TRA Consulting

Root Investigation by TreeRadar

Tree Radar

SITE

15 Chalcot Square,

London,

NW1 8YA

CLIENT

Bridget Plant

Ian Lee

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

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DATE: 22.05.2025

OUR REF: TRA 0479

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EXECUTIVE SUMMARY

This report provides information on the root spread of trees growing in the rear garden of 15 Chalcot Square, London, NW1 8YA, where it is proposed to construct a new rear extension to the existing residential property.

The scan lines do not cover the full theoretical root protection areas (RPAs) of the subject trees due to the boundary wall, dense vegetation and raised shrub beds, but instead focuses on the areas initially identified for the potential extension or soil level changes.

The results show that the trees have been influenced by the surrounding garden walls but that the footings have not formed a complete barrier to the rooting of T2 and T5. As such the trees are rooting out into the garden beyond their RPAs at significant densities.

No increase in density was seen as the scan lines approached the off-site trees T6 and T7 and no visible evidence was found on site of these trees extending their roots beneath the boundary wall.

The final design and layout of any proposed development or alterations, along with the depth of any excavations and the working methodology required are outside the remit of this report, however, arboricultural advice, using the information provided within this report should aid in the design of a scheme that will allow the retention of the tree wherever possible, with the minimal impact upon its health and long-term viability.

Contents

1. INTRODUCTION: -

1.1. This report provides information on the root spread of trees growing in the rear garden of 15 Chalcot Square, London, NW1 8YA, where it is proposed to construct a new rear extension to the existing residential property.

1.2. The survey was carried out on 13th May 2025 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 the private rear garden of 15 Chalcot Square, London, a 5-storey end of terrace residential property, located on the south east side of Chalcot Square and opposite Chalcot Gardens. The property is surrounded on all sides by further residential properties and their gardens, which are separated and screened off by high brick boundary walls. The rear garden can be accessed from the lower ground floor or via an external staircase leading down from the upper ground floor terrace.

2.2 A tree survey was carried out by TRA Consulting as part of our on-going arboricultural consultancy work for the project. Details of the trees have been covered within the accompanying arboricultural report and the information will not be repeated within this report, as it is outside the remit of the TreeRadar survey. For ease of reference the corresponding tree numbers will be used within the TreeRadar report where applicable.

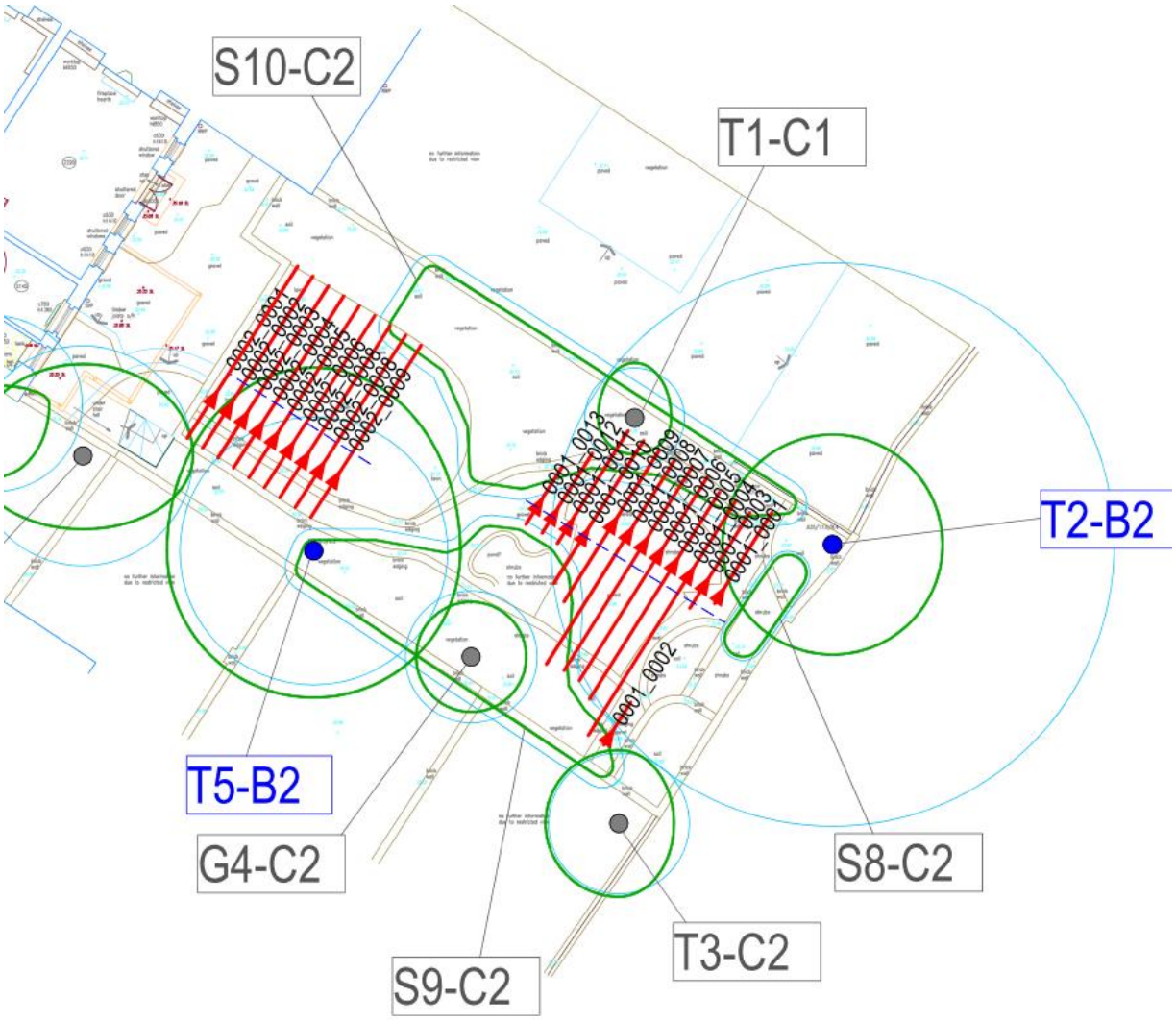
3. METHODOLOGY:-

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 1. Photo of the TreeRadar cart (in a different setting)

3.2 Scanning conditions were relatively straight forward, though much of the site contain 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 theoretical root protection areas (RPAs) of the subject trees due to the boundary wall, dense vegetation and raised shrub beds, but instead focuses on the areas initially identified for the potential extension or soil level changes.

3.3 The locations of the scan lines are found at Appendix 1 on the TreeRadar plan (reference *TRA 0479TR,* extract below), and the results super-imposed on the TreeRadar Results Plan (*TRA 0479TRR).* 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.

