TRA Consulting

Root Investigation by TreeRadar

Tree Radar

SITE

The Tree House

37 Camden Mews

London

NW1 9BY

CLIENT

Mr W. Samuel

Ian Lee
MICFor MArborA BSC (Hons) Tech Cert (Arbor A)
Chartered Arboricultural Consultant

DATE: 20.10.2023

OUR REF: TRA 0349

CONTACT DETAILS: 01622 435929
Ian@TRAconsulting.co.uk

EXECUTIVE SUMMARY

This report provides information on the root spread of a single tree of Heaven growing within a courtyard area at The Tree House, 37 Camden Mews, London, NW1 9BY.

The scan lines do not cover the full theoretical root protection area (RPA) of the subject tree due to the physical restriction of the existing building but focuses on the exposed courtyard area where it may be necessary to install engineered supports for the tree.

The results show that the tree has a lower root density within sections of the courtyard than would typically be expected of a tree of this size, species, age and proximity. This may be due to mechanical severance of roots during historic building works, areas of reduced moisture or other underground obstructions. Areas of lower density give potential sites for localised excavation should new supports need to be installed.

The final design and layout of any proposed works, along with the depth and locations of any excavations and the working methodology are outside the remit of this report, however, arboricultural advice and the use of the results of this survey may aid in the design of a scheme that will allow the retention of the tree where possible.

Contents

1. INTRODUCTION: -

1.1. This report provides information on the root spread of a single tree of Heaven growing within a courtyard area at The Tree House, 37 Camden Mews, London, NW1 9BY.

1.2. The survey was carried out on 18th October 2023 using TreeRadar, which identifies locations of roots with a diameter greater than 20mm along the scan lines. The scan line results show their depth and location. Determination of root diameter is difficult (other than it being above 20mm), but new software will be released shortly which will provide this detail. This report provides technical details of root locations, and the use of this in developing any designs and assessing the arboricultural impact will be carried out by the project arboricultural consultant and the wider design team.

2. CURRENT SITE DESCRIPTION: -

2.1 The site of the survey is a roughly square shaped internal courtyard area within 37 Camden Mews, London, NW1 9BY. The courtyard contains a single large tree of Heaven, which has formed a key feature of the property. Sections of the building extend over the courtyard, with a staircase to the roof deck climbing up through the branches of the tree. The floor of the courtyard is partially covered with raised tiled walkways, with smaller areas of stone and pebbles in between the walkways.

2.2 A tree survey was carried out by Sylvan Resources Limited as part of their ongoing arboricultural consultancy work for the site. Details of the trees have been covered within their report and the information will not be repeated within this report, as it is outside the remit of the TreeRadar survey.

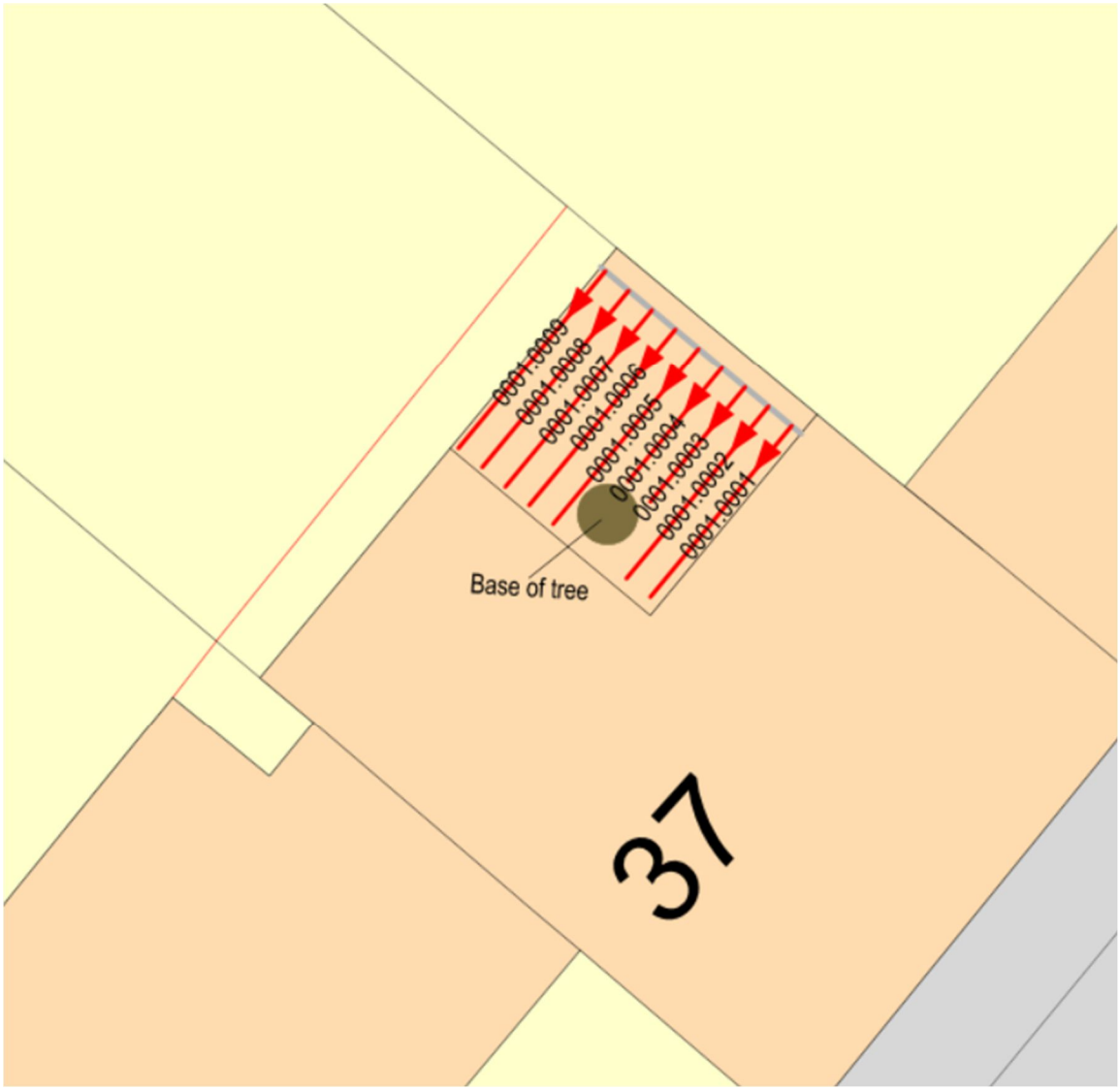
3. METHODOLOGY:-

3.1 This report identifies locations of roots with a diameter greater than 20mm along scan lines. The TreeRadar unit is a scanning cart with a 400MHz antenna which sends a beam every 1cm down to a depth prescribed by the operator (usually between 2 - 3m, which is the maximum depth). The reflection is recorded in a field computer and then analysed by the latest software, TBA. Water and metal reflect, therefore the machine records live roots which contain moisture, and cannot detected dead dried out roots. For each scan line a 'virtual trench' is produced which shows all roots with a diameter greater than 20mm. The machine cannot determine root diameter, other than it being greater than 20mm, due to the lack of correlation between the amounts of live root tissue in a root compared to the thickness of a root. For example, a large root may have a partially desiccated or dysfunctional central core with low moisture content and so give a relatively weak radar return, while a smaller root may be filled with water molecules and give a much stronger return. An anticipated update of the software is expected to begin to address this issue.

Photo of the TreeRadar cart (in a different setting)

3.2 Scanning conditions were relatively straight forward, though the site contains a very large number of metals and non-root reflectors, which were filtered out of the data as far as was reasonably practical. This may slightly affect the accuracy of the results, but we are experienced at looking at data in these situations. The scan lines do not cover the full root protection area (RPA) of the subject tree due to the physical restriction of the existing building but focuses on the exposed courtyard area where it may be necessary to install engineered supports for the tree.

3.3 The locations of the scan lines are found at Appendix 1 on the TreeRadar plan (reference *TRA 0349TR,* extract below), and the results super-imposed on the TreeRadar Results Plan (*TRA 0349TRR).* Top-down views for the roots at various depths, along with the cross sections for each scan line are found at section 8. Details of how to read the results are found at section 7.

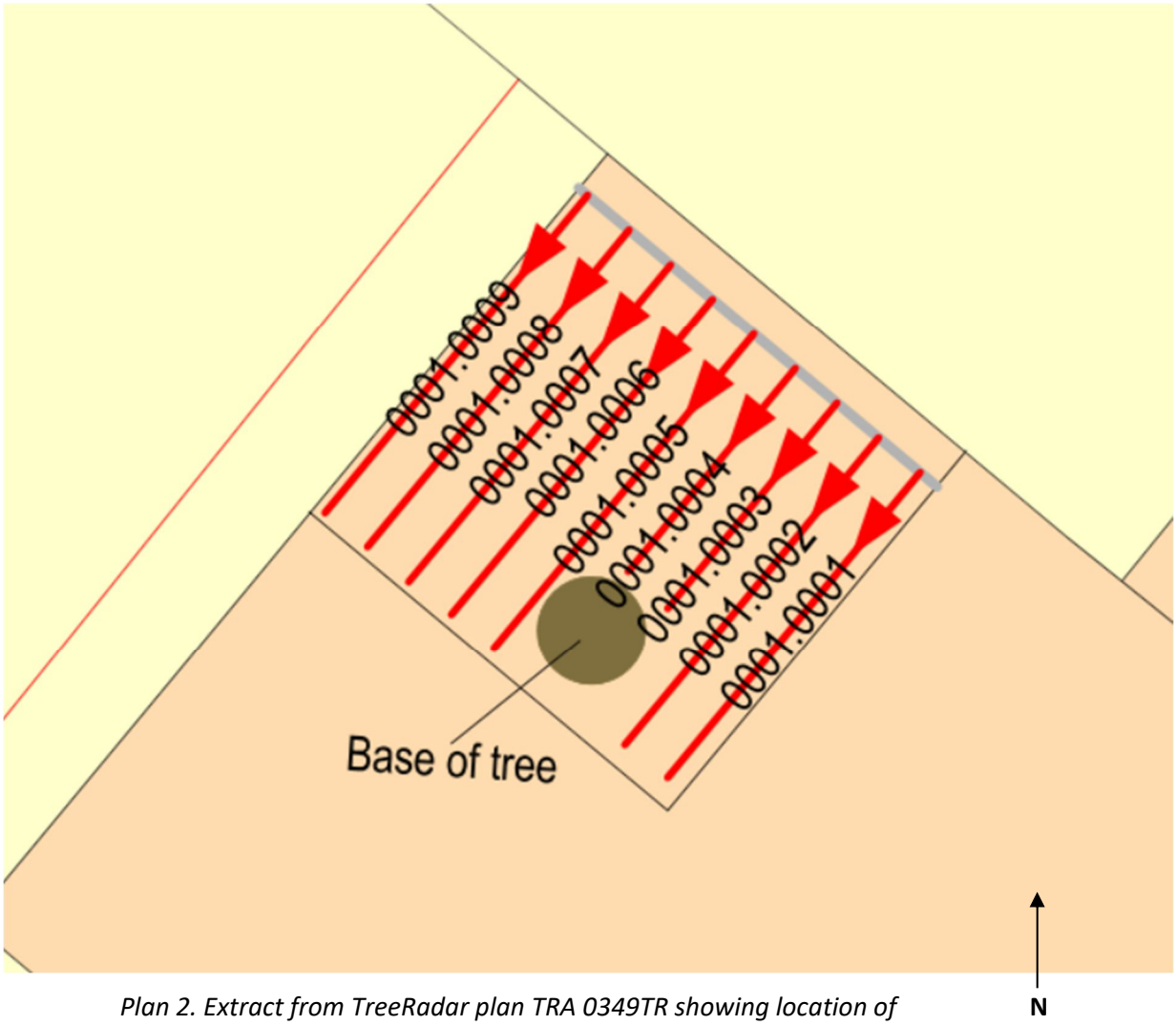


Plan 1 – extract from TRA 0349TR showing the survey area. Do not scale.

