

The latest research and development confirms the accuracy and use of TreeRadar GPR and the value of this equipment for trenchless subsurface investigations. Use includes root positioning, root morphology, root-zone growing conditions and subsurface artefacts including services and foundations etc.

### **TreeRadar root detection accuracy:**

The ISA Journal (July 2011) reported<sup>1</sup> on the research carried out at Cornell University, U.S.A. This confirmed TreeRadar GPR provides a high degree of accuracy in locating roots and root morphology mapping.

Similar research was carried out by the Institute of Forest Ecology, Brno, Czech Republic as reported in Tree Physiology (19, 125--130 1999)<sup>2</sup>. Using alternative GPR equipment, this research also confirmed GPR root location accuracy.



PBA Consulting have conducted trials and investigations in the UK to provide support for further research by TreeRadar Inc. USA.

The conclusion is that accuracy is around 85-90% with an over-score i.e. more roots being “hit” rather than under-score. Over-score is where “TreeRadar” locates clusters of roots - where these root clusters have roots with individual diameters of less than 10 mm and the spatial separation between the roots is less than 5 mm, such groupings are normally recorded as a single root “hit”.

It should also be noted that dead roots (over twelve months old) with lower moisture content and structure do not provide suitable reflective qualities and are not located.

### **TreeRadar: Trenchless subsurface investigations**

TreeRadar is only the credible no-invasive, no mess alternative to physical trenching for the exploration of root systems. TreeRadar does not cause damage to roots! Air excavations techniques will damage small roots and can easily strip off root cortex (outer layer); the noise and mess air-spade makes is unquestionable!

TreeRadar provides accurate substantive information as to the extent of tree root zones in support of BS5837 Arboricultural Impact Assessments and surveys.

<sup>1</sup>[www.pba-consulting.co.uk/pdfs/ISA-Paper-GPR%20Accurately%20Locates%20Tree%20Roots.pdf](http://www.pba-consulting.co.uk/pdfs/ISA-Paper-GPR%20Accurately%20Locates%20Tree%20Roots.pdf)

<sup>2</sup> <http://treephys.oxfordjournals.org/content/19/2/125.full.pdf+html>

### **TreeRadar: BS5837 Arboricultural Impact Assessments**

TreeRadar provides accurate substantive information as to the extent of tree root zones in support of BS5837 Arboricultural Impact Assessments and surveys; this includes:

- Predicted root morphology (location and position of roots) – all validation data regarding protected root zones.
- Subsurface environment - buried artefacts, services, previous excavations, soil cultivations etc. and other root-zone conditions including locating voids attributable to badger activities.



### **Size of Roots detected**

Uniquely, and with the use of alternative antennae PBA Consulting can accurately size roots:-

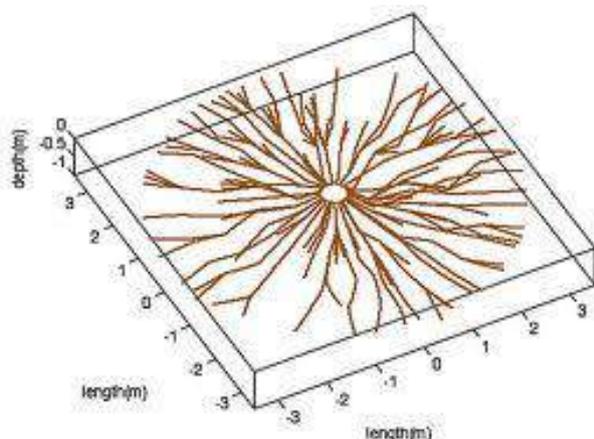
Roots @ 10mm diameter and above and;

Roots @ 20mm diameter and above .

During the analysis process arbitrary guidance can be given as to the likely root size i.e. large/extremely large based on site knowledge, distance from the tree and the magnitude of reflective properties.

### **Results: TreeRadar Trenchless investigations:**

With over a decade of use, PBA Consulting have demonstrated the reliability and accuracy of TreeRadar. It is now regularly used as part of planning submissions associated with working in protected root-zone areas.



On challenging development sites Local Planning Authorities are requesting/approving the use of TreeRadar GPR for subsurface investigations.

With the supportive evidence provided by TreeRadar GPR clients have obtained Planning Authority approvals for working in protected roots zones areas.

### **TreeRadar GPR use: the outcome**

With the supportive evidence provided by TreeRadar GPR, clients have obtained Planning Authority approvals for working in the protected roots zones, enabling:

- The installation of strip and pile foundations.
- Building of basement structures
- Installation of suspended road surface across protected root-zones for access to development sites.
- The removal/replacement of poor quality protected trees with insignificant root structure growing in adverse root zone conditions (rubble/concrete fill);
- Building works (extension) in protected root zone areas.

### **TreeRadar: Projects Overview**

Through the use of TreeRadar - the following projects were achievable:

- Morrison's supermarkets are now able to improve the visibility of and access to their proposed store on Coventry Road, Birmingham (Birmingham City council)
- Home owners have been able to extend home adjacent to trees, (Birmingham City council, Merton LB, Sevenoaks DC)
- Extension to the Lidl Supermarket in Stourbridge (Stourbridge District Council)
- Cala homes housing re suspended road surface across root-zones for access to development sites. (Wokingham DC)
- Building of Sportshall Queen Alexandra College, Harborne (Birmingham City Council)

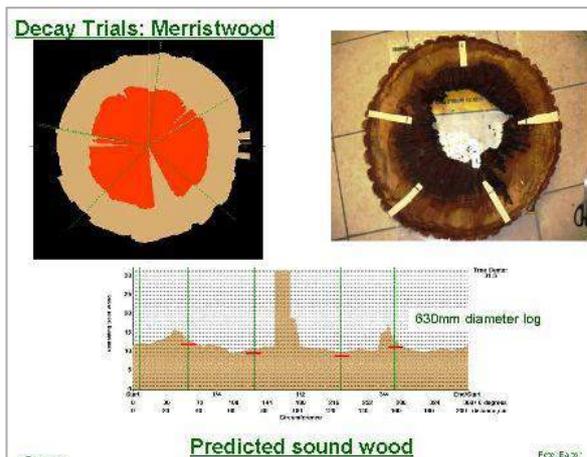


**TreeRadar provides credible supporting evidence for Arboricultural investigations and assessments.**

### TreeRadar: non-invasive decay-detection

TreeRadar provides a rapid and therefore cost effective non-invasive decay detection technology for both the main bole of trees and due to the equipments mobility, scaffold and crown branches.

TreeRadar It is currently the only non-invasive decay detection equipment to provide sound wood predictions.



With regards to accuracy, PBA Consulting regularly carry out trials; where possible substantiating the results with Resistograph use or analysing the cross sections when trees are felled.

Similar trials and research has been carried out in the US – a high degree of accuracy is assured.

### TreeRadar-decay-detector outputs

TreeRadar decay detection has been used by Hampshire Schools, Waverly Borough Council and the Greater London Authority on a number of large 200/100 year old Oak, Plane and Lime trees. Many of these trees had cavities high in the crowns.

TreeRadar provides cost effective, totally non-invasive decay investigations in tree crowns and scaffold branches. Tree-climbers operated the antennae within the crowns with PBA staff controlling the field computer from ground level.

On analysing the data, substantiated report/risk assessments with sound wood predictions. These gave reassurance as to the condition and integrity of these trees, retaining many trees within public areas/highway situations.

**TreeRadar provides credible supporting evidence for Arboricultural investigations, VTA/hazard tree surveys and reports.**