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## **PICUS SONIC TOMOGRAMS**

### **For two London Plane trees in Bedford Square Gardens, London WC1B**

**Prepared for:** Dr Martin Dobson of Martin Dobson Associates Ltd acting for Bedford Estates

#### **Explanation of tomograms and limitations:**

The PICUS Sonic Tomograph detects and shows differences in the ability of wood to transmit sound waves. It does not differentiate between decay or cavities. Both are shown as white, pale blue or purple. Dark colours (dark brown and light brown) in the tomogram indicate areas of the trunk's cross section where the sound travels relatively fast – compared to purple and blue areas where the sound travels relatively slowly. Green indicates the area between fast and slow sound transmission.

The numbered red dots show the sensor positions. Sensor 1 indicates the north side of the tree. The red line indicates tree radius divided by 3; a centralised area of cavity or decay extending to 66% of the stem radius would reach the red line. This would show up as 45% area of decay/cavity on the tomogram.

The scale along the axes is in centimetres. The straight-edged outline of the tomogram omits some of the undulations of the cross-section profile.

The wood is coloured according to the relative sound velocities measured. **Brown represents solid wood. The colours green, purple and blue indicate increasing degrees of decay.**

**All recommendations in this report are based on assessment of the tomogram in relation to external features observed. No climbing inspections, drilling, core samples or excavations were undertaken unless otherwise stated**

**Trees are living dynamic organisms, responding to internal and external changes. Occasionally any tree may fail without warning and the safety of any tree cannot therefore be guaranteed with absolute certainty.**

**All measurements are approximate**

**Site and location:** The subject trees were located in Bedford Square Gardens, London WC1B. Tree 3 stood at the south-west end of the garden and Tree 10 was three trees east of the south-east gate. Both trees stood close to the railings and had *Ganoderma* fungal fruiting bodies at ground level.

I was informed by a Mr Stephen Heath of the Bloomsbury Association, that Bedford Square was the only complete Georgian Square in London and that the gardens and trees were an integral part of the square.

**Dates and weather:** The reading was taken on 8<sup>th</sup> December 2012. The weather was cold and sunny but clouding over towards the end of the day.

**Tree 3:** The tree was a mature London Plane (*Platanus x acerifolia*) with a height of 28m, and a trunk diameter at 1.5m of 1430mm.

**Rooting zone:** The tree stood less than 1m from the railings, in a shrub bed at the south-west end of the gardens. Outside the railings was a well-used pedestrian area with seats and old-style lamp posts. Beyond that was the road and across the road a Georgian terrace of buildings. The gardens inside the railings are private but even on the cold day I was there, several people were present. There were thus plenty of targets should the tree fail.



**Trunk base and trunk:** The southern half of the trunk base was swollen to an unusual degree, from ground level to approximately 0.8m, like the base of giant a chess piece. Whereas the swelling on the *northern* half of the trunk was from 1.6m to 1.7m, and also substantial. Several of the other 20 or so plane trees in the gardens had similar swellings, though less pronounced..

Above 1.7m the trunk rose straight to a height of 7m where branch division began. There was one old, semi-occluded wound at 7m and a further wound with some burry growth 1.5m below that.



Views of the swellings on trunk and trunk base

Old wounds

Near ground level on the west side there was a fungal fruiting body (bracket fungus) of the species *Ganoderma applanatum*. At 300mm wide and 200mm deep, it had several years' growth on it but the under surface showed that it was still active. On the north side there were the old, woody remains of a very small bracket at 400mm above ground level.



*Ganoderma* bracket on west from above and below

and its location



Location of very old bracket on north

Dead epicormic

Dead epicormic shoots on the north may indicate minor root death.

