



Fulford-Dobson Associates Ltd
ARBORICULTURAL CONSULTANCY

DETAILED TREE HAZARD ASSESSMENT

Mill Green
Wargrave
Berkshire
RG10 8EU

April 2024

Addendum to Duckworths Arboriculture Report (Tree Condition Survey)

(March 2024 ref. SCD 06308/2024)

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1. Introduction

1.1 Instruction and project brief

Fulford-Dobson Associates have been instructed by Peter Mayes of St Mary's Church to carry out a detailed wood decay assessment of the large London plane on Mill Green, following recommendations in the Duckworths Arboriculture Tree Condition Survey (March 2024).

1.2 Methodology

This assessment was carried out by Jasper Fulford-Dobson on the 13th April 2024 in fair weather conditions. The initial visual inspection was followed by sounding of the lower trunk with a nylon hammer and probing of the voids between and under the buttresses with a 50cm long steel rod. Decay mapping of the trunk base was done using ultrasound tomography.

A useful reference for strength assessment of hollow stems comes from Mattheck and Breloer (The Body Language of Trees 1994. Research for Amenity Trees no. 4). They estimate that the safety factor for a solid stem is reduced by only 29%, where the central cavity occupies 2/3 of stem diameter. However, they add that this applies to full-crowned trees, and so if the trees' crown is shortened, the lever arm and sail area are reduced, the tree can be significantly hollower than 70% (of stem radius) whilst still maintaining a broadly acceptable safety factor. Where open cavities of greater than 1/3 of stem diameter exist, they suggest the safety factor is lost altogether. These are purely useful starting points and should be considered together with a host of other factors and species characteristics such as the mode and extent of known decay fungi colonising the tree, tree vigour, species resistance to decay and mechanical characteristics.

The risk assessment has been carried out using Quantified Tree Risk Assessment™, of which the author is a trained and licenced user.

1.3 Limitations

The copyright of this document resides with Fulford-Dobson Associates unless assigned in writing by the company. It is for the sole use of the named client and relates only to the defined scope, survey area and trees therein.

Trees are living organisms subject to continual change by a host of biotic and abiotic factors. This report is based on the condition of the subject tree(s) at the time of the assessment. The authority of this report ceases when any site conditions change, or pruning or other works unspecified in the report are carried out to, or affecting, the subject tree(s), whichever is the sooner.

This report is valid for one year under normal prevailing weather conditions only. Trees can never be deemed to be 100% safe. Those that are considered to be reasonably safe may still fail in normal weather conditions and the risk increases under gale force winds and after sustained and heavy rainfall. However, in the absence of significant defects on the subject tree(s), Fulford-Dobson Associates cannot be held liable for such unforeseeable failures.

The statements made in this report do not take account of the effects of extremes of climate, vandalism or accident, whether physical, chemical or fire. Fulford-Dobson Associates cannot therefore accept any liability in connection with these factors, nor where prescribed work is not carried out in a correct and professional manner in accordance with current good practice.

2. The tree

The subject tree is a large mature London plane situated on a village green. It was highlighted for a further assessment by way of detailed decay mapping in the Duckworth Arboriculture tree condition survey due to the presence of cavities and decay under the buttresses on the north and east sides.

The tree appears to be in generally fair health for its age and species characteristics, although the very top of the crown appears to exhibit declining vigour in the form of a slight thinning of bud and shoot density.

The tree has a very large branch growing southwards over the green, that extends out beyond the main canopy and which presents a moderate hazard.

Probing suggests that the extent of the cavities or voids under and between the buttresses appear to be about 20-40cm depth. The probe was prevented from going any further by solid (rather than decayed) wood, suggesting that the voids are well contained.

As noted by Duckworths Arboriculture, there is no evidence of any decay fungi.

The superficial bark wounding on the eastern side of the trunk base is probably the result of an historic vehicle impact wound. The exposed wood is case hardened and surrounded by callus wood but again no evidence of active decay.

