Sharon Hosegood
ASSOCIATES

Root investigation by Tree Radar

radar

SITE

Kingsgate School, Camden, NW6 2JG

CLIENT

Wharton Tree and Ecology Consultants Ltd

IAN LEE
MArborA BSC (Hons) Tech Cert (Arbor A)

DATE: 20th June 2017
OUR REF: SHA 411

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EXECUTIVE SUMMARY

This report is intended to provide information to aid in the preparation of an arboricultural impact assessment for a proposed building extension and development at Kingsgate School, Camden, NW6 2JG.

This report investigates the rooting of trees growing within Kilburn Grange Park adjacent to the north west boundary of the site at Kingsgate School, Camden, NW6 2JG, determining if roots of the tree extend into the site and if so establishing the root depth, location and rooting densities to help assess the impact of any proposals and aid in design work.

The survey was undertaken as four sets of parallel scan lines along the western and northern boundaries of the site within the playground and areas of hard standing. The scanning locations were identified following a tree survey undertaken by Wharton Tree and Ecology Consultants Ltd, focusing on areas where the root protection areas of off-site trees extend into the site.

The results of the survey found that the roots of the trees extended beneath the scanning area within the development site, at densities varying from very high to very low but decreasing in density with increased distance from the boundary.

Contents

1. INTRODUCTION:

1.1. This report provides details of TreeRadar results of line scans within an area of playground and hard standing at Kingsgate School, Camden, NW6 2JG and seeks to provide information to aid in the development of an Arboricultural Impact Assessment for the extension of the existing of the school building adjacent to the northern and western boundaries of the site.

1.2. The survey was carried out on 22nd June 2017 by Ian Lee of Sharon Hosegood Associates Ltd. The scanning location was identified on a plan provided by Sebastian Onslow of Wharton Tree and Ecology Consultants.

1.3. This report identifies locations of roots with a diameter greater than 20mm along scan lines. The scan line results show the depth and location of the roots. 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 detail of root locations and the use of this in developing and assessing the arboricultural impact is the responsibility of Wharton Tree and Ecology Consultants.

2. CURRENT SITE DESCRIPTION:-

2.1 The site of this investigation is an area of playground and hard standing between the existing buildings and the adjacent Kilburn Grange Park along the northern and north-western boundaries of the site. Along this boundary are a number of off-site trees within the park whose crown and root protection area (RPA) extend into the site. The area is surfaced with tarmac and is smooth, forming good surveying conditions.

2.2 All of the trees have been surveyed by Wharton Tree and Ecology Consultants Ltd as part of their ongoing arboricultural consultancy work for the development. The numbering system used within the Arboricultural Impact Assessment will be used within this report to reference the individual trees and their rooting areas.

3. METHODOLOGY AND TREERADAR INFORMATION:-

3.1 Not all of the scan lines are located within the RPAs of the off-site trees. The location of the scan lines are found at Appendix 1 on the Tree Radar plan reference [SHA 411 TR] and the results for each area can be found in section 4. The individual scan lines were measured from the boundary fence line or other fixed points to assist plotting parallel lines. Each scan line has a unique file number (e.g. 0005.0001) and the lines are shown on a digital plan.

3.2 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 roots. For example a large root may only have a live central core. An anticipated update of the software is expected to address this issue.

Photo 1 of TreeRadar equipment

4. RESULTS:-

A summary of the scan locations and the results is found below:

4.1. **Scans 0001.0001-0008:** Line 0001.0001 runs from south to north, 1m out from the western boundary line and parallel to it. The line starts 0.75m from the end of the decking area and planter extending north for a length of 12.5m and ends at the northern boundary wall, with a marker at 7.9m (the trunk of T9). Scan line 0001.0002 runs parallel to line 0001.0001 with the same start and finish point and the same marker but 2m out from the boundary wall. Scan lines 0001.0003-0004 run parallel to line 0001.0001 with the same start point and marker, 3m and 4m from the boundary wall respectively. These lines end after 11m due to the presence of the play wall. Scan lines 0001.0005-0008 start 2.7m south of the northern end of the decking, level with the end of the large planter, running north parallel to lines 0001.0003 with the same marker and finish point and located 5m, 6m, 7m and 8m from the western boundary wall respectively.

4.1.1. **Results:** Roots are found in moderate/low to low rooting densities in an unevenly distributed pattern, with the density decreasing with increased distance from the tree. Throughout the scan lines a layer of roots are found beneath the hard surfacing, likely exploiting the condensation layer which forms there. A very large number of non-root reflectors such as metallic debris or services were found within the scan results.

4.2. **Scans 0002.0001-0004:** Line 0002.0001 runs from west to east, 1m in from the northern boundary line and parallel to it. The line starts 0.75m from the western boundary wall and runs east for a length of 25.5m, with markers at 11m (the trunk of T12) and 18.5m (the trunk of T13). Scan lines 0002.0002-0004 run parallel to line 0002.0001 with the same start and finish points and the same markers but located 2m, 3m and 4m in from the boundary respectively.

4.2.1. **Results:** Roots are found in moderate/low rooting densities in an unevenly distributed pattern, concentrating around the start of the line near T9 and adjacent to the trunks of T12 and T13. The rooting density generally decreases with increased distance from the tree. Throughout the scan lines a layer of roots are found beneath the hard surfacing, likely exploiting the condensation layer which forms there. A very large number of non-root reflectors such as metallic debris or services were found within the scan results.

4.3. **Scans 0003.0001-0003:** Line 0003.0001 runs from west to east, 1m in from the northern boundary line and parallel to it. The line starts level with the western edge of the existing school building and runs east for a length of 12.5m, with markers at 1m (the trunk of T14) and 8.7m (the trunk of T15). Scan lines 0003.0002-0003 run parallel to line 0003.0001 with the same start and finish points and the same markers but located 2m and 3m in from the boundary respectively.

4.3.1. **Results:** Roots are found in initially very high rooting density immediately inside the boundary, however the rooting density rapidly drops away to moderate density in line 0003.0002 then very low rooting density by line 0003.0003. Again a layer of roots are found beneath the hard surfacing, likely exploiting the condensation layer which forms there. A very large number of non-root reflectors such as metallic debris, metal grids or services were found within the scan results.

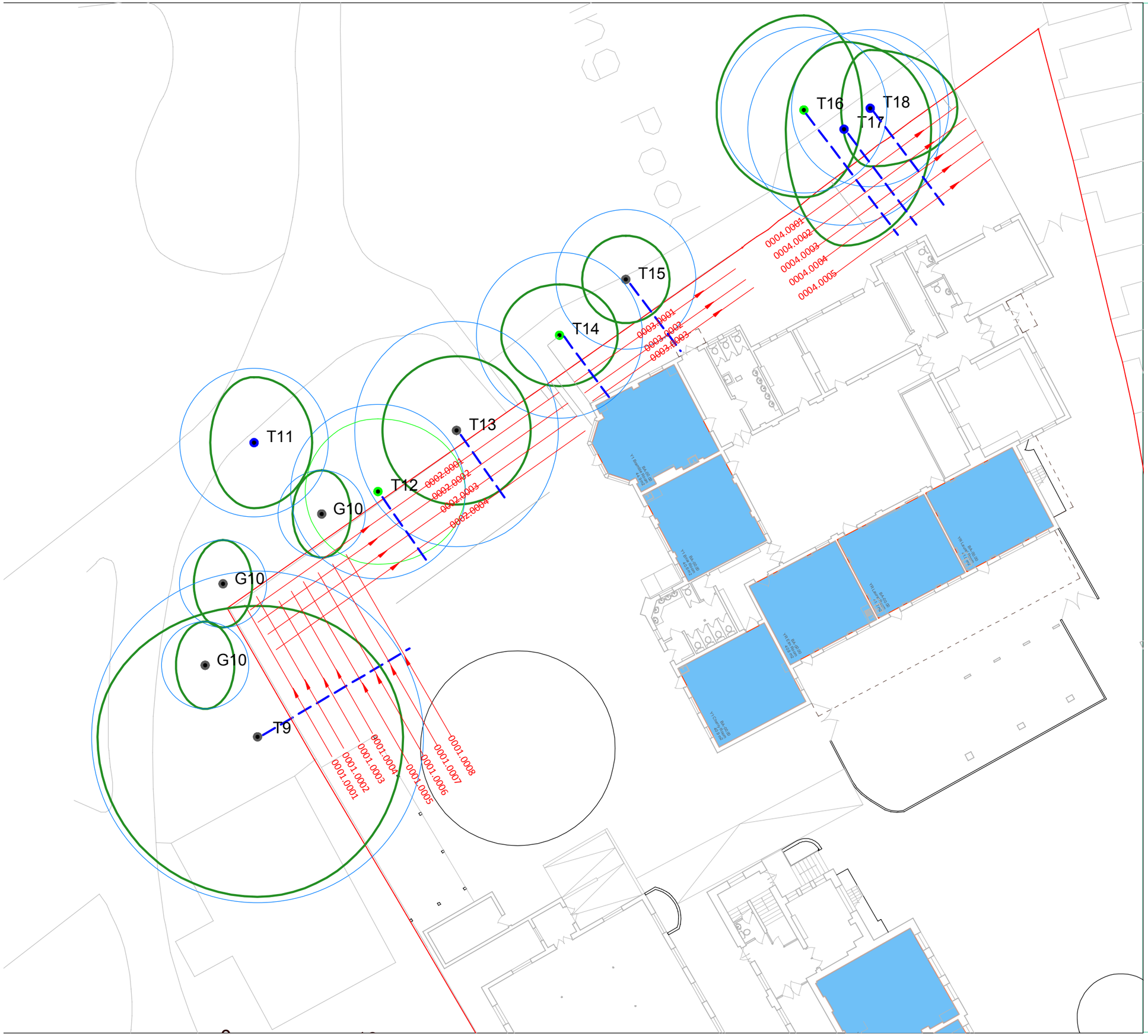
4.4. **Scans 0004.0001-0005:** Line 0004.0001 runs from west to east, 1m in from the northern boundary line and parallel to it. The line starts level with a small off-site tree (not marked on the Tree Survey Plan) and runs east for a length of 14m, with markers at 6.5m (the trunk of T16), 8.5m (the trunk of T17) and 11.5m (the trunk of T18). Scan lines 0004.0002-0005 run parallel to line 0004.0001 with the same start and finish points and the same markers but located 2m, 3m, 4m and 5m in from the boundary respectively.

4.4.1. **Results:** Roots are found in initially moderate rooting density immediately inside the boundary, however the rooting density rapidly drops away to low and very low densities. Again a layer of roots are found beneath the hard surfacing, likely exploiting the condensation layer which forms there. A very large number of non-root reflectors such as metallic debris, metal grids or services were found within the scan results.

5. CONCLUSIONS:-

5.1. The results find that the off-site tree growing in the neighbouring park is rooting beneath an area of hard surfacing at varying densities but generally at lower rooting densities than would be expected in an open grown tree. This indicates that although roots from the trees are growing beneath the hard surfacing both for mechanical support as well as to exploit the moisture within the condensation layer, most of the trees roots are growing within the park area and have been partially restricted by the physical barrier of the walls footings and the unfavourable rooting conditions on the site.

6. TREE RADAR PLAN SHA 411 TR APPENDIX 1 – PLAN



Please refer to full arboricultural report for details

Scan lines and direction

Markers (a surveying aid)

Crown spread

RPA - root protection area as defined by Table 2 BS 5837:2012

0001.0001 Scan line number

Rev :	Description :	Authorized :

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Parkway
Chelmsford
Essex CM2 7PX

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Client

Wharton Tree & Ecology Consultants Ltd

Site Address

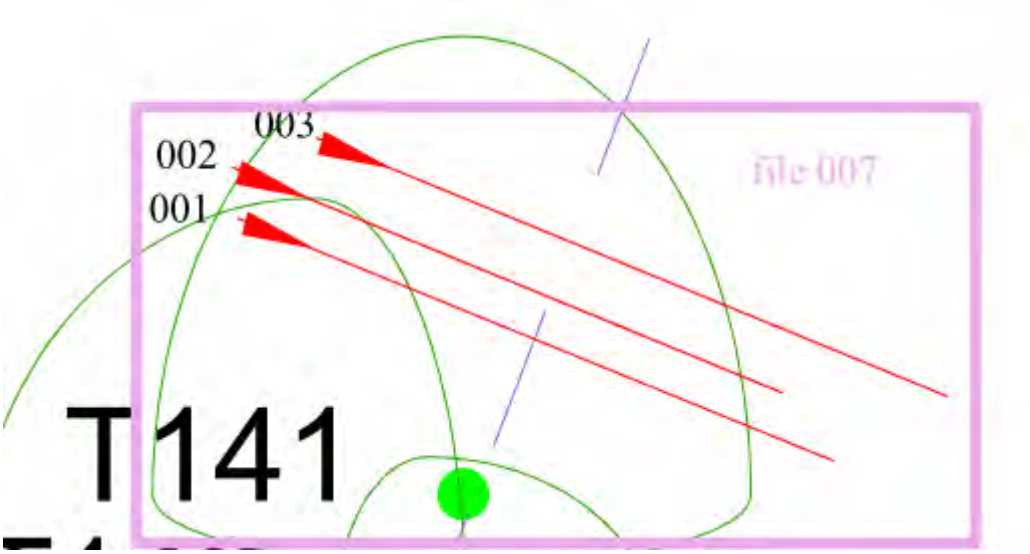
Kingsgate School,Camden NW6 2JG

Drawing Title	Orientation	Drawn	Authorized
Tree Radar Plan		ND-H	SMH
Date	**Drawing Number**	**Scale**	**Drawing Status**
28.06.17	SHA 411 TR	1:250@A3	For Issue
Revision			
-			

7. How to read the scan lines – Appendix 2

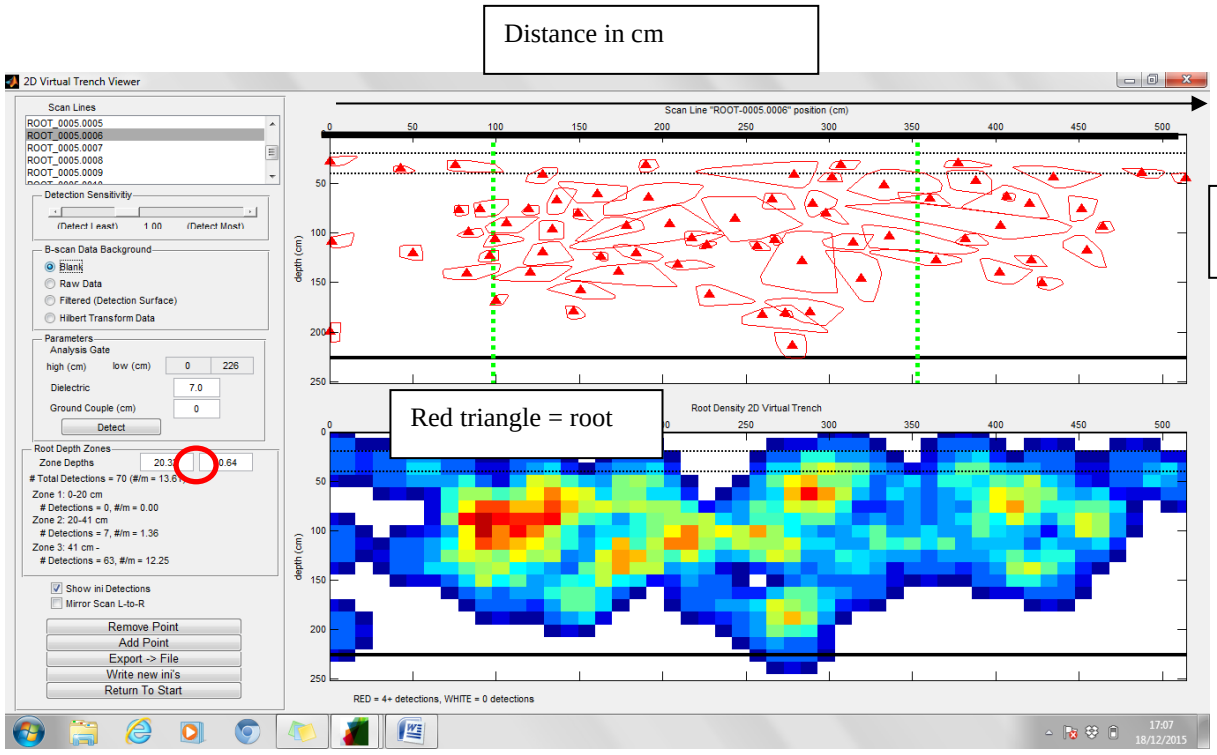
The results are shown as a top down view (plan) and a cross section of each scan line. This is an extract of the plan, a scaled copy of which is found at appendix 1. The location of the scan lines are based on the plotting from the survey, and the length of the line on the plan by the exact length of the scan.