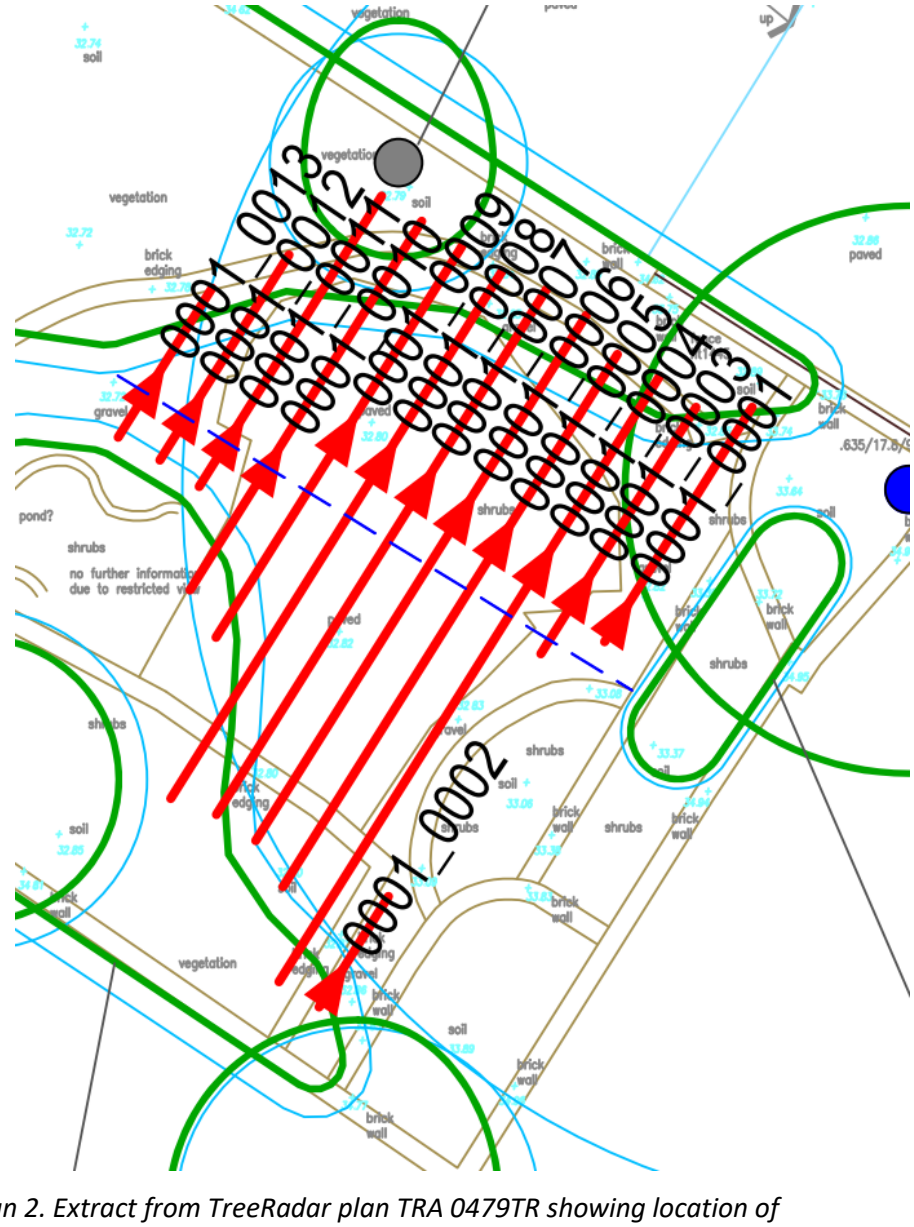


Plan 1 – Extract from TRA 0479TR showing the survey area. Do not scale.

Red lines are the scan lines. Blue lines are survey markers. North is vertical.

4. RESULTS:-

4.1. Scan lines 0001_0001-0013 – Scan lines 0001_0001-0013 are a series of parallel lines running approximately south west to north east at the far end of the rear garden. The lines start at the southern wall and run across the garden parallel to the eastern wall to end at the northern wall unless obstructed by vegetation or the raised garden beds. Where lines 0001_0002 is obstructed by part of the shrub bed wall, the line stops and is then continued on the far side of the obstruction by 0001_0003. Scan line 0001_0001 is located 0.5m from the lower tier of the raised brick shrub bed containing tree T2, with each subsequent line or pair of lines located an additional 0.5m from the wall in turn. A survey marker is made level with the north east corner of the lower curved wall to help align the scan lines. An extract from the TreeRadar plan *TRA 0479TR* below shows the locations of the scan lines.



Plan 2. Extract from TreeRadar plan TRA 0479TR showing location of scan lines 0001_0001-0013. Do not scale.

Photo 2. Survey area for the 0001 series.

4.1.1. **Results:** Roots in this area are initially found in high densities, with the density slowly falling with increased distance from tree T2, reaching moderate density along 0001_0005 and low along 0001_0010 and beyond. Slightly raised densities are found at either end of the scan lines where the lines are close to the shrub beds containing woody shrubs and small trees. This distribution is best shown visually on the tree root density plan in section 8 of this report, with areas of high density shown in warm colours and lower density in cooler colours. The distribution shows that the tree is rooting beneath the shrub bed walls and extending into the garden area. The density on the outer RPAs is slightly higher than typically expected for an open grown tree, likely as a result of restricted rooting to the north and east from the boundary walls.

4.1.2. The majority of the roots are found in an unevenly distributed band between 10-90cm deep, with the soils appearing highly disturbed and containing a number of metals and non-root reflectors. This is typical of urban environments which may have been dug up and redeveloped over an extended period.

4.2. Scan lines 0002_0001-0009 – Scan lines 0002_0001-0009 are a series of parallel lines running approximately south west to north east within the lawn between the existing patio and tree T5. The lines start at the southern shrub bed and end at the northern shrub bed, running parallel to the brick wall edging around the patio. Scan line 0002_0001 is located 0.2m from the edge of the wall, with each subsequent line located an additional 0.5m to the north in turn. A survey marker is made level with the north east corner of the patio steps to help align the survey lines. An extract from the TreeRadar plan *TRA 0479TR* below shows the locations of the scan lines.

Plan 3. Extract from TreeRadar plan TRA 0479TR showing location of scan lines 0002_0001-0009. Do not scale.

Photo 3. View of the survey area for the 0002 series.

Arrow shows the located of scan line 0002_0001.

4.2.1. **Results:** Roots are initially found in extremely low density along lines 0002_0001-0003, rising to low along 0002_0004 and then moderate along lines 0002_0007-0009. However, the measure of density along the length of the scan lines does not give the full picture of rooting, with areas of higher density seen closer to the tree and shrub beds at either end of the lines and much lower density in the middle of the lawn. This distribution is best shown visually on the tree root density plan in section 8 of this report, with areas of high density shown in warm colours and lower density in cooler colours.

4.2.2. Rooting density remains significant beyond the theoretical RPA, likely due to the partially restricted rooting resulting from the boundary wall, although cracking to the wall shows that the footings do not form a complete barrier to tree roots.

4.2.3. The majority of the roots are found in an unevenly distributed band between 10-80cm deep, with the soils again appearing highly disturbed and containing a number of metals and non-root reflectors. This is typical of urban environments which may have been dug up and redeveloped over an extended period.

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 theoretical RPAs of the subject trees due to the boundary wall, dense vegetation and raised shrub beds, but instead focuses on the areas initially identified for the potential extension or soil level changes.