Red lines are the scan lines. North is vertical.

4. RESULTS:-

4.1. **Scan lines 0001.0001-0009** – Scan lines 0001.0001-0009 are a series of parallel lines running approximately north east to south west within the courtyard. The scan lines start 0.4m from the north eastern wall (due to the size of the radar antennae) and end 0.25m from the south western wall, however scan lines 0001.0003-0004 end early where they are obstructed by the trunk of the subject tree. Scan line 0001.0001 is located 0.2m from the south eastern wall and runs parallel to it, with each subsequent line located an additional 0.5m from the wall in turn. An extract from the TreeRadar plan *TRA 0349TR* below shows the locations of the scan lines.



Plan 2. Extract from TreeRadar plan TRA 0349TR showing location of scan lines 0001.0001-0009. Do not scale.

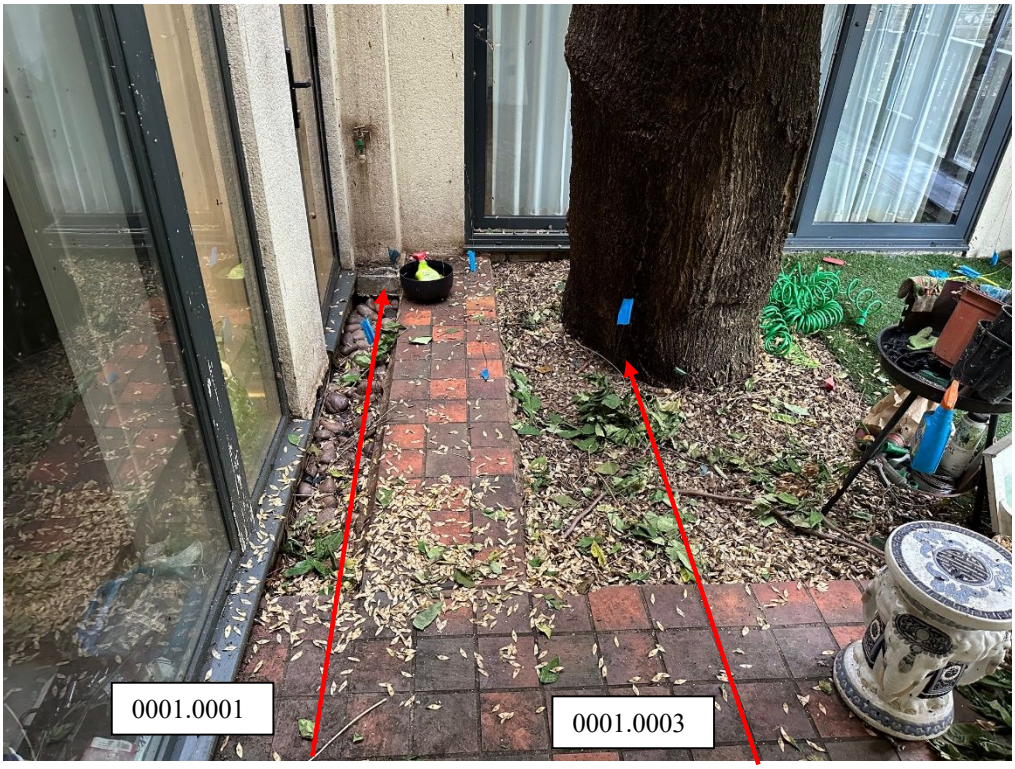


Photo 2. Survey area for 0001.0001-0003.

Photo 3. Survey equipment configured for restricted access, lined up along scan line 0001.0007.

Photo 4. Survey area for 0001.0004-0009. All obstructions other than the tree were removed for the scanning.

4.1.1. **Results:** Roots are initially found in moderate densities along lines 0001.0001-0002, rising to high density along lines 0001.0003-0007 and falling to moderate again along lines 0001.0008-0009. The densities along the lines do not give the full picture, with the densities unevenly distributed along the length of the scan lines, with higher densities seen in the middle of the courtyard and lower densities nearer to the edges. A particular area appearing devoid of roots is found adjacent to the external doors along lines 0001.0008-0009. The rooting density showing the areas of highest and lowest density is best described in the root density plan in section 8 of this report, with areas of high density shown in the hotter colours and lower density as the cooler colours.

4.1.2. The overall root density is slightly lower than would typically be expected of a tree of this size and species, with lowest densities seen adjacent to the building. This may be due to restricted rooting from foundations or due to lower moisture levels on the edges of the courtyard.

4.1.3. The majority of the root detections are found in an unevenly distributed band between 20-80cm deep beneath the open areas and between 30-100cm deep beneath the raised walkways. A large number of metals and non-root reflectors are found within the soils, typical of the urban environment and where the soils may have been dug up and repurposed multiple times over the years.

5. CONCLUSIONS:-

5.1. The TreeRadar unit picks up roots with a diameter greater than 20mm but does not detect smaller roots. However, where a large clump or mat of roots creates sufficient mass, this may be detected. The radar unit is also unable to determine which tree the roots are associated with, and it is the experience of the operator and arboricultural consultant to determine the most likely source.

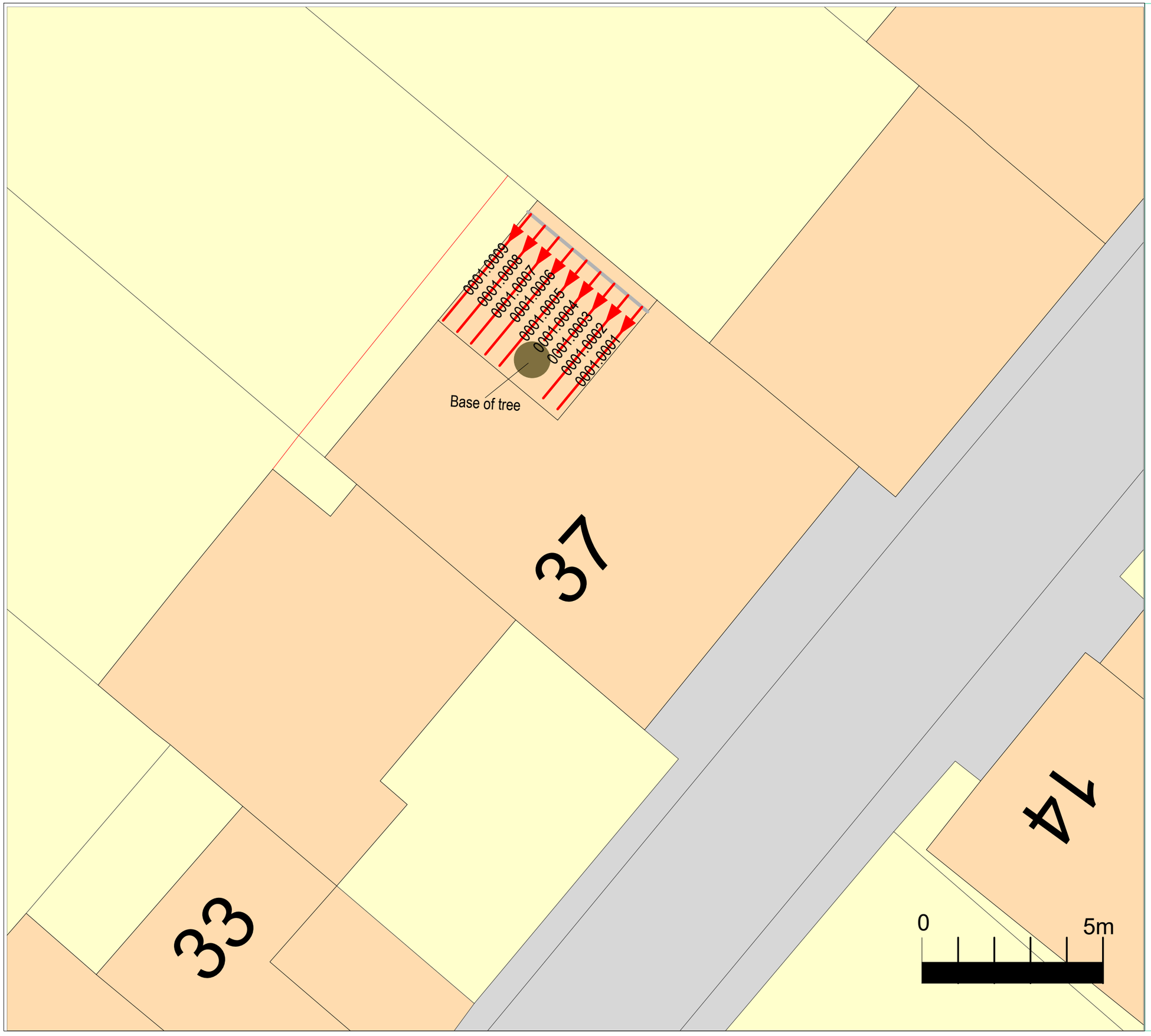
5.2. The scan lines do not cover the full RPA of the subject tree due to the physical restriction of the existing building but focuses on the exposed courtyard area where it may be necessary to install engineered supports for the tree.

5.3. Within the survey data a very large number of metals, services and non-root reflectors were found, with poorly defined soil horizons. This indicates that the soils have been significantly disturbed over time, typical of sites which may have been in use for a long period, dug up or levelled multiple times over the years. Non-root reflectors within the data can initially provide false positives within the results, which are identified and removed by the operator during the analysis process as far as possible. This can leave false positives within the data, but not false negatives. These false positives may consist of building materials such as clay bricks and clinker or clay nodules which are porous and retain water at higher densities than the surrounding soils. This retained water has the same radar signature as the water held within tree roots and so cannot all be disregarded.

5.4. The results show that the tree has a lower root density within sections of the courtyard than would typically be expected of a tree of this size, species, age and proximity. This may be due to mechanical severance of roots during historic building works, areas of reduced moisture or other underground obstructions. Areas of lower density give potential sites for localised excavation should new supports need to be installed.

5.5. The final design and layout of any proposed works, along with the depth and locations of any excavations and the working methodology are outside the remit of this report, however, arboricultural advice and the use of the results of this survey may aid in the design of a scheme that will allow the retention of the tree where possible.

