

Quantified Tree Risk Assessment

Compiled by: J Urwin

2nd October 2024



Instructed by G Buckley
on behalf of Brundall Parish Council
for Cremer's meadow
ref. BCM/THA/171024

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1 Introduction

Instruction and brief

- 1.1 Ravencroft Tree Services Ltd. has been instructed by G Buckley to undertake an inspection of and provide a risk assessment for trees around Cremer's Meadow.
- 1.2 This appraisal intends to evaluate any existing and potential tree hazards and specify works to mitigate risk of harm to persons or property using the Quantified Tree Risk Assessment (QTRA) system.
- 1.3 The assessment also takes into consideration the social, environmental and economic benefits which the trees provide to the site and surrounding area.

Limitations

- 1.4 The collection of all tree survey data was undertaken from ground level without invasive inspection of individual trees, trunks, buttresses or root flares; the disclosure of hidden defects cannot therefore be expected. As explained in the fee proposal, inspection was restricted where trees were ivy clad, located wholly or partly on neighbouring land or impeded by poor access due to ditches, fencing and where basal growth or other vegetation obscured lower stems and root collars. Were more detailed assessments using internal examination equipment required, recommendations would have been set out in the survey schedule. Height, spread and other dimensions were estimated unless otherwise stated.
- 1.5 This information is confidential to our client and their professional advisers. No liability is accepted for its contents to any other than our client.
- 1.6 The assessment and its recommendations relate specifically to the condition of the trees on the day that the inspection was carried out. They are necessarily invalid if works of any type are undertaken on or close to trees other than those recommended herein. This includes changes to soil levels, excavations carried out on the land subject to this survey and abnormal weather conditions generating new defects or exacerbating those already present but currently obscured.
- 1.7 Trees are dynamic, living organisms and failures a part of their natural processes. Even healthy trees or their parts may fail, particularly - although not exclusively - as a result of strong winds or violent storms. Occasionally, yet with ever greater frequency, extreme weather systems occur, bringing with them an unusual degree of tree damage. Clearly, Ravencroft Tree Services Ltd. cannot

be held liable for the consequences of any such events or similarly unpredictable failures.

- 1.8 Assessment of the potential effects of trees on buildings or other structures resulting from their abstraction of water from shrinkable load-bearing soils was not included in our instruction and is not considered here.
- 1.9 Some of these trees may be subject to conservation area or Tree Preservation Order protection. If so, prior to any works being instructed or undertaken, the district council's tree officer must be informed to establish whether all proposed works comply with all applicable regulations. Please note that the council requires 6 weeks' notice of proposed tree works within conservation areas, in accordance with section 211 of the Town and Country Planning Act (1990). Where trees are protected by a Tree Preservation Order, an application for works will be required to ensure adherence to the stipulations of this same Act. Had trees been identified by our inspection as being dead or 'dangerous' i.e. presenting an unacceptably high risk of harm, they *may* have been exempt from the Act, requiring only five days notification to the council's tree officer before commencement of works.
- 1.10 This report is based on findings from the site survey, tree observations and any information provided. Conclusions have been drawn from the author's professional qualifications and experience in arboriculture.

Documents received

- 1.11 No plans or relevant documents were received prior to the survey being undertaken. The survey has been based on boundaries set at the last survey. Please notify us should there be any changes and an update will be made.

2 Inspection method

Consideration of risk

- 2.1 Under the Quantified Tree Risk Assessment system the 'targets' (people and property) onto which trees could fail are assessed and quantified, so enabling the arboriculturist to determine whether a closer inspection of any particular tree is required and to what degree of rigour.

Tree plotting and identification

- 2.2 Any trees recorded were mapped during inspection to a level of detail sufficient to enable distinction and position. Recorded trees' stems were tagged where possible with a numbered aluminium tag. Had trees been inaccessible due to thick vegetation or other barriers at the stem base, or the tree belonging to a neighbouring property, no tag would have been applied. Tag numbers form the basis of the identification system used in the survey schedule. Tree ID numbering in the schedule (T1, T2 etc.) may not reflect any previous documentation.
- 2.3 Trees may have been grouped where individual identification was neither feasible nor useful. These trees typically share a taxonomic or spatial connection. Marked trees may remain as part of the group in which they are located for the purposes of reference while being assigned a different work priority or re-inspection interval.