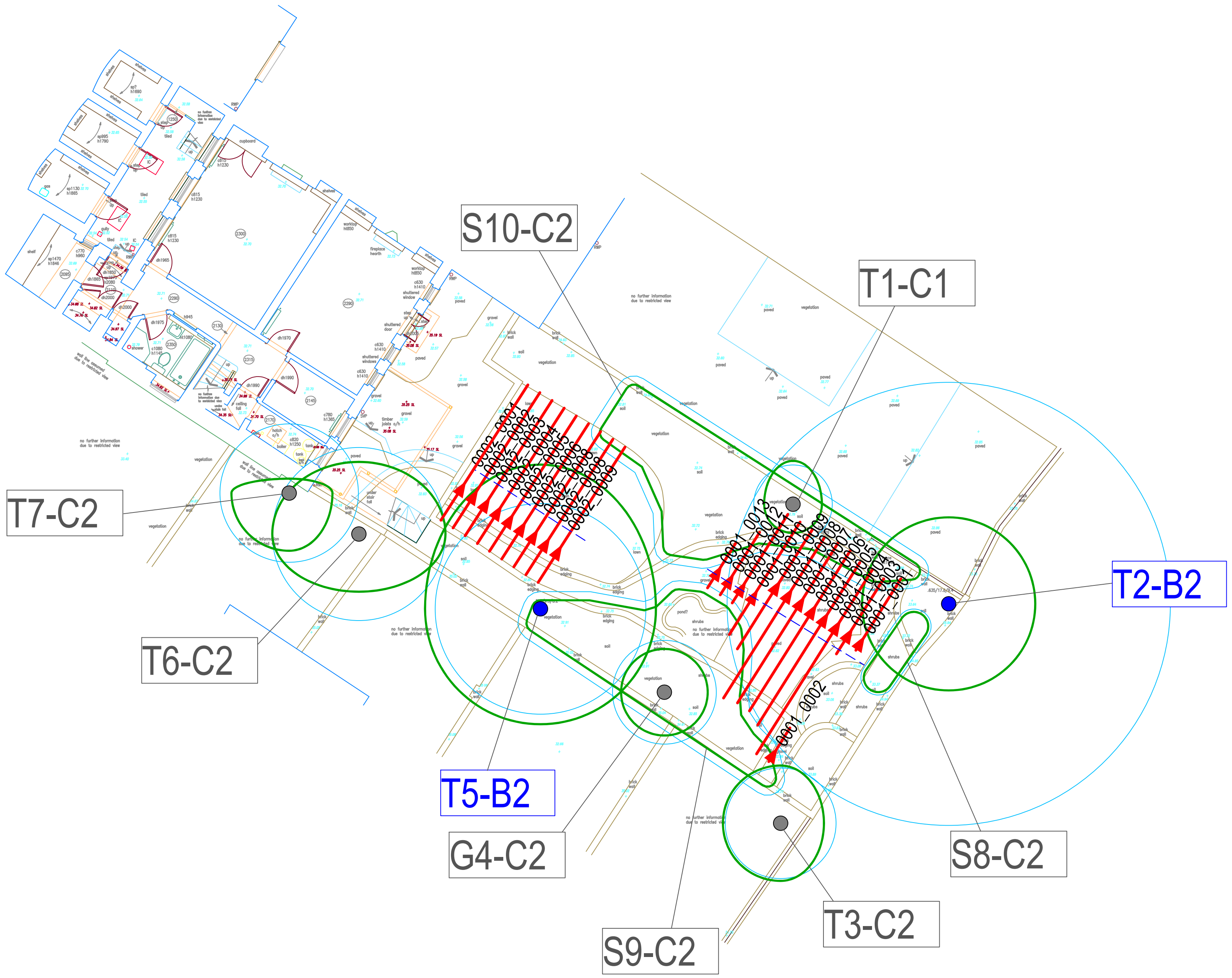
5.3. Within sections of the site the survey data contained a number of metals and non-root reflectors, with poorly defined soil horizons. Non-root reflectors within the data can initially provide false positives within the results, which are identified and removed by the operator during the analysis process as far as possible. This can leave false positives within the data, but not false negatives. These false positives may consist of certain types of rock or clay nodules, which are porous and retain water at higher densities than the surrounding soils but may also be old clay bricks, which are hydrophilic and are often found in London soils due to the history of the city. This retained water has the same radar signature as the water held within tree roots and so cannot all be disregarded. In areas of very low root density and high quantities of non-root reflectors, there is a significantly increased likelihood of a detection being a false positive.

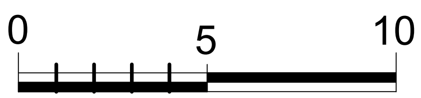
5.4. The results show that the trees have been influenced by the surrounding garden walls but that the footings have not formed a complete barrier to the rooting of T2 and T5. As such the trees are rooting out into the garden beyond their RPAs at significant densities.

5.5. No increase in density was seen as the scan lines approached the off-site trees T6 and T7 and no visible evidence was found on site of these trees extending their roots beneath the boundary wall.

5.6. The final design and layout of any proposed development or alterations, along with the depth of any excavations and the working methodology required are outside the remit of this report, however, arboricultural advice, using the information provided within this report should aid in the design of a scheme that will allow the retention of the tree wherever possible, with the minimal impact upon its health and long-term viability.

6. Appendix 1 – Tree Radar Plan TRA 0479TR and TreeRadar Results Plan TRA 0479TRR





Please refer to full arboricultural report for details

0001-0001 Scan lines and direction

Survey Markers

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

Description : Authorized :

TRA Consulting
t: 01622 435929
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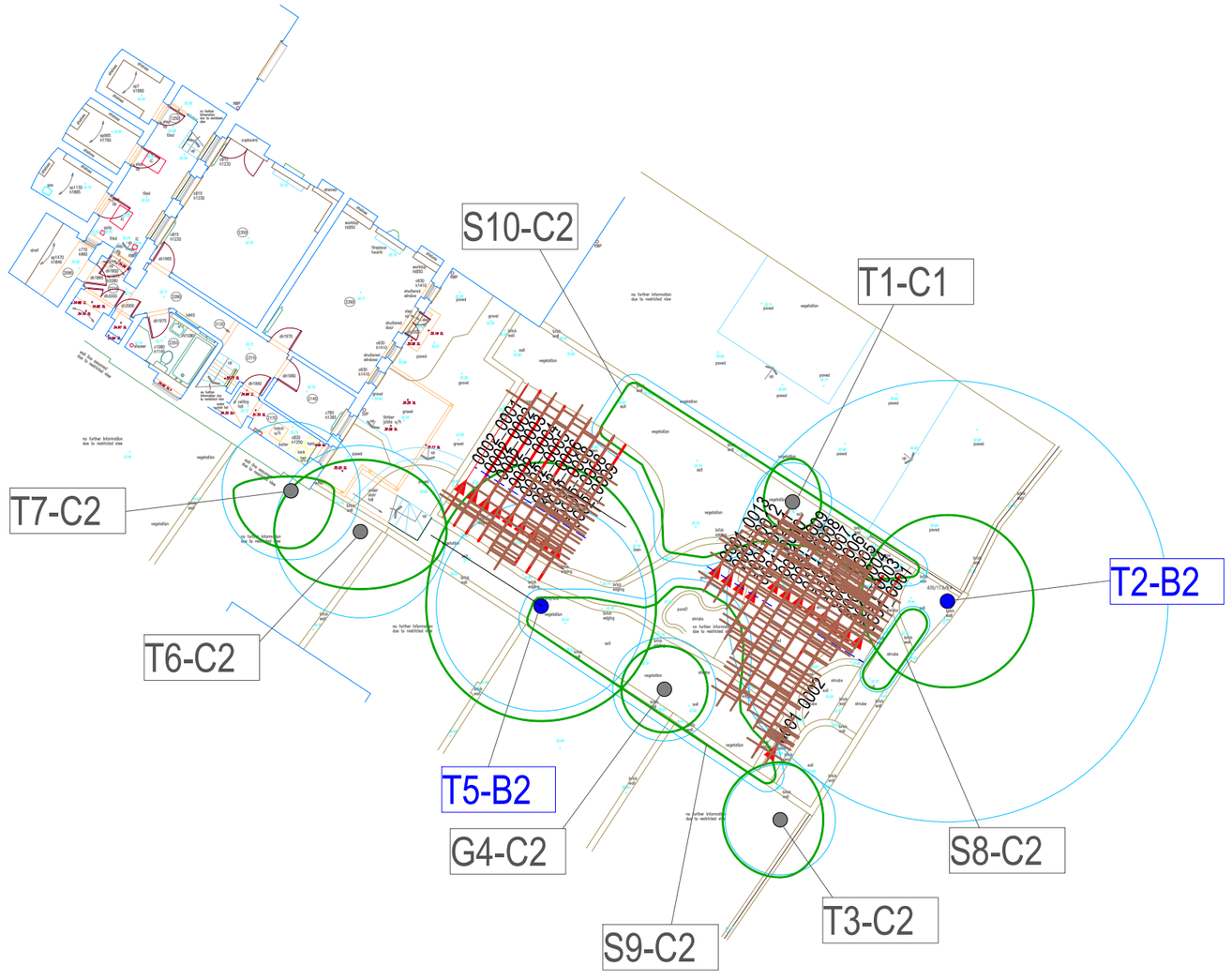
Bridget Plant

Site Address

15 Chalcot Square, London, NW1 8YA

Drawing Title	Orientation	Drawn	Authorized
Tree Radar Plan	N	IL	KL
Date	**Drawing Number**	**Scale**	**Drawing Status**
20.05.2025	TRA 0479 TR	1:200@A3	For Issue



0 5 10

Please refer to full arboricultural report for details

0001-0001 Scan lines and direction

Survey Markers

Detected roots with a diameter greater than 20mm

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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Site Address