### **Main limbs, shoots and foliage:**

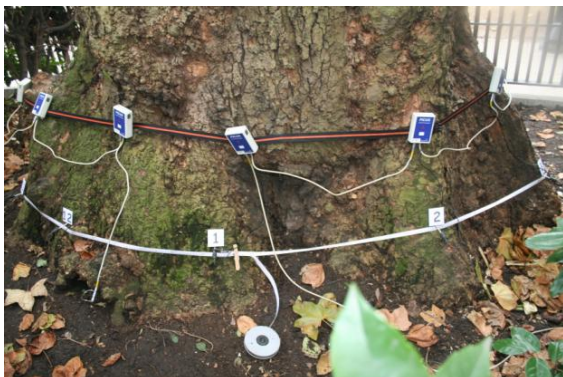
Above 7m the stem divided progressively to create a spreading crown. The crown spread was 11m to the north, 11m to the west, 12m to the south and 10m to the east. The weight distribution was predominantly to the south-west, away from the garden and towards the street.



Vigour appeared normal and re-growth at the top suggested that the tree had been reduced a few years previously.

### **External features observed, related to tomogram on T3:**

The tomogram was taken at a height varying with unevenness in the ground between 0.15m and 0.25m. The circumference at this level was 6860mm. The position of the sensors is indicated by white labels along the white horizontal tape in the photographs below, which were taken from the north, west, south and east approximately.



Sensors 11 - 3 showing depression between 1 & 2



Sensors 3 - 6

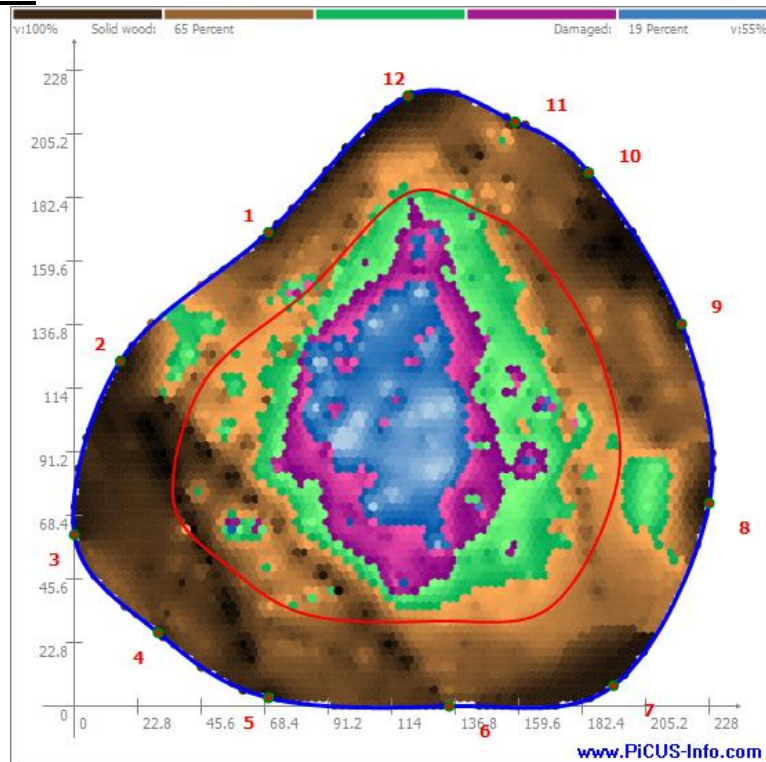


Sensors 5 - 8



Sensors 9 - 12

### **Tomogram for T3:**



### **Findings and discussion T3**

The tomogram shows 65% solid wood (brown), and 19% decay or cavity (blue and purple), with a further 16% wood affected to some extent (green) at this level. The red line represents 30% of the radius, and decay extending beyond this might indicate a tree at risk of failure. In the case of Plane trees a narrower residual wall of wood is widely regarded as tolerable.

The green patch between sensors 1 & 2 is related to a depression between these two sensors and does not indicate decay. The green near sensor 8 is less clear, but undulations in the trunk profile at this point are the most probable explanation of this green patch, rather than decay.