Quantified Tree Risk Assessment

- 2.4 After the mapping of target areas the surveyor will have walked the site, not necessarily with the intention of inspecting or surveying all parts or all sides of every tree but to take a general overview and look for signs of substantial defects which might be significant relative to the targets. Only these would then be further investigated and their defects recorded.
- 2.5 The level of detail at which trees were inspected was guided by the target appraisal. This involved assessing trees on approach before undertaking a closer examination in line with recognised Visual Tree Assessment principles and may have included the use of binoculars, probe and mallet. Where necessary, the tree or branch was then considered in terms of both size and probability of failure. Values derived from the assessment of these three components (target range, size and probability of failure) were combined to calculate the risk of that harm occurring. This risk of harm for all combinations of these three ranges has been calculated using Monte Carlo simulations*. The QTRA

risk of harm is the mean value from each set of Monte Carlo results.* For an overview of the Monte Carlo simulation method, please refer to http://en.wikipedia.org/wiki/Monte_Carlo_method

- 2.6 Target assessment was based on the average estimated occupancy of any area under trees during a typical 24 hour period throughout the next two years, derived from observations made on site such as desire lines, compaction, access, current type of use, etc.
- 2.7 Once the calculation for risk of harm was completed, remedial works may have been specified to reduce that risk to more tolerable levels. For the purposes of this survey, a tolerable risk of harm (where that risk is imposed on an unwitting general public and is judged to be **as low as reasonably practicable** [ALARP]) is accepted to range from less than one in ten thousand (< 1 in 10k) to one in one million (1 in 1M), in keeping with industry and HSE guidelines. Risks less than one in one million (<1 in 1M) are judged to be broadly acceptable.
- 2.8 These works were subsequently assigned a work priority based on their risk of harm, ensuring that the most significant risks are to be reduced first. Tree hazards that were found to present a more acceptable risk were given a lower priority. Implementation of works recommended remains at the discretion of the site manager.

Works priority ratings have been assessed as follows: -

Risk of harm	Works priority	Degree of urgency	To be completed~
>1 in 1k	1 - Unacceptable risk of harm	Requiring immediate action *	within 7 days or as advised
<1 in 1k to 1 in 10k	2 - Significant risk of harm	Requiring swift Action	within 2 months
<1 in 10k to 1 in 60k	3 - Tolerable risk of harm	Important management	within 6 months
<1 in 60k to 1 in 1M	4 – Tolerable to broadly acceptable	General management, as budget allows **	Within 9 months
<1 in 1M	5 - Broadly acceptable		As recommended

* Notification of these trees would have been given directly to the person instructing this report on the day the survey was carried out. This date can be found on the cover page.

Recommended works in priorities 1 & 2 may be deemed necessary in order to discharge the duty of care owed by tree owners to the general public and other users of their land under the Occupier's

Liability Act 1984. Recommended works in priority 3 & 4 may be required to ensure the risks are ALARP.

**These categories exist to inform of potential defects which may worsen over time. As the risks decrease to the broadly acceptable threshold of 1 in 1M they may only require demonstration that the risks are ALARP, i.e. they are at a point where the cost of mitigatory work disproportionately outweighs an insignificant risk. The categories are a guide for what is in effect a sliding scale. For example, a risk of harm at the upper end of works priority 3 may be treated similarly to those at the lower end of works priority 2.

- 2.9 Contained within the schedule are general management recommendations considered by the surveyor significant enough to be worthy of mention. Whilst of lower priority at present, if these works were completed sooner, consequently greater expenses might be avoided. It may be considered prudent to undertake these works proactively as funds become available, so minimising the urgency and expense of remedial works. In addition to reducing risks associated with tree failure, general management of tree stocks, carried out to British Standard 3998:2010 Tree work - Recommendations, may improve the structural form of trees, increasing their aesthetic value and prolonging their use for shading, wildlife and air cooling.

3 Future management

Survey frequency

- 3.1 A walkover assessment of trees is recommended to be repeated every two years, unless any identifiable problems or noticeable defects appear, in which case professional arboricultural advice should be sought. It may also be beneficial to inspect the trees in late summer or early autumn when most decay fungus fruit bodies are to be found.

Planting

- 3.2 Opportunities exist on this site to increase diversity by planting a wider variety of trees and plants which will in turn encourage a more complete ecosystem and capable of co-existence with their environment. To maintain an ongoing tree stock, we advise replacement planting if ever a tree is removed. Whether a 'native' species to encourage wildlife, or more unusual species to make an impact; a smaller tree as a focal point or a larger specimen as an architectural statement, we would be pleased to offer guidance on selection, planting and aftercare, this latter being the most important part of the process.
- 3.3 In order to ensure the continuation and sustainability of the tree population, planting and establishment works may be given precedence over - without replacing - the lowest priority tree works, when organising budgets.