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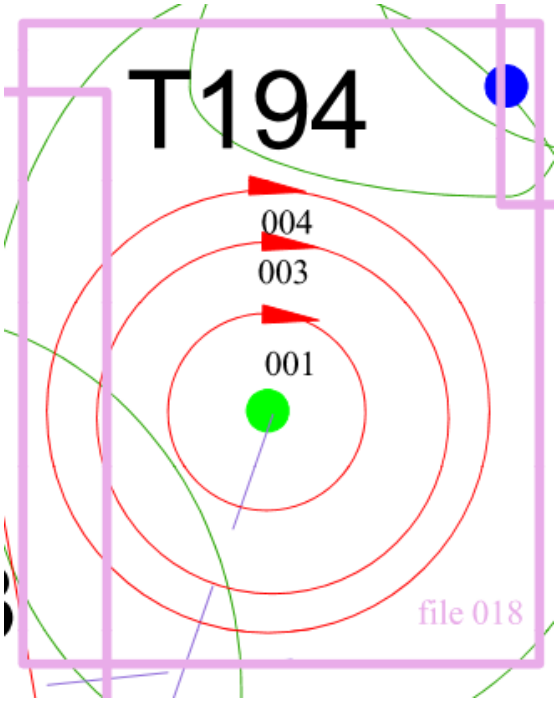
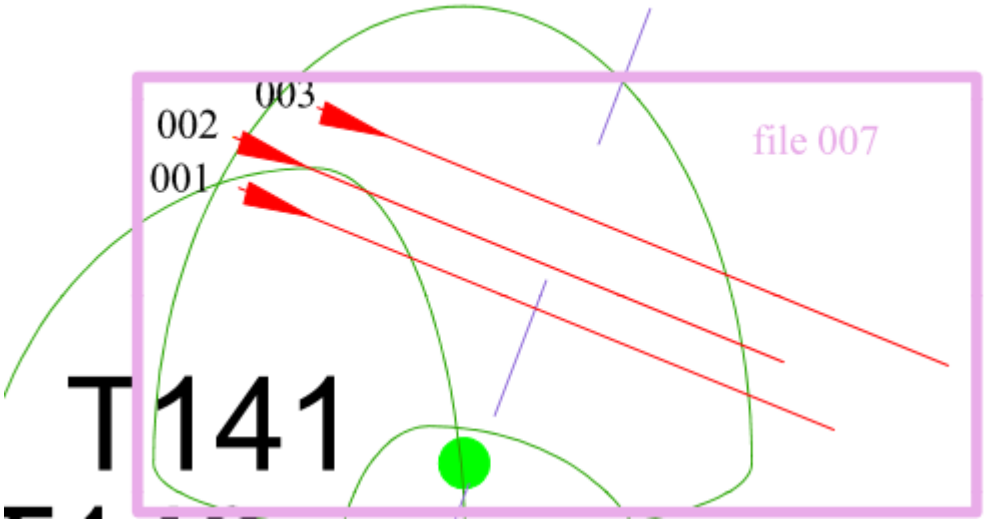
Drawing Title	Orientation	Drawn	Authorized
Tree Radar Results Plan		IL	KL
Date	**Drawing Number**	**Scale**	**Drawing Status**
20.05.2025	TRA 0479 TRR	1:200@A3	For Issue

7. How to read the scan lines

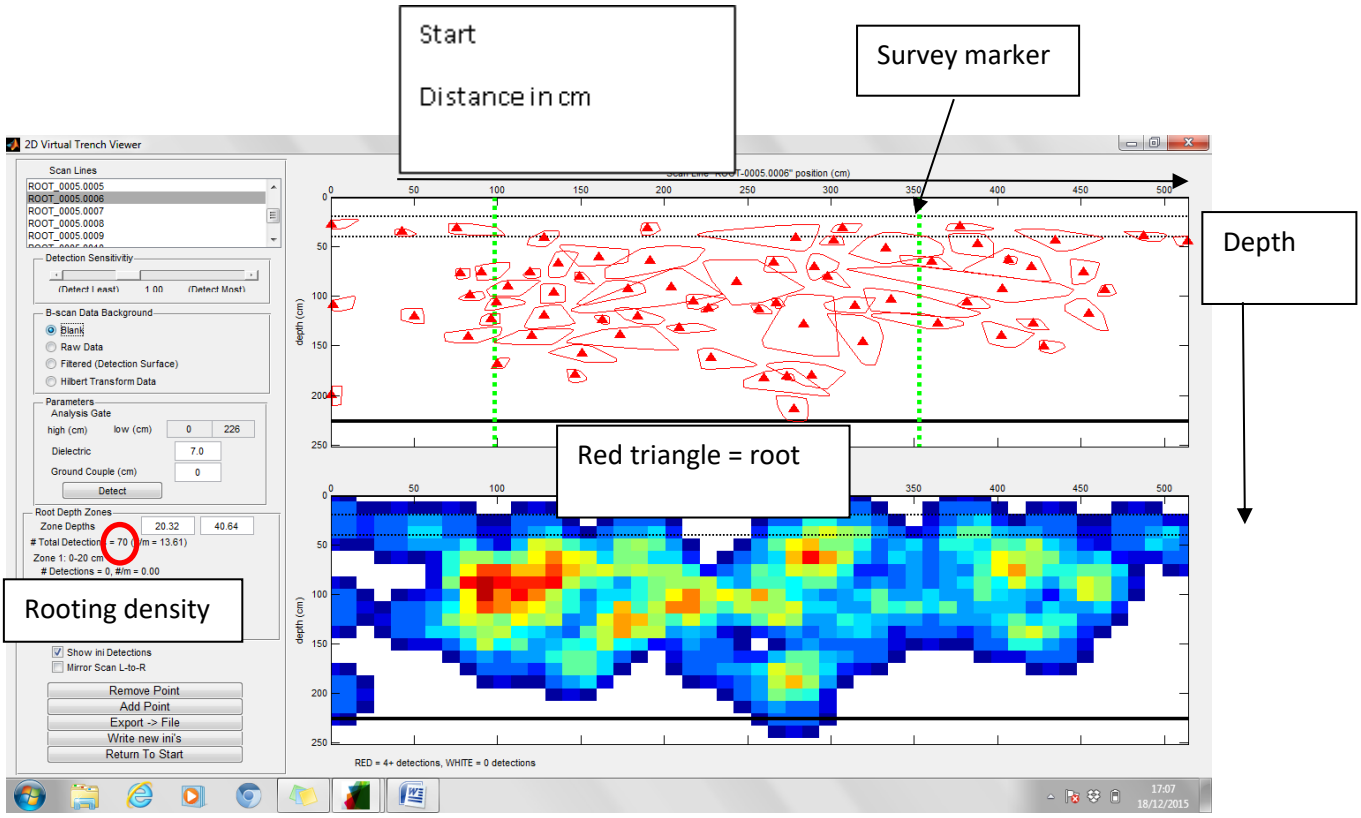
The results are shown as a top-down view (plan), and a cross section of each scan line. This is an extract of the plan, a scaled copy of which is found at appendix 1. The plan extracts in appendix 7 are not to scale. The locations of the scan lines are based on the plotting from the survey, and the length 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:

