against broadly acceptable and tolerable levels of risk.

A Proportionate Approach to Risks from Trees

The risks from falling trees are usually very low and high risks will usually be encountered only in areas with either high levels of human occupation or with valuable property. Where levels of human occupation and value of property are sufficiently low, the assessment of trees for structural weakness will not usually be necessary. Even when land-use indicates that the assessment of trees is appropriate, it is seldom proportionate to assess and evaluate the risk for each individual tree in a population. Often, all that is required is a brief consideration of the trees to identify gross signs of structural weakness or declining health. Doing all that is reasonably practicable does not mean that all trees have to be individually examined on a regular basis (HSE 2013).

The QTRA method enables a range of approaches from the broad assessment of large collections of trees to, where necessary, the detailed assessment of an individual tree.

Risk of Harm

The QTRA output is termed the Risk of Harm and is a combined measure of the likelihood and consequences of tree failure, considered against the baseline of a lost human life within the coming year.

ALARP (As Low As Reasonably Practicable)

Determining that risks have been reduced to As Low As Reasonably Practicable (HSE 2001) involves an evaluation of both the risk and the sacrifice or cost involved in reducing that risk. If it can be demonstrated that there is gross disproportion between them, the risk being insignificant in relation to the sacrifice or cost, then to reduce the risk further is not 'reasonably practicable'.

Costs and Benefits of Risk Control

Trees confer many benefits to people and the wider environment. When managing any risk, it is essential to maintain a balance between the costs and benefits of risk reduction, which should be considered in the determination of ALARP. It is not only the financial cost of controlling the risk that should be considered, but also the loss of tree-related benefits, and the risk to workers and the public from the risk control measure itself.

When considering risks from falling trees, the cost of risk control will usually be too high when it is clearly 'disproportionate' to the reduction in risk. In the

[1] See Tables 1, 2 & 3.

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context of QTRA, the issue of 'gross disproportion'[2], where decisions are heavily biased in favour of safety, is only likely to be considered where there are risks of 1/10 000 or greater.

Acceptable and Tolerable Risks

The Tolerability of Risk framework (ToR) (HSE 2001) is a widely accepted approach to reaching decisions on whether risks are broadly acceptable, unacceptable, or tolerable. Graphically represented in Figure 1, ToR can be summarised as having a Broadly Acceptable Region where the upper limit is an annual risk of death 1/1 000 000, an Unacceptable Region for which the lower limit is 1/1 000, and between these a Tolerable Region within which the tolerability of a risk will be dependent upon the costs and benefits of risk reduction. In the Tolerable Region, we must ask whether the benefits of risk control are sufficient to justify their cost.

In respect of trees, some risks cross the Broadly Acceptable 1/1 000 000 boundary, but remain tolerable. This is because any further reduction would involve a disproportionate cost in terms of the lost environmental, visual, and other benefits, in addition to the financial cost of controlling the risk.

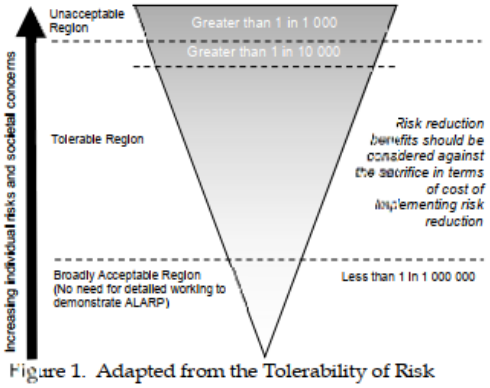

Figure 1. Adapted from the Tolerability of Risk framework (HSE 2001).

Value of Statistical Life

The Value of Statistical Life (VOSL), is a widely applied risk management device, which uses the value of a hypothetical life to guide the proportionate allocation of resources to risk reduction. In the UK, this value is currently in the region of £2 000 000, and this is the value adopted in the QTRA method.

In QTRA, placing a statistical value on a human life has two particular uses. Firstly, QTRA uses VOSL to enable damage to property to be compared with the loss of life, allowing the comparison of risks to people and property. Secondly, the proportionate allocation of financial resources to risk reduction can be informed by VOSL. *"A value of statistical life of £1 000 000 is just another way of saying that a reduction in risk of death of 1/100 000 per year has a value of £10 per year"* (HSE 1996).

Internationally, there is variation in VOSL, but to provide consistency in QTRA outputs, it is suggested that VOSL of £2 000 000 should be applied internationally. This is ultimately a decision for the tree manager.

2. OWNERSHIP OF RISK

Where many people are exposed to a risk, it is shared between them. Where only one person is exposed, that individual is the recipient of all of the risk and if they have control over it, they are also the owner of the risk. An individual may choose to accept or reject any particular risk to themselves, when that risk is under their control. When risks that are imposed upon others become elevated, societal concern will usually require risk controls, which ultimately are imposed by the courts or government regulators.

Although QTRA outputs might occasionally relate to an individual recipient, this is seldom the case. More often, calculation of the Risk of Harm is based on a cumulative occupation – i.e. the number of people per hour or vehicles per day, without attempting to identify the individuals who share the risk.

Where the risk of harm relates to a specific individual or a known group of people, the risk manager might consider the views of those who are exposed to the risk when making management decisions. Where a risk is imposed on the wider community, the principles set out in the ToR framework can be used as a reasonable approach to determine whether the risk is ALARP.

