

Decay Detection Investigation

PiCUS/RESI PD

22 Frognall Way
London
NW3 6XE

March 2023

230227-DID-02

Project Reference	230227-DID-02 – 22 Frognall Way
Report Type	Decay Detection Investigation (Risk/Condition)
Author	James Chambers
Checked by	Tim Moya
Date Checked	08 Mar 2023
Original Issue Date	08 Mar 2023
Most Recent Version	

The contents of this report are copyright of Tim Moya Associates and may not be altered or amended without the author's permission. Tim Moya Associates standard Limitations of Service apply to this report and all associated work relating to this site. A copy has been supplied with our original quotation and further copies are available on request. Tree locations have been visually estimated while on site and, while adequate for the purposes of this report, tree positions should not be relied on for other purposes.

CONTENTS PAGE

1 EXECUTIVE SUMMARY.....4
STATUTORY PERMISSIONS 4

2 INTRODUCTION 5

3 TREE INSPECTION 6
INSPECTION DETAILS..... 6

4 T1 BAY TREE..... 7

5 RECOMMENDATIONS 12

6 APPENDICES CONTENTS..... 13

1 EXECUTIVE SUMMARY

- 1.1 A mature bay tree - *Laurus nobilis* - was inspected and its structural condition assessed using specialist equipment. The conclusion of this report is that while the tree is not currently considered to present an unacceptable risk of harm or damage, its condition is likely to deteriorate over time, so removal and replacement is recommended. Please see below and Appendix A for details.

Statutory Permissions

- 1.2 As the tree is protected by virtue of its location in a Conservation Area or a Tree Preservation Order (TPO) it is necessary to notify and or obtain permission from the London Borough of Camden prior to carrying out any works not covered by an exception. Unauthorised work to protected trees could lead to prosecution, resulting in enforcement action such as fines and a criminal record.

2 INTRODUCTION

- 2.1 We received instructions from Cook Arboricultural Services to attend site and inspect T1 bay tree - *Laurus nobilis* at 22 Frognall Way. Following the inspection we are instructed to prepare a report of our findings and make appropriate recommendations to manage the risks assessed.
- 2.2 Cook Arboricultural Services contacted us to arrange for this investigation due to concerns about the structural condition of the tree.
- 2.3 The scope of this investigation is: to visually inspect¹ the identified tree from ground level and record relevant features; to inspect the tree's stem for decay using sonic tomography and/or a decay detecting drill (as considered appropriate); and to provide a report of our findings including recommendations for works where required and additional inspections where necessary. These decay detection methods are further explained at Appendix B of this report.
- 2.4 Trees are dynamic living organisms that change significantly over time². The observations and recommendations in this report can only be considered valid for a period of up to 2 years and all trees should be re-inspected within this time period or immediately following gale or storm force winds which may increase the likelihood of structural failure.
- 2.5 TMA have invested considerable time and resources in acquiring the expertise and experience to enable the company to offer the assessment of trees using PiCUS and RESI PD decay detection equipment, however, no liability is accepted for any errors or omissions within the analysis, algorithms or calculations incorporated into the PiCUS or RESI PD software.
- 2.6 The results, conclusions and recommendations presented in this report are based on the conditions at the time of inspection. Trees are subject to dynamic, natural processes and the effects of any debilitating factors may be progressive. Consequently, the observations made and the data collected and analysed are interpreted to present an assessment of the tree in its current condition and situation.
- 2.7 Tree owners and or the occupiers of properties with trees have legal duty of care³ regarding their trees under the Occupiers Liability Acts⁴. Various guidance is available on how tree owners can meet their duty of care. A list of key guidance is attached at Appendix C.

1 - Mattheck, Updated field guide to visual tree assessment, ISBN-13: 978-3923704590

2 - BSI. (2010) British Standard 3998: Tree works - Recommendations. UK: British Standards Institution.