Below is an example of the information shown on the tree radar plan. Scan lines are shown red, with the direction indicated by red arrows. Each scan line has a number.



The results are shown as a top down view (plan) and a cross section of each scan line. The plan extracts in Appendix 3 are not to scale. The location 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.

The cross section of each scan line shows where the roots are in relation to depth and distance. Depth is shown relative to the upper scanning surface, in this case the top surface of the hard surfacing is shown at 0cm. Red triangles represent the centre of the root detections, with the centre of the triangle showing the depth. Red polygons are an experimental attempt at determining root diameter but have yet to overcome the issue of the angle of roots over the scan lines and offer much larger detections than are found in ground truthing tests. As such they should be disregarded. Green dotted lines represent the survey markers. The coloured areas represent root density (relative to the scan area). An example is shown below:



Rooting density is relative to the individual scan line and the colour map should not be compared between scan lines with different lengths. Its purpose is to highlight areas of higher density along the single line. The rooting density figure circled in red above gives an accurate measure of density for the scan line, comparable other lines. White areas are areas with no roots.

High relative density

Low relative density

INDIVIDUAL SCAN LINE RESULTS – APPENDIX 3

Scan 0001.0001-0008

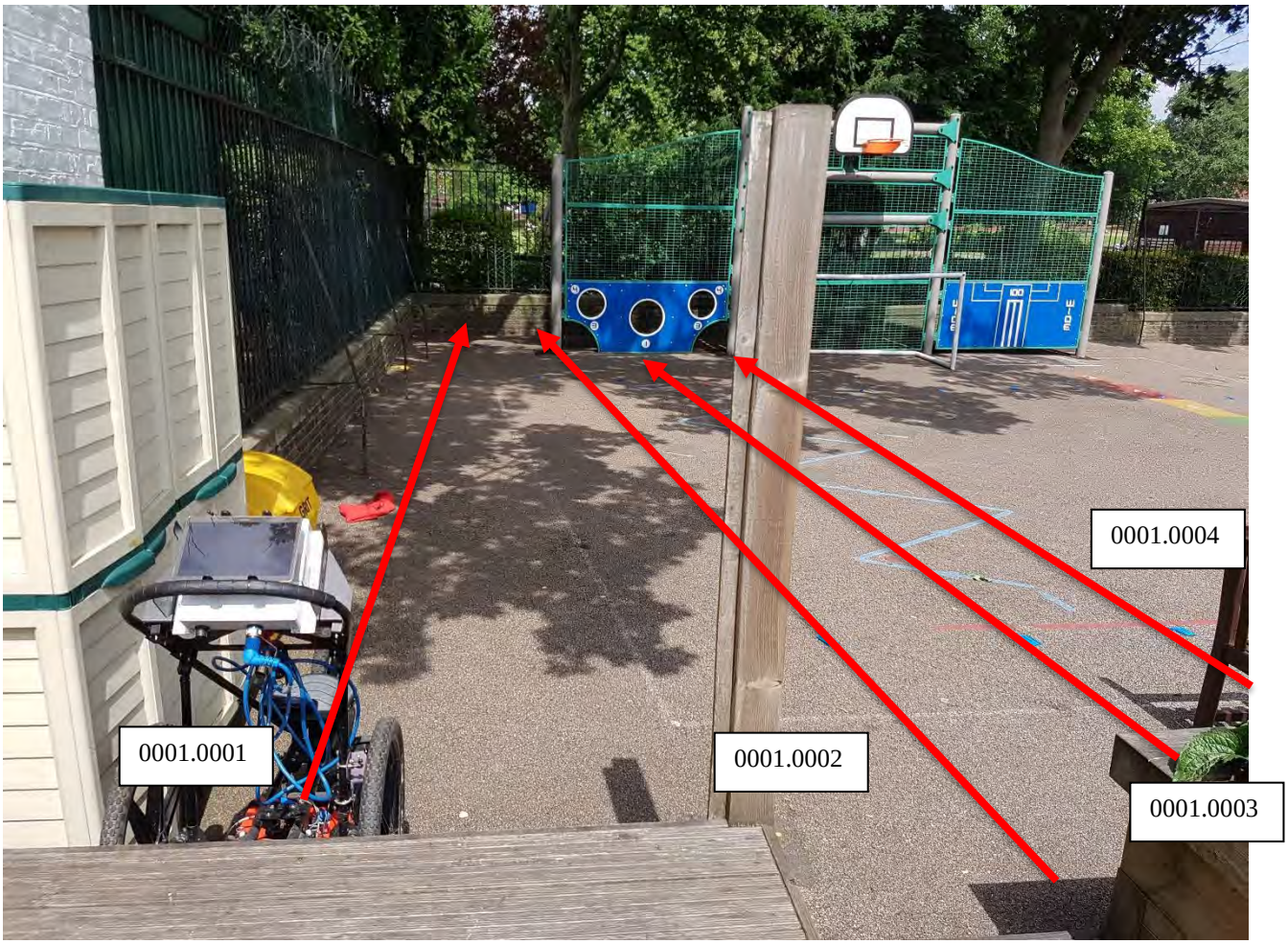
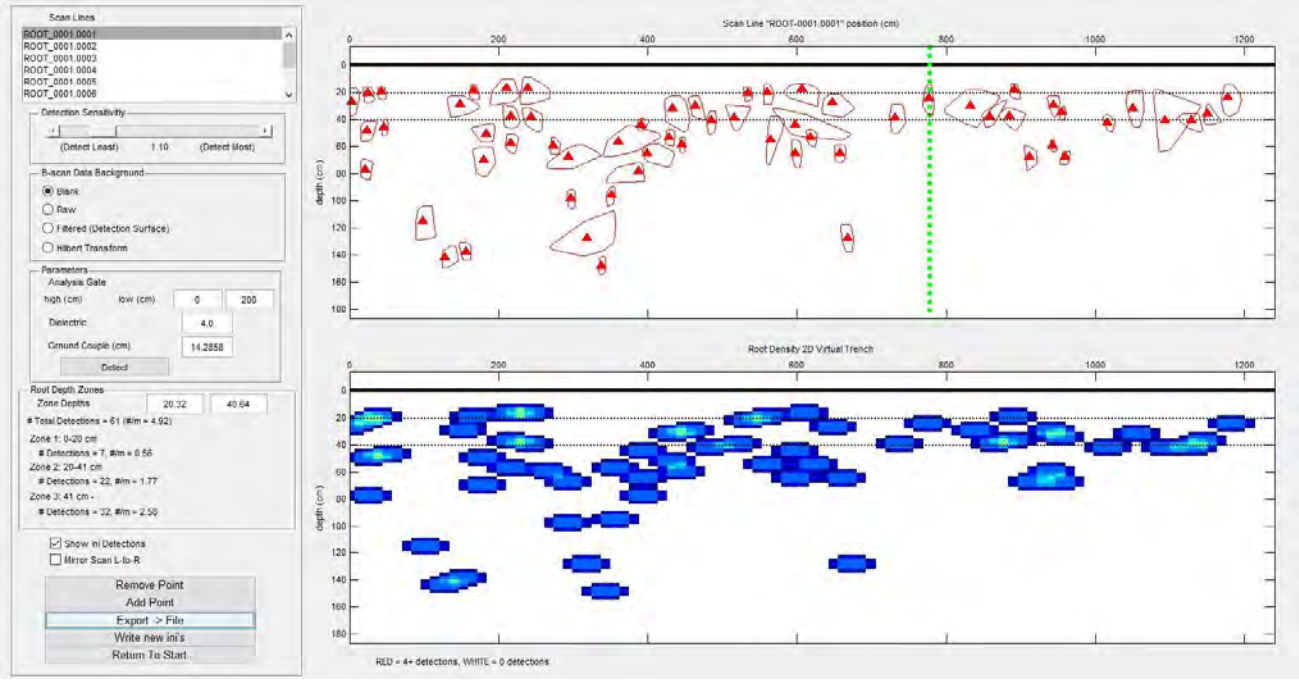