3. THE QTRA METHOD - VERSION 5

The input values for the three components of the QTRA calculation are set out in broad ranges[3] of Target, Size, and Probability of Failure. The assessor estimates values for these three components and inputs them on either the manual calculator or software application to calculate the Risk of Harm.

[2] Discussed further on page 5.

[3] See Tables 1, 2 & 3.

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Assessing Land-use (Targets)

The nature of the land-use beneath or adjacent to a tree will usually inform the level and extent of risk assessment to be carried out. In the assessment of Targets, six ranges of value are available. Table 2 sets out these ranges for vehicular frequency, human occupation and the monetary value of damage to property.

Human Occupation

The probability of pedestrian occupation at a particular location is calculated on the basis that an average pedestrian will spend five seconds walking beneath an average tree. For example, an average occupation of ten pedestrians per day, each occupying the Target for five seconds is a daily occupation of fifty seconds, giving a likelihood of occupation 1/1,728. Where a longer occupation is likely, as with a habitable building, outdoor café, or park bench, the period of occupation can be measured, or estimated as a proportion of a given unit of time, e.g. six hours per day (1/4). The Target is recorded as a range (Table 2).

Weather Affected Targets

Often the nature of a structural weakness in a tree is such that the probability of failure is greatest during windy weather, while the probability of the site being occupied by people during such weather is often low. This applies particularly to outdoor recreational areas. When estimating human Targets, the risk assessor must answer the question 'in the weather conditions that I expect the likelihood of failure of the tree to be initiated, what is my estimate of human occupation?' Taking this approach, rather than using the average occupation, ensures that the assessor considers the relationship between weather, people, and trees, along with the nature of the average person with their ability to recognise and avoid unnecessary risks.

Vehicles on the Highway

In the case of vehicles, likelihood of occupation may relate to either the falling tree or branch striking the vehicle or the vehicle striking the fallen tree. Both types of impact are influenced by vehicle speed; the faster the vehicle travels the less likely it is to be struck by the falling tree, but the more likely it is to strike a fallen tree. The probability of a vehicle occupying any particular point in the road is the ratio of the time it is occupied - including a safe stopping distance - to the total time. The average vehicle on a UK road is occupied by 1.6 people (DfT 2010). To account for the substantial protection that the average vehicle provides against most tree impacts and in particular, frontal collisions, QTRA values the substantially protected 1.6 occupants in addition to the value of the vehicle as equivalent to one exposed human life.

Property

Table 1. Size

Size Range	Size of tree or branch	Range of Probability
1	> 450mm (>18") dia.	1/1 - >1/2
2	260mm (10½") dia. - 450mm (18") dia.	1/2 - >1/8.6
3	110mm (4½") dia. - 250mm (10") dia.	1/8.6 - >1/82
4	25mm (1") dia. - 100mm (4") dia.	1/82 - 1/2 500

* Range 1 is based on a diameter of 600mm.

Property can be anything that could be damaged by a falling tree, from a dwelling, to livestock, parked car, or fence. When evaluating the exposure of property to tree failure, the QTRA assessment considers the cost of repair or replacement that might result from failure of the tree. Ranges of value are presented in Table 2 and the assessor's estimate need only be sufficient to determine which of the six ranges the cost to select.

In Table 2, the ranges of property value are based on a VOSL of £2 000 000, e.g. where a building with a replacement cost of £20 000 would be valued at 0.01 (1/100) of a life (Target Range 2).

When assessing risks in relation to buildings, the Target to be considered might be the building, the occupants, or both. Occupants of a building could be protected from harm by the structure or substantially exposed to the impact from a falling tree if the structure is not sufficiently robust, and this will determine how the assessor categorises the Target.

Multiple Targets

A Target might be constantly occupied by more than one person and QTRA can account for this. For example, if it is projected that the average occupation will be constant by 10 people, the Risk of Harm is calculated in relation to one person constantly occupying the Target before going on to identify that the average occupation is 10 people. This is expressed as Target 1(10T)/1, where 10T represents the Multiple Targets. In respect of property, a Risk of Harm 1(10T)/1 would be equivalent to a risk of losing £20 000 000 as opposed to £2 000 000.

Tree or Branch Size

A small dead branch of less than 25mm diameter is not likely to cause significant harm even in the case of direct contact with a Target, while a falling branch with a diameter greater than 450mm is likely to cause some harm in the event of contact with all but the most robust Target. The QTRA method categorises

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Size by the diameter of tree stems and branches (measured beyond any basal taper). An equation derived from weight measurements of trees of different stem diameters is used to produce a data set of comparative weights of trees and branches ranging from 25mm to 600mm diameter, from which Table 1 is compiled. The size of dead branches might be discounted where they have undergone a significant reduction in weight because of degradation and shedding of subordinate branches. This discounting, referred to as 'Reduced Mass', reflects an estimated reduction in the mass of a dead branch.