3 - Occupiers Liability Act (1957) c. 31, 5, 6. Available at <http://www.legislation.gov.uk/ukpga/Eliz2/5-6/31>

4 - Occupiers Liability Act (1984) c. 3. Available at <http://www.legislation.gov.uk/ukpga/1984/3>

3 TREE INSPECTION

Inspection details

- 3.1 My name is James Chambers; I am a principal arboricultural consultant dealing with trees in relation to all forms of human activity including trees within the built environment. I have a National Diploma in Arboriculture, I am a LANTRA qualified professional tree inspector, a registered Quantified Tree Risk Assessment (QTRA) user, a VALID Tree Risk-Benefit Validator, a Veteran Tree Specialist - Consulting Level, a Technician member of the Arboricultural Association, an Associate member of the Institute of Chartered Foresters and I have extensive experience as a local authority tree officer and consultant.
- 3.2 I inspected the tree as arranged with Cook Arboricultural Services on Tuesday 7th March 2023 and the findings of my investigation are set out below and in the attached appendices.
- 3.3 The details and condition notes for the inspected tree are attached in the schedule at Appendix A. This schedule also contains recommendations for works and/or further inspections as appropriate. Where tree work recommendations have been made to address safety concerns they have been given a risk of harm (RoH) rating, and work should be prioritised accordingly.
- 3.4 Further inspection/investigation works have been given a time-based priority and it is strongly recommended that these recommendations are carried out within the time limits stated. Information on Quantified Tree Risk Assessment (QTRA) and TMA use of the system is attached at Appendix D.
- 3.5 As the tree is protected by virtue of its location in a Conservation Area or a Tree Preservation Order (TPO) it is necessary to notify and or obtain permission from the London Borough of Camden prior to carrying out any works not covered by an exception. Unauthorised work to protected trees could lead to prosecution, resulting in enforcement action such as fines and a criminal record.