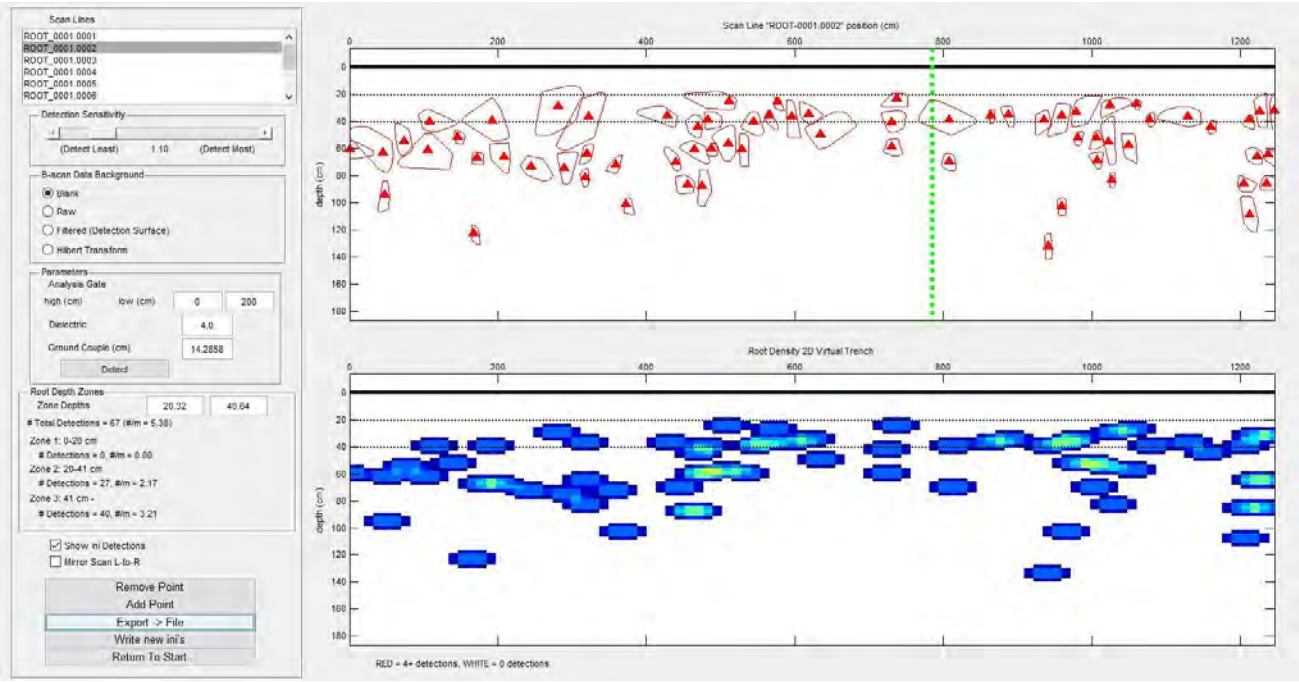
Photo 2. Scan lines 0001.0001-0004

Photo 3. Locations of scan lines 0001.0005-0008

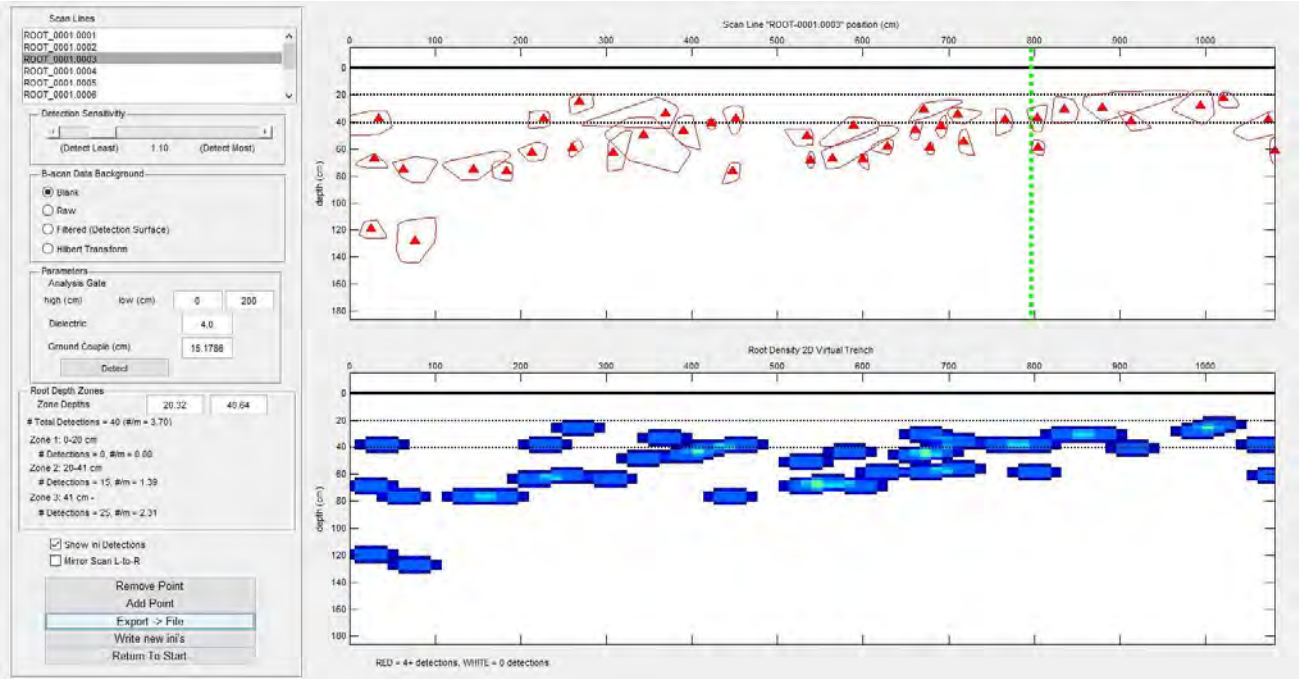
Scan line 001.0001



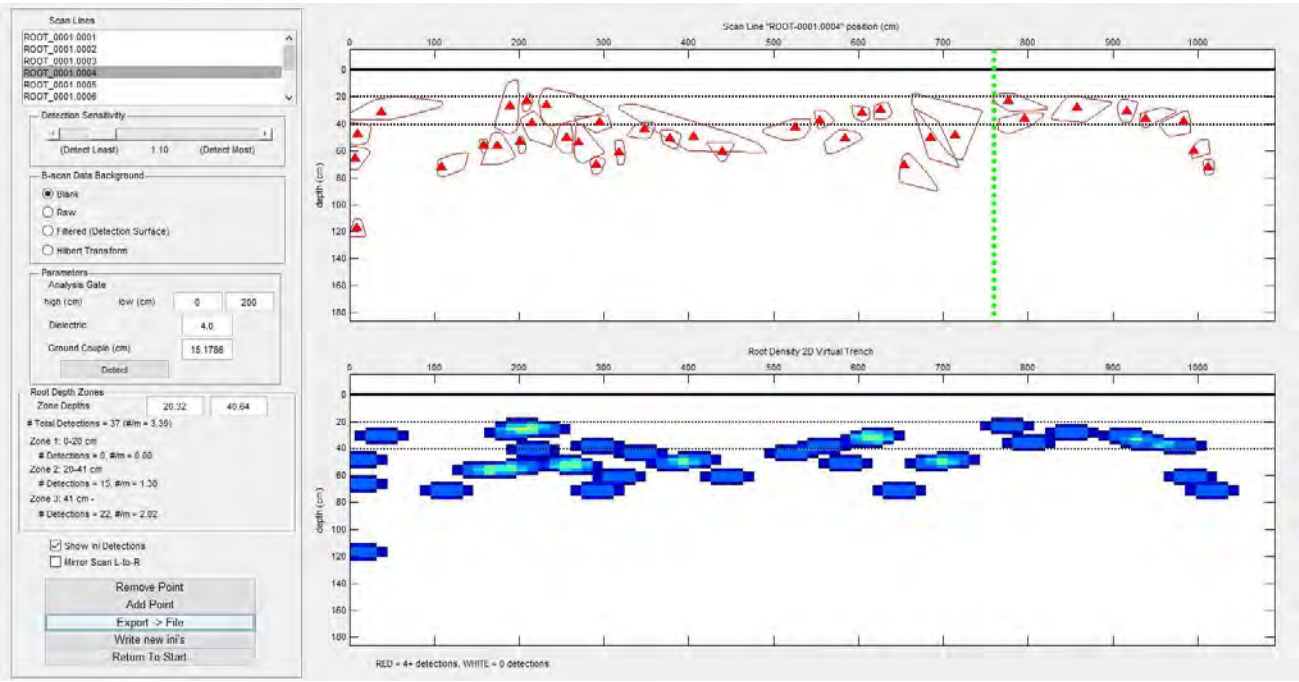
Scan line 0001.0002



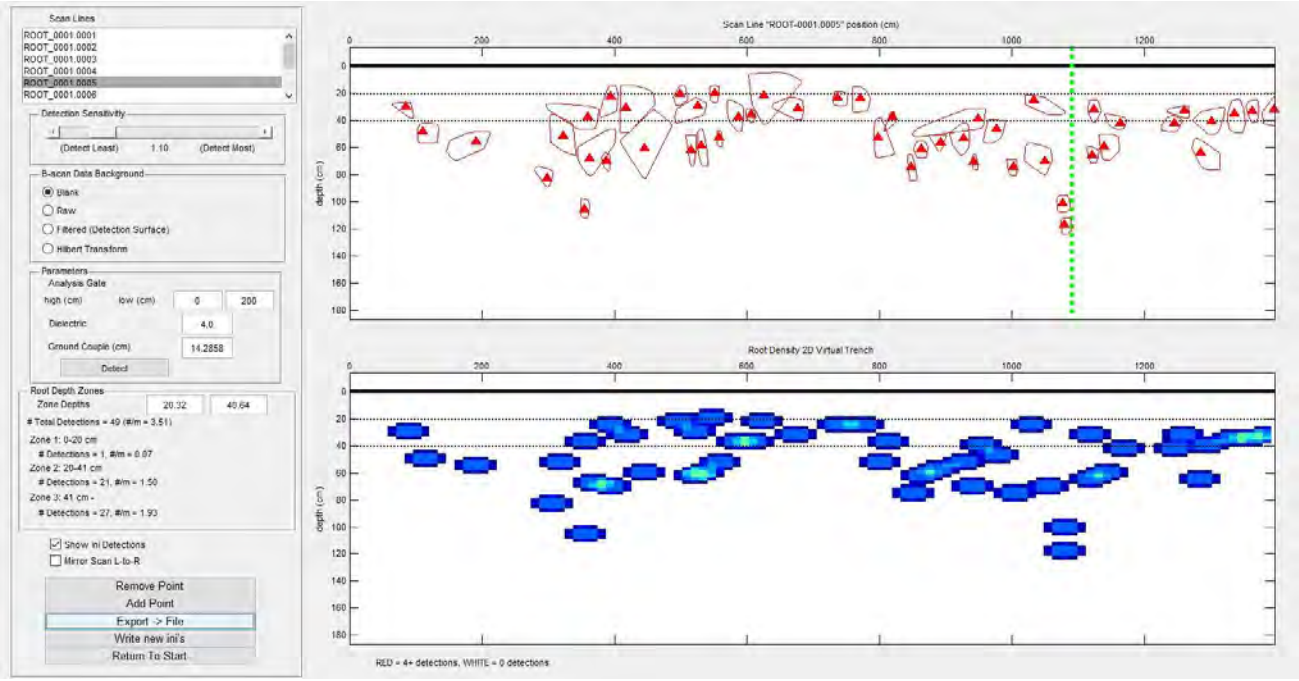
Scan line 0001.0003



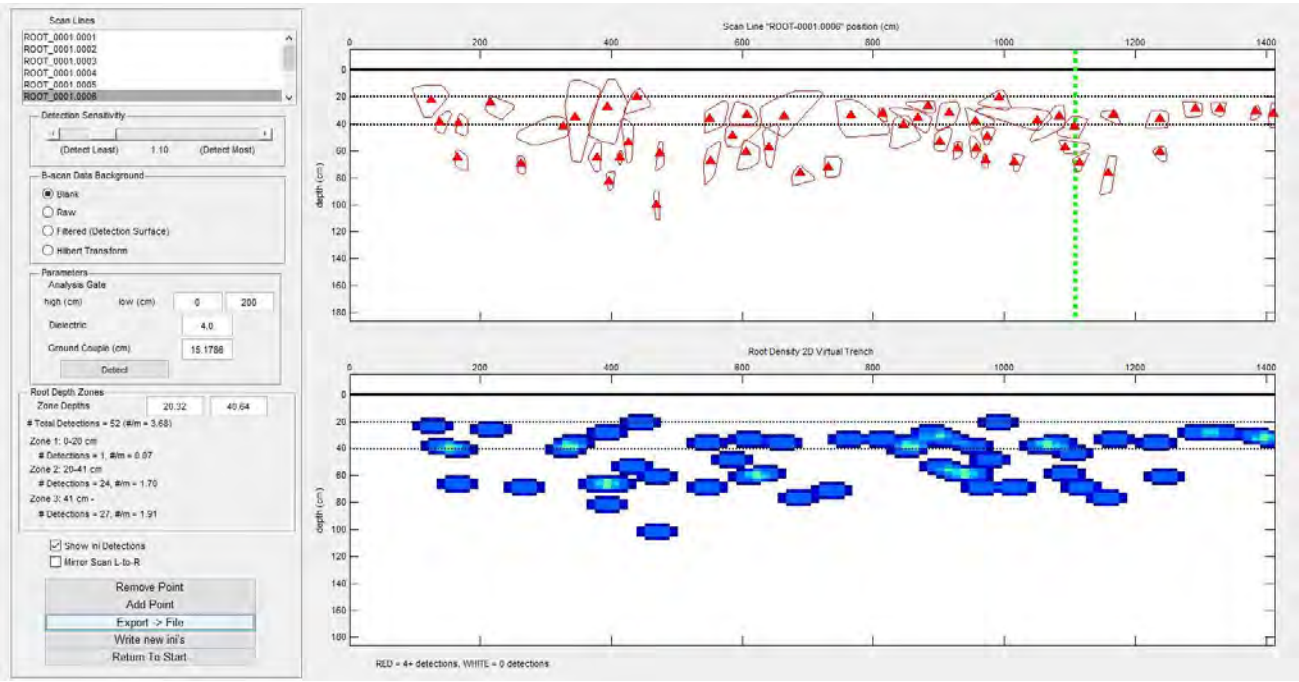
Scan line 0001.0004



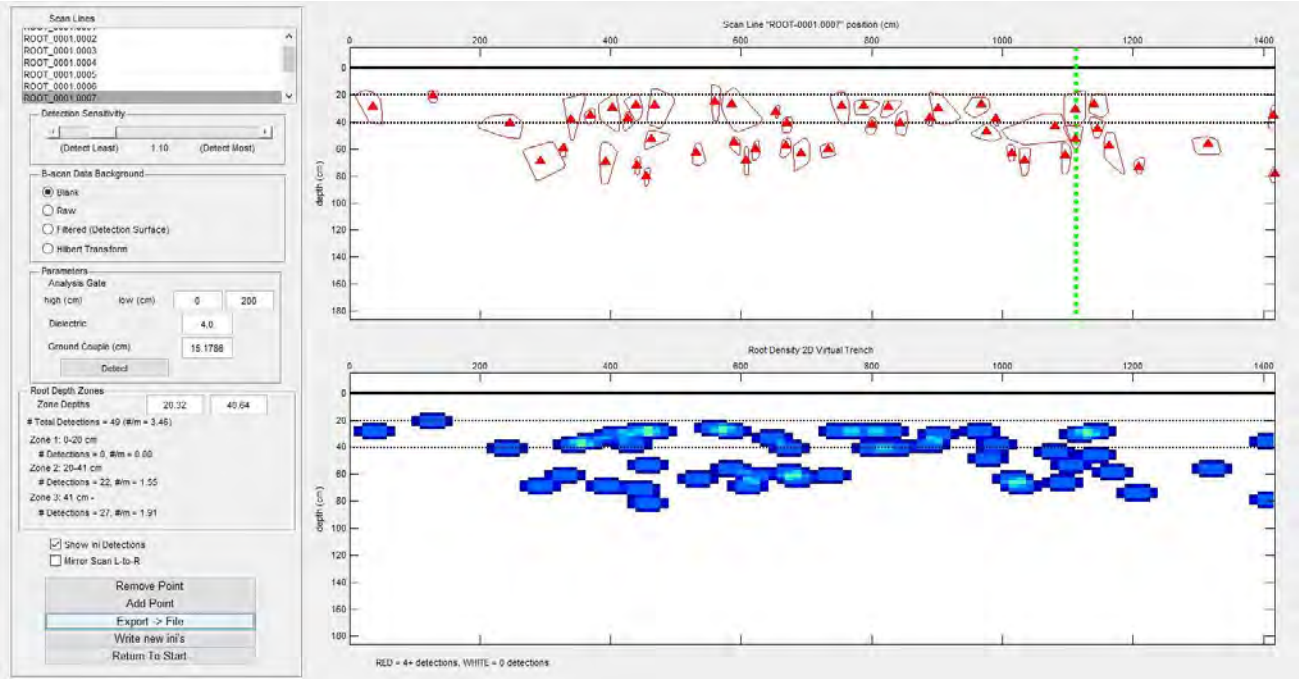
Scan line 0001.0005