Table 2. Targets

Target Range	Property (repair or replacement cost)	Human (not in vehicles)	Vehicle Traffic (number per day)	Ranges of Value (probability of occupation or fraction of £2 000 000)
1	£2 000 000 – >£200 000	**Occupation:** Constant – 2.5 hours/day **Pedestrians & cyclists:** 720/hour – 73/hour	26 000 – 2 700 @ 110kph (68mph) 32 000 – 3 300 @ 80kph (50mph) 47 000 – 4 800 @ 50kph (32mph)	1/1 – >1/10
2	£200 000 – >£20 000	**Occupation:** 2.4 hours/day – 15 min/day **Pedestrians & cyclists:** 72/hour – 8/hour	2 600 – 270 @ 110kph (68mph) 3 200 – 330 @ 80kph (50mph) 4 700 – 480 @ 50kph (32mph)	1/10 – >1/100
3	£20 000 – >£2 000	**Occupation:** 14 min/day – 2 min/day **Pedestrians & cyclists:** 7/hour – 2/hour	260 – 27 @ 110kph (68mph) 320 – 33 @ 80kph (50mph) 470 – 48 @ 50kph (32mph)	1/100 – >1/1 000
4	£2 000 – >£200	**Occupation:** 1 min/day – 2 min/week **Pedestrians & cyclists:** 1/hour – 3/day	26 – 4 @ 110kph (68mph) 32 – 4 @ 80kph (50mph) 47 – 6 @ 50kph (32mph)	1/1 000 – >1/10 000
5	£200 – >£20	**Occupation:** 1 min/week – 1 min/month **Pedestrians & cyclists:** 2/day – 2/week	3 – 1 @ 110kph (68mph) 3 – 1 @ 80kph (50mph) 5 – 1 @ 50kph (32mph)	1/10 000 – >1/100 000
6	£20 – £2	**Occupation:** <1 min/month – 0.5 min/year **Pedestrians & cyclists:** 1/week – 6/year	None	1/100 000 – 1/1 000 000

Vehicle, pedestrian and property Targets are categorised by their frequency of use or their monetary value. The probability of a vehicle or pedestrian occupying a Target area in Target Range 4 is between the upper and lower limits of 1/1 000 and >1/10 000 (column 5). Using the VOSL £2 000 000, the property repair or replacement value for Target Range 4 is £2 000 - >200.

Probability of Failure

In the QTRA assessment, the probability of tree or branch failure within the coming year is estimated and recorded as a range of value (Ranges 1 – 7, Table 3).

Selecting a Probability of Failure (PoF) Range requires the assessor to compare their assessment of the tree or branch against a benchmark of either a non-compromised tree at Probability of Failure Range 7, or a tree or branch that we expect to fail within the year, which can be described as having a 1/1 probability of failure.

During QTRA training, Registered Users go through a number of field exercises in order to calibrate their estimates of Probability of Failure.

Table 3. Probability of Failure

Probability of Failure Range	Probability
1	1/1 - >1/10
2	1/10 - >1/100
3	1/100 - >1/1 000
4	1/1 000 - >1/10 000
5	1/10 000 – >1/100 000
6	1/100 000 – >1/1 000 000
7	1/1 000 000 – 1/10 000 000

The probability that the tree or branch will fail within the coming year.

The QTRA Calculation

The assessor selects a Range of values for each of the three input components of Target, Size and Probability of Failure. The Ranges are entered on either the manual calculator or software application to calculate a Risk of Harm.

The Risk of Harm is expressed as a probability and is rounded, to one significant figure. Any Risk of Harm

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that is lower than 1/1 000 000 is represented as <1/1 000 000. As a visual aid, the Risk of Harm is colour coded using the traffic light system illustrated in Table 4 (page 7).

Risk of Harm - Monte Carlo Simulations

The Risk of Harm for all combinations of Target, Size and Probability of Failure Ranges has been calculated using Monte Carlo simulations[4]. The QTRA Risk of Harm is the mean value from each set of Monte Carlo results.

In QTRA Version 5, the Risk of Harm should not be calculated without the manual calculator or software application.

Assessing Groups and Populations of Trees

When assessing populations or groups of trees, the highest risk in the group is quantified and if that risk is tolerable, it follows that risks from the remaining trees will also be tolerable, and further calculations are unnecessary. Where the risk is intolerable, the next highest risk will be quantified, and so on until a tolerable risk is established. This process requires prior knowledge of the tree manager's risk tolerance.

Accuracy of Outputs

The purpose of QTRA is not necessarily to provide high degrees of accuracy, but to provide for the quantification of risks from falling trees in a way that risks are categorised within broad ranges (Table 4).

4. INFORMING MANAGEMENT DECISIONS

Balancing Costs and Benefits of Risk Control

When controlling risks from falling trees, the benefit of reduced risk is obvious, but the costs of risk control are all too often neglected. For every risk reduced there will be costs, and the most obvious of these is the financial cost of implementing the control measure. Frequently overlooked is the transfer of risks to workers and the public who might be directly affected by the removal or pruning of trees. Perhaps more importantly, most trees confer benefits, the loss of which should be considered as a cost when balancing the costs and benefits of risk control.

When balancing risk management decisions using QTRA, consideration of the benefits from trees will usually be of a very general nature and not require detailed consideration. The tree manager can consider, in simple terms, whether the overall cost of risk control is a proportionate one. Where risks are approaching 1/10 000, this may be a straightforward balancing of cost and benefits. Where risks are 1/10 000 or greater, it will usually be appropriate to implement risk controls unless the costs are grossly disproportionate to the benefits rather than simply disproportionate. In other words, the balance being weighted more on the side of risk control with higher associated costs.