*Ganoderma applanatum* degrades lignin rather than cellulose so that the tree is stimulated to lay down extra wood in response to greater flexure of the stem. This would cause swelling at the base of the trunk. Typically the area of decay would taper upwards from the roots into the trunk. The tomogram was taken low down so that decay further up the stem is likely to be less extensive. Decay penetrating into the roots is probable, but serious root death would show as die-back in the crown. The dead epicormic growth and associated dead bark near ground level below sensor 12 may indicate a minor amount of root death.

My conclusion therefore is that the tree is not at immediate risk of failure. However I would recommend re-examination in three years' time. Meanwhile as the tree is a tall specimen, leverage exerted by the wind could be considerably lessened by reducing the height.

### **Recommendations T3**

- **Reduce the height by approximately 3m back to previous pruning points and by a further 2m or so if considered practicable. (See indication in picture below) The spread would also be reduced slightly to maintain a good form.**
- **Re-examine for spread of decay in three years' time**



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**Tree 10:** The tree was a mature London Plane (*Platanus x acerifolia*) with a height of 25m and a trunk diameter at 1.5m of 1430mm.



From outside the garden



From inside

**Rooting zone:** It stood on level ground just inside the railings, a few trees to the east of the south east gate. As with Tree 3, there was a well-used pedestrian area outside

the railings with a road and Georgian buildings beyond that. The presence of people, cars and buildings meant that the risk of damage or injury was high if the tree were to fail.

**Trunk base:** The trunk base was fluted and buttressed all round. One flute between two buttresses on the west side could be probed to a depth of 300mm, indicating some decay at ground level. Another small cavity on the south was 200mm deep but when probed, the wood was sound. On the south side a mature fruiting body of the fungus *Ganoderma applanatum* was growing at ground level.



The *Ganoderma* bracket between sensors 7 & 8

**Trunk, main limbs and branches:** The stem was clear of branches to a height of 3m, where it divided into four main limbs. The branch attachment appeared good with no signs of imminent breakage. The remains of a fifth limb, previously broken or cut, were still present.

At 9m these four limbs divided into a widely spreading crown.



Four main limbs from 3m . . . . .



. . . . . well attached

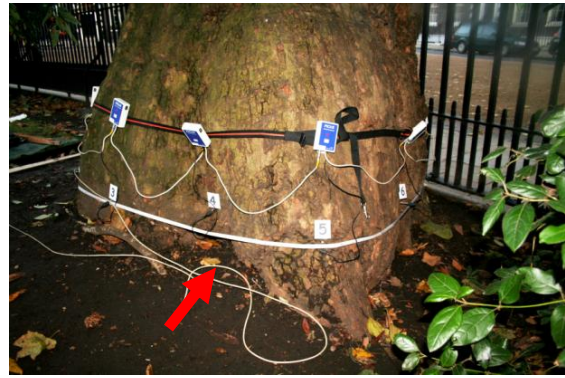
The crown spread was 14m to the north, 12m to the west, 13m to the south and 15m to the east. So the majority of the branch weight was over the street rather than the garden.

**External features observed, related to tomogram on T10:**

The tomogram was taken at a height of 0.2m. The circumference at this level was 5800mm. The position of the sensors is indicated by white labels along the white horizontal tape in the photographs below, which were taken from the north, west, south and east very approximately.