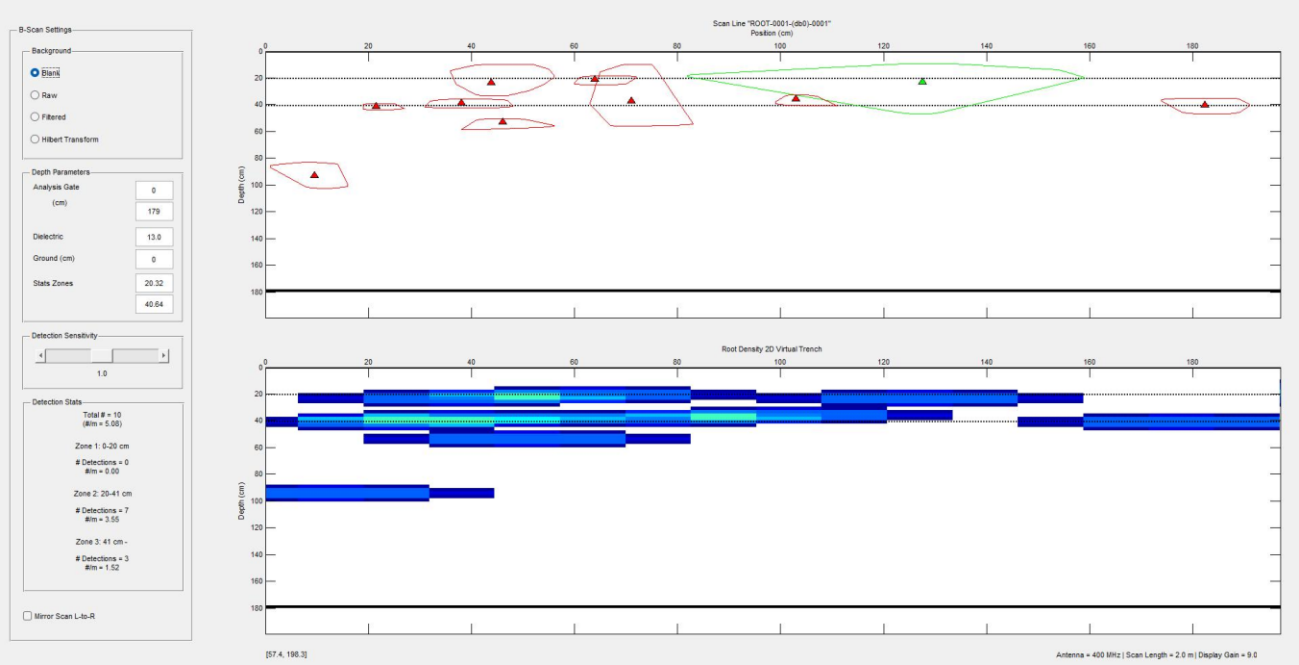


Polygons around the root detections are early attempts at root diameter, however, these are not particularly accurate currently as they can be influenced by the angle at which the scan crosses the root as well as smaller roots adjacent to the larger detection. Blue polygons are regions of very high mass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