Considering the Value of Trees

It is necessary to consider the benefits provided by trees, but they cannot easily be monetised and it is often difficult to place a value on those attributes such as habitat, shading and visual amenity that might be lost to risk control.

A simple approach to considering the value of a tree asset is suggested here, using the concept of 'average benefits'. When considered against other similar trees, a tree providing 'average benefits' will usually present a range of benefits that are typical for the species, age and situation. Viewed in this way, a tree providing 'average benefits' might appear to be low when compared with particularly important trees – such as in Figure 2, but should nonetheless be sufficient to offset a Risk of Harm of less than 1/10 000. Without having to consider the benefits of risk controls, we might reasonably assume that below 1/10 000, the risk from a tree that provides 'average benefits' is ALARP.

In contrast, if it can be said that the tree provides lower than average benefits because, for example, it is declining and in poor physiological condition, it may be necessary to consider two further elements. Firstly, is the Risk of Harm in the upper part of the Tolerable Region, and secondly, is the Risk of Harm likely to increase before the next review because of an increased Probability of Failure. If both these conditions apply then it might be appropriate to consider the balance of costs and benefits of risk reduction in order to determine whether the risk is ALARP. This balance requires the tree manager to take a view of both the reduction in risk and the costs of that reduction.

[4] For further information on the Monte Carlo simulation method, refer to http://en.wikipedia.org/wiki/Monte_Carlo_method

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Fig. 2

Lower Than Average Benefits from Trees

Usually, the benefits provided by a tree will only be significantly reduced below the 'average benefits' that are typical for the species, age and situation, if the life of the benefits is likely to be shortened, perhaps because the tree is declining or dead. That is not to say that a disbenefit, such as undesirable shading, lifting of a footpath, or restricting the growth of other trees, should not also be considered in the balance of costs and benefits.

The horse chestnut tree in Figure 3 has recently died, and over the next few years, may provide valuable habitats. However, for this tree species and the relatively fast rate at which its wood decays, the lifetime of these benefits is likely to be limited to only a few years. This tree has an already reduced value that will continue to reduce rapidly over the coming five to ten years at the same time as the Risk of Harm is expected to increase. There will be changes in the benefits provided by the tree as it degrades. Visual qualities are likely to reduce while the decaying wood provides habitats for a range of species, for a short while at least. There are no hard and fast measures of these benefits and it is for the tree manager to decide what is locally important and how it might be balanced with the risks.

Where a risk is within the Tolerable Region and the tree confers lower than average benefits, it might be appropriate to consider implementing risk control while taking account of the financial cost. Here, VOSL can be used to inform a decision on whether the cost of risk control is proportionate. Example 3 below puts this evaluation into a tree management context.

There will be occasions when a tree is of such minimal value and the monetary cost of risk reduction so low that it might be reasonable to further reduce an already relatively low risk. Conversely, a tree might be of such considerable value that an annual risk of death greater than 1/10 000 would be deemed tolerable.

Occasionally, decisions will be made to retain elevated risks because the benefits from the tree are particularly high or important to stakeholders, and in these situations, it might be appropriate to assess and document the benefits in some detail. If detailed assessment of benefits is required, there are several methodologies and sources of information (Forest Research 2010).

Delegating Risk Management Decisions

Fig. 3

Understanding of the costs with which risk reduction is balanced can be informed by the risk assessor's knowledge, experience and on-site observations, but the risk management decisions should be made by the tree manager. That is not to say that the tree manager should review and agree every risk control measure, but when delegating decisions to surveyors and other staff or advisors, tree managers should set out in a policy, statement or contract, the principles and perhaps thresholds to which trees and their associated risks will ordinarily be managed.

Based on the tree manager accepting the principles set out in the QTRA Practice Note and or any other specific instructions, the risk assessor can take account of the cost/benefit balance and for most situations will

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be able to determine whether the risk is ALARP when providing management recommendations.

Table 4. QTRA Advisory Risk Thresholds

Thresholds	Description	Action
	Unacceptable Risks will not ordinarily be tolerated	• Control the risk
1/1,000		
	Unacceptable (where imposed on others) Risks will not ordinarily be tolerated	• Control the risk • Review the risk
	Tolerable (by agreement) Risks may be tolerated if those exposed to the risk accept it, or the tree has exceptional value	• Control the risk unless there is broad stakeholder agreement to tolerate it, or the tree has exceptional value • Review the risk
1/10 000		
	Tolerable (where imposed on others) Risks are tolerable if ALARP	• Assess costs and benefits of risk control • Control the risk only where a significant benefit might be achieved at reasonable cost • Review the risk
1/1 000 000		
	Broadly Acceptable Risk is already ALARP	• No action currently required • Review the risk

QTRA Informative Risk Thresholds

The QTRA advisory thresholds in Table 4 are proposed as a reasonable approach to balancing safety from falling trees with the costs of risk reduction. This approach takes account of the widely applied principles of ALARP and ToR, but does not dictate how these principles should be applied. While the thresholds can be the foundation of a robust policy for tree risk management, tree managers should make decisions based on their own situation, values and resources. Importantly, to enable tree assessors to provide appropriate management guidance, it is helpful for them to have some understanding of the tree owner's management preferences prior to assessing the trees.