6. APPENDIX 1 – TREE RADAR PLAN TRA 0349TR AND TREERADAR RESULTS PLAN TRA 0349TRR



0006.0001

Scan lines and direction

Start of scan lines

Please refer to full report for details

Notes

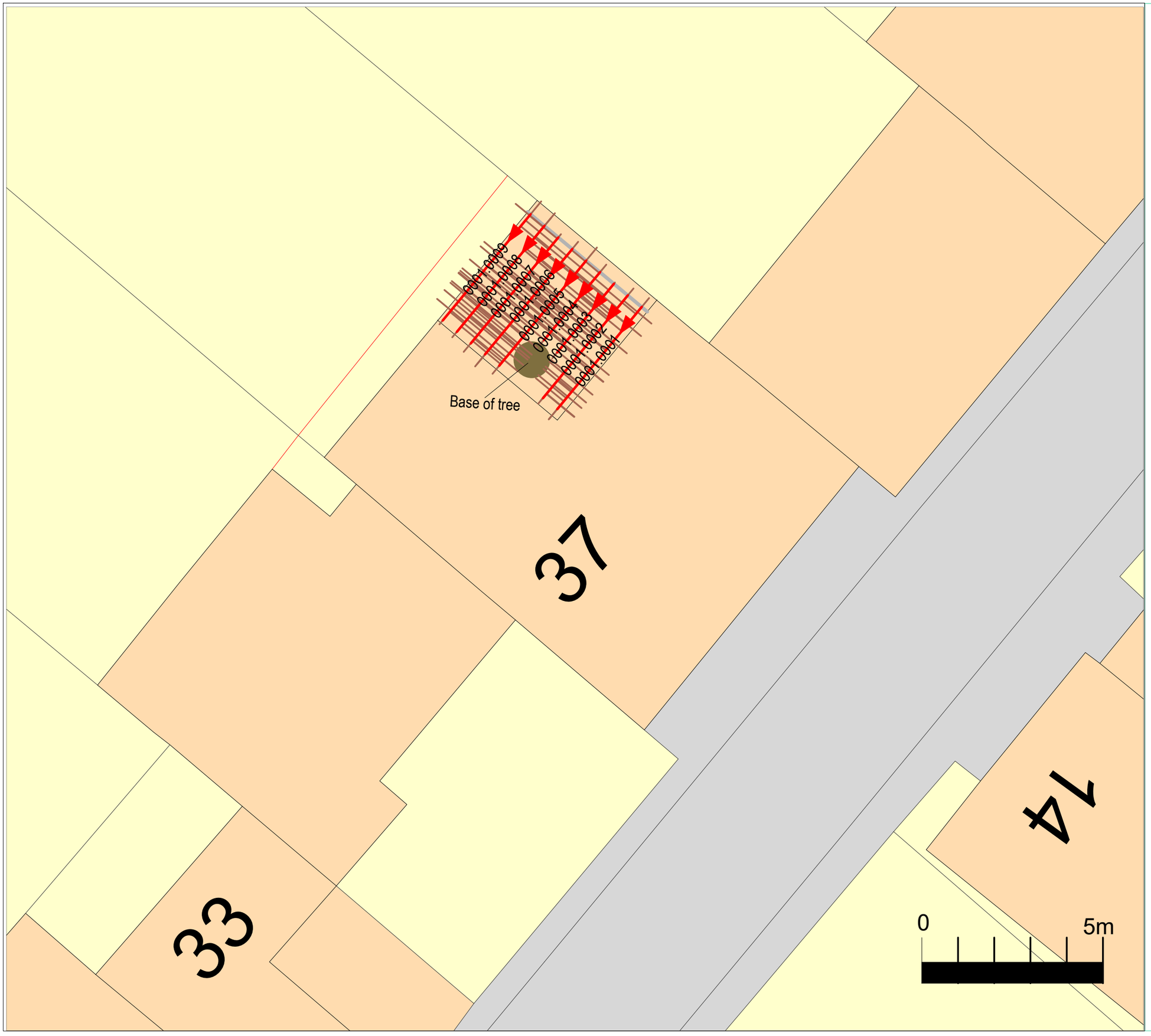
1. Contractors to check all dimensions on site
2. Discrepancies must be reported to the Arboricultural Consultant before proceeding
3. The original of this drawing was produced in colour, a monochrome copy should not be relied upon.
4. It is the responsibility of the contractor to ensure necessary consents for tree works are in place
5. This drawing is copyright © TRA Consulting

TRA Consulting
Office 01622 435929
www.treeradaruk.com

Client
Mr W. Samuel

Site Address
The Tree House, 37 Camden Mews, London, NW1 9BY

Drawing Title	Orientation	Drawn	Authorized
Tree Radar Plan		IL	KL
Date	**Drawing Number**	**Scale**	**Drawing Status**
19.10.2023	TRA0349 TR	1:100@A3	For Issue



0006.0001

Scan lines and direction

Start of scan lines

Detected roots with a diameter greater than 20mm

Please refer to full report for details

Notes

1. Contractors to check all dimensions on site
2. Discrepancies must be reported to the Arboricultural Consultant before proceeding
3. The original of this drawing was produced in colour, a monochrome copy should not be relied upon.
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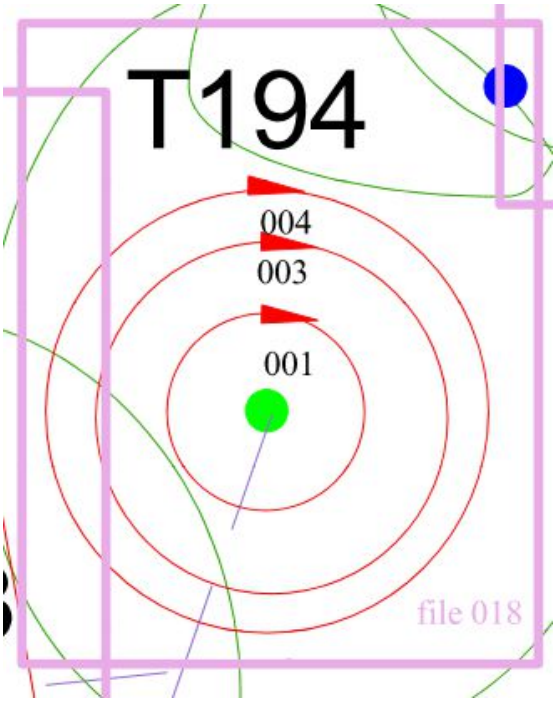
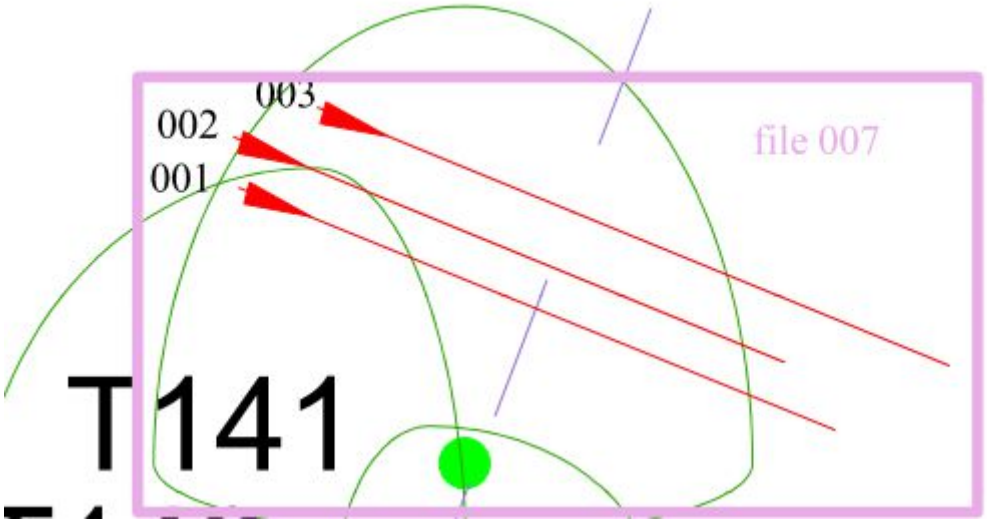
Drawing Title	Orientation	Drawn	Authorized
Tree Radar Results Plan		IL	KL
Date	**Drawing Number**	**Scale**	**Drawing Status**
19.10.2023	TRA0349 TRR	1:100@A3	For Issue

7. HOW TO READ THE SCAN LINES

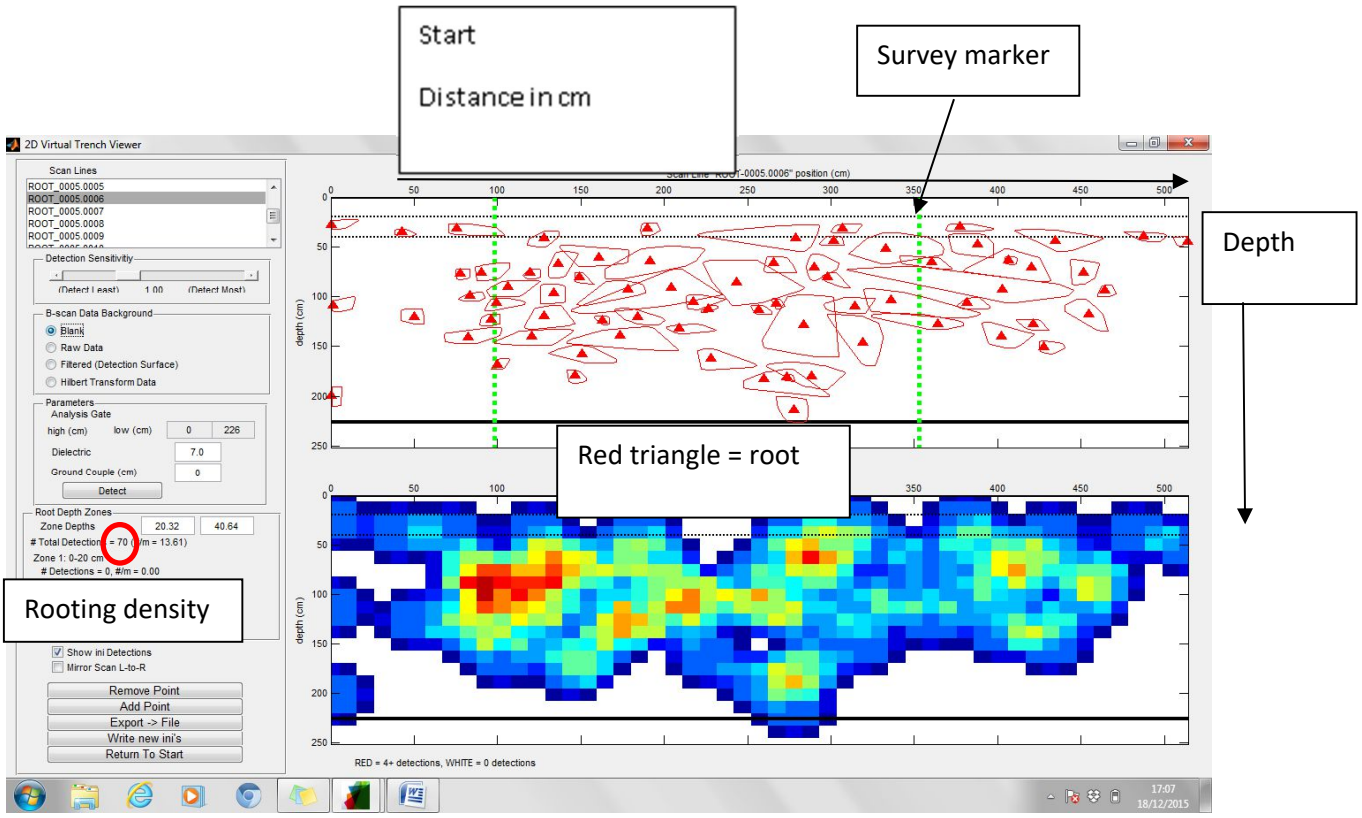
The results are shown as a top-down view (plan), and a cross section of each scan line. This is an extract of the plan, a scaled copy of which is found at appendix 1. The plan extracts in appendix 7 are not to scale. The locations of the scan lines are based on the plotting from the survey, and the length of the line on the plan by the exact length of the scan. Circular scans are clockwise, starting on the northern side of the tree and are at 1m intervals unless otherwise shown.