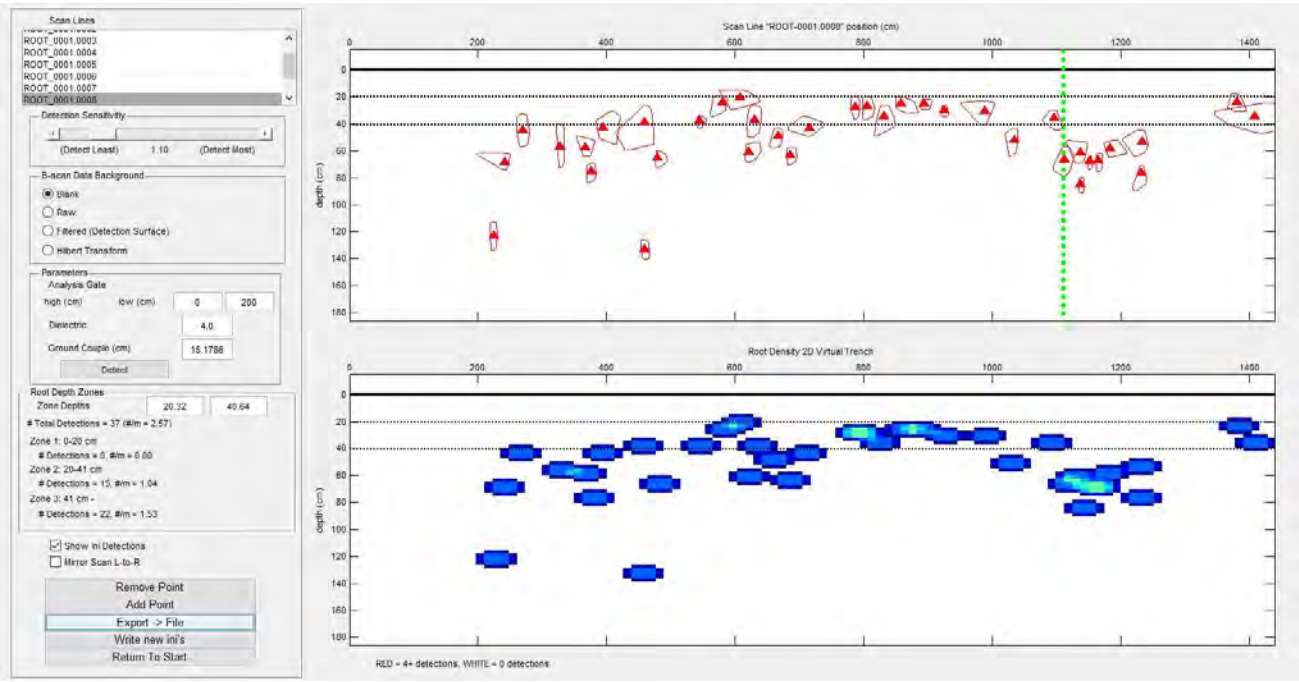
Scan line 0001.0006

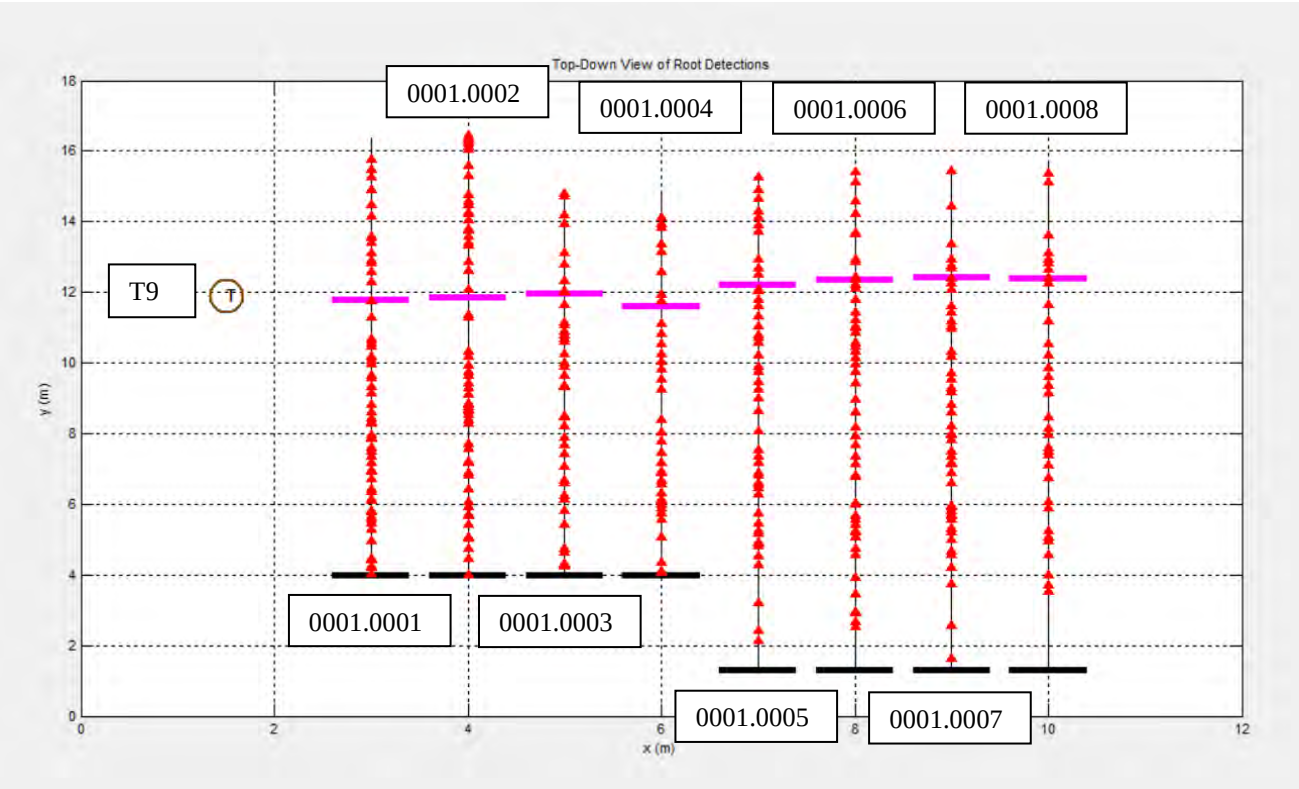


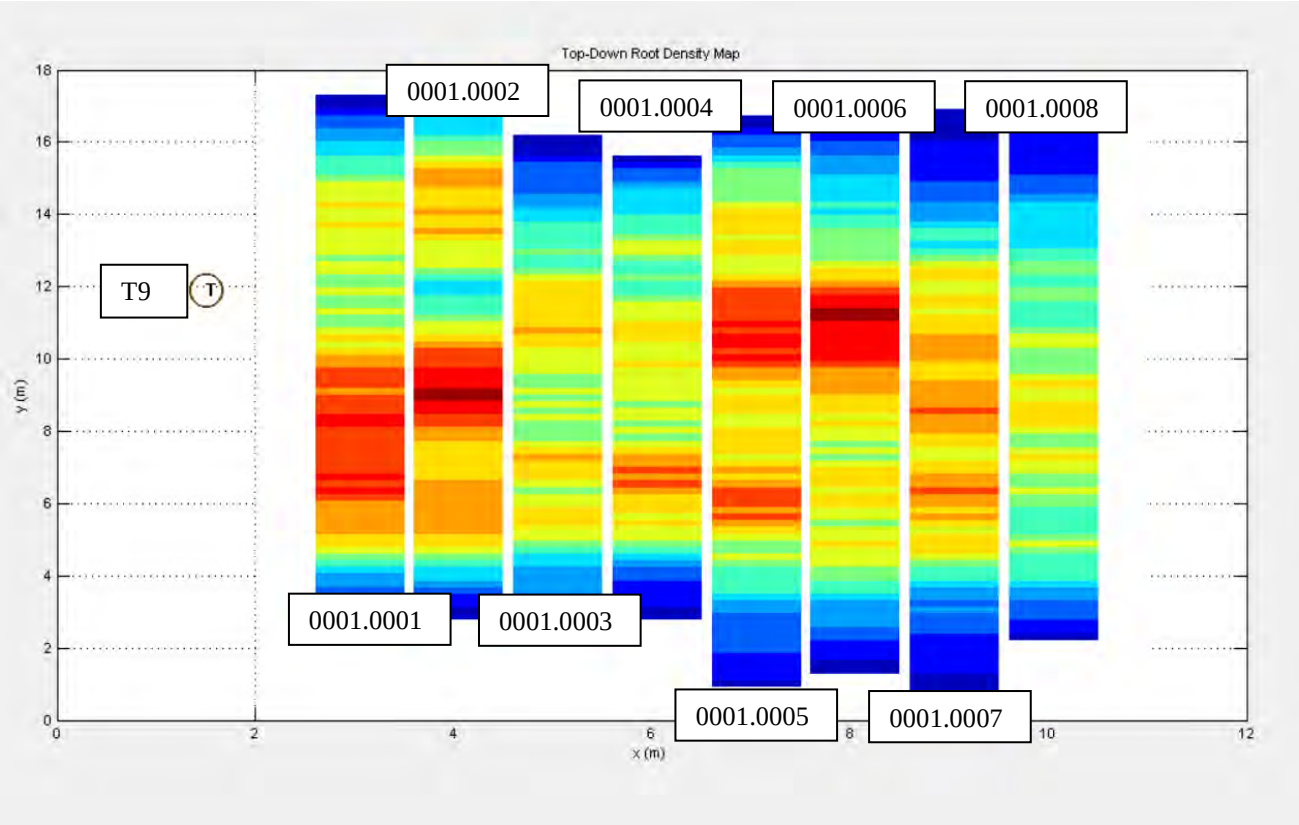
Scan line 0001.0007



Scan line 0001.0008



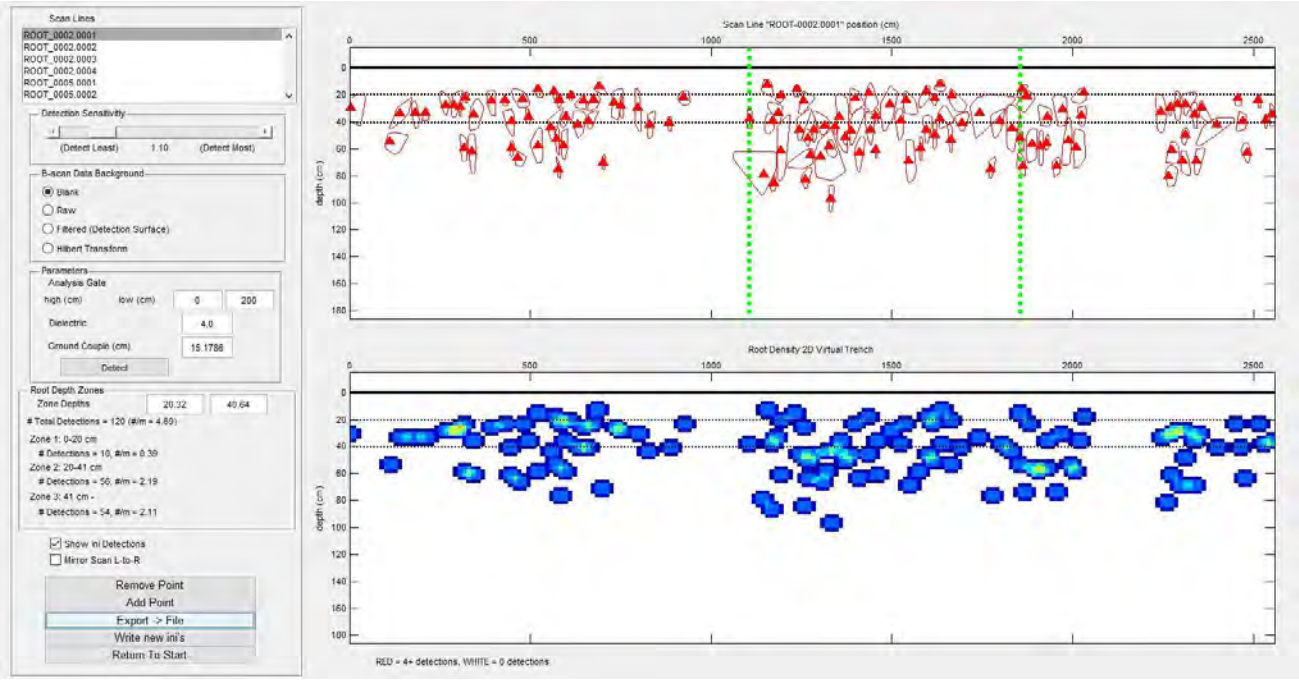

Top-Down View of Root Detections
0001.0002
0001.0004
0001.0006
0001.0008
T9
0001.0001
0001.0003
0001.0005
0001.0007
y (m)
x (m)


Top-Down Root Density Map
0001.0002
0001.0004
0001.0006
0001.0008
T9
0001.0001
0001.0003
0001.0005
0001.0007
y (m)
x (m)

