PICUS SONIC TOMOGRAPH REPORT

Subject tree. *Eucalyptus robusta*

11th November 2017

Australian Tree Consultants Pty Ltd.

AUSTRALIAN TREE CONSULTANTS Pty Ltd
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11th November 2017

To: Mrs. Mari Notaras
25 Lakeside Crescent
North Manly

Rob
Andrew
(Daniel).

Re – Arborist Inspection - Picus Sonic Tomograph Testing

I refer to your request to undertake Picus Sonic Tomograph testing on a tree located at 25 Lakeside Crescent North Manly NSW. Australian Tree Consultants Pty Ltd undertook the site inspection and Picus testing on the 10th November 2017.

The Picus test was undertaken on a *Eucalyptus robusta* (Swamp Mahogany) identified as requiring further investigation to determine the structural condition of the tree at the site of the large lower trunk wound which has *Phellinus spp*. brackets.

Based on the findings from this Picus test the structural integrity at the site of the *Phellinus spp.* brackets has been compromised by extensive decay and the tree should be removed.

If you require any further information in relation to this report, please contact us on 1300 737 674 or 0418 474 796.

Yours sincerely

Hugh Taylor
Director Australian Tree Consultants
Member Arboriculture Australia
BA (L) Major in Wilderness Management/Outdoor Education
Diploma Horticulture – Arboriculture (Level 5)
Arborist/ Tree Surgeon/ Horticulturist
Certificate IV Occupational Health & Safety
QTRA No 2650
NPWS Wildlife license and Wires volunteer
CASA RPAS Pilot and Operator

FACTS & KEY TO ANALYSING PICUS REPORTS

The following points will assist you with visual interpretation of the test results against the subject tree.

- Sensor one is usually located to the northern side of the tree.
- The test height is always measured at sensor one.
- The red line in the photograph of the tree demonstrates the approximate height in which the test was conducted.
- In some test results other measurements may be mentioned. These will be explained within the text of the report.
- In most cases the active fungus and decayed wood (blue, pink and white areas in the test results) will not be visible to human eye within the cross section (at the test location) of the tree. This may alter dependent on the species of fungus.
- In most cases the altering wood (wood being chemically and structurally changed by the fungus - green area) will not be visible to human eye within the cross section (at the test location) of the tree. This may alter dependent on the species of fungus.
- The **PICUS Sonic Tomograph (Series 3)** is very accurate with the colour coding produced. At times, the image produced may vary to what will be visually observed in the cross section of the tree when the test area is exposed. It is important that only trained professionals make comments and recommendations regarding any test results.
- Every endeavour is made to identify the species of active fungi present in the test results. However, without scientific laboratory tests accurate visual identification is not always possible.
- If used GNSS Co-ordinates are recorded in Map Grid of Australia Zone 56.
- Australian Tree Consultants have attended the Master Picus Accreditation. ATC has completed over 5000 Picus tests and has been using the Picus Sonic Tomograph since 2005.

DIAGNOSTIC ICONS

Diagnostic icons may be used within the Picus tomogram.

Open Cavity

Foreign material (steel concrete etc)

Crack

Decay

Co-dominant stem

Bracket fungus

Bark inclusion

Moisture emerging (water sap etc)

Bark abnormalities

Mechanical damage

Callus strong growing wood

Tension load

Damaged root

Compression load

North Direction

Prevailing wind direction

INTRODUCTION / METHODOLOGY:

Australian Tree Consultants Pty Ltd has been commissioned to undertake Picus Sonic Tomograph testing on a *Eucalyptus robusta* (Swamp Mahogany) tree which is in the rear yard of No 25 Lakeside Cres North Manly, NSW.

Australian Tree Consultants Pty Ltd undertook the site inspection and Picus test on 10th November 2017. A Visual Structural Tree Assessment (VSTA) was undertaken on the *Eucalyptus robusta* to determine the most probable area of concern. The Picus test on this tree was undertaken at 2 metres above ground level at the site of the two (2) *Phellinus spp.* bracket fungal fruiting bodies within the trunk wound site.

Photo 1. Trunk wound with two (2) *Phellinus spp.* bracket fungi fruits.

Tree Risk Assessment – Decay in trees

Previously, many tree technicians when determining the point of failure of trees with decay / cavities have relied on research conducted by Mattheck and Breloer (1994). They applied a t/R ratio (t radial thickness of sound wood to R the radius of the stem) to determine a threshold point of failure. They found that trees usually failed when the ratio fell below that threshold (t/R<0.3), but rarely failed when the t/R was greater than 30% (t/R>0.3).