Scan lines are shown red, with the direction by red arrows. Each scan line has a scan number. An example from a different site is shown below.





The cross section of each scan line shows where the roots are in relation to depth and distance. The coloured splodges are root density (relative to the scan area). An example is shown below:

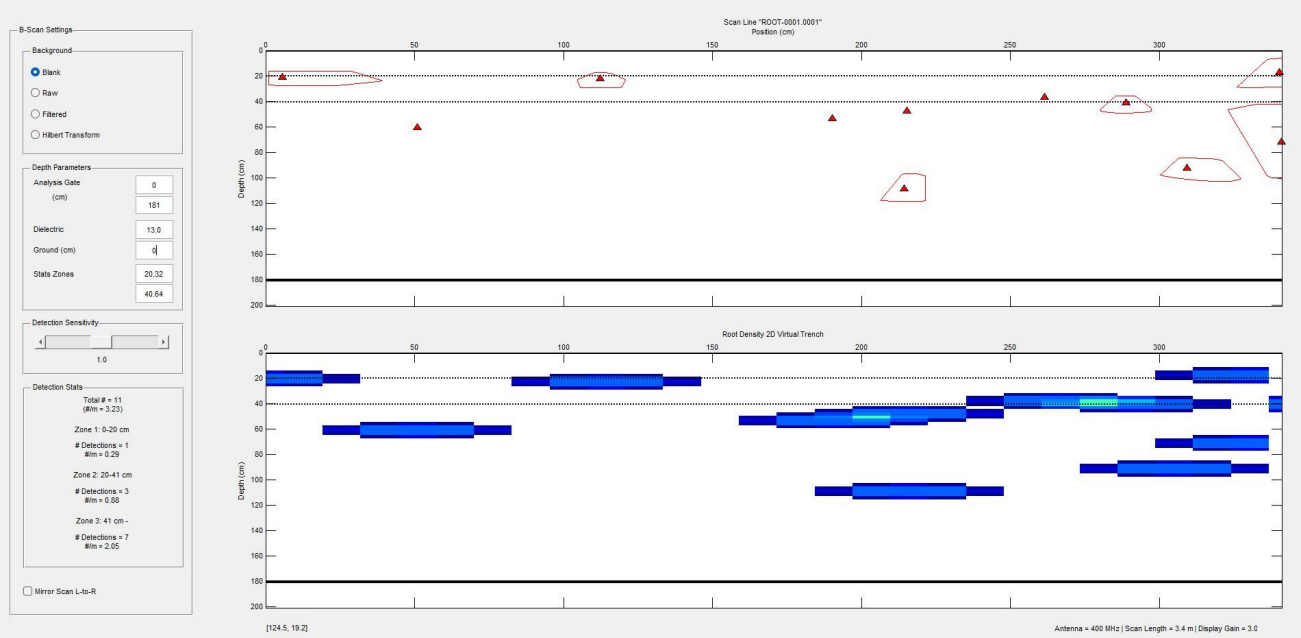


Polygons around the root detections are early attempts at root diameter, however, these are not particularly accurate currently as they can be influenced by the angle at which the scan crosses the root as well as smaller roots adjacent to the larger detection. Blue polygons are regions of very high mass detections such as very large roots or large regions of rooting activity.