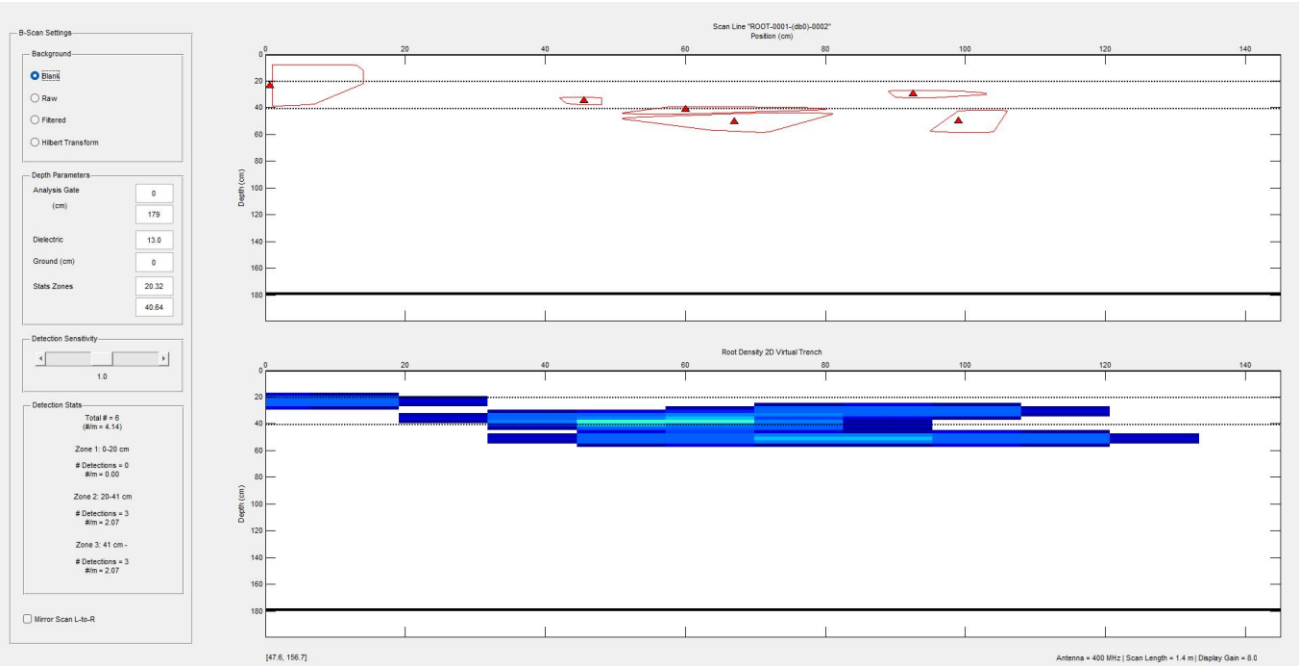
8. INDIVIDUAL SCAN LINE RESULTS

SCAN LINES 0001_0001-0013

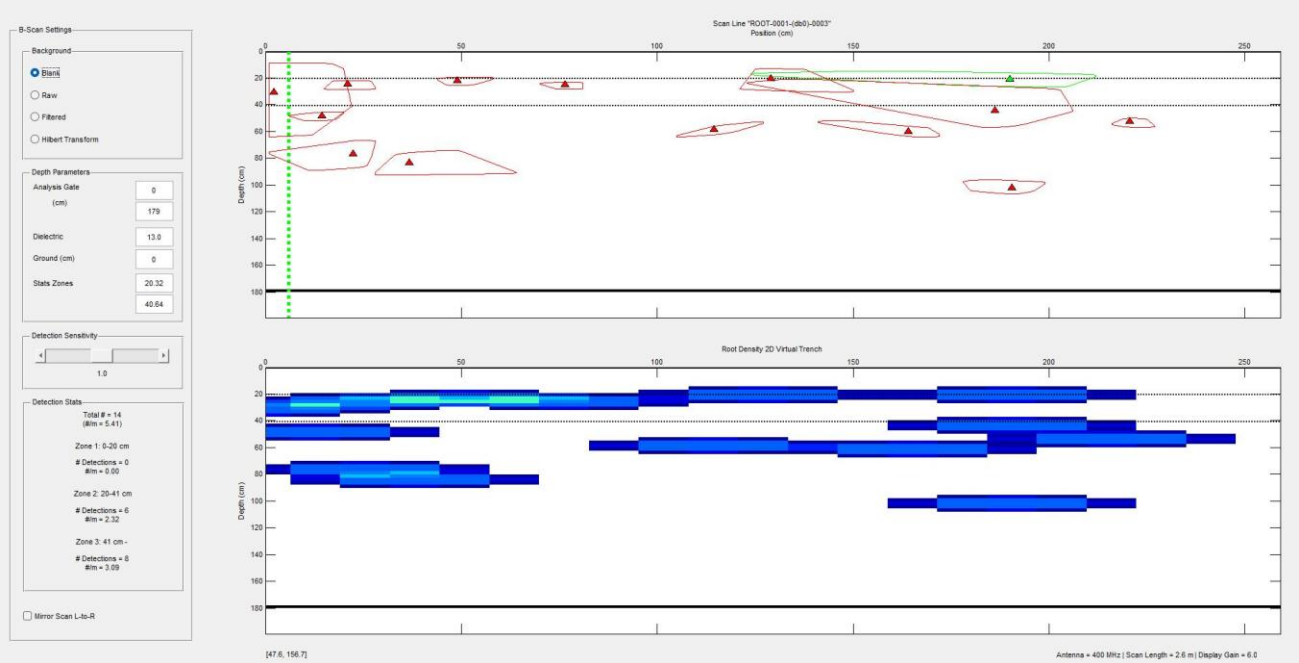
Scan line 0001_0001



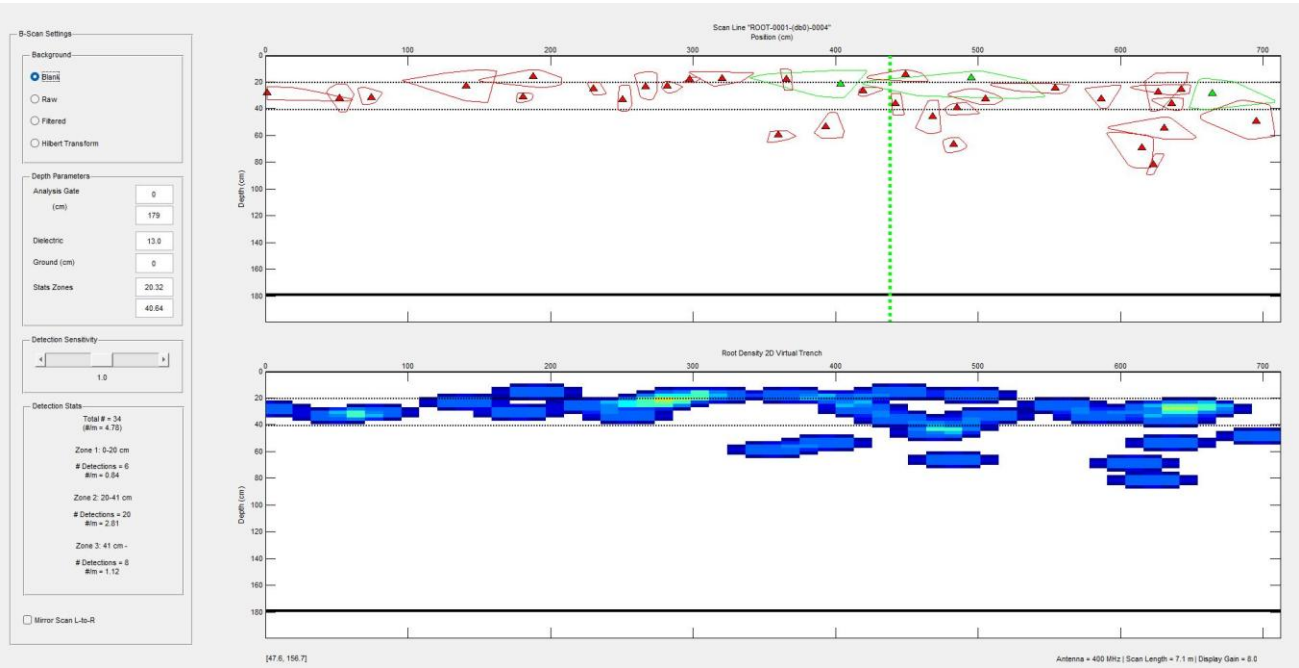
Scan line 0001_0002