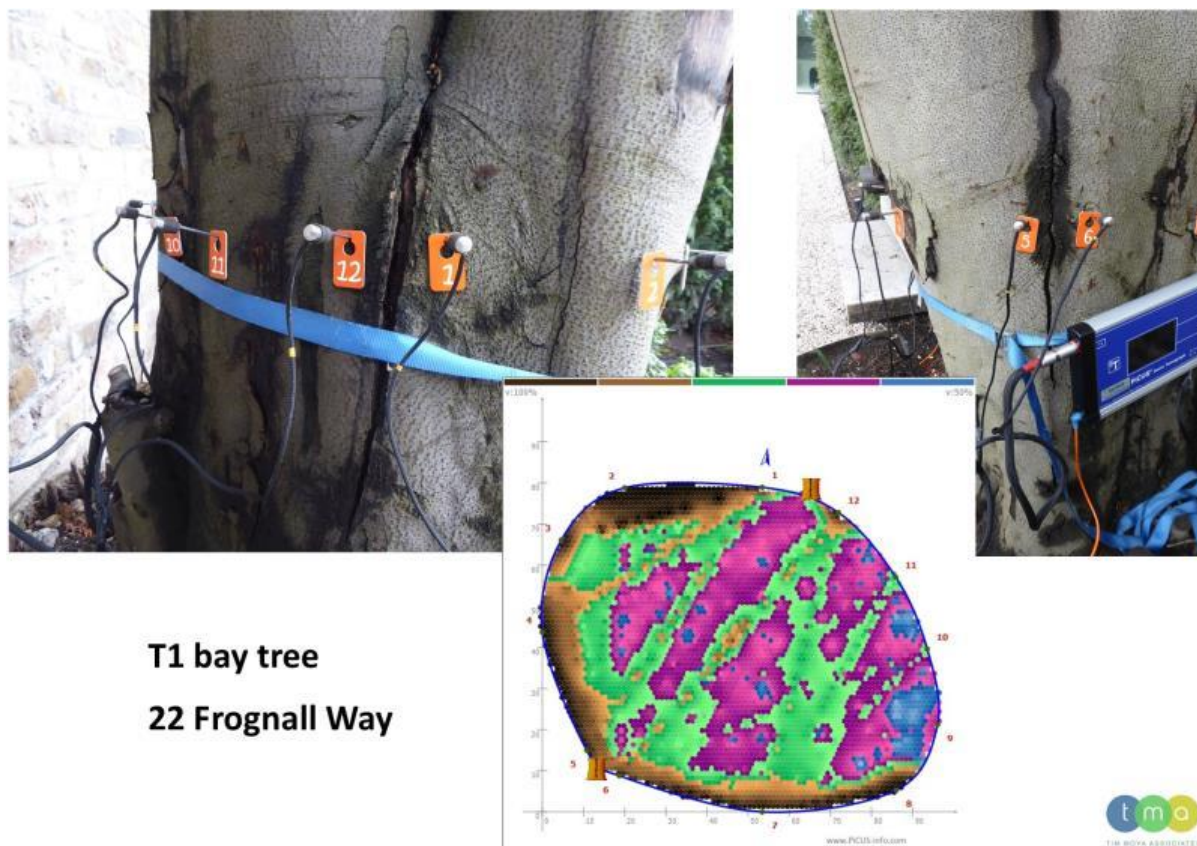
4 T1 BAY TREE



T1 Bay tree: with map showing approximate location highlighted in red, and views of the crack/bark inclusion between stems from the north (right) and south (left).

- 4.1 A mature tree in fair physiological condition with moderate vitality and well-developed buttressing, growing at the boundary of a private garden, above a footpath and within falling distance of buildings. The crown has recently been reduced.
- 4.2 The tree has two co-dominant stems with adaptive growth around them. These stems present a structural weakness due to a crack and included bark between them. There is adaptive growth around the lower trunk. A flexible brace has been installed to prevent/arrest stem failure.
- 4.3 Some bark wounding has occurred around the lower trunk, though tap testing with a sounding mallet did not indicate any decay. Visual inspection of the crack on the northern and southern sides indicates that it may extend down approximately 30cm between the stems.
- 4.4 Sonic tomography involves measuring the time taken for sound waves to pass between sensors placed around the circumference of the stem. Slower areas are usually indicative of decay however other factors such as cracks or bark inclusions can also slow sound waves.

- 4.5 The test was undertaken at approximately 75cm (at measuring point (mp) 1) above ground level. This height was selected to include the most significantly cracked area on both sides of the main stem.

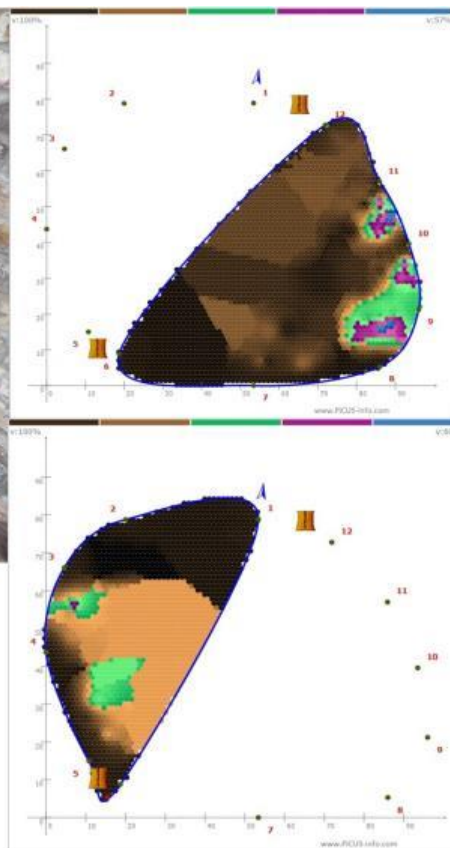


T1 bay tree PiCUS: sonic tomograph setup around the crack/bark inclusion and initial tomogram.

- 4.6 The initial tomogram produced shows extensive slow velocities (blue, pink) across the stems at the test height, which is very likely due to the crack and bark inclusion between the stems interrupting those sound waves, making the results unhelpful.
- 4.7 Revision of the data allows the separation of readings for each stem to provide more realistic results, as shown below.