Sensors 11 - 4



Sensors 3 – 6, with decay probed below 4

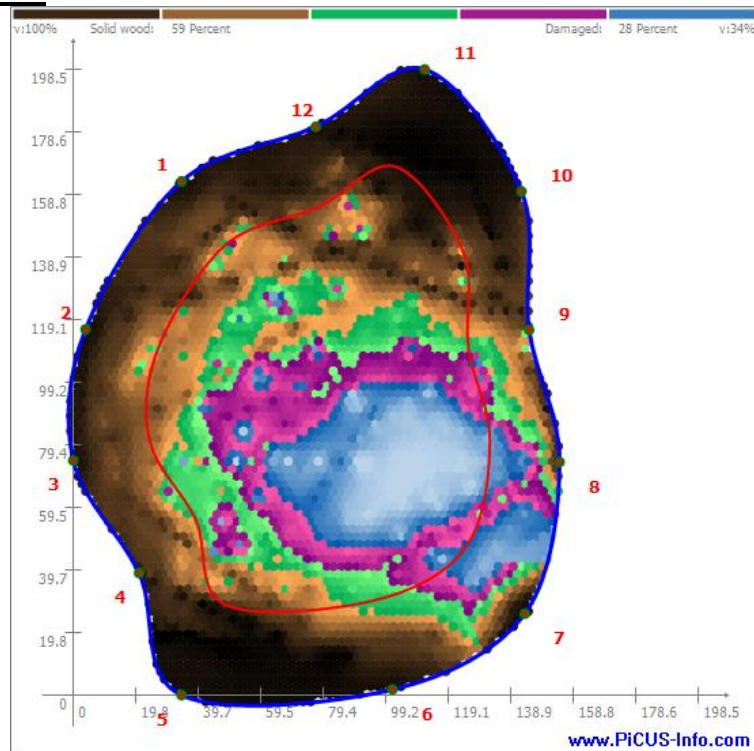


Sensors 6 – 8, with small cavity between 6 & 7



Sensors 8 - 11

### Tomogram for T10:



### Findings and discussion T10

The tomogram shows 59% solid wood (brown), and 28% decay or cavity (blue and purple), with a further 13% wood affected to some extent (green) at this level. The small cavity was between 6 & 7, and the *Ganoderma* bracket was between 7 & 8. The tomogram

shows a considerable amount of decay, and importantly, the decay is not centralised but extends right to the edge of the cross section.

While a tree stem in the form of a hollow cylinder will retain most of its strength until the cylinder wall becomes thin, a weakness or cavity in the wall of that cylinder weakens it seriously.

The buttressing at 4 and 11 looks thick and strong, but decay was detected at 4 and the north-west side of the tree is not so strong. In my opinion, the position of this tree overhanging the street, and the weakened condition of the trunk lead me to conclude that this tree poses an unacceptable risk, and is likely to become more dangerous as time passes.

### **RecommendationsT10**

- Option one: Reduce the height and spread of the tree drastically, within six months, especially on the east side over the street. In the short term this would diminish the forces threatening to break the tree across the railings and into the street. Unfortunately removing a lot of wood would reduce the tree's energy reserves and the loss of foliage would reduce its photosynthetic capability. Both of these factors would be likely to favour the more rapid advance of the decay.
- Option two: Dismantle and remove the tree within six months. This is the safer option and moreover it would create a space for a replacement tree to grow in the light. This collection of trees will eventually reach a stage when they all have to go and the opportunity could be taken to start a programme of replacement planting.
- I favour option two.



Jerry Dicker, 9<sup>th</sup> December 2012

Recommendations for tree work are subject to the following limitations

- Before any works are undertaken the legal status of the tree should be ascertained e.g whether it is subject to a tree preservation order, is in a conservation area or included in a planning condition.
- All tree works should be carried out to the standards specified in BS 3998 Recommendations for Tree Work.
- Under the Wildlife and Countryside Act 1981 and the Countryside and Rights of Way Act 2000, it is an offence to disturb nesting birds or a bat roost, whether bats are present or not. Trees should be inspected before work starts and if bats are discovered during tree work operations, work should stop and Natural England should be contacted for advice on 0845 601 4523 (Wildlife Management and Licensing Team)

### **Book references:**

1. David Lonsdale: *Principles of Tree Hazard Assessment and Management*
2. F.M.R. Schwarze: *Fungal Strategies of Wood Decay in Trees*
3. C Mattheck: *The Body Language of Trees*
4. K Weber & C Mattheck: *Manual of Wood Decays*
5. G Watson & T Green: *Fungi on Trees*