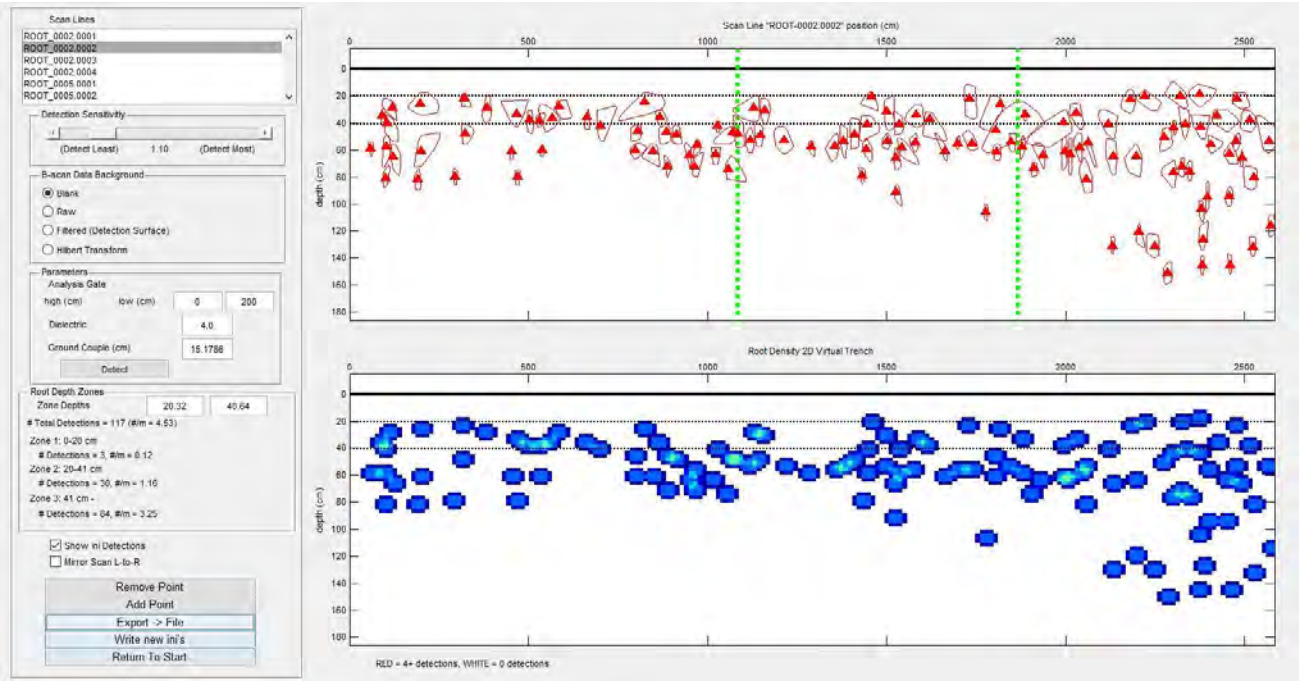
Scan 0002.0001-0004

Photo 4. Line of scan line 0002.0001

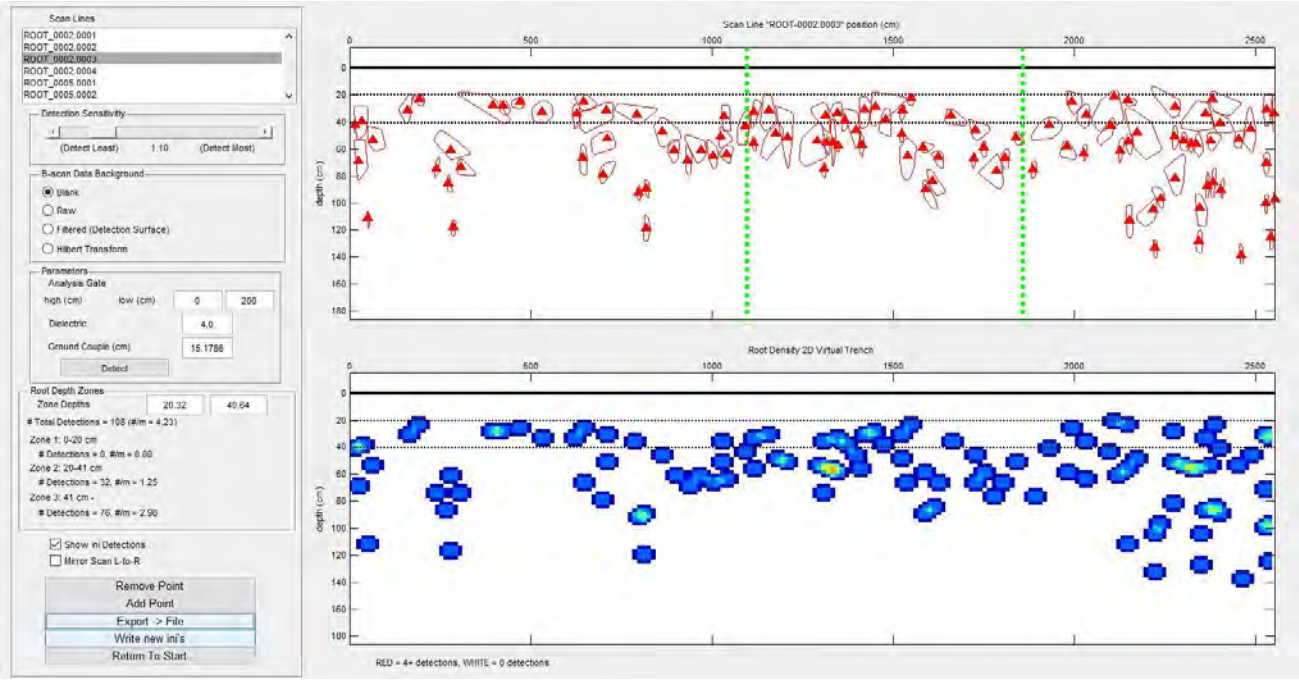
Scan line 0002.0001



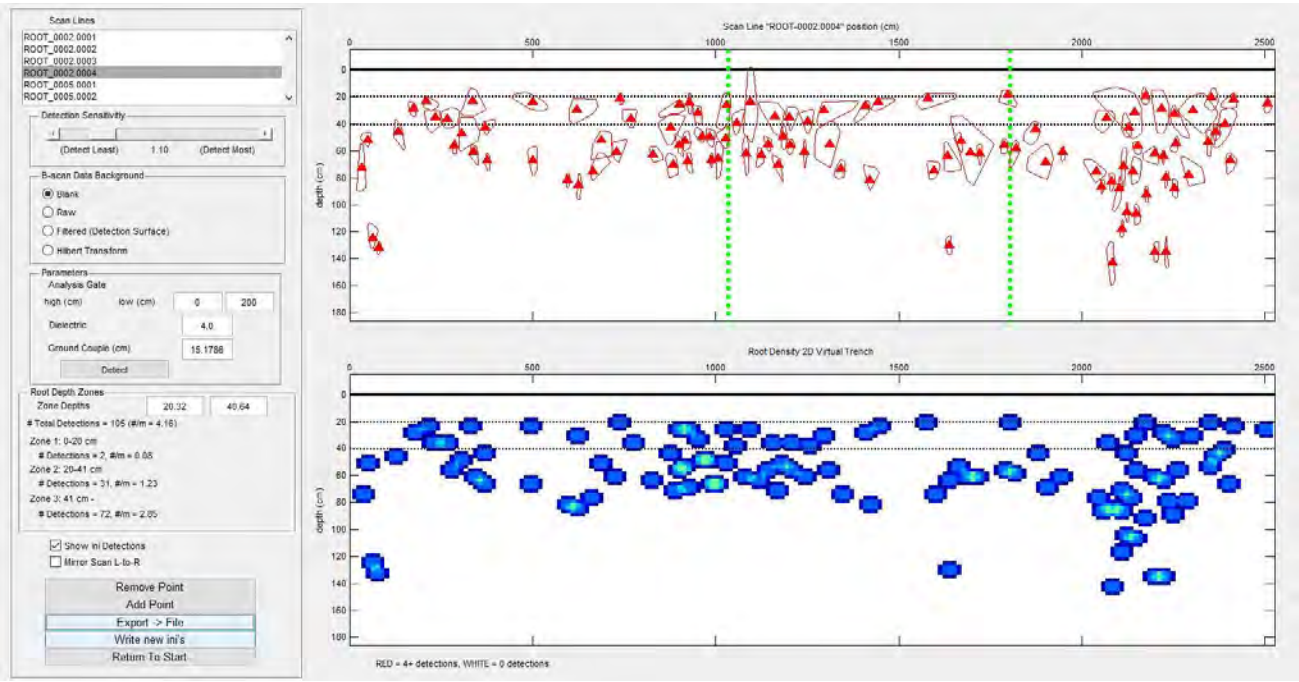
Scan line 0002.0002

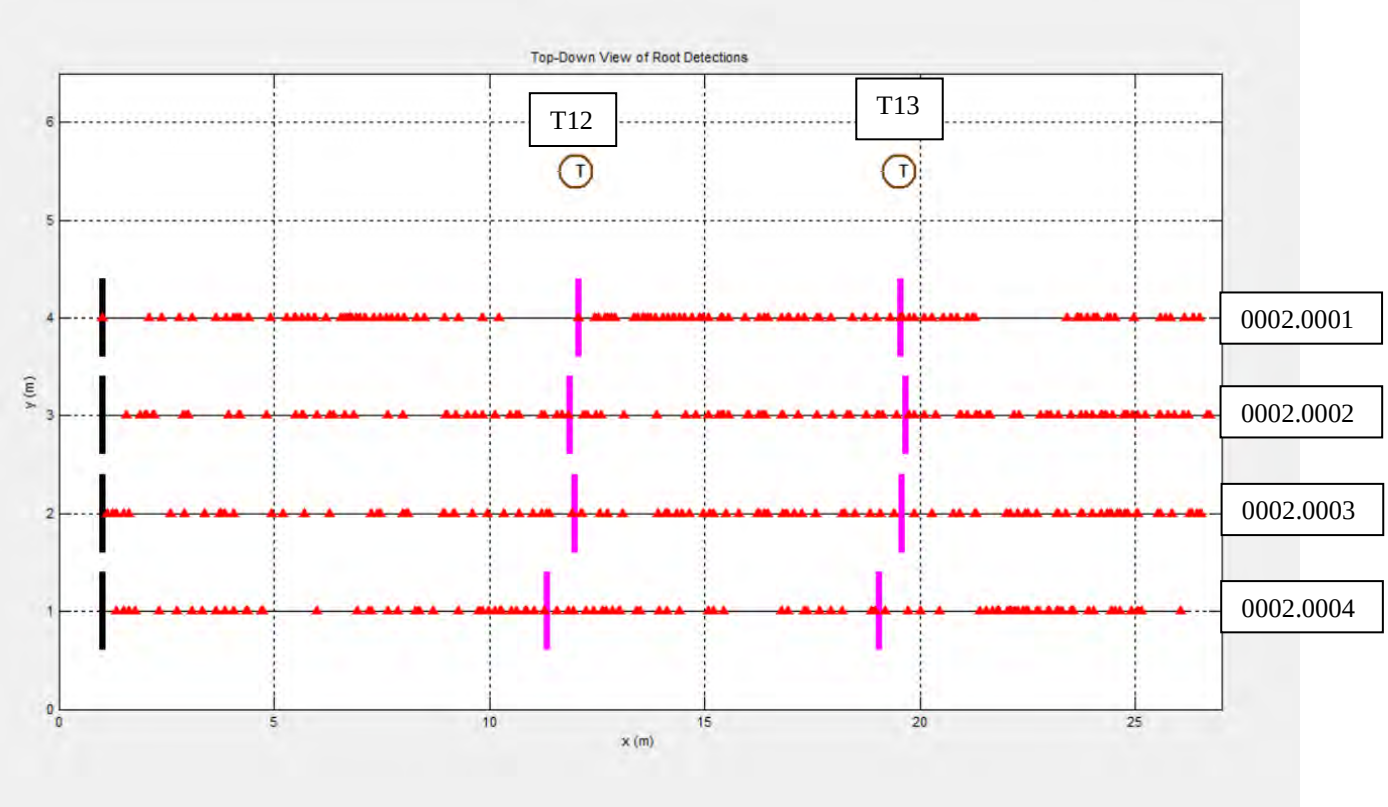


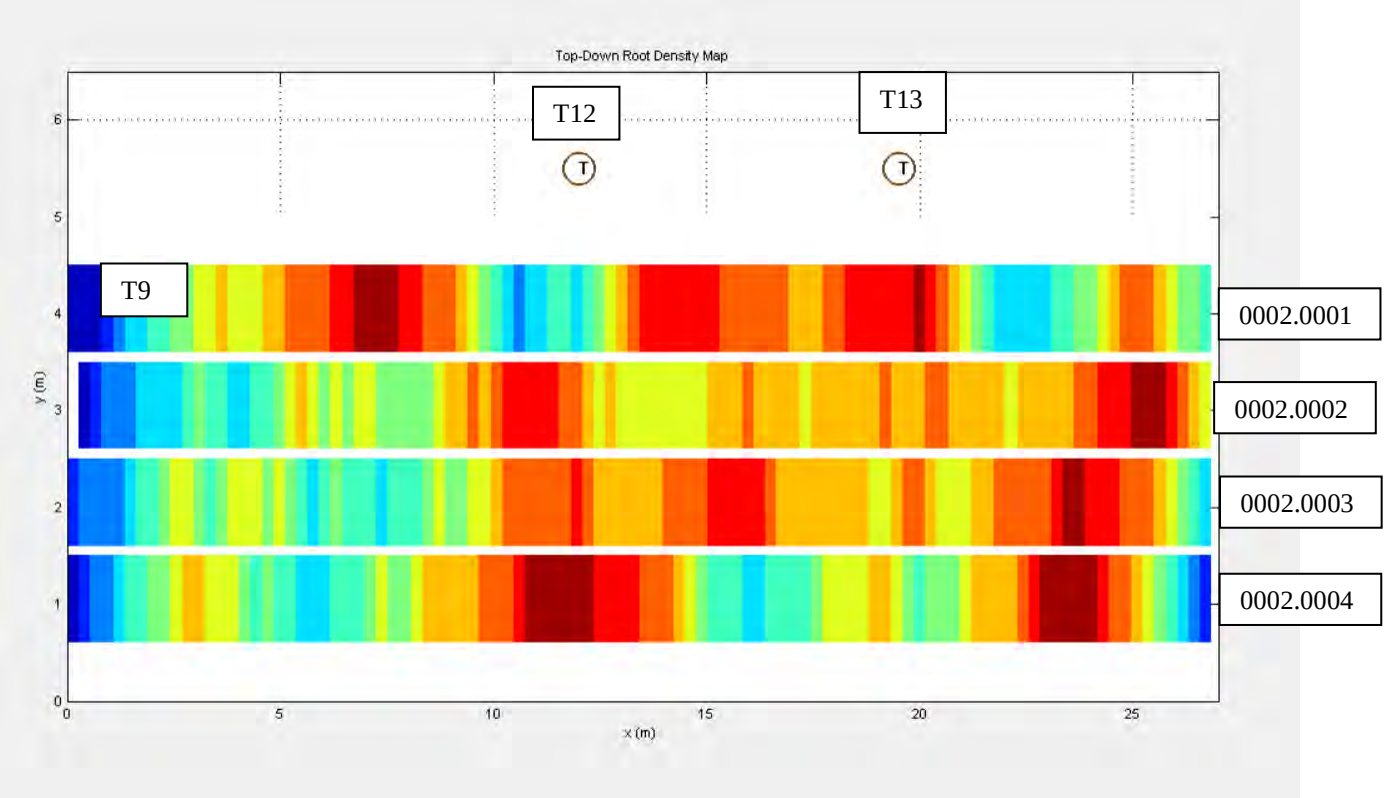
Scan line 0002.0003



Scan line 0002.0004




Top-Down View of Root Detections
T12
T13
0002.0001
0002.0002
0002.0003
0002.0004
y (m)
x (m)


Top-Down Root Density Map
T12
T13
T9
0002.0001
0002.0002
0002.0003
0002.0004
y (m)
x (m)