T1 bay tree
22 Frognall Way



T1 bay tree PicUS: sonic tomograms of each stem, superimposed in approximate position over the stems.

- 4.8 The results for each stem show high velocities indicating intact wood - black, dark brown, brown - with slower areas within each tomogram shown in green, pink and blue. The velocities in these areas are slower in comparison to other areas but are not considered to represent structurally significant damage in the stems.
- 4.9 These results indicate that each stem is largely intact, however the crack and included bark between the stems presents a significant structural weakness. Further investigation was carried out using the RESI PD at the height of the tomogram and below.



T1 bay tree RESI PD: graphs with direction and position indicated, and images of tests being undertaken.

- 4.10 The graphs confirm high resistance indicating intact wood until the crack/bark inclusion as shown by the drop in resistance in each graph, with intact wood beyond the crack.
- 4.11 The graphs by and below mp 2 confirm a drop in resistance of approximately 4cm & 5.5cm respectively, indicating that the crack/bark inclusion is more significant lower down the stem.
- 4.12 The graphs by and below mp 6 confirm a drop in resistance of approximately 6cm & 1cm respectively, indicating that the crack/bark inclusion is more significant at the visually apparent opening higher on the stem.
- 4.13 Due to the recent remedial crown reduction and installation of bracing between the stems, the structural condition of the tree is not currently considered to present an unacceptable risk of harm or damage through stem failure.
- 4.14 The remedial works have helped to manage the risk of stem failure in the short term, however it is considered likely that these measures have also reduced stem movement and therefore limited the ability of the tree to produce more reactive growth around the weakened area.
- 4.15 It is considered likely that the crown will require regular reduction to manage mechanical wind loading and the brace will require regular inspection and replacement

while the tree is retained. It is also considered likely that the cracking between the stem will naturally increase over time, despite the remedial measures already undertaken.

4.16 For the above reasons tree removal and replacement are recommended.

4.17 Please see below and Appendix A for details.

5 RECOMMENDATIONS



TIM MOYA ASSOCIATES

Purpose of work recommendations key -

Red – urgent

Orange – necessary

Yellow - appropriate

Green - continue inspection regime

Blue – good arboricultural practice

Purple – to allow access

Pink - to manage nuisance

Grey – continue established management

Brown – to manage ancient or veteran trees

Taupe – landscape improvement

PoW key: Purpose of works

5.1 T1 bay tree - **fell tree - appropriate**

5.2 **plant replacement tree - landscape improvement**

5.3 The above works and tree details are detailed at Appendix A.

5.4 The Trees and Design Action Group (TDAG) have produced a species selection document which is freely available to download here <https://www.tdag.org.uk/tree-species-selection-for-green-infrastructure.html>