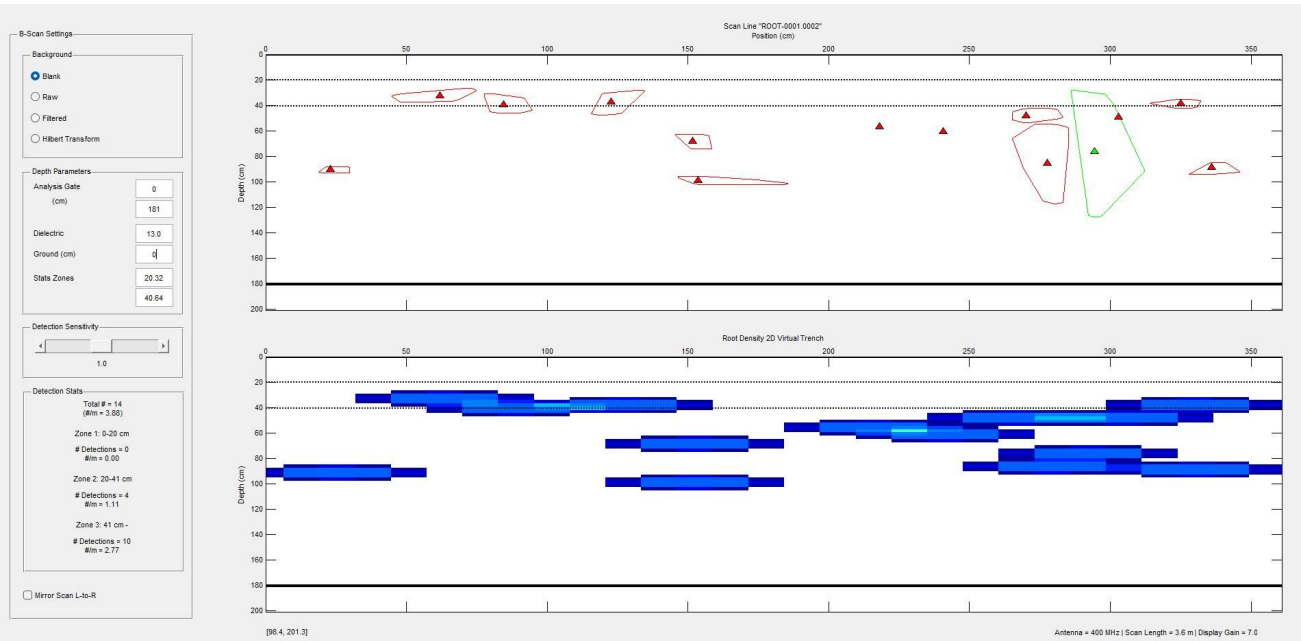
8. INDIVIDUAL SCAN LINE RESULTS

SCAN LINES 0001.0001-0009

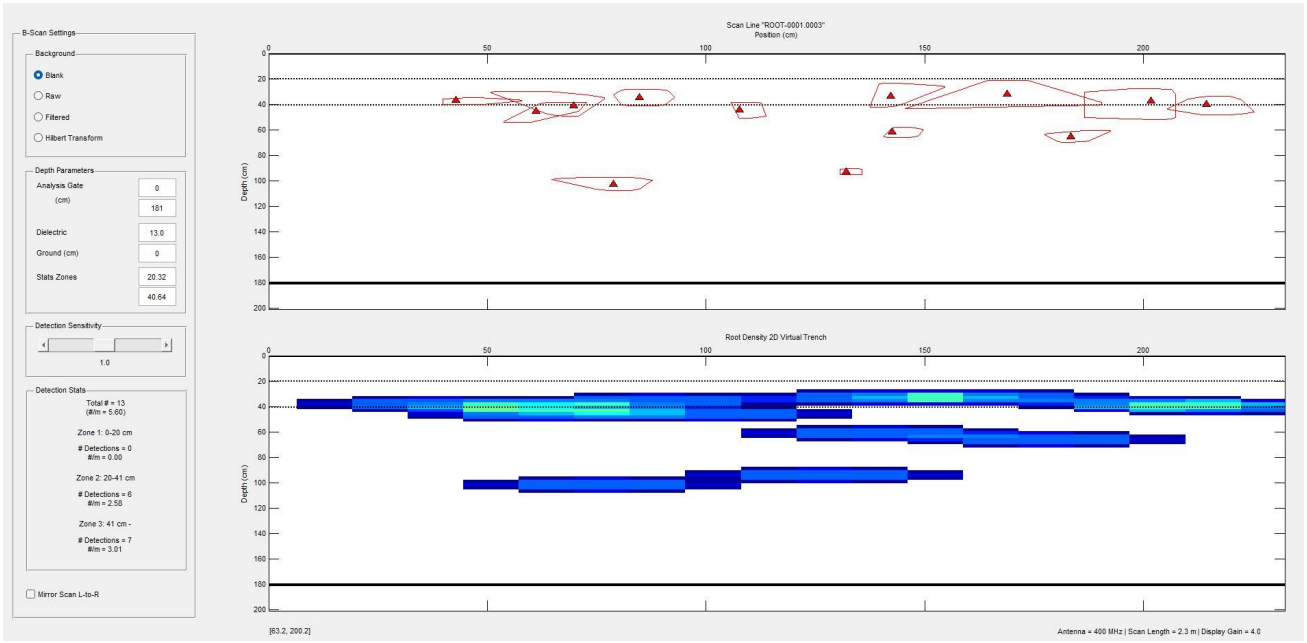
Scan line 0001.0001



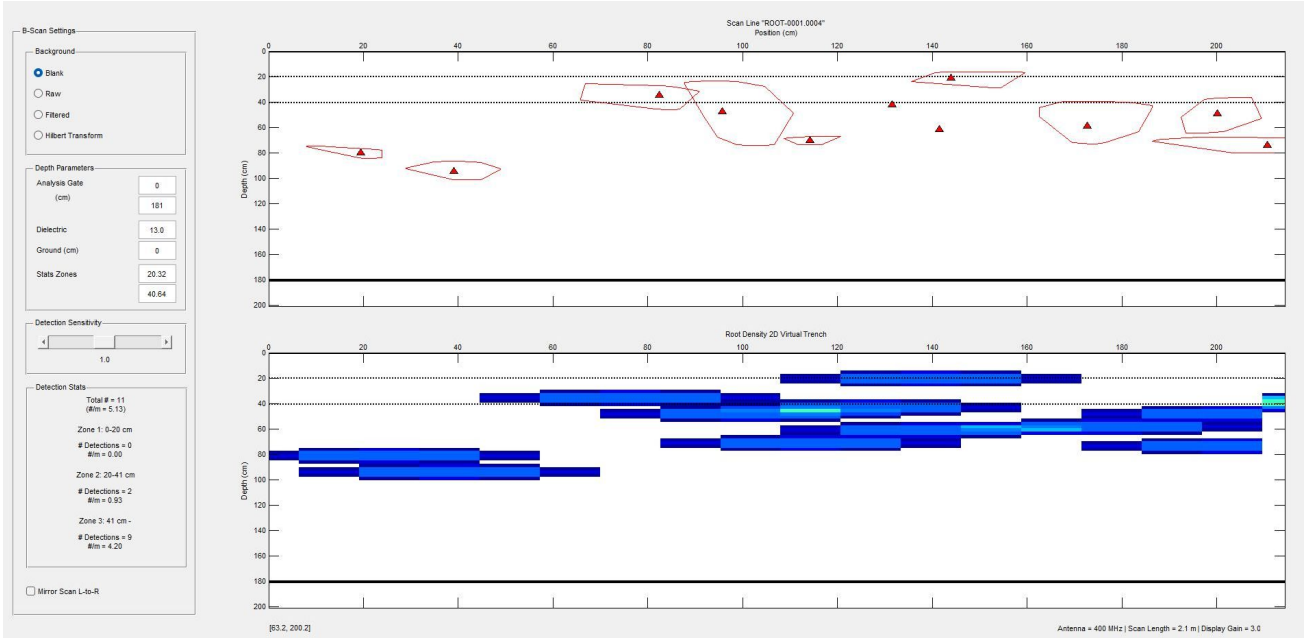
Scan line 0001.0002



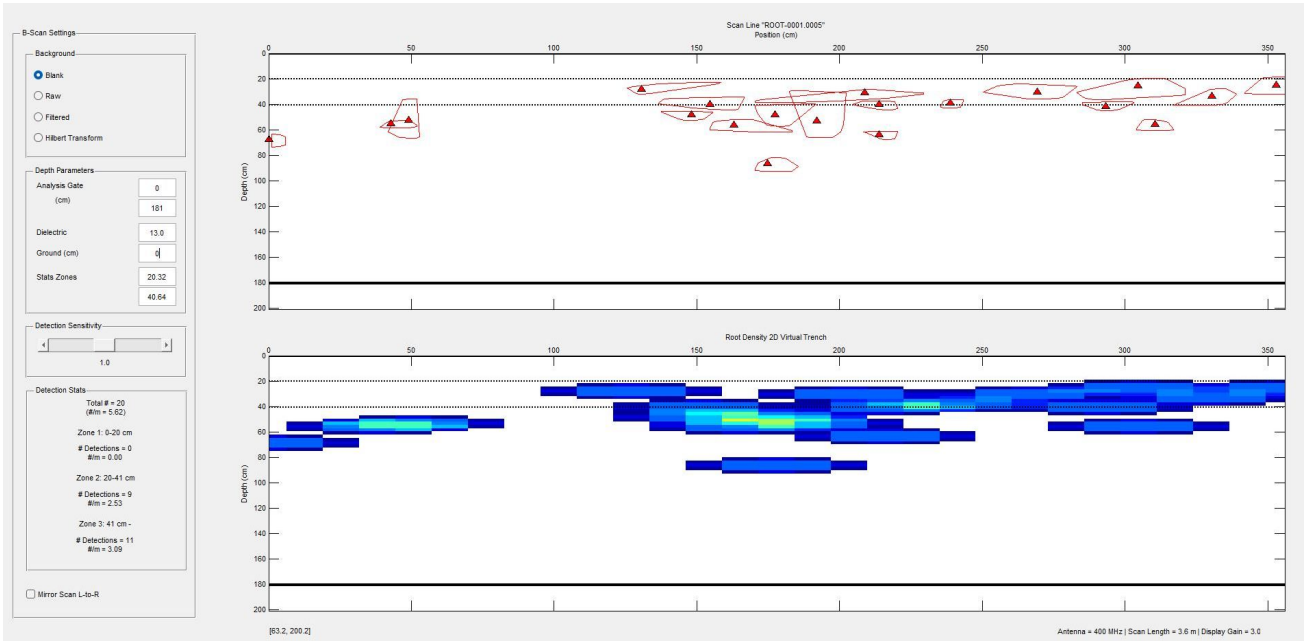
Scan line 0001.0003



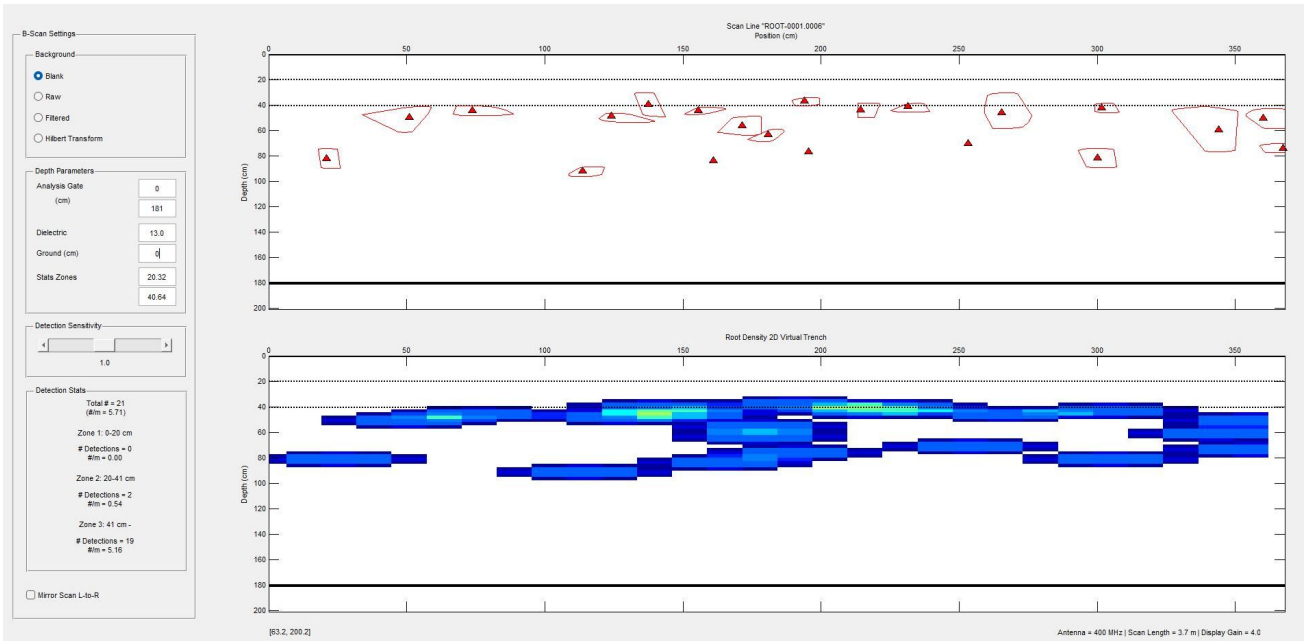
Scan line 0001.0004