A Risk of Harm that is less than 1/1 000 000 is Broadly Acceptable and is already ALARP. A Risk of Harm 1/1 000 or greater is unacceptable and will not ordinarily be tolerated. Between these two values, the Risk of Harm is in the Tolerable Region of ToR and will be tolerable if it is ALARP. In the Tolerable Region, management decisions are informed by consideration of the costs and benefits of risk control, including the nature and extent of those benefits provided by trees, which would be lost to risk control measures.

For the purpose of managing risks from falling trees, the Tolerable Region can be further broken down into two sections. From 1/1 000 000 to less than 1/10 000, the Risk of Harm will usually be tolerable providing that the tree confers 'average benefits' as discussed above. As the Risk of Harm approaches 1/10 000 it will be necessary for the tree manager to consider in more detail the benefits provided by the tree and the overall cost of mitigating the risk.

A Risk of Harm in the Tolerable Region but 1/10 000 or greater will not usually be tolerable where it is imposed on others, such as the public, and if retained, will require a more detailed consideration of ALARP. In exceptional circumstances a tree owner might choose to retain a Risk of Harm that is 1/10 000 or greater. Such a decision might be based on the agreement of those who are exposed to the risk, or perhaps that the tree is of great importance. In these circumstances, the prudent tree manager will consult with the appropriate stakeholders whenever possible.

5. EXAMPLE QTRA CALCULATIONS AND RISK MANAGEMENT DECISIONS

Below are three examples of QTRA calculations and application of the QTRA Advisory Thresholds.

Example 1.

	Target		Size		Probability of Failure		Risk of Harm
Range	6	x	1	x	3	=	<1/1 000 000

Example 1 is the assessment of a large (Size 1), unstable tree with a probability of failure of between 1/100 and >1/1 000 (PoF 3). The Target is a footpath with less than one pedestrian passing the tree each week (Target 6). The Risk of Harm is calculated as less than 1/1 000 000 (green). This is an example of where the Target is so low consideration of the structural condition of even a large tree would not usually be necessary.

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Appendix D — Glossary of Arboricultural Terms

Absorptive roots	Non-woody, short-lived roots, generally having a diameter of less than one millimetre, the primary function of which is uptake of water and nutrients
Adaptive growth	In tree biomechanics, the process whereby the rate of wood formation in the cambial zone, as well as wood quality, responds to gravity and other forces acting on the cambium. This helps to maintain a uniform distribution of mechanical stress.
Adaptive roots	The adaptive growth of existing roots; or the production of new roots in response to damage, decay or altered mechanical loading
Adventitious shoots	Shoots that develop other than from apical, axillary, or dormant buds; see also 'epicormic'
Anchorage	The system whereby a tree is fixed within the soil, involving cohesion between roots and soil and the development of a branched system of roots which withstands wind and gravitational forces transmitted from the aerial parts of the tree
Architecture	In a tree, a term describing the pattern of branching of the crown or root system
Axil	The place where a bud is borne between a leaf and its parent shoot
Bacteria	Microscopic single-celled organisms, many species of which break down dead organic matter, and some of which cause diseases in other organisms
Bark	A term usually applied to all the tissues of a woody plant lying outside the vascular cambium, thus including the phloem, cortex, and periderm; occasionally applied only to the periderm or the phellem
Basidiomycotina (Basidiomycetes)	One of the major taxonomic groups of fungi; their spores are borne on microscopic peg-like structures (basidia), which in many types are in turn borne on or within conspicuous fruit bodies, such as brackets or toadstools Most of the principal decay fungi in standing trees are basidiomycetes
Bolling	A term sometimes used to describe pollard heads
Bottle-butt	A broadening of the stem base and buttresses of a tree, more than normal and sometimes denoting a growth response to weakening in that region, especially due to decay involving selective delignification
Bracing	The use of rods or cables to restrain the movement between parts of a tree
Branch:	- A first order branch arising from a stem. - A second order branch, subordinate to a primary branch or stem and bearing sub-lateral branches. - A third order branch, subordinate to a lateral or primary branch, or stem and usually bearing only twigs
Branch bark ridge	The raised arc of bark tissues that forms within the acute angle between a branch and its parent stem
Branch collar	A visible swelling formed at the base of a branch whose diameter growth has been disproportionately slow compared to that of the parent stem; a term sometimes applied also to the pattern of growth of the cells of the parent stem around the branch base
Brown-rot	A type of wood decay in which cellulose is degraded, while lignin is only modified
Buckling	An irreversible deformation of a structure subjected to a bending load
Buttress zone	The region at the base of a tree where the major lateral roots join the stem, with buttress-like formations on the upper side of the junctions
Cambium	Layer of dividing cells producing xylem (woody) tissue internally and phloem (bark) tissue externally
Canker	A persistent lesion formed by the death of bark and cambium due to colonisation by fungi or bacteria
Canopy species	Tree species that mature to form a closed woodland canopy
Cleaning out	The removal of dead, crossing, weak, and damaged branches, where this will not damage or spoil the overall appearance of the tree
Compartmentalization	The confinement of disease, decay or other dysfunction within an anatomically discrete region of plant tissue, due to passive and/or active defences operating at the boundaries of the affected region
Compression strength	The ability of a material or structure to resist failure when subjected to compressive loading; measurable in trees with special drilling devices
Compressive loading	Mechanical loading which exerts a positive pressure; the opposite to tensile loading
Condition	An indication of the physiological vitality of the tree. Where the term 'condition' is used in a report, it should not be taken as an indication of the stability of the tree
Construction exclusion zone	Area based on the Root Protection Area (in square metres) to be protected during development, by the use of barriers and/or ground protection
Crown/Canopy	The main foliage bearing section of the tree
Crown lifting	The removal of limbs and small branches to a specified height above ground level
Crown thinning	The removal of a proportion of secondary branch growth throughout the crown to produce an even density of foliage around a well-balanced branch structure
Crown reduction/shaping	A specified reduction in crown size whilst preserving, as far as possible, the natural tree shape
Crown reduction/thinning	Reduction of the canopy volume by thinning to remove dominant branches whilst preserving, as far as possible the natural tree shape
Deadwood	Dead branch wood, Branch or stem wood bearing no live tissues.
Decurrent	In trees, a system of branching in which the crown is borne on several major widely spreading limbs of similar size (cf. excurrent)