6 APPENDICES CONTENTS

APPENDIX A

- Tree Schedule

APPENDIX B

- TMA decay detection appendix

APPENDIX C

- Duty of Care Guidance

APPENDIX D

- TMA QTRA Briefing Note

APPENDIX A

- Tree Schedule

22 Frognall Way, NW36XE, London (No. of Trees: 1)

Tree No (old tag)	Vegetation type	Species	No. of stems	Height (m)	Crown spread	DBH (cm)	Life stage	Vitality	Physiological Condition	Structural Condition	Safe Life Expectancy	Access	CAVAT value (£)/ Crown area (m2)
T1 ()	Tree	1 Laurus nobilis Bay/Bay Laurel/Poets Laurel	1	11.0	7.0	40	Mature	Moderate	Fair	Poor	<5 yrs	Poor	£2896.55 / 38.48m2
Site Features	Targets		Conditions			Notes						Survey date/ Surveyor	
	Congregation point within falling distance. Building within falling distance of tree. Footpath within crown spread. Tree overhangs neighbouring property. Wall or fence within crown spread.		Buttresses / buttress roots - Major adaptive growth / strong development. Bark wound - Major. Cable / cables present - Flexible. Crown reduction - Recent. Epicormic growth - Base. Fork - Weak with included bark. Reaction wood / Adaptive growth - Stem / stems. Stems - Co-dominant.			Significant crack between stems, appears to have recently worsened. Adaptive growth also present, flexible bracing installed and crown reduction recently undertaken.						2023-03-07. /James Chambers.	
Recommendation	- Detailed investigation - Internal decay assessment PiCUS and/or RESI PD investigation at 5m agl to determine consistency of remaining wood and inform future management decision. - Plant replacement tree in suitable nearby location. - Fell - Ground level to manage risk of harm or damage through stem failure due to crack between stems.					Purpose of works		Completed Landscape improvement Appropriate	Safety Action Date / Completed /		07/03/23		
Risk assessed	Tree failure on to other target(s)					Risk of harm range		1/10 000 - 1/1 000 000		Risk category		2	