Scan 0003.0001-0003

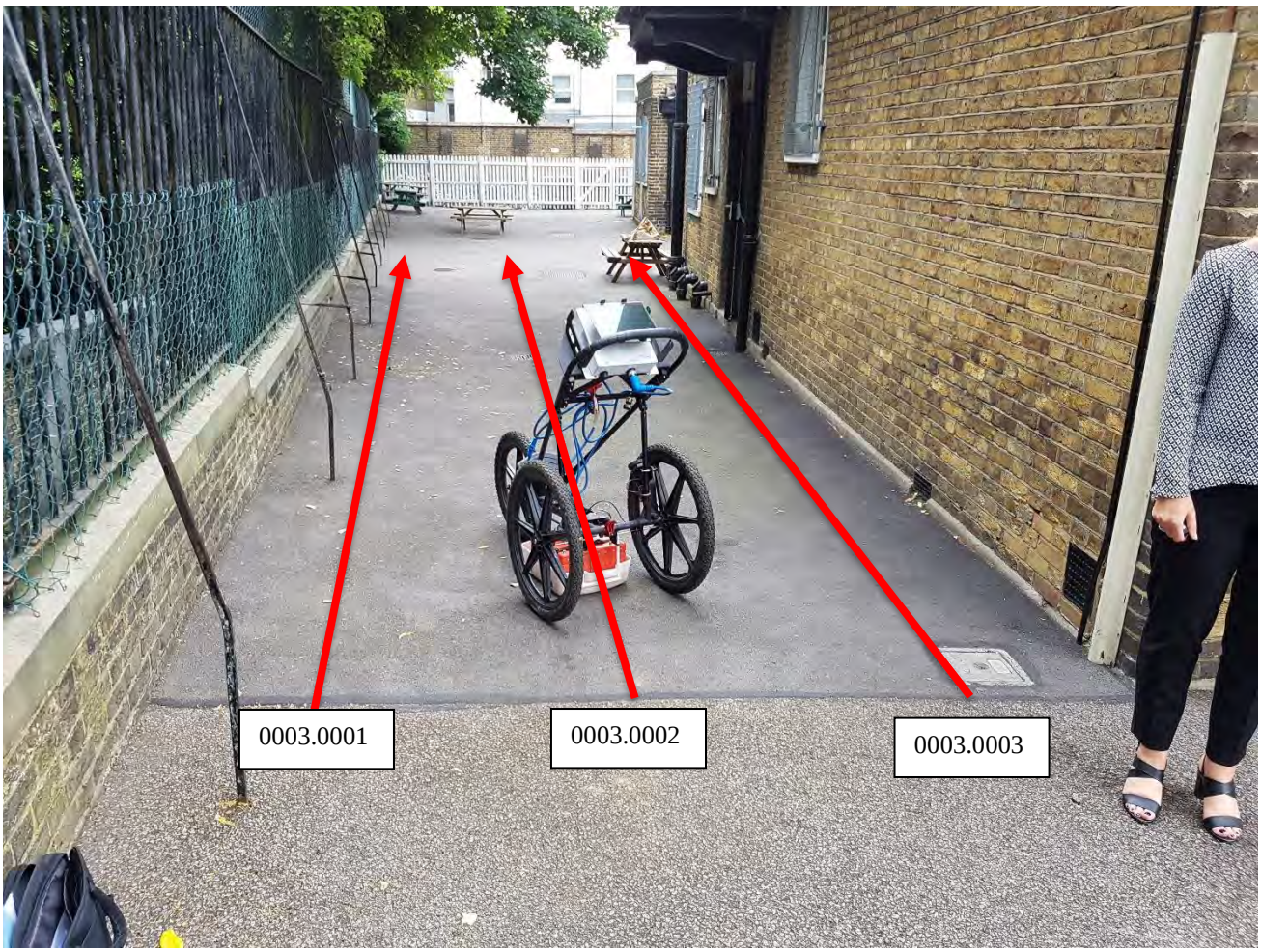
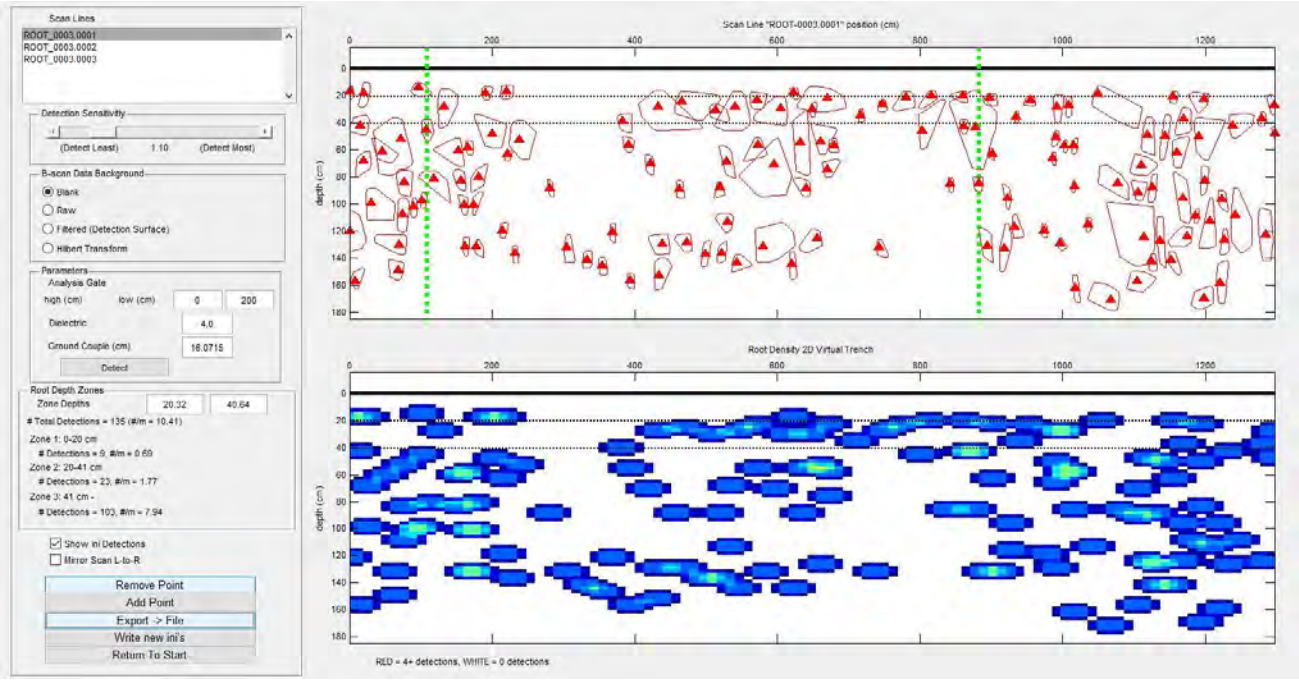
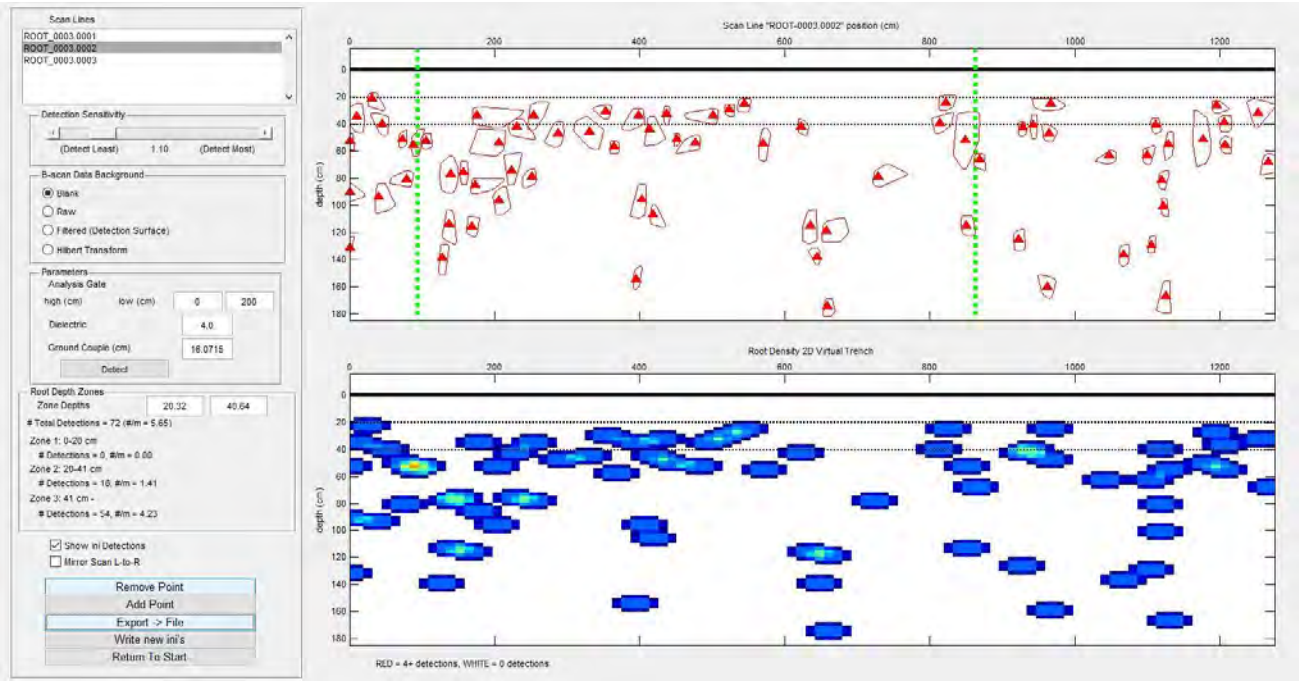