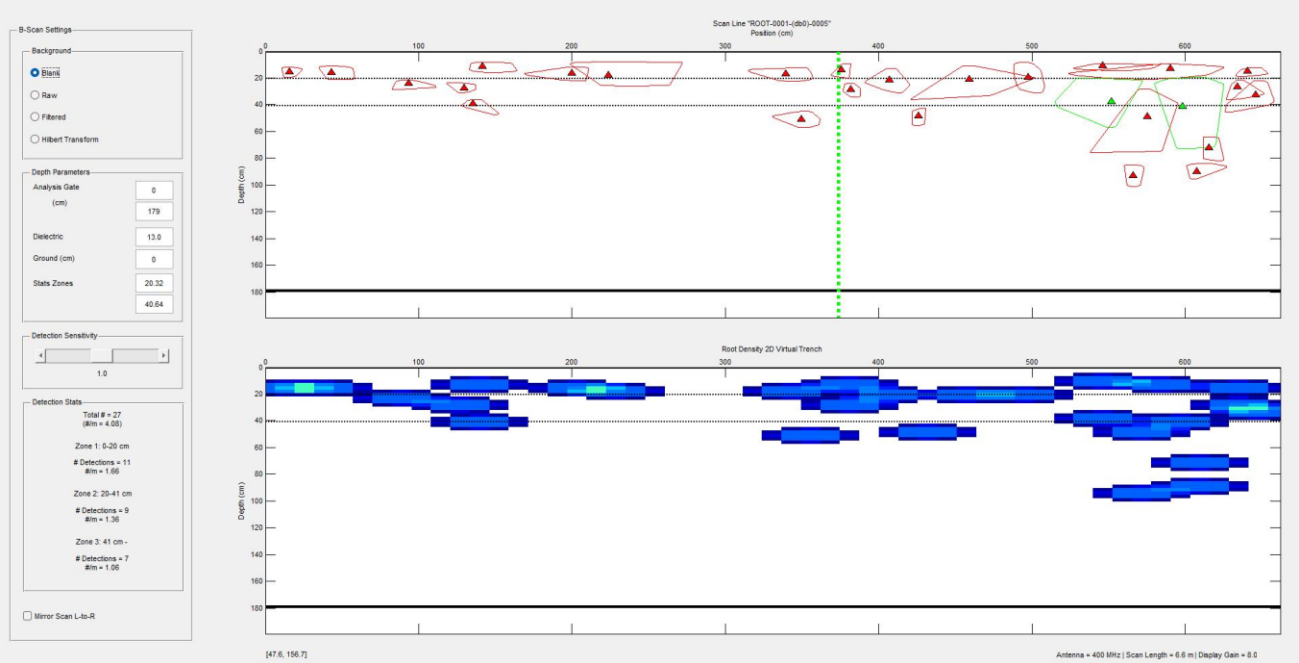
Scan line 0001_0003



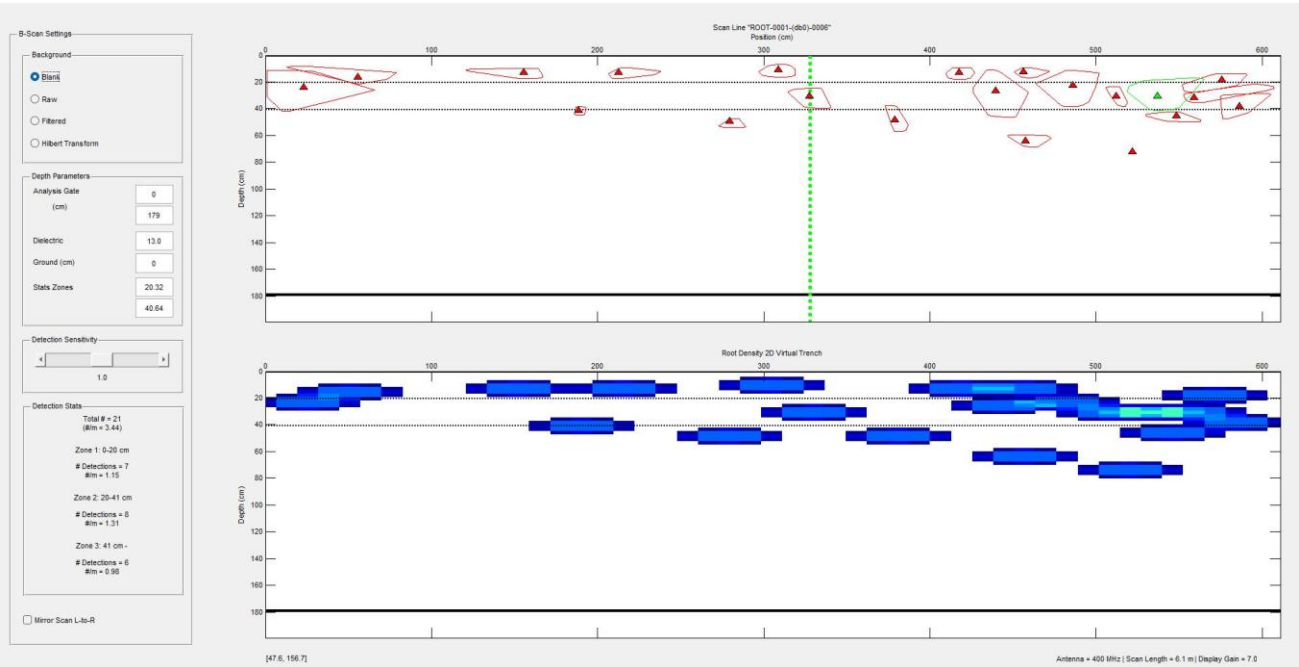
Scan line 0001_0004



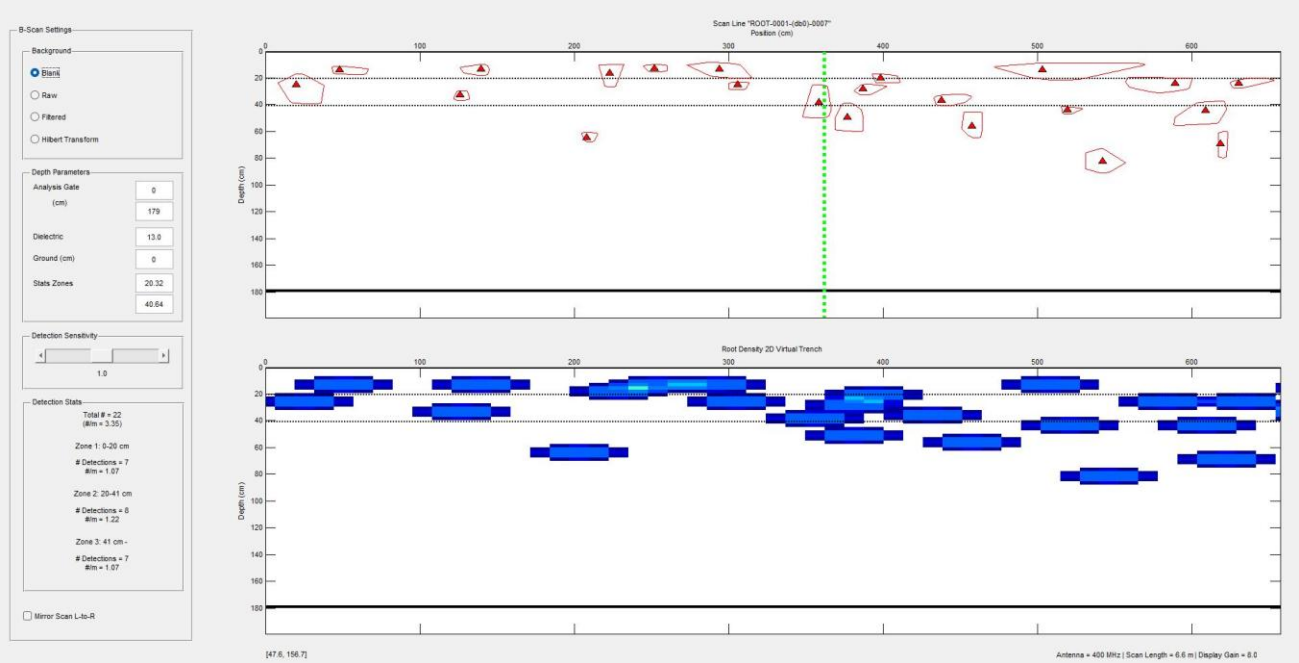
Scan line 0001_0005



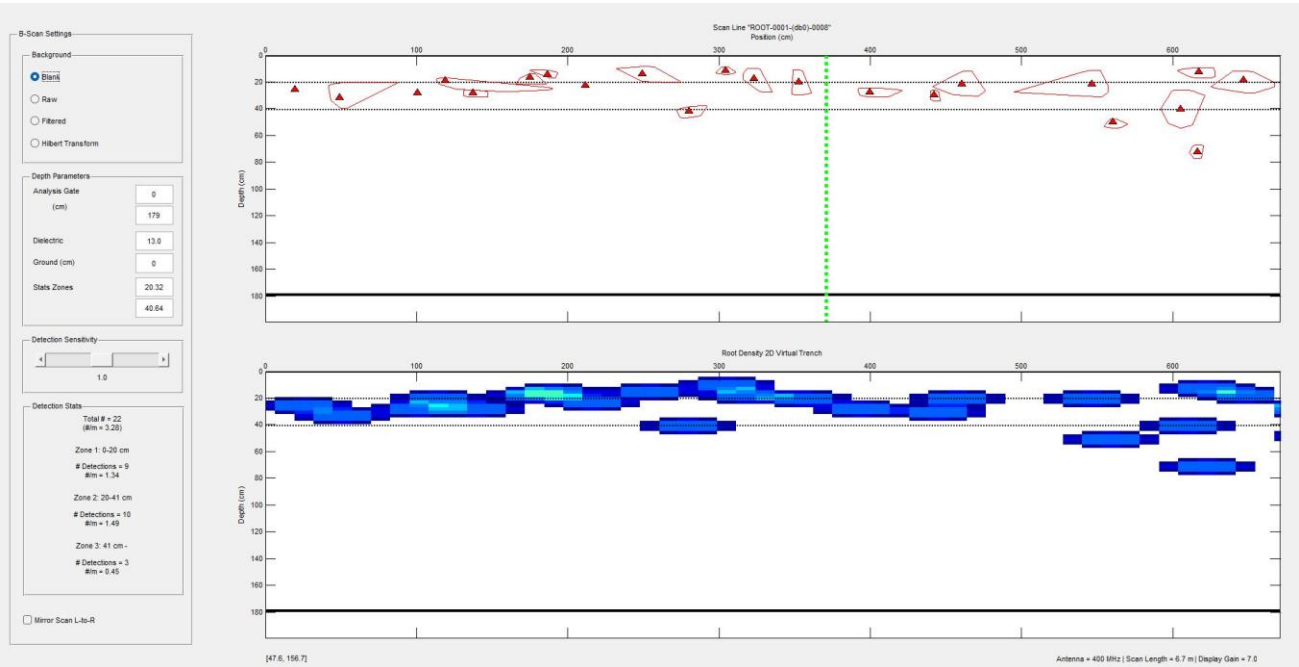
Scan line 0001_0006