APPENDIX B

- TMA decay detection appendix

PiCUS

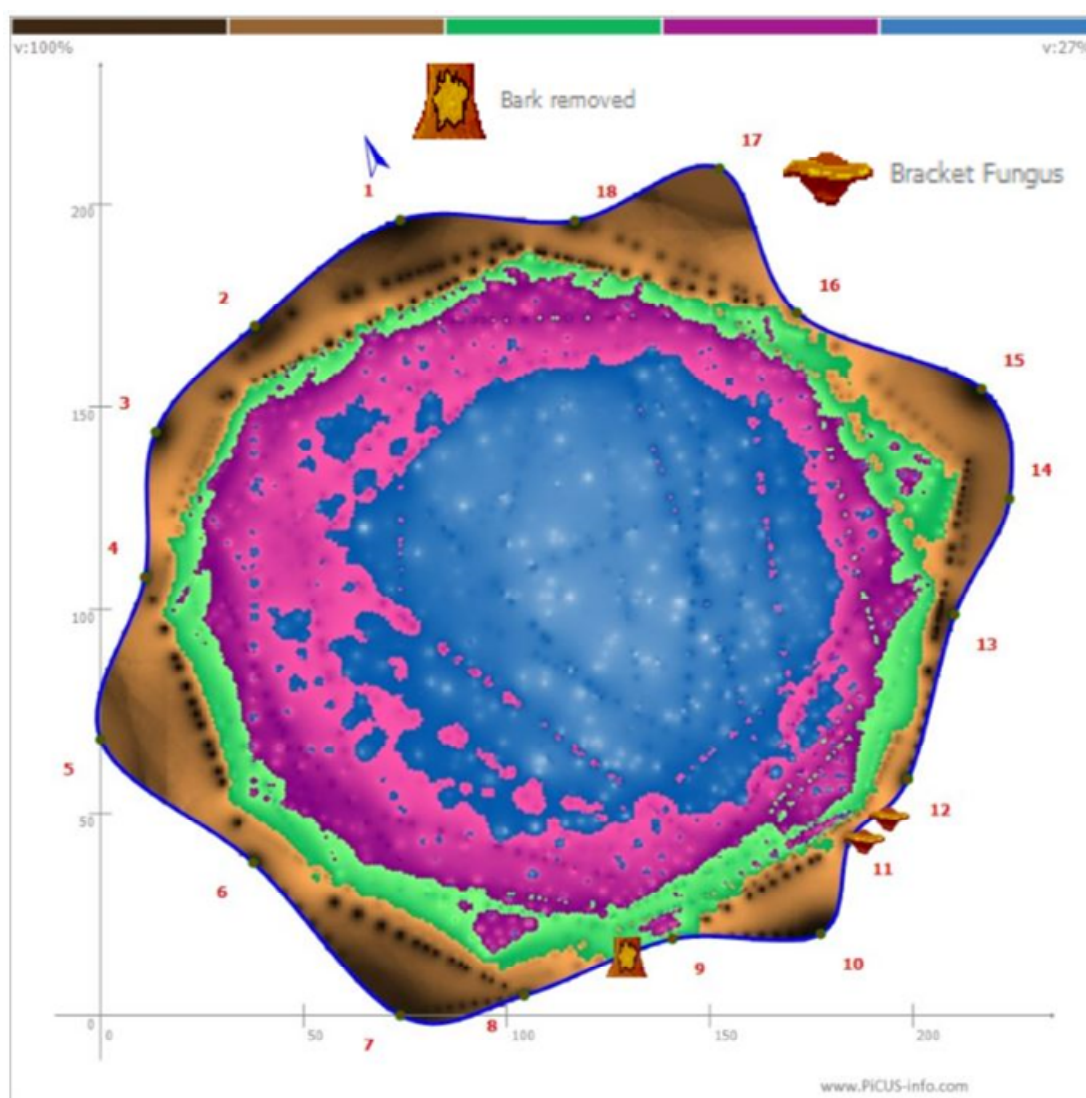


TIM MOYA ASSOCIATES

PiCUS investigations involve an assessment of the consistency of wood within a tree by passing sound waves through the trunk and measuring how long they take to reach sensors placed around the circumference. Sound travels relatively slowly through decayed wood.

The Tomogram includes a scale at the top showing;

HIGHER VELOCITY TO LOWER VELOCITY indicating **SOUND WOOD TO DECAYED WOOD**



The above tomogram shows extensive internal decay (blue, pink) which continues to develop across the stem (green, yellow/light brown) with some sound wood (dark brown) remaining around the circumference

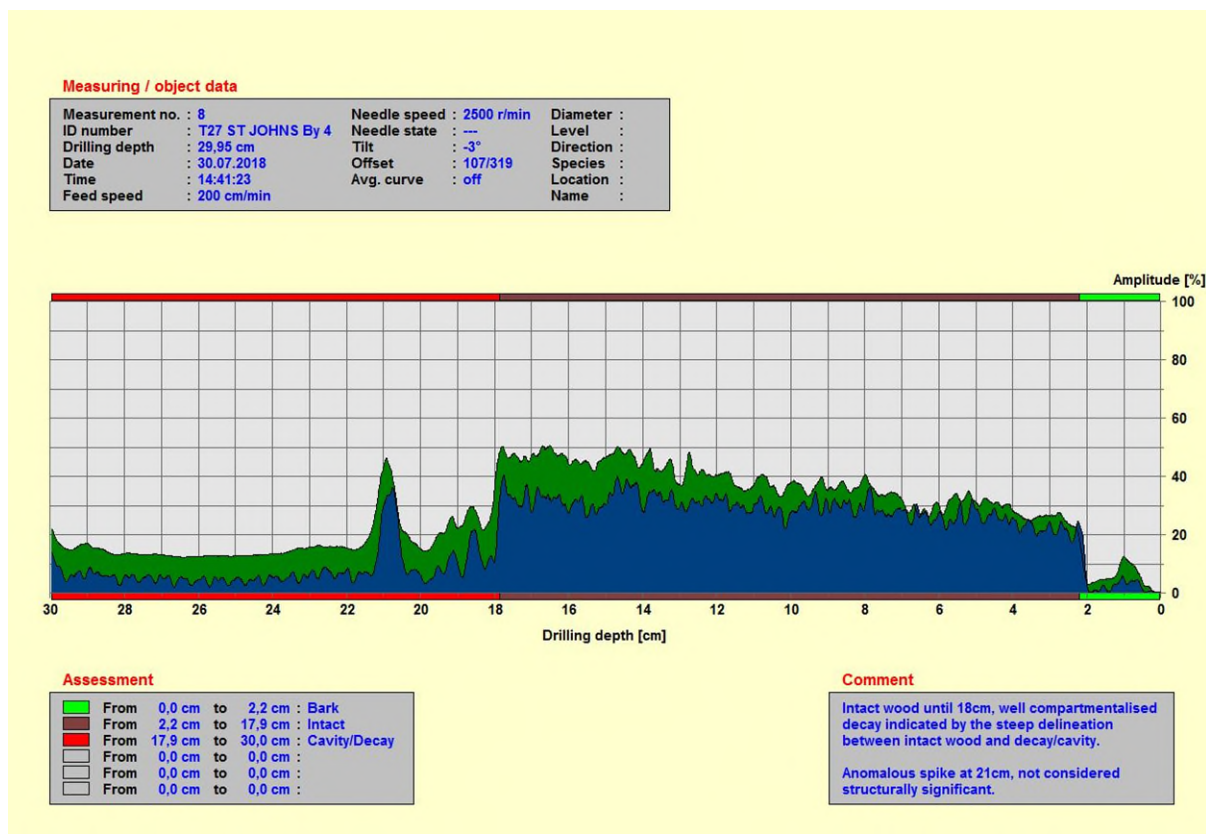
The Barn, Feltham, Chalk Lane, Harlow, Essex CM17 0PF
0845 094 3268 | www.tma-consultants.co.uk