However, numerous limitations with the one-third rule have been identified (Bond 2006 Gruber 2007 and Schwarze 2008) such as the need to include an evaluation of other factors that contribute to failure e.g. wind load, exposure, crown architecture, decay type, species, maturity etc. The following important implications for the t/R requirement can be made:

- Gruber (2007) concludes that the 'one-third' rule is neither scientifically valid nor practicable and therefore should not be used for tree hazard assessment.

- A low t/R ratio does not necessarily imply high risk. Some trees can tolerate extremely large amounts of internal decay without necessarily incurring adverse effects on their stability.

By combining our diagnostic techniques (Picus Sonic Tomograph), Visual Structural Tree Assessment, sounding out the tree, the location of the decay – cavity and our arboricultural knowledge we are then able to make recommendations for either the retention of the tree or remedial works that may include the removal of part or the whole removal of the tree.

ATC is one of the first companies in Australia to use the new **Picus Sonic Tomograph Series 3** unit to investigate cross sectional tomograph of the extent of decay in the tree by using sonic waves. The instrument measures the time of flight of the sonic signals that have been generated by an electronic hammer. By using accurate tree geometry information the software calculates the apparent sonic velocities and draws a "velocity" or "E-module" map of the tree. The velocity of sound in wood depends on the modulus of elasticity (MOE) and the density of the wood itself and therefore indicating the general condition of the tree (health and structure). Full resolution tomograms can be recorded with as few as 12 sonic sensors and up to 60 sonic sensors.

The Picus Sonic Tomograph detects differences in the ability of the wood to transmit sound waves. Although it can accurately identify the amount of damage in the tree at the testing location, it cannot specifically determine if the reason is due to decay, hollowness, cracks etc. If the tree is felled it is highly likely that the image and the cross section will not look exactly the same.

Inspection carried out by	**Hugh Taylor** Master Picus Accredited, Dip Arboriculture Level 5
Test Height	**2 metres above ground level at sensor one**
Tree Circumference	**3800 mm at test height**
Botanical Name	***Eucalyptus robusta***
Common Name	**Swamp Mahogany**
Tree Location	**25 Lakeside Cres North Manly**
GNSS Location	**33.783460°South - 151.276947°East**

The Picus© Sonic Tomograph (Series 3) test shows (lower right insert) that this *Eucalyptus robusta* tree has extensive active fungus, decay and altering wood within the test location.

The test results indicate 59% of the test area is sound wood (brown areas), 15% consists of altering wood i.e. wood being altered by the fungus (green area) and 26% active fungus and decay (pink and blue areas).

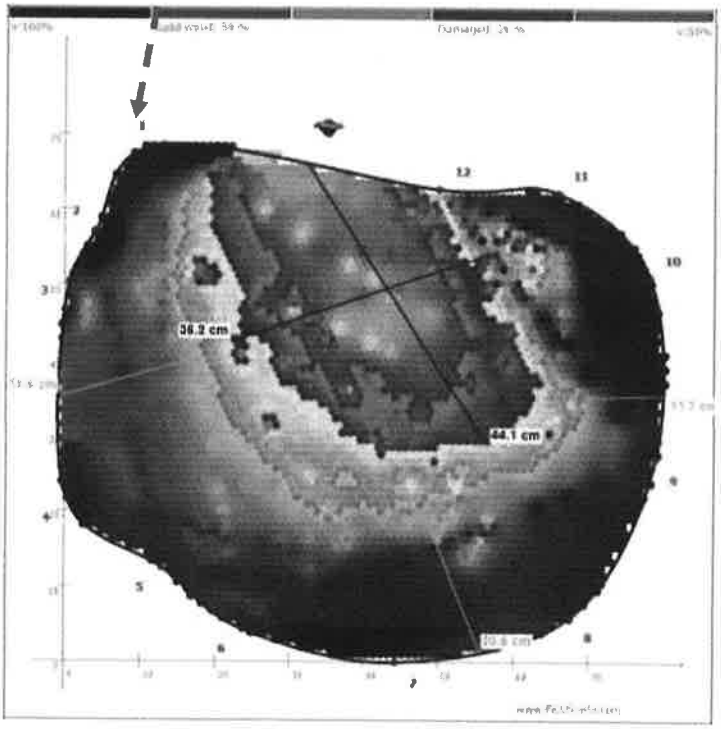
The fungal activity and decay appears to have initially entered the trunk through past lower trunk damage. The active fungal pathogen (*Phellinus spp*), decay and altering wood have breached the outer trunk on the northern side of the tree between sensors 12 – 1. The active fungus is spreading towards the south-eastern side of the tree towards sensors 8 – 9.

The active fungal pathogen is progressing through the remaining sound wood at a moderate rate, as shown by the amount of altering wood, (green colouration).

The fungal activity measured 44.1 cm in a north-south direction and 36.2 cm in an east-west direction.