4 Site summary

Site visit

- 4.1 Jonathan Urwin, arboriculturist for Ravencroft Tree Services Ltd., undertook the assessment of the trees at Cremer's Meadow during a visit on 2nd October 2024.

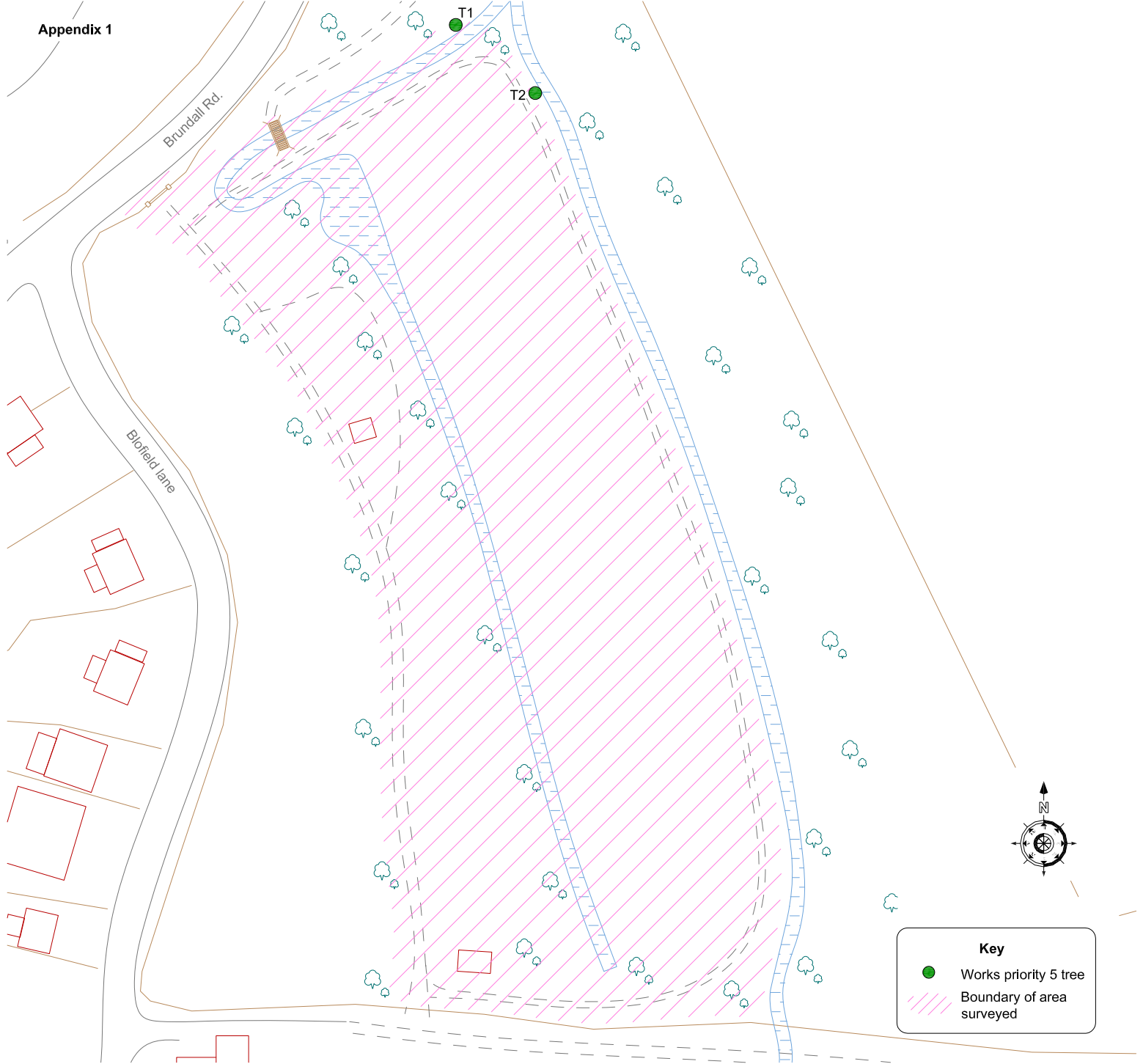
Site descriptions

- 4.2 Surveyed were those parts of the site and neighbouring land which might be reached by trees failing from within the boundaries of Cremer's meadow. The site consists of several acres of wetland meadow now managed by volunteers as a wildlife haven. There is public access along three footpaths running north/south and working parties meet to carry out practical tasks. The site stands at the north western edge of the village, between Brundall and Blofield. The dyke through the centre of site appears to have been created around mid-19th century and the pond between 40 and 60 years ago.