arboriculture ecology landscape innovation

RESI PD

RESI PD testing involves measuring the levels of resistance to drilling by passing a very fine drill through the wood to determine its consistency. The results show high peaks and low peaks for relatively high and low resistance.

Decayed wood normally has lower resistance to drilling.



The above RESI PD graph (read from right to left) shows bark to 2cm, intact wood with high resistance until 18cm where resistance drops sharply, indicating well compartmentalised decay throughout the remainder of the graph.

APPENDIX C

- Duty of Care Guidance

Meeting your duty of care - Guidance for tree owners

Please see below a selection of publicly available documents which offer guidance and information for tree owners regarding their legal duty of care as described in the Occupiers Liability Acts (1957 & 1984).

- [Common sense risk management of trees – National Tree Safety Group](#)
- [Hazards from trees – Forestry Commission](#)
- [Veteran Trees: A guide to risk and responsibility \(IN131\) – Natural England](#)
- [Guide to Trees and the Law – Arboricultural Association](#)
- [Planning Policy Guidance – Tree Preservation Orders and trees in Conservation Areas](#)

APPENDIX D

- TMA QTRA Briefing Note

Quantified Tree Risk Assessment

TMA has adopted the Quantified Tree Risk Assessment (QTRA) method for assessing the risk from trees, and all our arboricultural consultants are trained, registered users. Please contact us for further information.

The Quantified Tree Risk Assessment Method

Tree safety management is a matter of limiting the risk of harm from tree failure while maintaining the benefits conferred by trees. Although it may seem counterintuitive, the condition of trees should not be the first consideration. Instead, tree managers should consider first the usage of the land on which the trees stand, and in turn this will inform the process of assessing the trees.

The Quantified Tree Risk Assessment (QTRA) system, developed by Mike Ellison at Cheshire Woodlands, applies established and accepted risk management principles to tree safety management. The system moves the management of tree safety away from labelling trees as either 'safe' or 'unsafe' and thereby away from requiring definitive judgements from either tree assessors or tree managers. Instead, QTRA quantifies the risk of significant harm from tree failure in a way that enables tree managers to balance safety with tree values and operate to predetermined limits of tolerable or acceptable risk.

By quantifying the risk from tree failure as a probability, QTRA enables a tree owner or manager to manage the risk in accordance with widely applied and internationally recognised levels of risk tolerance. QTRA further provides a decision-making framework which considers the balance between the benefits provided by trees, levels of risk they pose, and costs of risk management.