The rooting zone of the tree has been damaged by repeated vehicle movements over the grass, compacting and capping the soil. This removes air spaces from between the soil particles and prevents rain water from percolating into the soil, which in turn suffocates the roots and reduces available water. The usual symptoms of such root damage is declining vigour and thinning at the top of a tree's crown.

Figure 1: View of the tree from the east – large southern branch highlighted



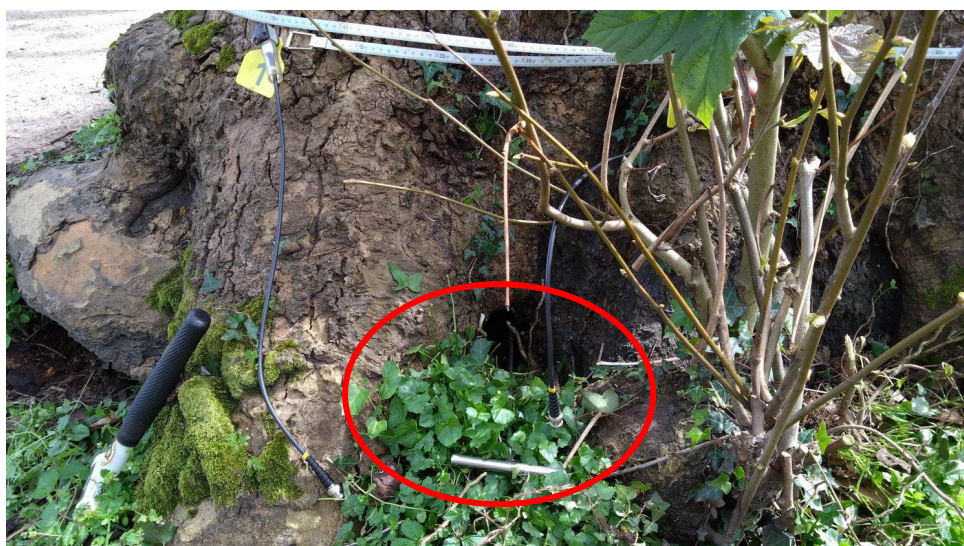
Figure 2: Trunk base, showing old vehicle impact wound



Figure 3: Void under eastern buttress (50cm probe fully inserted)