General assessment and recommendations

- 4.3 The trees on site are a mix of common, naturalised species. With the exception of the oak at the north entrance and two other trees on site, all trees appear to have developed since the mid-1940s, some planted and others 'self sown'. Some of the trees surveyed are reaching early maturity and their failures may increase over the coming decades. All are very important visually and may be viewed by the public from within and beyond the boundaries. Drainage problems on parts of this site may inhibit root development for some species, encouraging decay fungi and other pathogens. The trees vary a little in their age and size and condition, and also their structural integrity and physiological vigour.
- 4.4 Possible risk of harm remains relatively low across the site, dependant as it is on how frequently any area within failing distance of trees is occupied (target range) and how likely it is that a tree should fail (probability of failure). Estimated target ranges have been assessed as follows: - nearby roads, buildings and access paths have been designated a higher range as the targets are either static or numerous. All other areas have been recorded by degrees in lower ranges, being less often visited and for less time. In addition to occupancy levels, approximate monetary values of property repairs may also have been considered where appropriate.

- 4.5 Any works recommended are expected to be carried out by fully insured, qualified and experienced arboriculture contractors, to British Standard 3998:2010 Tree work – Recommendations, where applicable. The site's aesthetic and ecosystems depend on its trees' good conditions and forms, so careful works of a high standard are particularly important.
- 4.6 Some of the trees carry dead wood yet may not appear in the survey schedule. Clearly the cost of removing all dead wood from the trees' crowns may be prohibitive and unnecessary, therefore only instances with a higher probability of failure and / or larger pieces likely to contact a target need be considered. Deadwood removal may be undertaken to reduce risk of harm and inexpensively discharge some of the duty of care imposed by the Occupier's Liability Act. This can be done from the ground with the appropriate PPE and subject to a risk assessment. Either a pole with a hook fixed to the end or a strong nylon line with a small, weighted bag may be used. The bag with line attached can be thrown over the dead branch and both ends of the line pulled to break the branch at a point nearer to its union with live wood. This activity can be carried out at intervals and a record kept of trees cleared of the most likely deadwood to fail over a target. This record will provide proof of an effective system which may be used as part of any defence against the remote possibility of a claim.
- 4.7 Some of the trees are ivy clad. This provides valuable habitat for wildlife but can prevent full inspection, hiding defects and adding weight to a tree's structure. A compromise could be implemented by removing it completely to a height of 2m up the stem from ground level and allowing it to die back naturally, facilitating inspection in future whilst reducing pressure on the tree from wind, rain and snow. This is a task which should be undertaken using a handsaw rather than an axe or chainsaw, in order to avoid damage to the tree's bark. Ivy removal should be carried out at least six months before an inspection to allow it to die back sufficiently for the tree to be effectively assessed. Sometimes the ivy might not completely die, in which case a recommendation *may* be made in future surveys to remove it from the crown entirely.
- 4.8 No trees on this site, which were clear of vegetation and fully inspected, were calculated to fall outside the level of risk generally accepted by HSE and industry standards as tolerable. The recommended works fall into the category of general management and as such may be carried out within the recommended timeframes in priority order as budget restrictions allow.



Survey schedule															
Tree ID	Tag no.	Tree species	Life stage	EPS habitat potential	Height (m)	Stem dia. (mm)	General observations	Most likely failure	Target range	Size range	Probability of failure	Risk of harm	Recommended works	Works priority	To be completed
T1	345	Poplar	Mature	Medium	23	1000	Large decay cavity at base, north side. Good reaction wood & secondary thickening	Stem base fracture	4	1	5	< 1 in 1M	Monitor for splits & cracks after storms & at next survey	5	as part of general management
T2	36	Ash	Semi mature	Low	10	240	Standing dead tree within reach of path	Root shear		3	4		Fell to leave 3m stem for habitat		

There are, at the time of this survey, no trees within range of targets which are considered to present a significant risk of harm, i.e. a risk of 1:10,000 or greater

All works recommended are expected to be carried out by fully qualified arboricultural contractors to British Standard 3998:2010 Tree work - Recommendations

Next survey due date:- October 2026

PROJECT

Cremer's Meadow

TITLE

Tree location plan

SCALE

Not to scale, drawn @ A4

DATE SURVEYED

2nd October 2024

DRAWN BY

J.U.