Photo 5. Scan line 0003.0001-0003

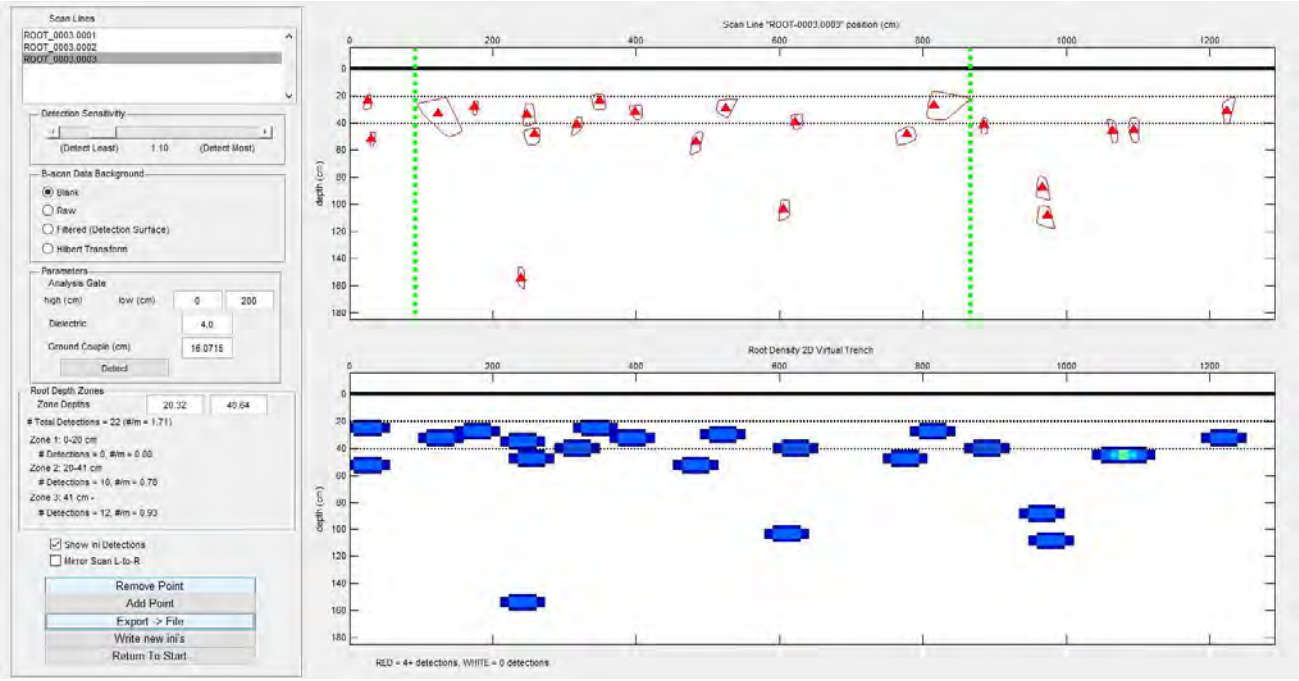
Scan line 0003.0001

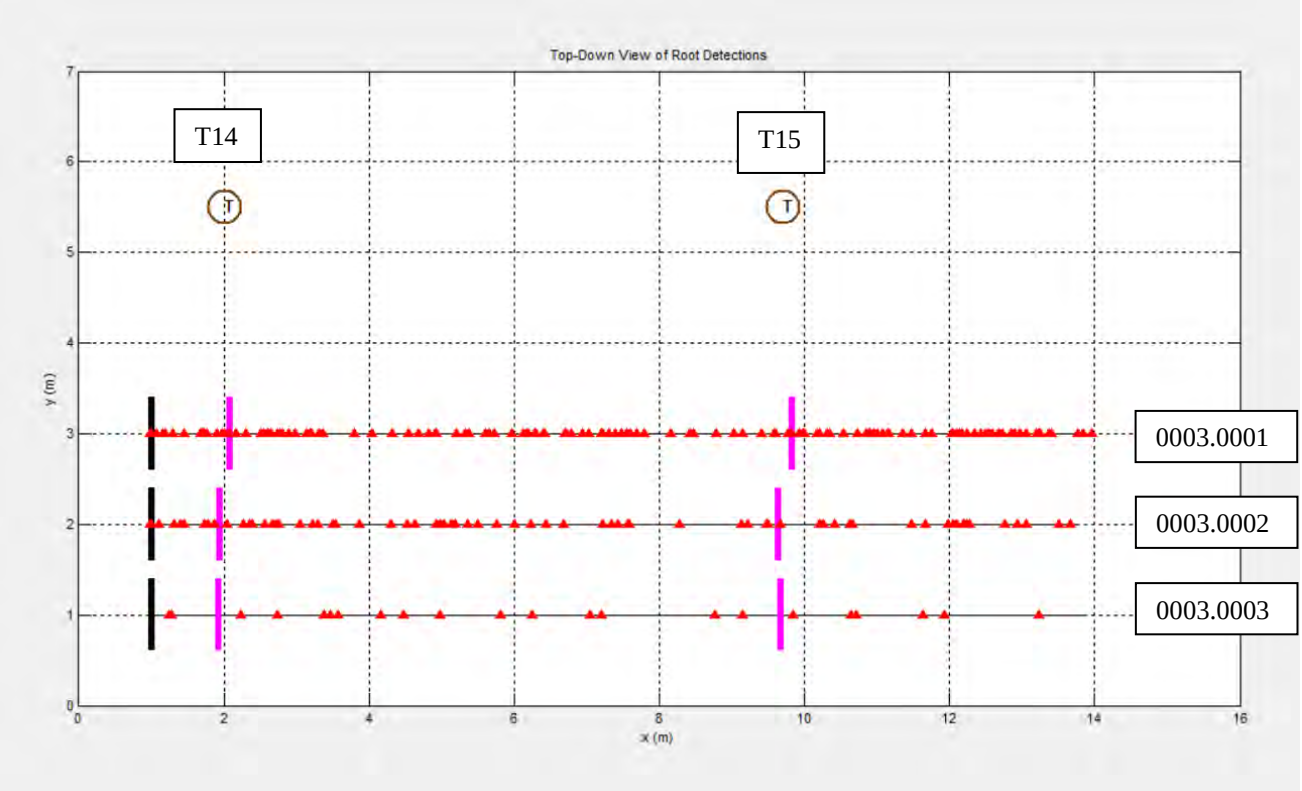


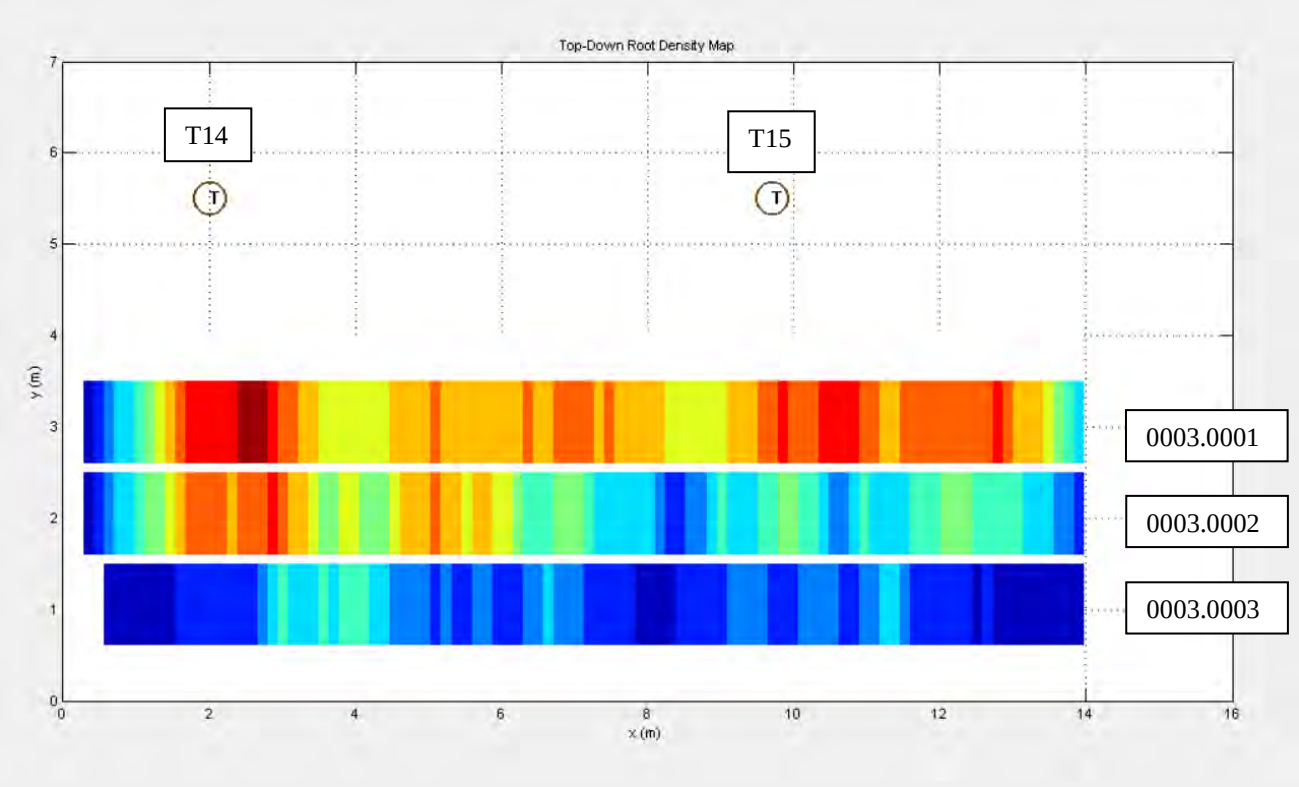
Scan line 0003.0002



Scan line 0003.0003




Top-Down View of Root Detections
T14
T15
0003.0001
0003.0002
0003.0003
y (m)
x (m)


Top-Down Root Density Map
T14
T15
0003.0001
0003.0002
0003.0003
y (m)
x (m)

0004.0001-0005

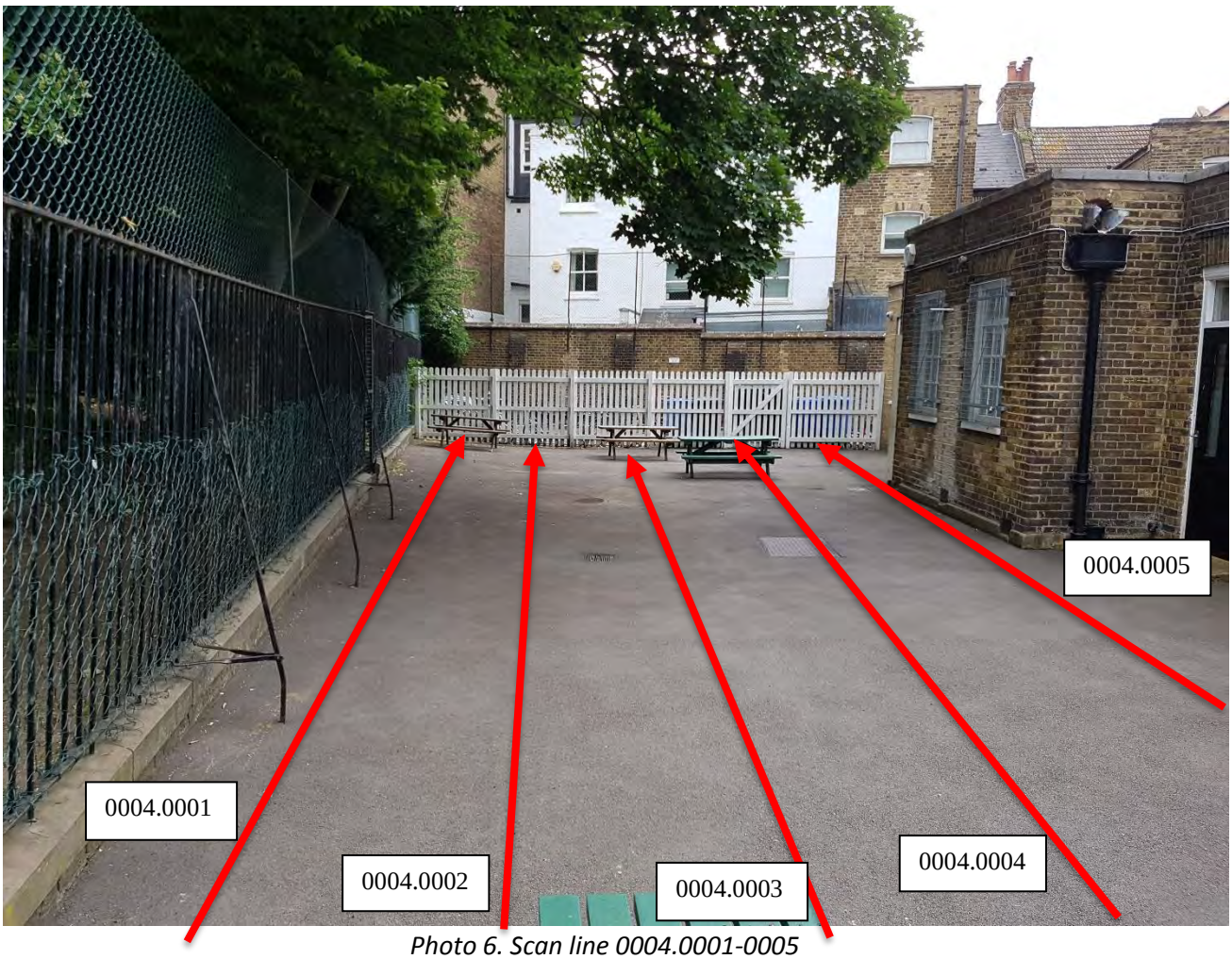
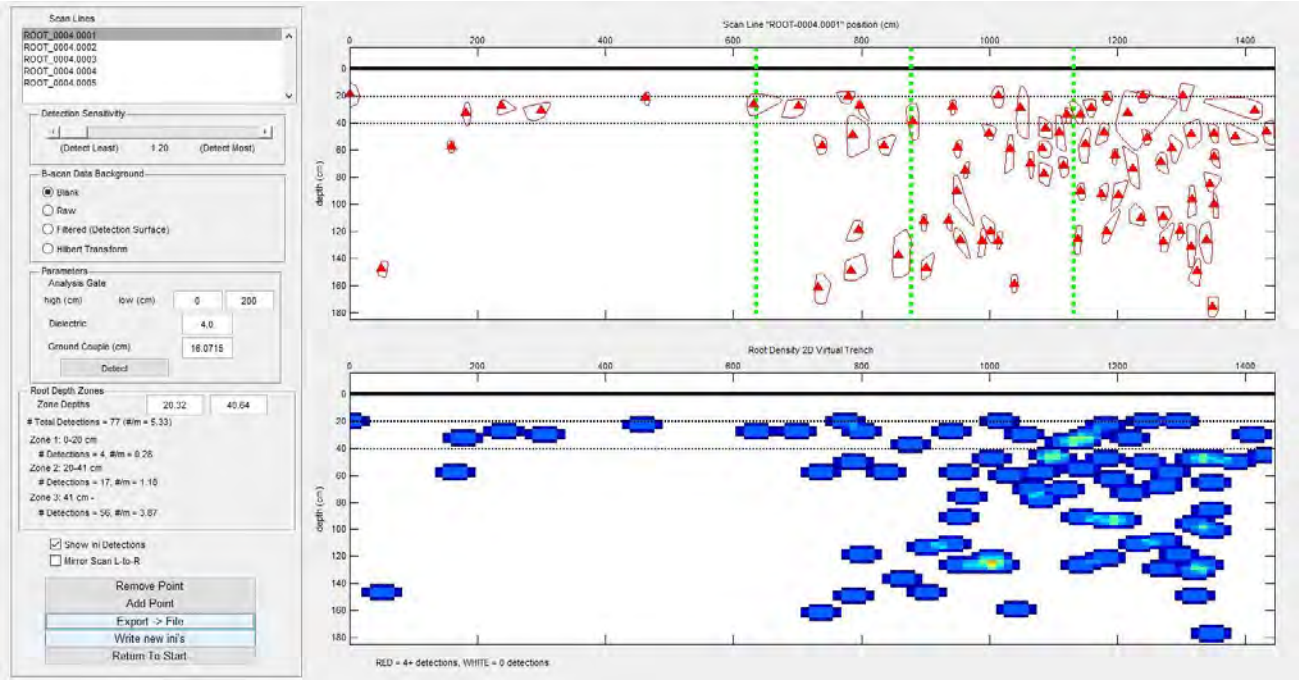
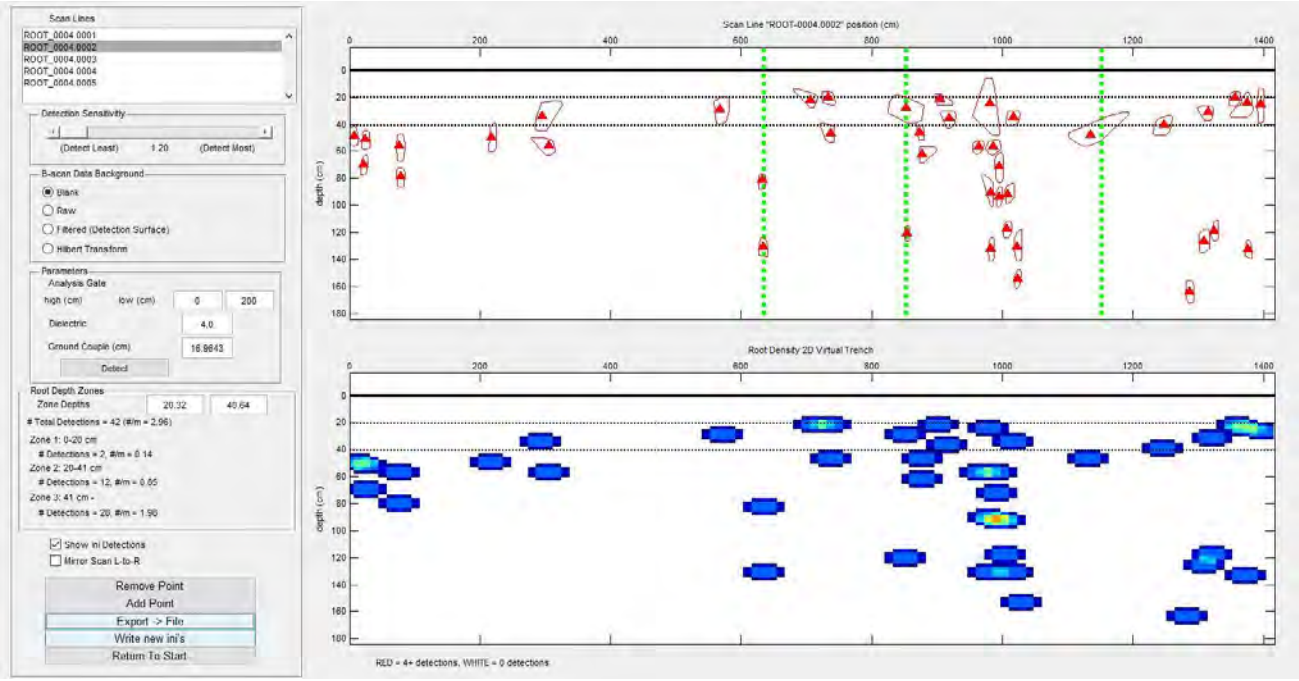