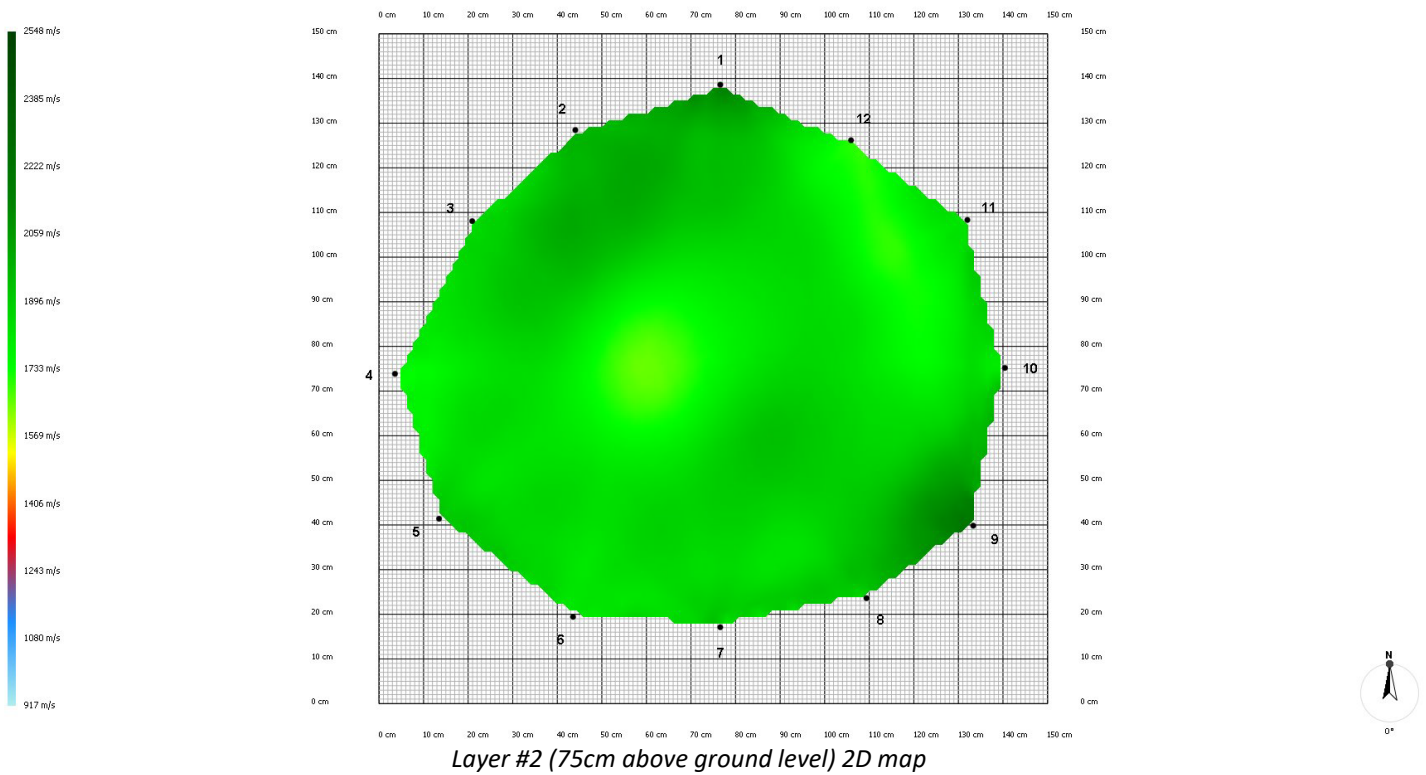
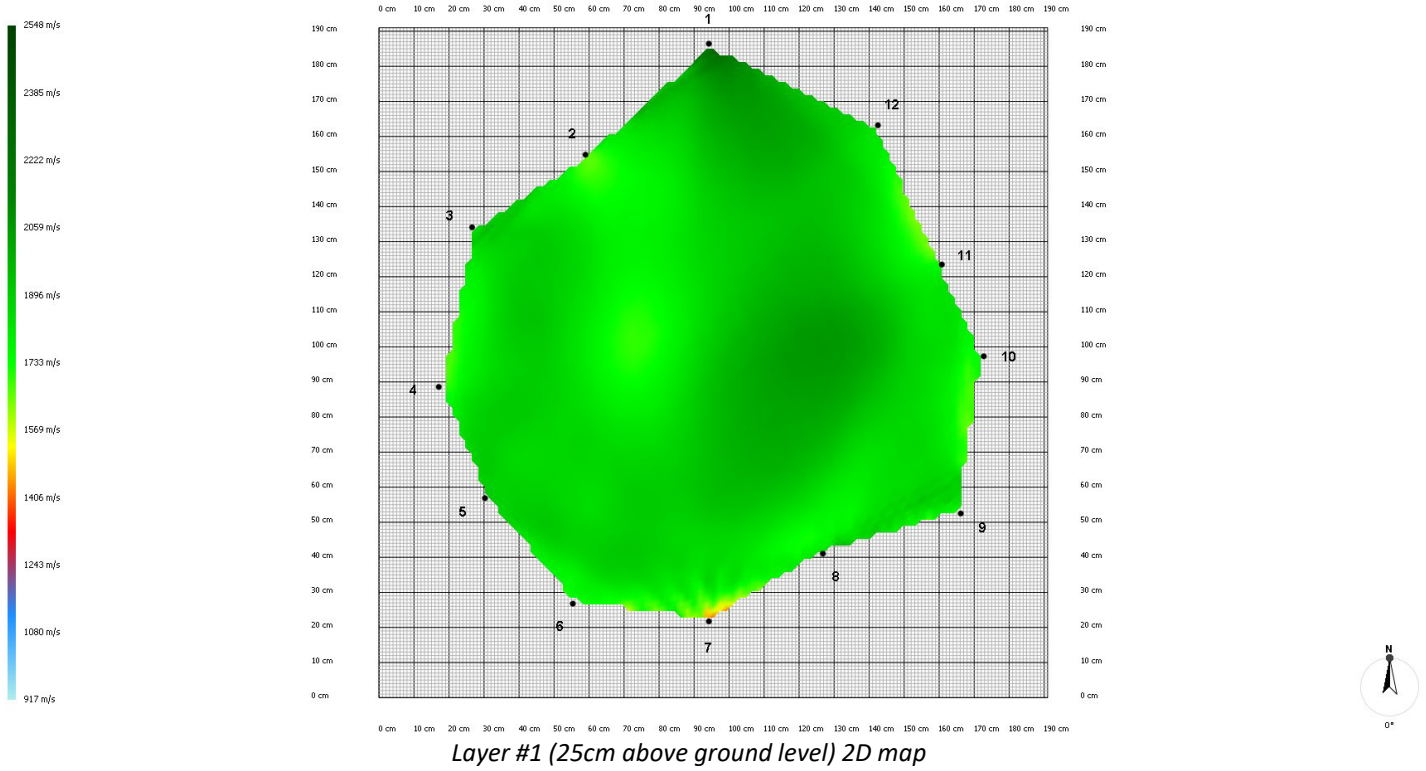
Figure 4: Void between buttresses on north side (50cm probe fully inserted)