Defect	In relation to tree hazards, any feature of a tree which detracts from the uniform distribution of mechanical stress, or which makes the tree mechanically unsuited to its environment
Delamination	The separation of wood layers along their length, visible as longitudinal splitting
Dieback	The death of parts of a woody plant, starting at shoot-tips or root-tips
Disease	A malfunction in or destruction of tissues within a living organism, usually excluding mechanical damage; in trees, usually caused by pathogenic micro-organisms
Distal	In the direction away from the main body of a tree or subject organism (cf. proximal
Dominance	In trees, the tendency for a leading shoot to grow faster or more vigorously than the lateral shoots; also, the tendency of a tree to maintain a taller crown than its neighbours
Dormant bud	An axial bud which does not develop into a shoot until after the formation of two or more annual wood increments; many such buds persist through the life of a tree and develop only if stimulated to do so
Dysfunction	In woody tissues, the loss of physiological function, especially water conduction, in sapwood
DBH (Diameter at Breast Height)	Stem diameter measured at a height of 1.5 metres (UK) or the nearest measurable point. Where measurement at a height of 1.5 metres is not possible, another height may be specified
Endophytes	Micro-organisms which live inside plant tissues without causing overt disease, but in some cases capable of causing disease if the tissues become physiologically stressed, for example by lack of moisture
Epicormic shoot	A shoot having developed from a dormant or adventitious bud and not having developed from a first-year shoot
Excrescence	Any abnormal outgrowth on the surface of tree or other organism
Excurrent	In trees, a system of branching in which there is a well-defined central main stem, bearing branches which are limited in their length, diameter, and secondary branching (cf. decurrent)
Felling licence	In the UK, a permit to fell trees more than a stipulated number of stems or volume of timber
Flush-cut	A pruning cut which removes part of the branch bark ridge and or branch-collar
Girdling root	A root which circles and constricts the stem or roots possibly causing death of phloem and/or cambial tissue
Guying	A form of artificial support with cables for trees with a temporarily inadequate anchorage
Habit	The overall growth characteristics, shape of the tree and branch structure
Hazard beam	An upwardly curved part of a tree in which strong internal stresses may occur without being reduced by adaptive growth; prone to longitudinal splitting
Heartwood/false-heartwood/ripewood	Sapwood that has become dysfunctional as part of the natural aging processes
Heave	A term mainly applicable to a shrinkable clay soil which expands due to re-wetting after the felling of a tree which was previously extracting moisture from the deeper layers; also, the lifting of pavements and other structures by root diameter expansion; also, the lifting of one side of a wind-rocked root-plate
High canopy tree species	Tree species having potential to contribute to the closed canopy of a mature woodland or forest
Incipient failure	In wood tissues, a mechanical failure which results only in deformation or cracking, and not in the fall or detachment of the affected part
Included bark (ingrown bark)	Bark of adjacent parts of a tree (usually forks, acutely joined branches or basal flutes) which is in face-to-face contact
Increment borer	A hollow auger, which can be used for the extraction of wood cores for counting or measuring wood increments or for inspecting the condition of the wood
Infection	The establishment of a parasitic micro-organism in the tissues of a tree or other organism
Internode	The part of a stem between two nodes; not to be confused with a length of stem which bear nodes but no branches
Lever arm	A mechanical term denoting the length of the lever represented by a structure that is free to move at one end, such as a tree or an individual branch
Lignin	The hard, cement-like constituent of wood cells; deposition of lignin within the matrix of cellulose microfibrils in the cell wall is termed Lignification
Lions tailing	A term applied to a branch of a tree that has few if any side-branches except at its end, and is thus liable to snap due to end loading
Loading	A mechanical term describing the force acting on a structure from a particular source, e.g. the weight of the structure itself or wind pressure
Longitudinal	Along the length (of a stem, root, or branch)
Lopping	A term often used to describe the removal of large branches from a tree, but also used to describe other forms of cutting
Mature Heights (approximate):	
	- Low maturing – less than 8 metres high - Moderately high maturing – 8 – 12 metres high - High maturing – greater than 12 metres high
Microdrill	An electronic rotating steel probe, which when inserted into woody tissue provides a measure of tissue density
Minor deadwood	Deadwood of a diameter less than 25mm and or unlikely to cause significant harm or damage upon impact with a target beneath the tree