New incremental wood growth was recorded at sensors 1 – 2, 4 and in a thin band between sensors 6 – 11.

Sound wood that has not been compromised by the active fungus measured 19.6 cm the western side, 20.6cm on the southern side between sensors 7 – 8 and on the eastern side between sensors 9 – 10 sound wood remaining was 11.7cm.



CONCLUSIONS:

The Picus test was undertaken at 2 metres above ground level at the location of lower trunk wounding which has two (2) *Phellinus spp.* bracket fungal fruiting bodies. The Picus Tomograph test showed that there is a moderate amount of altering wood 15% surrounding an extensive amount of fungal activity and decay 26% with 59% of sound wood remaining at the site of the test location.

The active fungal pathogen is progressing through the sound wood at a moderate rate, as shown by the amount of altering wood (green colouration), and has breached the outer trunk between sensors 12 – 1 and is spreading towards the south-eastern side of the tree towards sensors 8 - 9.

New incremental wood growth was recorded between sensors 1 – 2 and at sensor 4. A thin band was also recorded between sensors 6 – 11.

At the time of testing the Picus test results show that the structural integrity of the lower trunk has been compromised by the active fungal pathogen. *Eucalyptus robusta* trees are susceptible to *Phellinus spp.* bracket fungi and do not compartmentalise the active fungus as well as other Eucalyptus trees.

RECOMMENDATIONS:

- Based on the results of the Picus test combined with Visual Tree Assessment as well as a WHS/OH&S assessment and usage of the site at the time of testing the tree was considered to be structurally compromised at the test location and should be removed.

- The management of the tree should be based on this Picus report as well as any other recent and, or, current Arboricultural reports or Visual Tree Assessments.

Note: Only trained Picus professionals should make comments and recommendations regarding any testing results such as analyzing testing results against cross sections of felled trees. The Picus Sonic Tomograph detects differences in the ability of the wood to transmit sound waves. Although it can accurately identify the amount of damage in the tree at the testing location, it cannot specifically determine if the reason is due to decay, hollowness, cracks etc. If the tree is felled it is highly likely that the image and the cross section will not look exactly the same. Also, in most cases the altering wood (wood being chemically and structurally changed by the fungus - green area) will not be visible to human eye within the cross section (at the test location) of the tree. This may alter dependent on the species of fungus.

If you require any further information in relation to this report, please contact us on 1300 737 674 or 0418 474796.

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Bond J, 2006. Foundations of tree risk analysis: use of the t/R ratio to evaluate trunk failure potential. Arborist News 15, 31-34.

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Mattheck C, Breloer H, (1994) The Body Language of Trees: A Handbook for Failure Analysis, (Research for Amenity Trees 4). HMSO London

Schwarze FWMR, (2008) Diagnosis and Prognosis of the Development of Wood Decay in Urban Trees. Enspec Melbourne.

LIMITATION OF LIABILITY

Australian Tree Consultants Pty Ltd and their employees are tree specialists who use their qualifications, education, knowledge, training, diagnostic tools and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of this assessment and report.

Australian Tree Consultants Pty Ltd and its employees cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that sometimes fail in ways the arboriculture industry does not fully understand. Conditions are often hidden within trees and below ground. Unless otherwise stated, observations have been visually assessed from ground level. Australian Tree Consultants Pty Ltd cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments cannot be guaranteed.

Treatment, pruning and removal of trees may involve considerations beyond the scope of Australian Tree Consultants Pty Ltd services, such as property boundaries and ownership, disputes between neighbours, sight lines, landlord-tenant matters, and related incidents. Australian Tree Consultants Pty Ltd cannot take such issues into account unless complete and accurate information is given prior or at the time of the site inspection. Likewise Australian Tree Consultants Pty Ltd cannot accept responsibility for the authorisation or non-authorisation of any recommended treatment or remedial measures undertaken.

In the event that Australian Tree Consultants Pty Ltd recommends retesting or inspection of trees at stated intervals or installs any cable/s, bracing systems and support systems, Australian Tree Consultants Pty Ltd must inspect the system installed at intervals not greater than 12 months unless otherwise specified in written reports. It is the client's responsibility to make arrangements with Australian Tree Consultants Pty Ltd to conduct the re- inspection.

Trees can be managed, but they cannot be controlled. To live or work near a tree involves a degree of risk. The only way to eliminate all risks associated with a tree is to eliminate the tree.

All written reports must be read in their entirety, at no time shall part of the written assessment be referred to unless taken in full context of the whole written report.

If this written report is to be used in a court of law or any legal situation Australian Tree Consultants Pty Ltd must be advised in writing prior to the written assessment being presented in any form to any other party.