PROJECT NUMBER

BCM/TLP/171024

DRAWING NUMBER

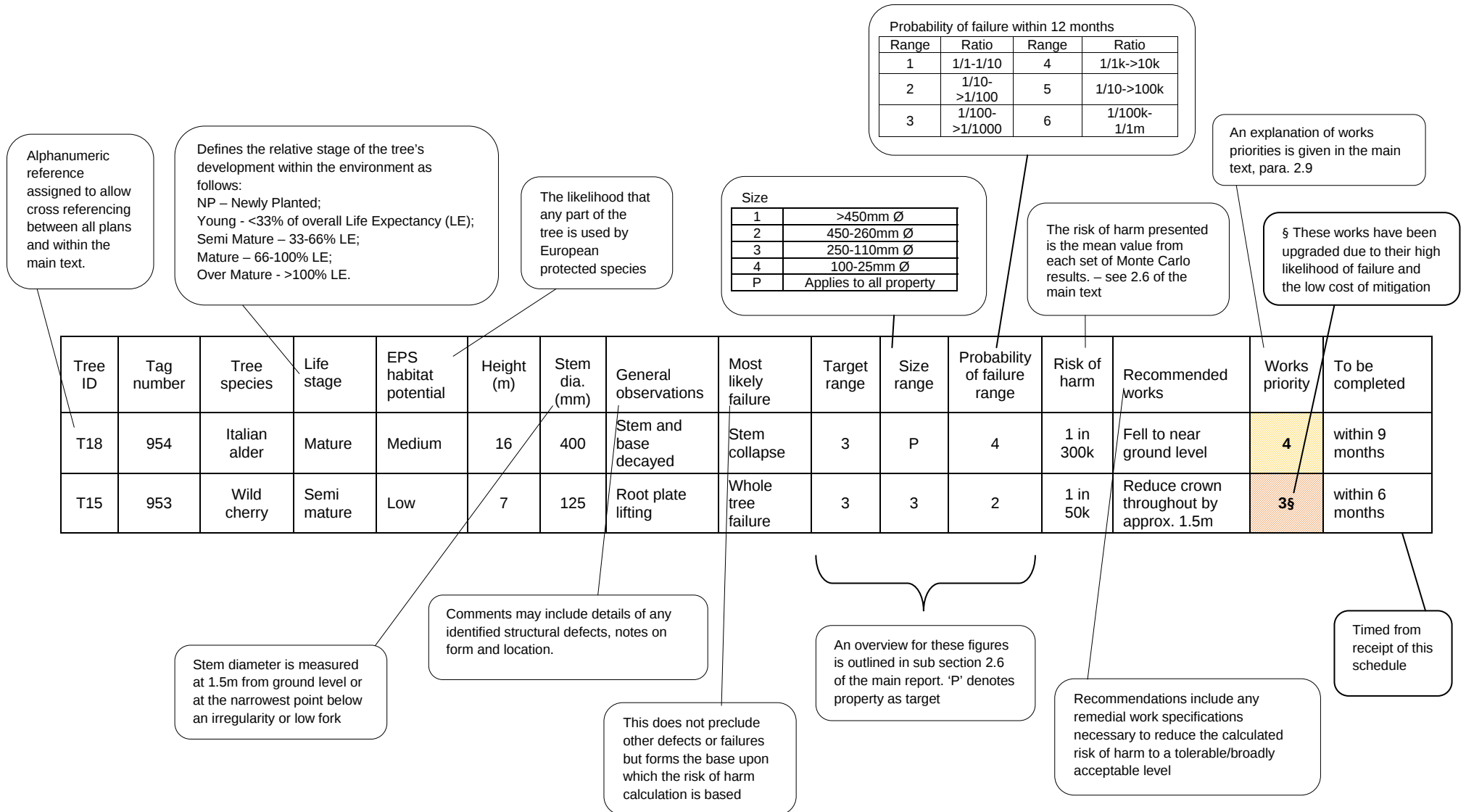
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Survey schedule explanation

The survey schedule details the data taken of trees with identifiable defects. Below is an example schedule with an explanation of its component parts.