QTRA Advisory Risk Thresholds

Thresholds	Description	Action
1/1 000	Unacceptable Risks will not ordinarily be tolerated	Control the risk
	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 a reasonable cost Review the risk
1/1 000 000	Broadly Acceptable Risk is already ALARP	No action currently required Review the risk

The Barn, Felthorpes Park, Chalk Lane, Harlow, Essex CM17 0PF
0845 094 3268 | www.tma-consultants.co.uk



Quantified Tree Risk Assessment



TIM MOYA ASSOCIATES

TMA categories in relation to QTRA

QTRA Risk of harm	TMA Recommendation
<1/1000	1. URGENT
1/1001 – 1/10,000	2. NECESSARY
1/10,001 – 1/1,000 000	3. APPROPRIATE

QTRA assessment is based on statistical data, calculated over a 1-year period. Tree managers should prioritise their resources to deal with all urgent and necessary works as soon as is practically possible. Works categorised as appropriate should be completed or reviewed within the reinspection period provided.

Following a QTRA tree survey, tree owners can identify where the Risk of Harm (RoH) is unacceptably high and allocate resources to remediate those risks to As Low as Reasonably Practicable (ALARP). Other works with a tolerable or broadly acceptable RoH can be addressed appropriately considering other factors including the availability of resources.

Using QTRA, the land-use (Target) upon which trees could fail is assessed first. By valuing the Target first, the tree owner and the risk assessor are able to determine how often a tree survey or inspection of the trees is required. Each tree is then evaluated in terms of its size and probability of failure.

Ranges of value for Target, Size, and Probability of Failure are entered into a QTRA calculator which generates a traffic light colour-coded risk of harm. The tree owner can then compare the risk to advisory levels for risk tolerance.

For most clients there will be circumstances where tree or branch failure would be unacceptable even where a low risk of harm has been calculated, for example: playgrounds; busy roads; car parks etc. In these circumstances TMA will make recommendations as considered appropriate or in line with the clients stated tolerability of risk *raising the priority of works to necessary regardless of the low risk of harm calculated.*

By taking a QTRA approach, tree owners commonly find they spend substantially less resources on assessing and managing tree risk than they did previously, whilst maximising the many benefits their trees provide. Moreover, in the event of a 'tolerable' or 'acceptable' risk being realised, they are in a position to demonstrate the risk has been managed reasonably and proportionately, to ALARP.

Once trees have been assessed and assigned a 'risk category', an appropriate timeframe for reinspection can be implemented, with trees in areas of higher occupancy revisited within a shorter timeframe than trees in lower occupancy areas.

This allows tree owners to allocate time and resources appropriately according to the use of the land where the trees are growing, leading to more effective, targeted tree management which meets the tree owner's duty of care and also recognises the essential values that trees provide.

Non-risk related works such as actionable nuisance, formative pruning and young tree maintenance will be categorised as considered appropriate. Please see overleaf.

The Barn, Feltham Park, Chalk Lane, Harlow, Essex CM17 0PF
0845 094 3268 | www.tma-consultants.co.uk

arboriculture ecology landscape innovation

Purpose of works category	Example works
7. landscape improvement	Tree planting, stump removal to facilitate replanting
8. good arboricultural practice	Young tree maintenance, non-risk related tree work, formative pruning etc
9. continue established management	Non-risk related re-reduction, pollarding, repeated tree maintenance
13. to manage ancient or veteran trees	Specialised pruning or tree management techniques
15. to manage nuisance	Cut back from buildings, lights, signs, lifting low branches etc
16. to allow access	Clearance of basal growth/ vegetation/detritus

Where reinspection is recommended following vegetation clearance or for a decay investigation it will be categorised as 'Necessary' *and* assigned a safety action date. E.g.

- 'Clear vegetation to allow inspection of base' – 'To allow access' – within 5 months & 'Inspect base of tree following vegetation clearance' – 'Necessary' – within 6 months
- 'Undertake decay investigation' – 'Necessary' – within 12 months



TIM MOYA ASSOCIATES

arboriculture ecology landscape innovation

The Barn, Feltimores Park, Chalk Lane, Harlow, Essex CM17 0PF

0845 094 3268 | info@tma-consultants.co.uk | www.timmoyaassociates.co.uk

Tim Moya Associates is a trading name of Tim Moya Tree Services Ltd. Company Reg No. 3028475