Mulch	Material laid down over the rooting area of a tree or other plant to help conserve moisture; a mulch may consist of organic matter or a sheet of plastic or other artificial material
Mycelium	The body of a fungus, consisting of branched filaments (hyphae)
Occluding tissues	A general term for the roll of wood, cambium and bark that forms around a wound on a woody plant (cf. wound wood)
Occlusion	The process whereby a wound is progressively closed by the formation of new wood and bark around it
Pathogen	A micro-organism which causes disease in another organism
Photosynthesis	The process whereby plants use light energy to split hydrogen from water molecules, and combine it with carbon dioxide to form the molecular building blocks for synthesizing carbohydrates and other biochemical products
Phytotoxic	Toxic to plants
Pollarding	The removal of the tree canopy, back to the stem or primary branches. Pollarding may involve the removal of the entire canopy in one operation or may be phased over several years. The period of safe retention of trees having been pollarded varies with species and individuals. It is usually necessary to re-pollard on a regular basis, annually in the case of some species.
Primary branch	A major branch, generally having a basal diameter greater than 0.25 x stem diameter
Primary root zone	The soil volume most likely to contain roots that are critical to the health and stability of the tree and normally defined by reference BS5837 (2005) Guide for Trees in Relation to Construction
Priority	Works may be prioritised, 1 = high, 5 = low
Probability	A statistical measure of the likelihood that a particular event might occur
Proximal	In the direction towards from the main body of a tree or other living organism (cf. distal)
Pruning	The removal or cutting back of twigs or branches, sometimes applied to twigs or small branches only, but often used to describe most activities involving the cutting of trees or shrubs
Radial	In the plane or direction of the radius of a circular object such as a tree stem
Rams-horn	In connection with wounds on trees, a roll of occluding tissues which has a spiral structure as seen in cross-section
Rays	Strips of radially elongated parenchyma cells within wood and bark. The functions of rays include food storage, radial translocation and contributing to the strength of wood
Reactive Growth/Reaction Wood	Production of woody tissue in response to altered mechanical loading; often in response to internal defect or decay and associated strength loss (cf. adaptive growth)
Removal of dead wood	Unless otherwise specified, this refers to the removal of all accessible dead, dying and diseased branch wood and broken snags
Removal of major dead wood	The removal of, dead, dying and diseased branch wood above a specified size
Respacing	Selective removal of trees from a group or woodland to provide space and resources for the development of retained trees
Residual wall	The wall of non-decayed wood remaining following decay of internal stem, branch, or root tissues
Root-collar	The transitional area between the stem/s and roots
Root-collar examination	Excavation of surfacing and soils around the root-collar to assess the structural integrity of roots and/or stem
Root protection area	An area of ground surrounding a tree that contains sufficient rooting volume to ensure the tree's survival. Calculated with reference to Table 2 of BS5837 (2005) and shown in plan form in square metres
Root zone	Area of soils containing absorptive roots of the tree/s described. The Primary root zone is that which we consider of primary importance to the physiological well-being of the tree
Sapwood	Living xylem tissues
Secondary branch	A branch, generally having a basal diameter of less than 0.25 x stem diameter
Selective delignification	A kind of wood decay (white rot) in which lignin is degraded faster than cellulose
Shedding	In woody plants, the normal abscission, rotting off or sloughing of leaves, floral parts, twigs, fine roots, and bark scales
Silvicultural thinning	Removal of selected trees to favour the development of retained specimens to achieve a management objective
Simultaneous white rot	A kind of wood decay in which lignin and cellulose are degraded at about the same rate
Snag	In woody plants, a portion of a cut or broken stem, branch or root which extends beyond any growing-point or dormant bud; a snag usually tends to die back to the nearest growing point
Soft rot	A kind of wood decay in which a fungus degrades cellulose within the cell walls, without any general degradation of the wall as a whole
Spores	Propagules of fungi and many other life-forms; most spores are microscopic and dispersed in air or water
Shrub species	Woody perennial species forming the lowest level of woody plants in a woodland and not normally considered to be trees