Target ranges

Target range	Property value	Pedestrian frequency	Vehicle frequency per day	Value (probability of occupation or fraction of £2M - value of statistical life)
1	Very high £2M - >£200k	Occupation: constant - 2.5hrs/day Pedestrians & cyclists: 720/hr - 73/hr	26,000-2700 vehicles @ 110kph (68mph)	1/1 - >1/10
			32,000-3300 vehicles @ 80kph (50mph)	
			47,000-4800 vehicles @ 50kph (32mph)	
2	High £200k - >£20k	Occupation: 2.4hrs/day - 15mins/day Pedestrians & cyclists: 72/hr - 8/hr	26,00-270 vehicles @ 110kph (68mph)	1/10 - >1/100
			32,00-330 vehicles @ 80kph (50mph)	
			47,00-480 vehicles @ 50kph (32mph)	
3	Moderate high £20k - >£2000	Occupation: 14/day - 2mins/day Pedestrians & cyclists: 7/hr - 2/hr	260-27 vehicles @ 110kph (68mph)	1/100 - >1/1,000
			320-33 vehicles @ 80kph (50mph)	
			470-48 vehicles @ 50kph (32mph)	
4	Moderate £2000 - >£200	Occupation: 1min/day - 2mins/week Pedestrians & cyclists: 1/hr - 3/day	26-4 vehicles @ 110kph (68mph)	1/1,000 - > 1/10,000
			32-4 vehicles @ 80kph (50mph)	
			47-6 vehicles @ 50kph (32mph)	
5	Low £200 - >£20	Occupation: 1min/week - 1min/month Pedestrians & cyclists: 2day - 2/week	3-1 vehicles @ 110kph (68mph)	1/10,000 - >1/100,000
			3-1 vehicles @ 80kph (50mph)	
			5-1 vehicles @ 50kph (32mph)	
6	Very low £20 - £1	Occupation: <1min/month Pedestrians & cyclists: 1/week - 6/year	None	1/100,000 - 1/1,000,000

Vehicle, pedestrian & 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, for example, target range 4 is between the upper and lower limits of >1/1,000 and 1/10,000. Using the value of statistical life (VOSL) of £2,000,000 the property repair or replacement value for target range 4 is £2,000 - £200

Quantified Tree Risk Assessment

A Non-technical Summary

Tree safety management is about limiting the risk of harm from tree failure while maintaining the benefits conferred by trees. Although it may seem counter-intuitive, the condition of trees should not necessarily be the first consideration. Instead, tree managers should first take account of the usage of the land on and around which the trees stand, and this in turn will inform the process of assessing the trees.

The Quantified Tree Risk Assessment (QTRA) method applies established and accepted risk management principles to tree safety management. Firstly, the targets (people and property) onto which trees could fail are assessed and quantified, thus enabling tree managers to determine whether they need to assess trees and to what degree of rigour an assessment or inspection of the trees is required. Where necessary, a tree or branch is then considered in terms of both its size (potential impact) and probability of failure. Values derived from the assessment of these three components (target, size and probability of failure) are combined to calculate a risk of harm within the coming year. The year is simply a convenient time-frame over which to measure the risk and does not in itself infer that the risk should be re-assessed annually; rather the frequency of re-assessment should be informed by the level of risk and the characteristics of the tree population and land-use.

The quantification of risk is not the only consideration when managing tree safety. The financial cost of reducing the risk and the potential loss of the many benefits from trees should be accounted for when making risk management decisions. By quantifying the risks we can more readily assess this balance.

The method moves the management of tree safety away from labelling trees as either 'safe' or 'unsafe' and requiring definitive statements of tree safety from either tree surveyors or tree managers. Instead, QTRA quantifies the risk of harm from tree failure in a way that enables tree managers to account for the various costs and benefits of risk reduction and operate to pre-determined risk thresholds. Using a traffic light system of colour coding the risk from trees, we have simplified the decision making process for tree owners and tree managers. For more information on the QTRA method and the decision making process, download the QTRA Practice Note, which is available in eight languages and seventeen country-specific versions.

	Broadly Acceptable	Do nothing.
	Tolerable	Do nothing, unless you expect the risk to increase significantly before the next assessment. The benefits conferred by the tree will usually outweigh the risk.
	Tolerable	Reduce the risk unless there is broad stakeholder agreement to retain it.
	Unacceptable	Reduce the risk.

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