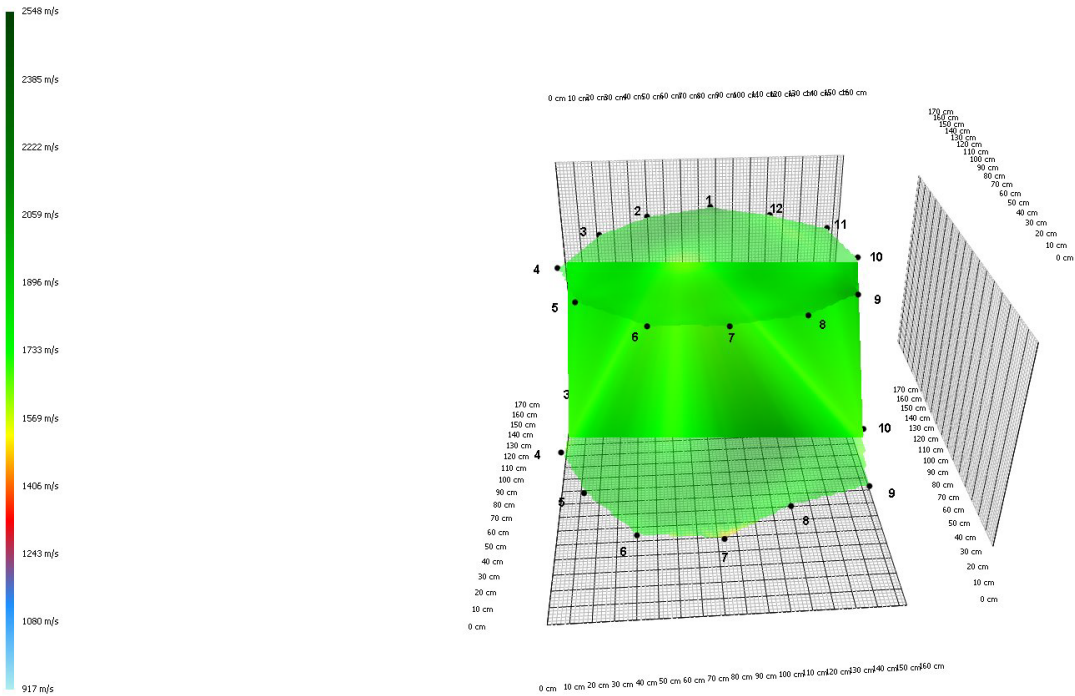


3. Fakopp Arborsonic 3D acoustic tomograph

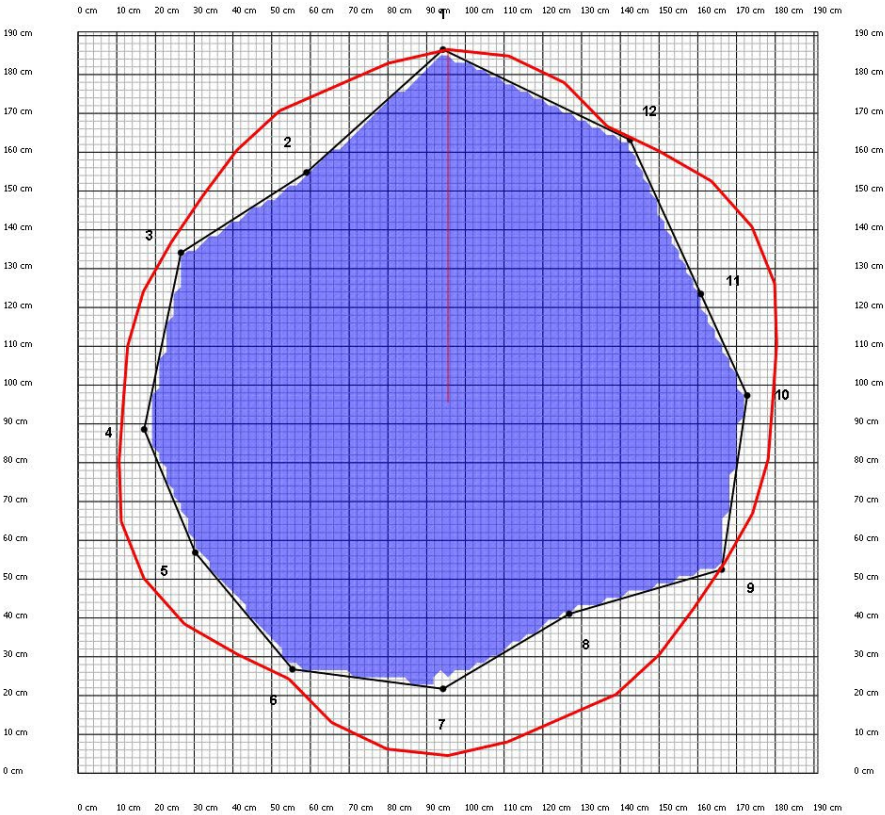


- 3.1 12 sensors were attached around the trunk with steel nails through the bark up to a maximum depth of 2cm into the water conducting outer (sap) wood. The distance between each sensor was measured with Bluetooth enabled electronic callipers to map the entire cross section of the trunk at the level of testing.
- 3.2 Each sensor was linked via an amplifier box to the main Bluetooth transmitter unit and once the measurements were calibrated each sensor was then tapped with a hammer. The unit measured the time-travel of the sound wave generated by the hammer tap between each sensor. If there was a hole, crack, or hollow area present, the sound wave would have to travel around it and therefore take more time to reach the other sensors.
- 3.3 Simplified interpretation of the colours in the tomograms: -
- **GREEN** = areas of high density, indicating solid/healthy wood.
 - **RED** & **YELLOW** = varying according to the defect. Usually depicting the area between solid/healthy and damaged/decayed wood. Can indicate early fungus infection.
 - **BLUE** & **WHITE** = representing areas of slower sound velocity or low density (i.e., advanced decay or hollowing).
- 3.4 Where an additional separate simplified blue and white 'layer map' is provided, **BLUE** refers to wood capable of holding the loads (based upon estimated tree dimensions). **WHITE** indicates areas where the sound velocity is under the average of minimum and maximum values; this refers to damaged, decayed wood which has lost its load bearing capacity. As the software can't predict from which direction the wind originates, the apparent mechanical stresses are calculated for every 5°. This is shown as a **RED** line on the image. This **RED** line from the centre to the edge shows the point of highest stress, which is then used by the software to calculate the 'Safety factor'.