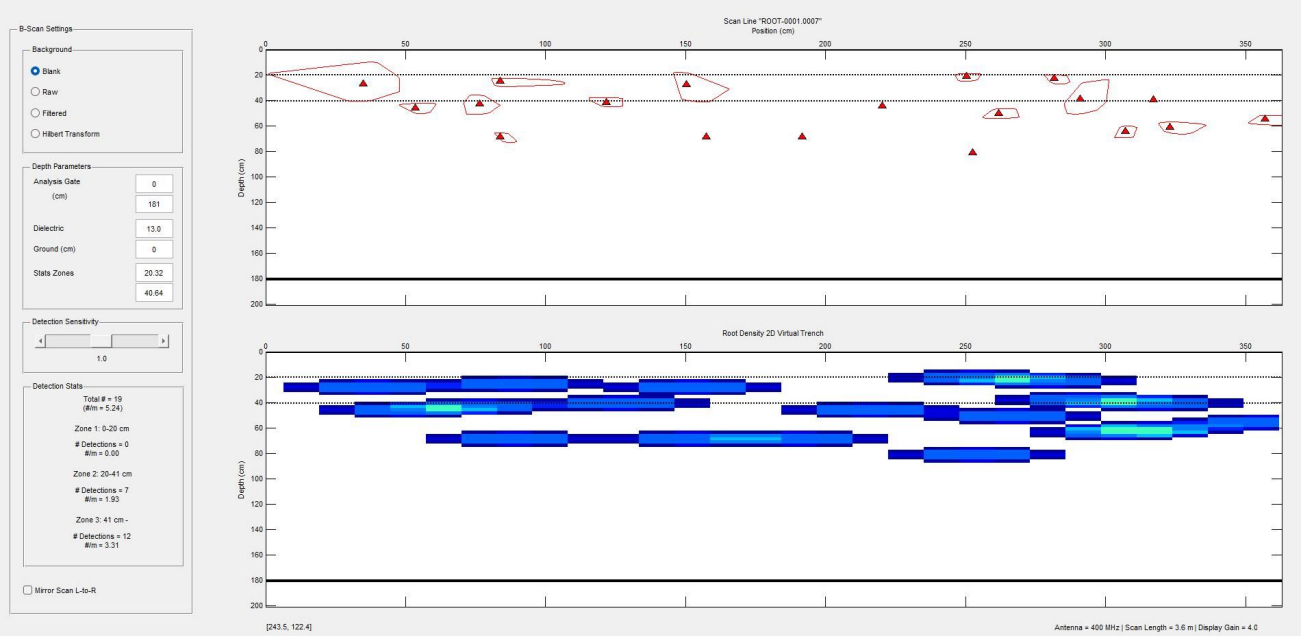
Scan line 0001.0005



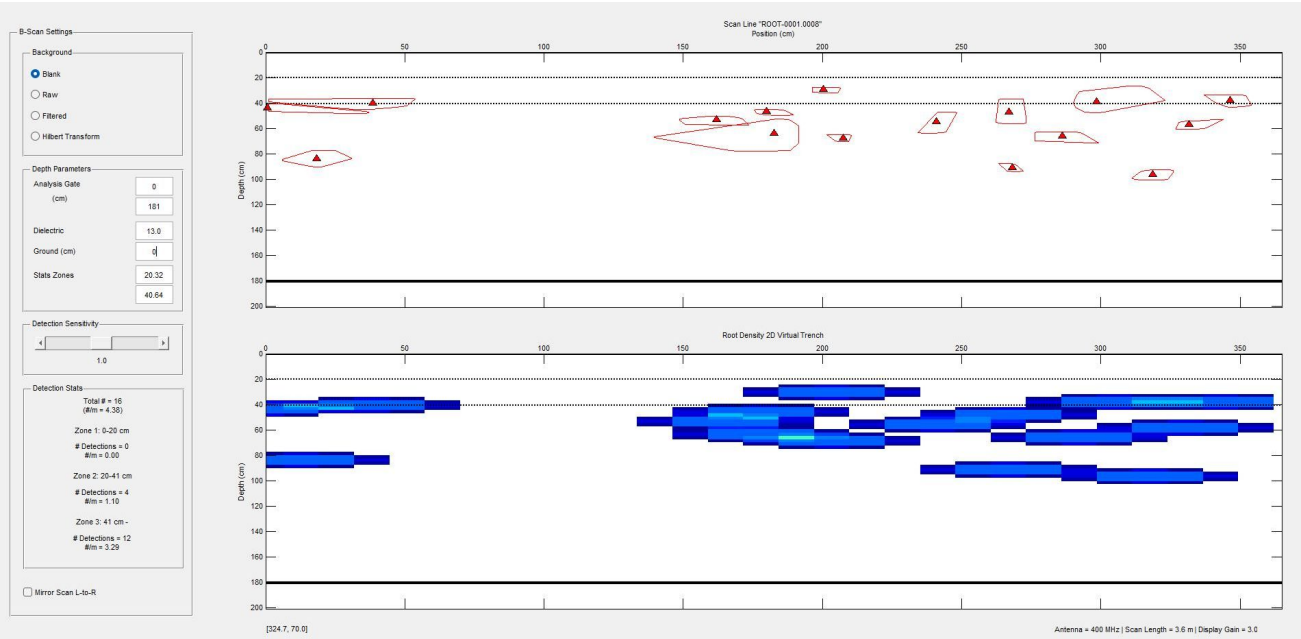
Scan line 0001.0006



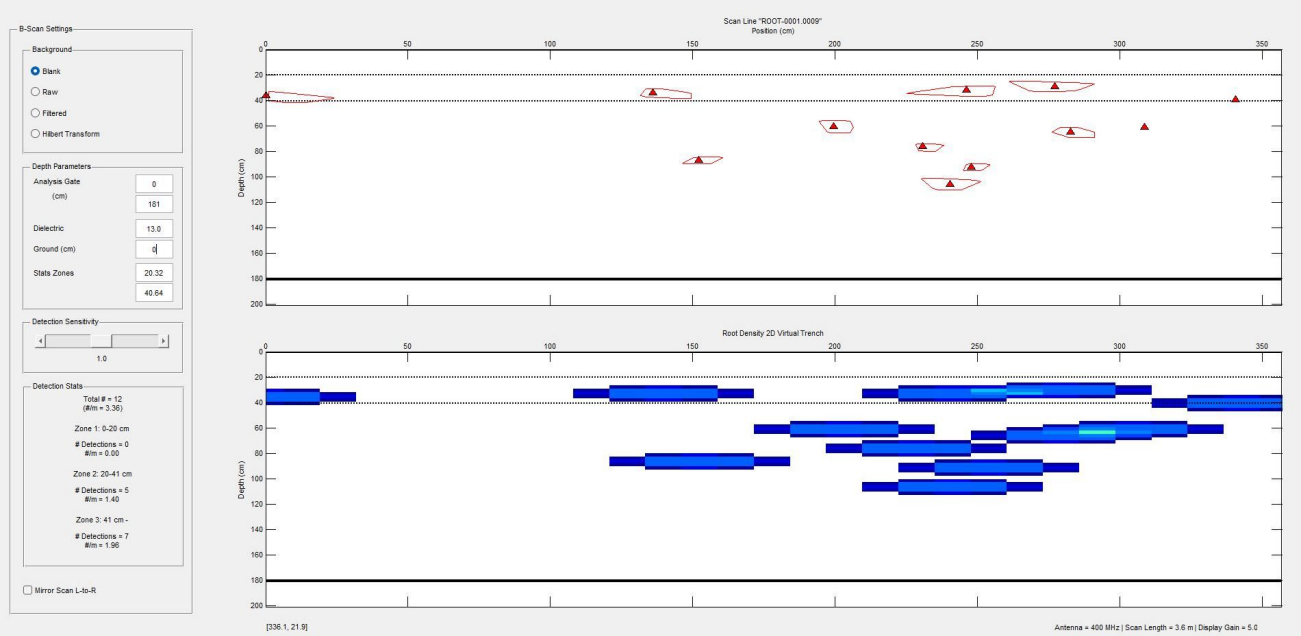
Scan line 0001.0007



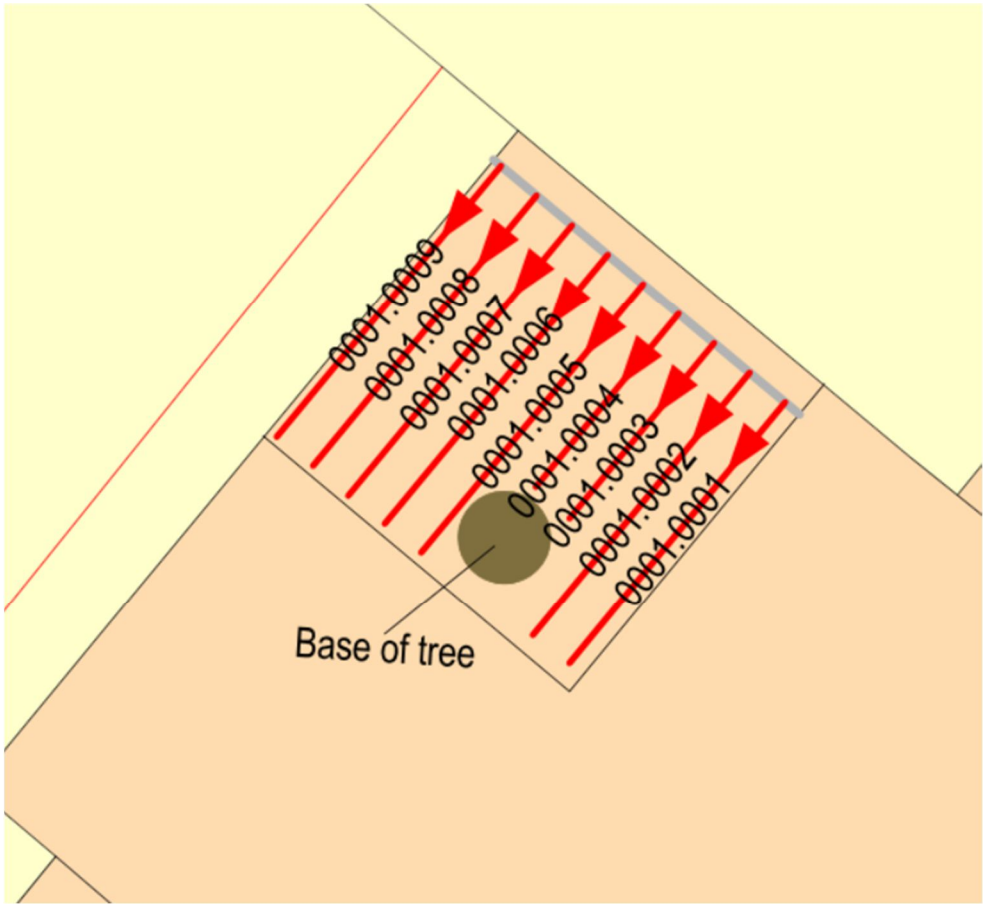
Scan line 0001.0008



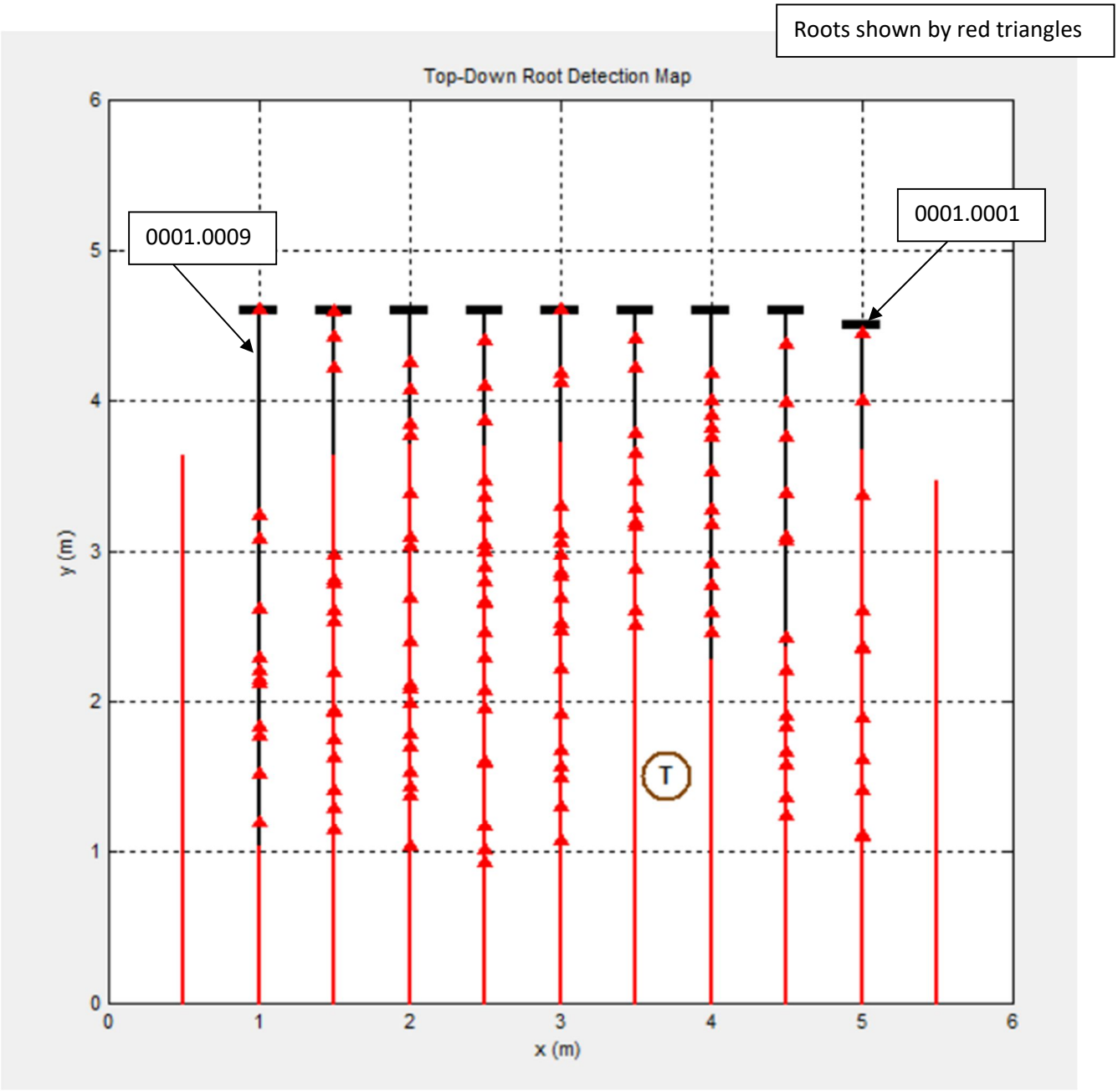
Scan line 0001.0009



SCAN LINES 0001.0001-0009 – LOCATIONS (DO NOT SCALE)