Photo 6. Scan line 0004.0001-0005

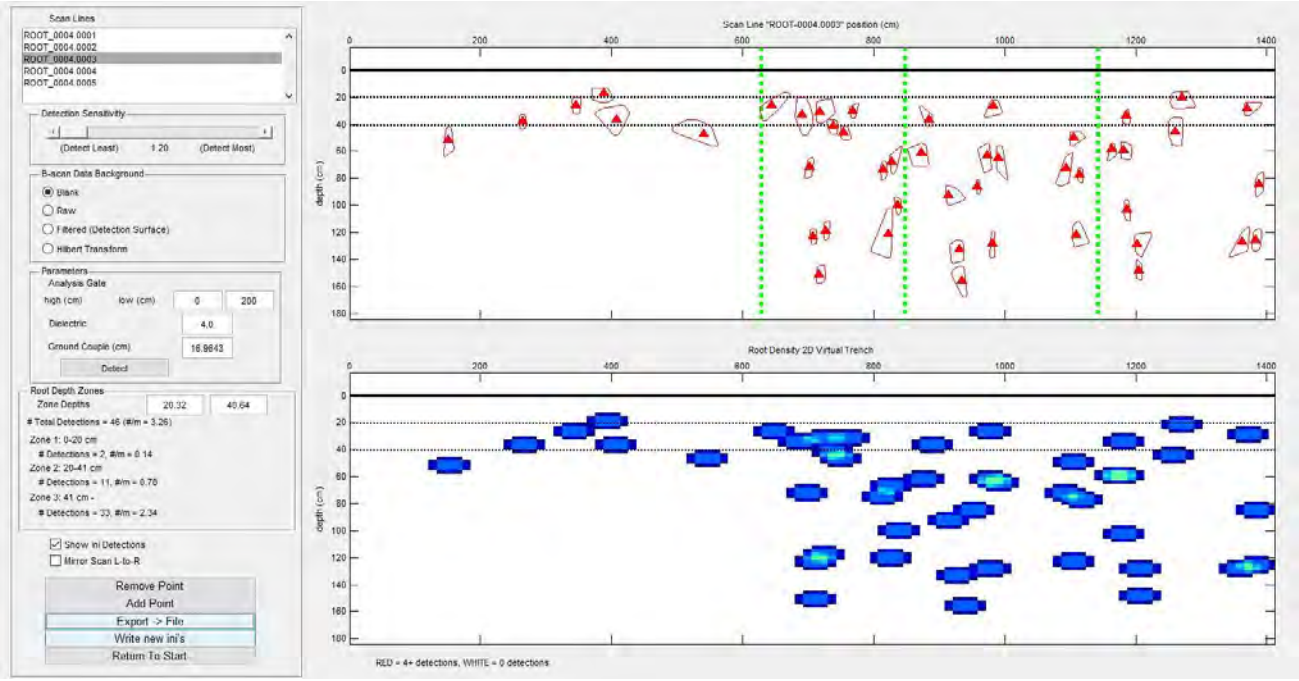
Scan line 0004.0001



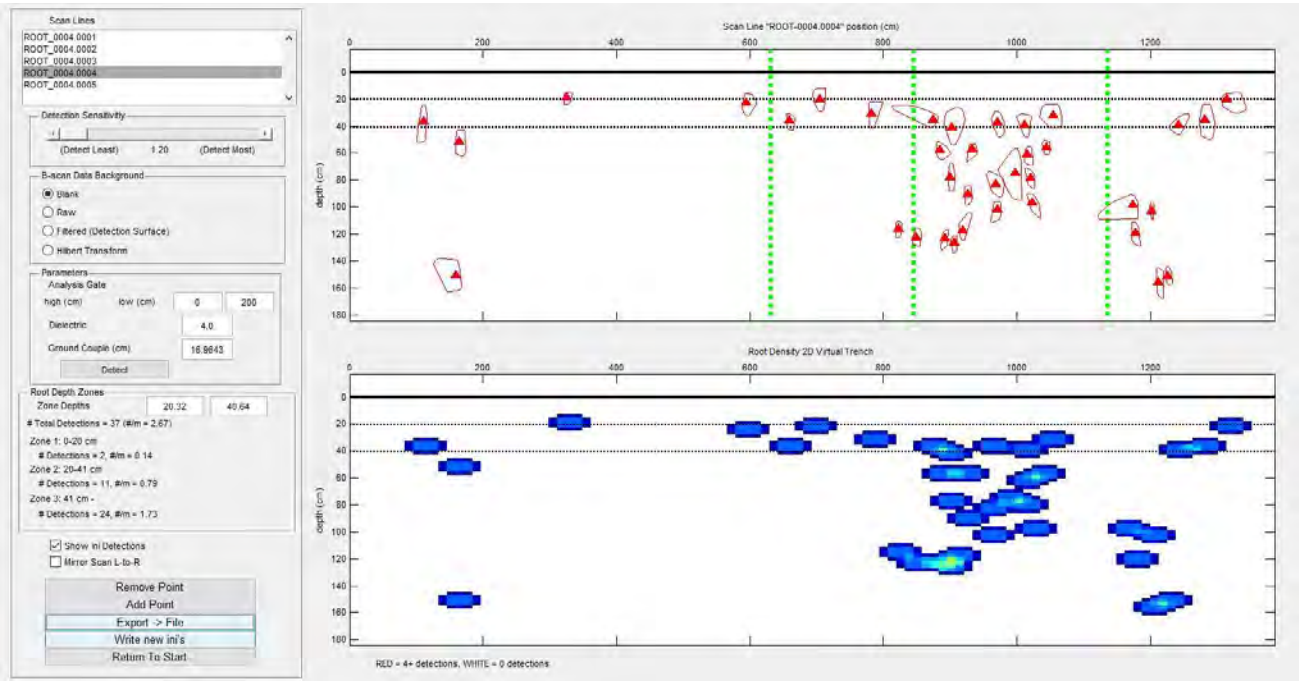
Scan line 0004.0002



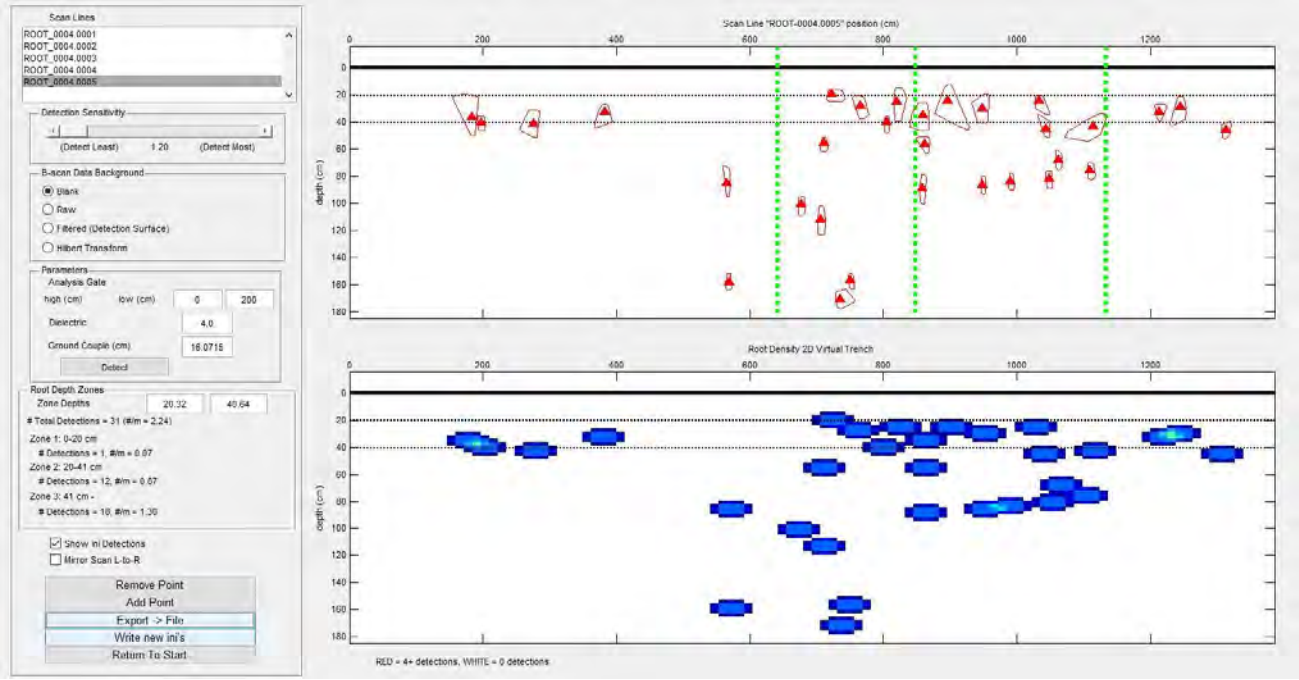
Scan line 0004.0003

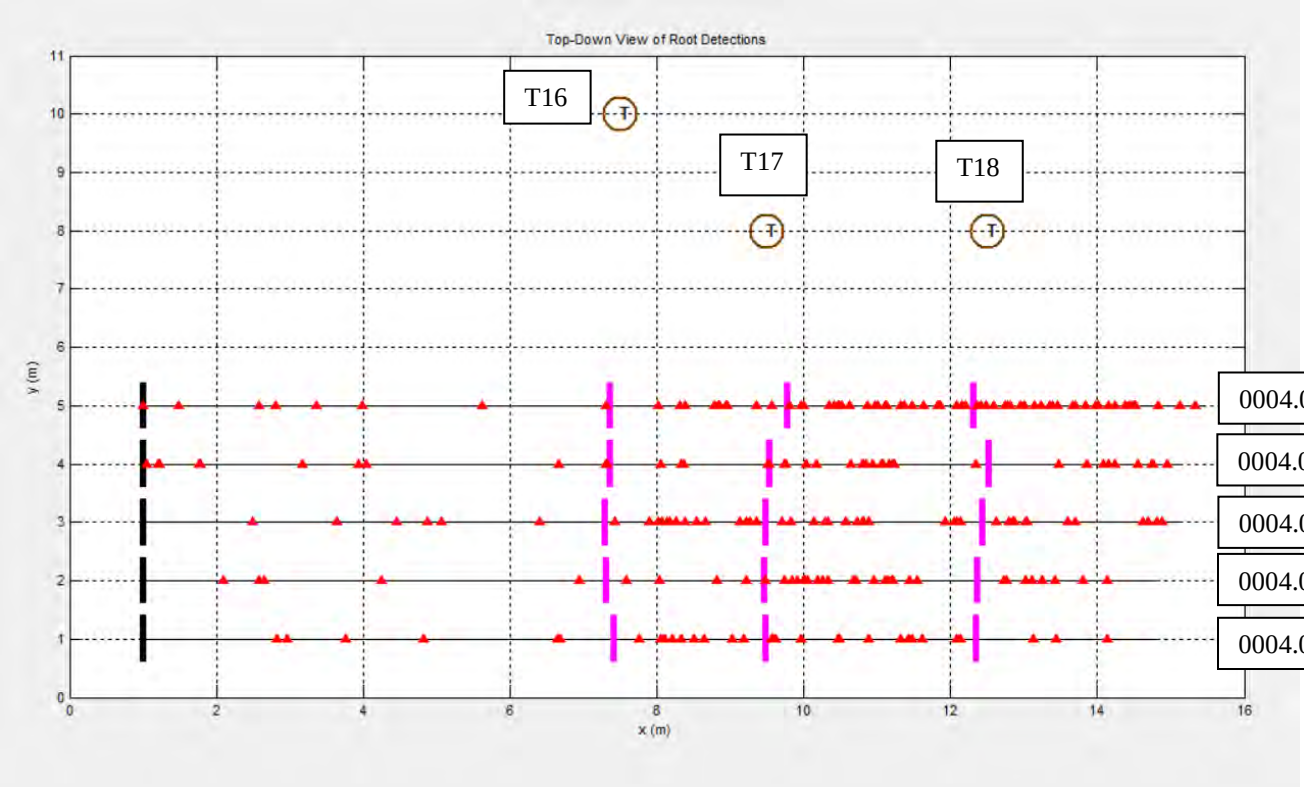


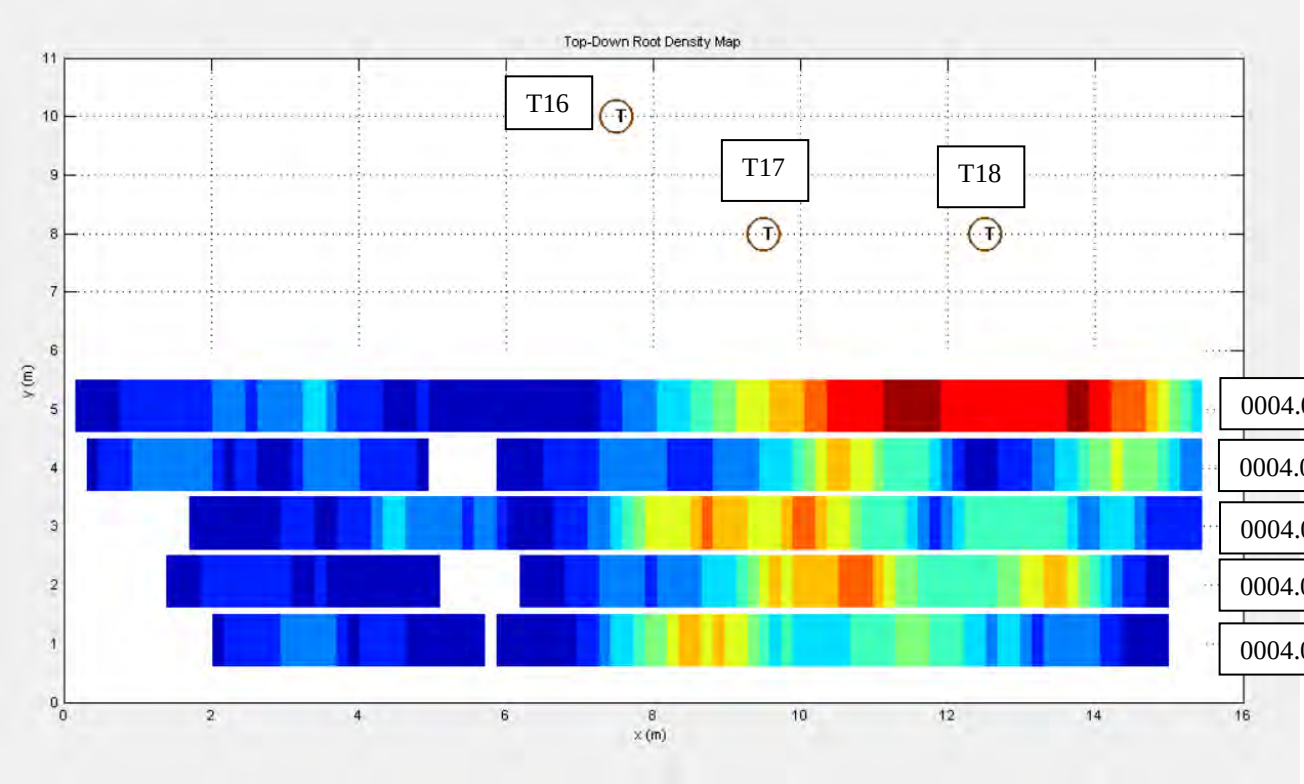
Scan line 0004.0004



Scan line 0004.0005




Top-Down View of Root Detections
T16
T17
T18
0004.0001
0004.0002
0004.0003
0004.0004
0004.0005
y (m)
x (m)


Top-Down Root Density Map
T16
T17
T18
0004.0001
0004.0002
0004.0003
0004.0004
0004.0005
y (m)
x (m)

8. CAVEATS & EXCLUSIONS:-

Specific report caveats

1. The survey is concerned solely with TreeRadar issues

2. As trees are a dynamic living organism this report is only valid for a period of 12 months

3. All arboricultural issues, other than the root analysis by TreeRadar are outside the scope of this report.

4. The TreeRadar equipment only picks up roots with a diameter greater than 20mm.

PROFILE:

Sharon Hosegood
ASSOCIATES

Ian Lee

MArborA BSC (Hons) Tech Cert (Arbor A)

Ian has ten 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 on the operation and interpretation of TreeRadar © and has carried out two research and development visits with SHA in 2016. This research is being continued in 2017 with international colleagues.

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

In 2017 Ian is working towards chartership with the Institute of Chartered Foresters and will be an integral part of SHA's growth strategy.

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:

- Associate 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

Sharon Hosegood
ASSOCIATES

Root investigation by Tree Radar

SITE
Kingsgate School, Camden, NW6 2JG

CLIENT

Wharton Tree & Ecology Consultants Ltd

IAN LEE
MArborA BSC (Hons) Tech Cert (Arbor A)

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OUR REF: SHA 411

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