Sporophore	The spore bearing structure of fungi
Sprouts	Adventitious shoot growth erupting from beneath the bark
Stem/s	The main supporting structure/s, from ground level up to the first major division into branches
Stress	In plant physiology, a condition under which one or more physiological functions are not operating within their optimum range, for example due to lack of water, inadequate nutrition, or extremes of temperature
Stress	In mechanics, the application of a force to an object
Stringy white rot	The kind of wood decay produced by selective delignification
Storm	A layer of tissue which supports the fruit bodies of some types of fungi, mainly ascomycetes
Structural roots	Roots, generally having a diameter greater than ten millimetres, and contributing significantly to the structural support and stability of the tree
Subsidence	In relation to soil or structures resting in or on soil, a sinking due to shrinkage when certain types of clay soil dry out, sometimes due to extraction of moisture by tree roots
Subsidence	In relation to branches of trees, a term that can be used to describe a progressive downward bending due to increasing weight
SULE	SULE 'Safe Useful Life Expectancy' is the length of time that the arboriculturist assesses an individual tree can be retained with an acceptable level of risk, based on the information available at the time of inspection. It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor. It is closely related to tree health and the surrounding conditions. Consequently, the reliability [of] all SULE assessments will decrease as time passes from the initial assessment and the potential for changes in variables increases.
Taper	In stems and branches, the degree of change in girth along a given length
Target canker	A kind of perennial canker, containing concentric rings of dead occluding tissues
Targets	In tree risk assessment (with slight misuse of normal meaning) persons or property or other things of value which might be harmed by mechanical failure of the tree or by objects falling from it
Topping	In arboriculture, the removal of the crown of a tree, or of a major proportion of it
Torsional stress	Mechanical stress applied by a twisting force
Translocation	In plant physiology, the movement of water and dissolved materials through the body of the plant
Transpiration	The evaporation of moisture from the surface of a plant, especially via the stomata of leaves; it exerts a suction which draws water up from the roots and through the intervening xylem cells
Understorey	A layer of vegetation beneath the main canopy of woodland or forest or plants forming this
Understorey tree species	Tree species not having potential to attain a size at which they can contribute to the closed high canopy of a woodland
Vascular wilt	A type of plant disease in which water-conducting cells become dysfunctional
Vessels	Water-conducting cells in plants, usually wide and long for hydraulic efficiency; generally, not present in coniferous trees
Veteran tree	A loosely defined term for an old specimen that is of interest biologically, culturally, or aesthetically because of its age, size, or condition and which has usually lived longer than the typical upper age range for the species concerned
White rot	A range of kinds of wood decay in which lignin, usually together with cellulose and other wood constituents, is degraded
Wind exposure	The degree to which a tree or other object is exposed to wind, both in terms of duration and velocity
Wind pressure	The force exerted by a wind on a particular object
Windthrow	The blowing over of a tree at its roots
Wound dressing	A general term for sealants and other materials used to cover wounds in the hope of protecting them against desiccation and infection; only of proven value against fresh wound parasites
Wound wood	Wood with atypical anatomical features, formed in the vicinity of a wound

APPENDIX E - Tree Conditions and Age Class Definitions Key

Overall Condition

Good – Minor Defects with good vitality, no structural defects
Fair – Significant rectifiable defects and/or limited crown signs. Limited vigour/vitality.
Poor – Serious structural defects and/or abnormal crown signs e.g., dieback/chlorosis

Structural Condition:

Good – Good Structure with minor rectifiable defects
Fair – Manageable defects but not structurally compromised.
Poor – Contains defects which undermine stability or the structural integrity of the tree.

Physiological Condition:

Good – Full tree with full well-formed crown
Fair – Suppression/minor restrictions
Poor – Heavily suppressed and/or defects clearly visible.

Age Class

NE – Newly Established – Small young tree, new generation of growth, easily replaced by nursery stock if necessary.
Y – Young – Young and established within 1/3rd of ultimate age/height potential. High Vigour.
SM – Semi Mature – A well established and maturing tree with high vigour, within 1/3rd and 2/3rd of its ultimate age/height.
M – Mature – Trees in the final 1/3rd of its ultimate age/height, fully grown tree, moderate vigour.
OM – Over Mature – Fully mature tree which may show decreased vigour and reduced annual extension growth, some decline may be present.
V – Veteran – A tree which has high ecological, arboricultural, biological, and aesthetic value due to its age. Low vigour.

Work Priority

1. Urgent – Immediately (that day) to make a tree safe or guard site
2. Very High – Within 7 days
3. High – Within 30 days
4. Moderate - within 90 days
5. Low – Works of the lowest priority, could be carried out if budget allows
6. None – No works required or target non-existent/excluded

Inspection Frequency

1. Urgent – Carried out ASAP, e.g., detailed/further inspection of aerial parts and/or use of decay detection equipment
2. Very High – 6 Months
3. High – 12 Months
4. Moderate – 18 Month
5. Low – 3 Years

APPENDIX F - Report Caveats

Full Legal Disclaimer

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Specific - Trees

All tree inspections, unless specified, have been undertaken from ground level and using non-invasive techniques. Comments contained within the report on the condition and risk associated with any tree relate to the condition of the tree at the date and time of survey. Please note that the condition of trees is subject to change. This change may occur but is not limited to biological and non-biological factors as well as mechanical/ physical changes to conditions in the proximity of the tree. Any freak weather events may cause physical changes to the structure of the trees beyond expectation or reasonable foreseeability, to which this report cannot be held to account. Trees should be inspected at intervals relative to identified site risks and in accordance with relevant HSE and Central Government guidance. Rainfords Arboriculture can provide further information on this matter if required.

Please note no statutory control checks have been undertaken (unless specified). Where tree surgery works have been identified these works assume that planning is approved, no tree works should be undertaken prior to determination of this application without up-to-date confirmation of the Tree Preservation Order / Conservation Area Status of the vegetation.

All works should be undertaken in accordance with the appropriate Duty of Care. This should include, for example, site specific risk assessments and due diligence inspections for the presence of protected species.

Any comment relating to 3rd party trees has been made without full access to the tree(s). Should these trees have any impact on the proposed development we would advise you to instruct us to contact the 3rd party and undertake further inspection work.