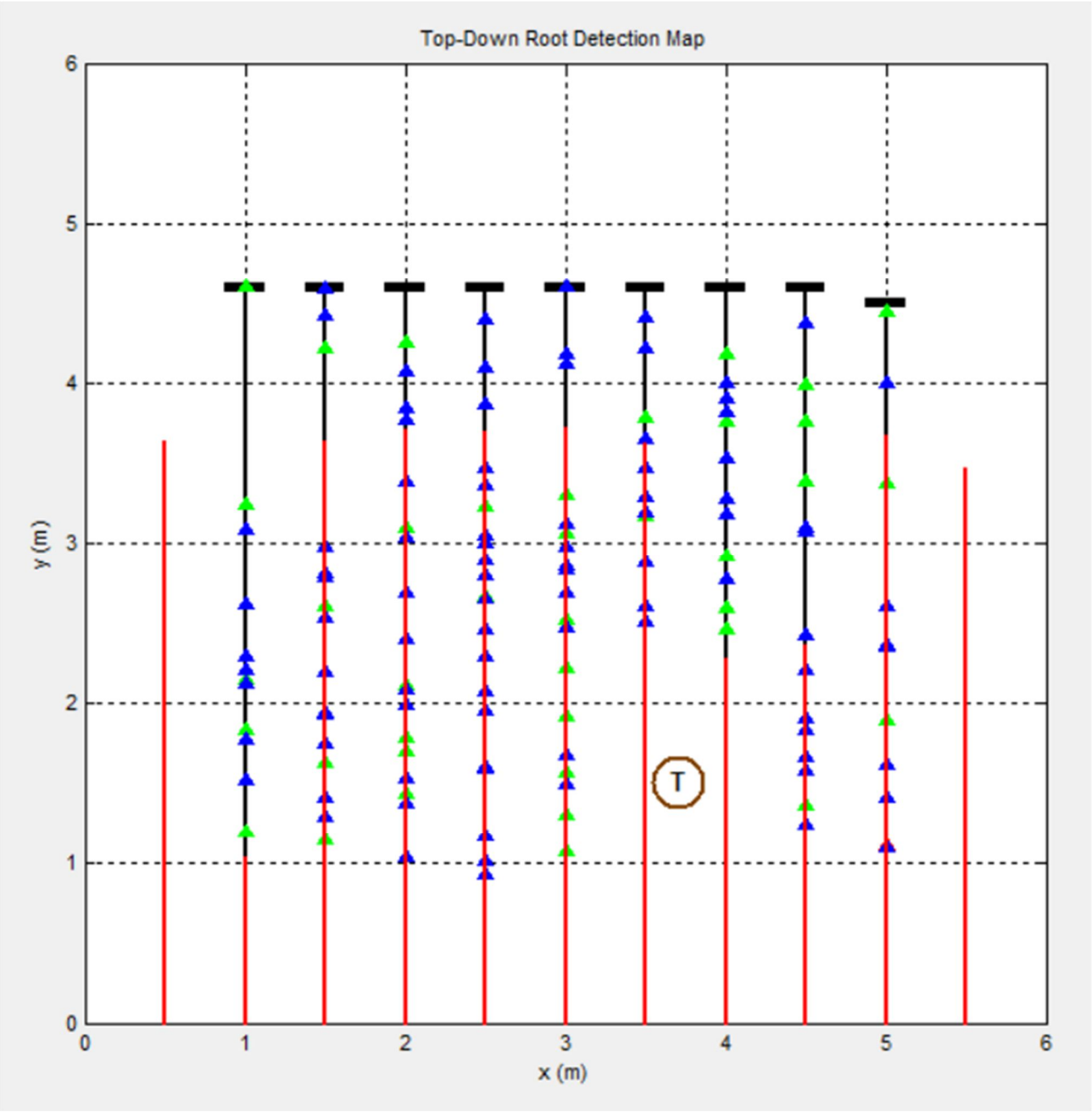


SCAN LINES 0001.0001-0009 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS



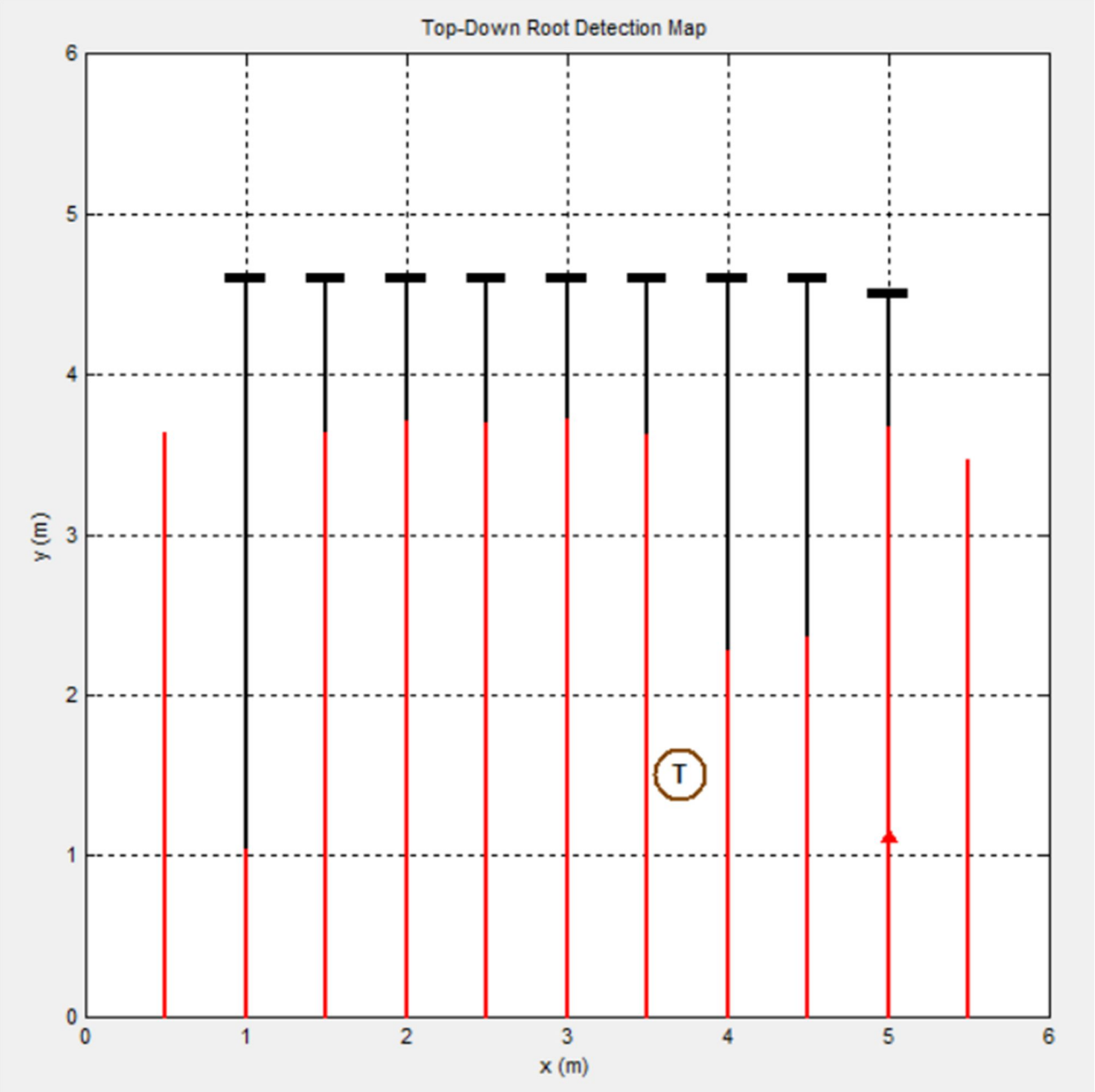
SCAN LINES 0001.0001-0009 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS

RED = 0-20CM GREEN = 20-40CM BLUE = 40-250CM



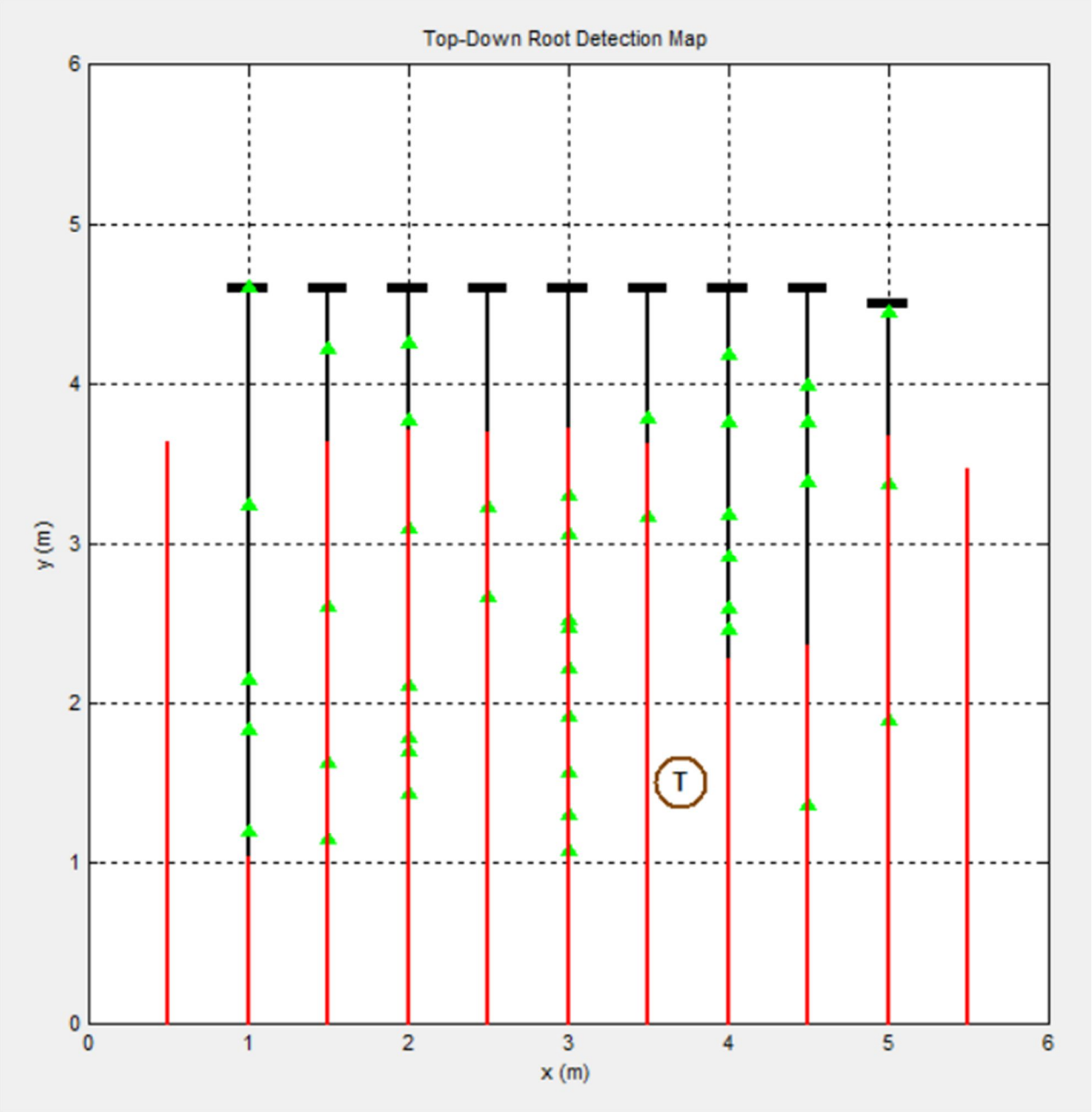
SCAN LINES 0001.0001-0009 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS

RED = 0-20CM



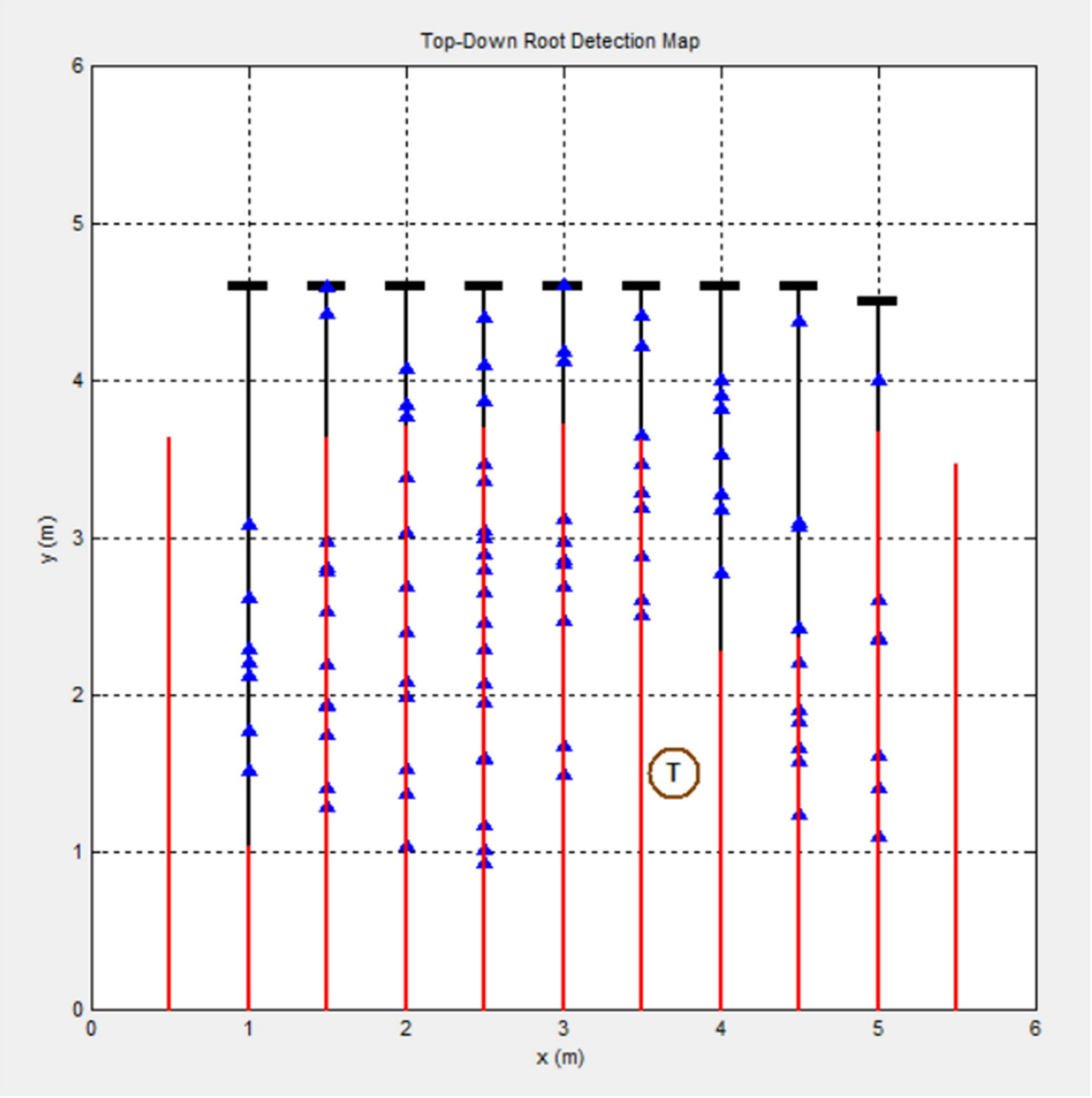
SCAN LINES 0001.0001-0009 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS

GREEN = 20-40CM



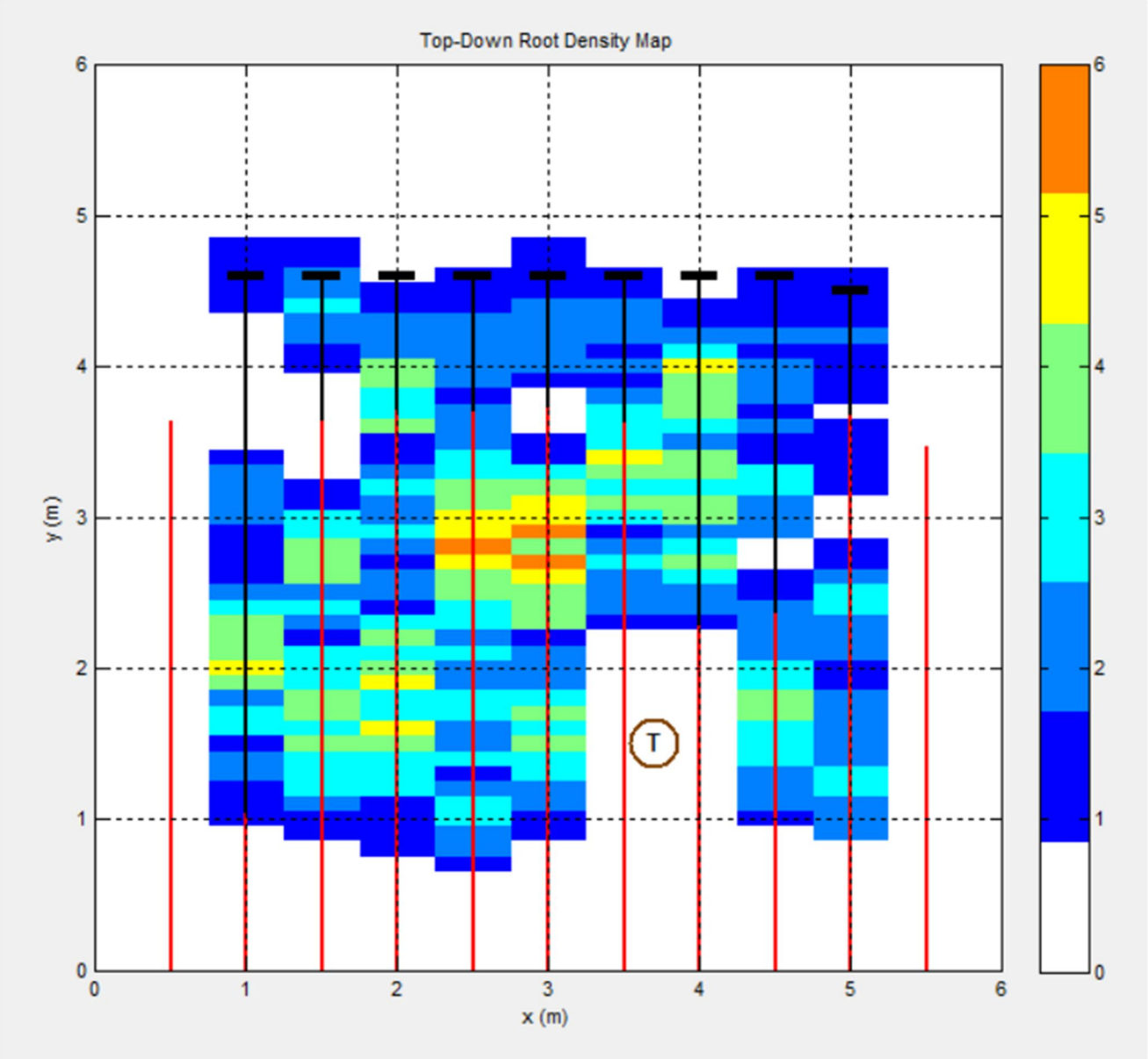
SCAN LINES 0001.0001-0009 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS

BLUE = 40-250CM



SCAN LINES 0001.0001-0009 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS - DIAGRAMMATIC REPRESENTATION OF ROOT DENSITY.

RED = RELATIVELY HIGH, BLUE = RELATIVELY LOW



9. CAVEATS & EXCLUSIONS: -

Specific report caveats

1. The survey is concerned solely with TreeRadar.
2. Any changes in ground level, or excavations near to tree roots not discussed within this report may change the stability and condition of the trees and a further examination would be required.
3. As trees are a dynamic living organism this report is only valid for a period of 12 months, in respect to their health and condition.
4. Only the trees and areas listed in this report have been examined by TreeRadar.
5. All arboricultural issues other than tree roots in the area covered specifically within this report are outside the remit of this report and should be assessed by the project arboricultural consultant.
6. Scanning conditions were relatively straight forward, with few obstructions. In much of the site there were a large number of non-root reflectors and metal found within the results, which were filtered out of the data as far as was reasonably practical. This may slightly affect the accuracy of the results, but we are experienced at looking at data in these situations.

10. BACKGROUND and STATEMENT OF METHODOLOGY

A TreeRadar investigation was carried out by Ian Lee on 18th October 2023. The locations of the scan lines are found at appendix one, drawing reference *TRA 0349TR,* and the results are found in the report at section 4. The location of the scan area was identified by Jonathan Terry of Sylvan Resources during the initial quotation process.

The individual scan lines were measured from the tree and/or other fixed points. Photographs were taken and the lines plotted on a plan and described in survey tables. Each group or individual tree (as appropriate) has a unique file number (e.g., 0005) and each scan within that file has a unique reference number (e.g., 0002). The lines are shown on a digital plan.

The TreeRadar unit is a scanning cart with a 400MHz antenna which sends a beam every 1cm down to a depth prescribed by the operator (usually between 2 - 3m, which is the maximum depth). The reflection is recorded in a field computer and then analysed by the latest software, TBA. Water and metal reflect; therefore, the machine records live roots which contain moisture, and cannot detect dead, dried out roots. For each scan line a 'virtual trench' is produced which shows all roots with a diameter greater than 20mm. The machine cannot determine root diameter, other than it being greater than 20mm, due to the lack of correlation between the amounts of live root tissue in a root compared to the thickness of a roots. For example, a large root may only have a live central core.

For each group of roots, the scans are organized into a 'top down' root morphology plan which is to scale.

Documents received: -

11. MY EXPERIENCE & QUALIFICATIONS: -

PROFILE: Ian Lee

MICFor MArborA BSC (Hons) Tech Cert (Arbor A)

Ian has seventeen years' experience as an arboricultural consultant in the private and public sector. Ian is a professional member of the Arboricultural Association and has a degree in Forestry. Ian has considerable expertise in problem solving in relation to trees and the planning process and complex construction issues.

Ian has a deep understanding and knowledge of the operation and interpretation of TreeRadar © and has carried out two research and development visits with Sharon Hosegood Associates in 2016. This research is to be continued with international colleagues in 2023 as travel returns to normal.

Ian has managed a team delivering volume tree surveys and has produced woodland management plans.

Specialities

- Trees in relation to development, including appeals and planning hearings
- Tree root investigations, including TreeRadar©
- Tree hazard evaluation
- Tree preservation orders
- Manager of volume tree surveys

Professional bodies:

- Chartered member of the Institute of Chartered Foresters (ICF)
- Professional member of the Arboricultural Association

Qualifications:

- Arboricultural Associations Technicians Certificate
- BSc (Hons) Forestry and Forest Products
- Lantra Visual Tree Assessment

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SITE

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OUR REF: TRA0349

CONTACT DETAILS: 01622 435929
Ian@TRAConsulting.co.uk

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www.treeradaruk.com