Multilayer view 3D map



Layer #1 - Layer Map

3.5 Fakopp Arborsonic Biomechanic Calculations: -

Wind	
Wind model:	EN1991
Terrain:	Village
Base wind velocity:	26.0 m/s
Dry air temp.:	9 °C
Crown	
Crown model:	Calculator
Area:	660.52 m ²
Top height:	30.5 m
Center height:	16 m
Bottom height:	1.5 m
Trunk	
Degree of lean:	90 °
Direction of lean:	Northwest (315 °)
Tree	
Wind load:	131998 N
Center height:	16.98 m
Drag factor:	0.23
Yield strength	19.7 MPa

Layer name	Height	Decayed area	Safety factor	Risk rating
Layer #2	75 cm	0 %	234 %	Low risk
Layer #1	25 cm	0 %	391 %	Low risk

3.6 Interpretation

The wood at the two test levels appears to be solid, with no obvious signs or decay or any hollowing.

The noted voids appear to be well contained and all buttresses appear to be solid with the exception of the one on the eastern side, which has a well contained void on its underside.

The likelihood of the tree failing at the trunk base as a result of the noted features is low.

The part of the tree that is of more concern is the weight and loading of the southern branch.

4. Risk assessment calculation

Quantified Tree Risk Assessment: -

Tree no.	Target range (1-6)	Size range (1-4)	Probability of failure* (1-7)	Risk of harm	Advisory risk threshold	
					Description	Action
T009	3	1	4	1:400,000	Tolerable (where imposed on others) Risk is tolerable if 'as low as reasonably possible'	Assess the costs and benefits of risk control Control the risk only where a significant benefit might be achieved at reasonable cost Review the risk

* Having completed the detailed inspection and decay mapping, this is an estimation of the probability of failure of the southern branch failing within the coming year under prevailing weather conditions.

5. Recommendations

Tree no.	Species	Recommendation	Priority	Reason
T009	London plane	Reduce by way of drop-crotch pruning techniques the large southern branch. Its overall length should be reduced from 17m back to 14.5m (+/- 0.5m), to suitable growth points. Install a 4T cable brace to provide precautionary support for southern branch. Carry out a soil aeration and decompaction exercise around the tree's root zone and install a physical barrier (posts and rope) to prevent vehicular access onto the grass.*	6 months	Combination of duty of care (safety) and long-term arboricultural management.
All work should be carried out in accordance with BS 3998 <i>Tree Work – Recommendations</i>, wherever appropriate. Cable brace installation should be carried out in accordance with the manufacturer's guidelines. The tree may be protected by a Tree Preservation Order and/or a Conservation Area. You and your appointed arboricultural contractor should therefore check and submit a protected tree work application as necessary. This tree should be inspected on a two yearly frequency as recommended in the Duckworths Arboriculture report.				

6. The author's professional credentials

- Fellow of the Arboricultural Association (membership since 1997)
- Registered Consultant of the Arboricultural Association (2016-2023) RETIRED
- Chartered Environmentalist (since 2013)
- Member of the Chartered Institute of Horticulture (since 2015)
- Technician's Certificate in Arboriculture (2005)
- National Diploma in Arboriculture (1996-1998)
- National Certificate in Horticulture (1992)
- Quantified Tree Risk Assessment - certified user and licence holder (since 2017)
- LANTRA Professional Tree Inspection certificate (2013) - refresher training in 2022
- Cardiff University Bond Solon Certified Expert Witness (2016)
- Various technical competence certificates/accreditations with the Consulting Arborist Society (formerly the Arboricultural Mortgage and Insurance Users Group), includes Mortgage and Insurance surveys, Tree Impact Assessments for planning applications and effective application of Tree Preservation Orders.

Experience during 30+ year career includes 12 years in commercial contracting, 4 years in local planning authority and 15 years as English Heritage's appointed tree and woodland inspector (eastern, London and southern regions).

To date, the author has conducted over 250 decay mapping exercises on a wide range of tree species across central and southern England using ultrasound tomography and resistance microdrilling.

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