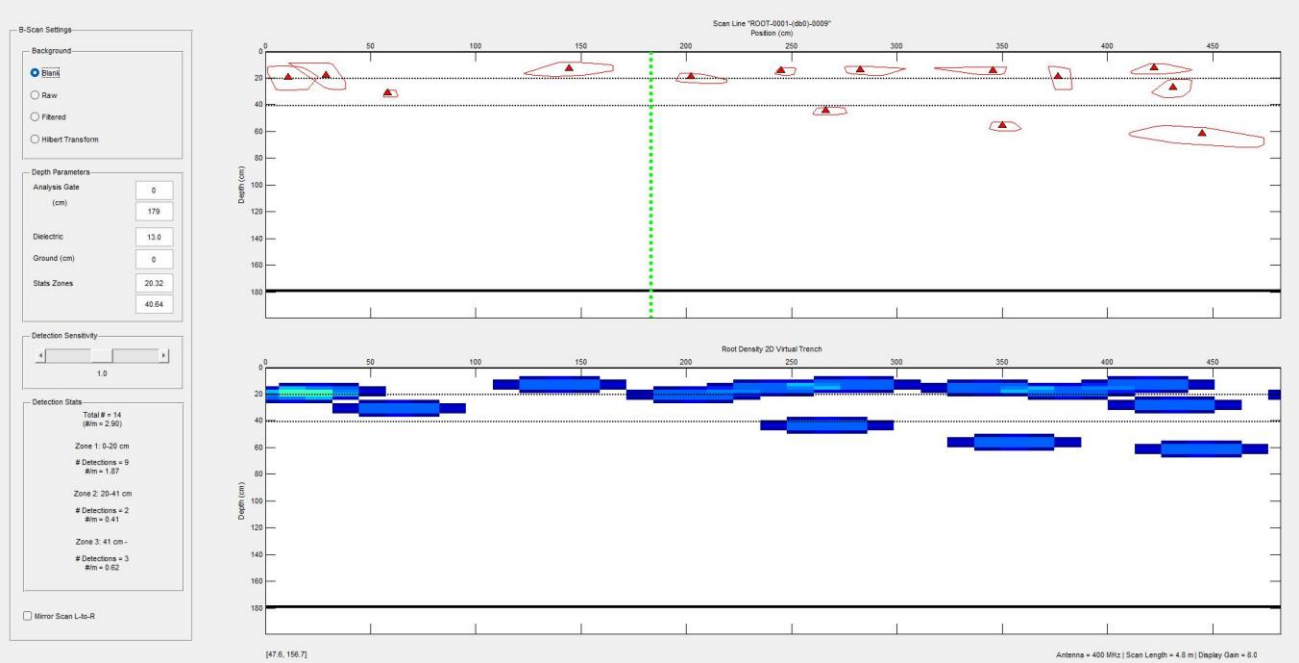
Scan line 0001_0007



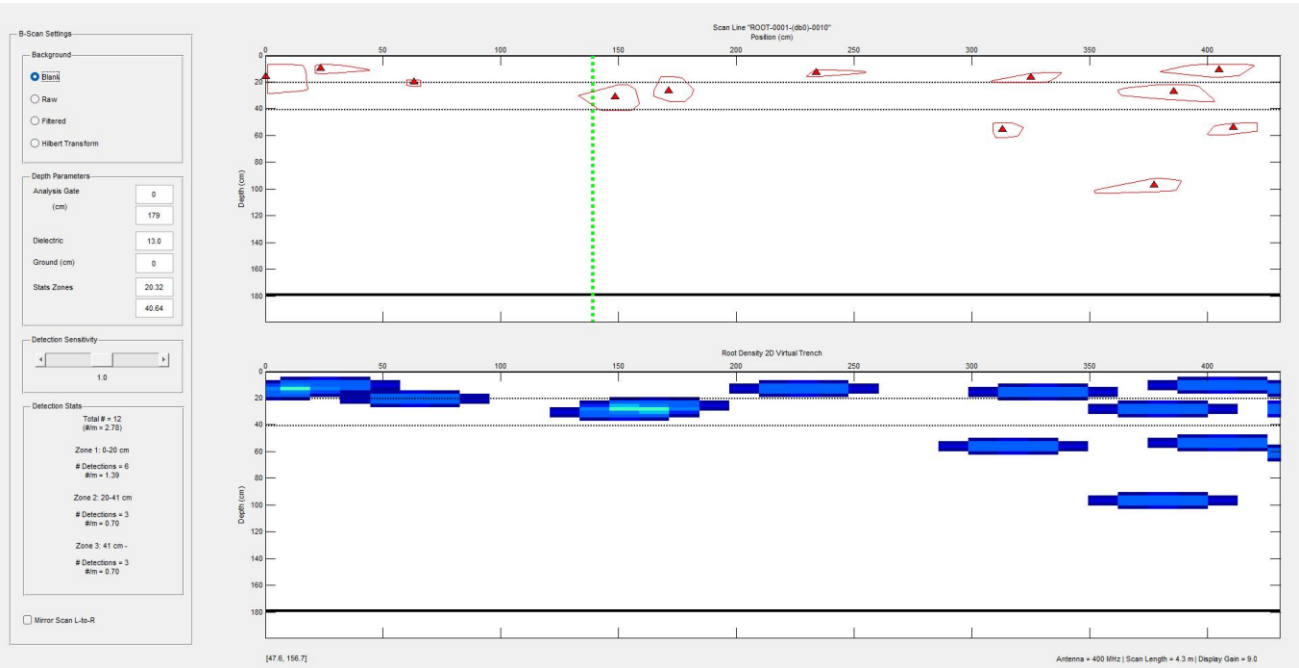
Scan line 0001_0008



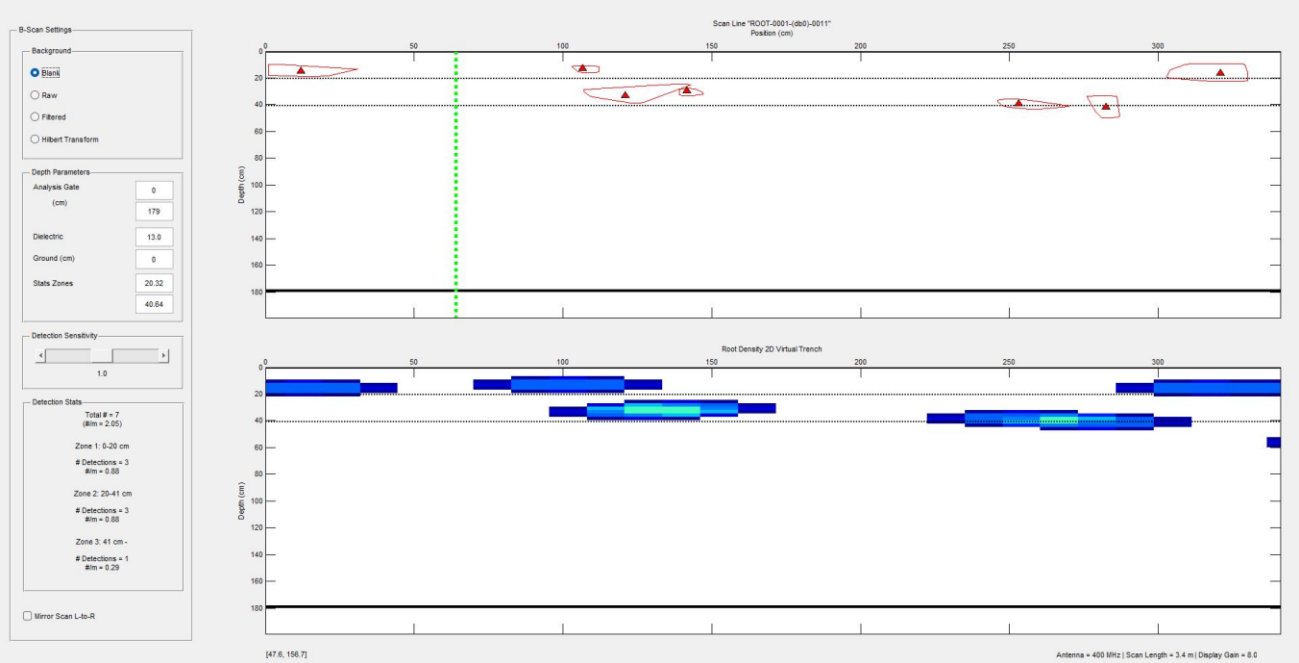
Scan line 0001_0009



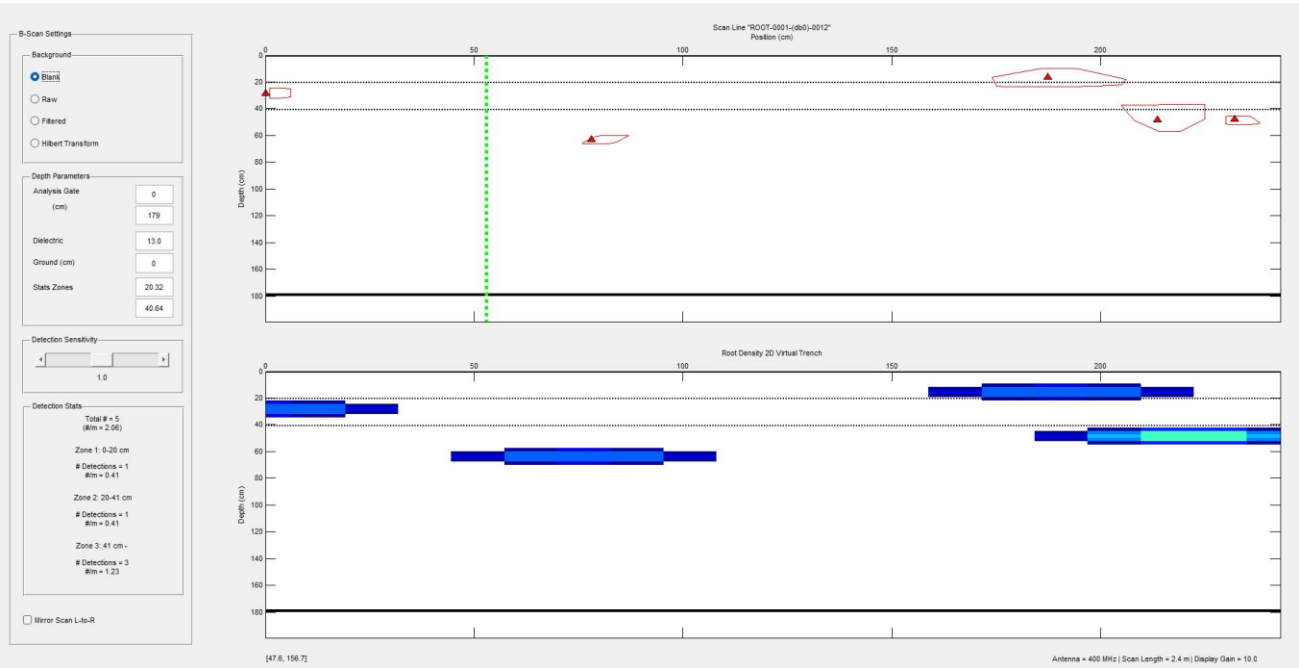
Scan line 0001_0010



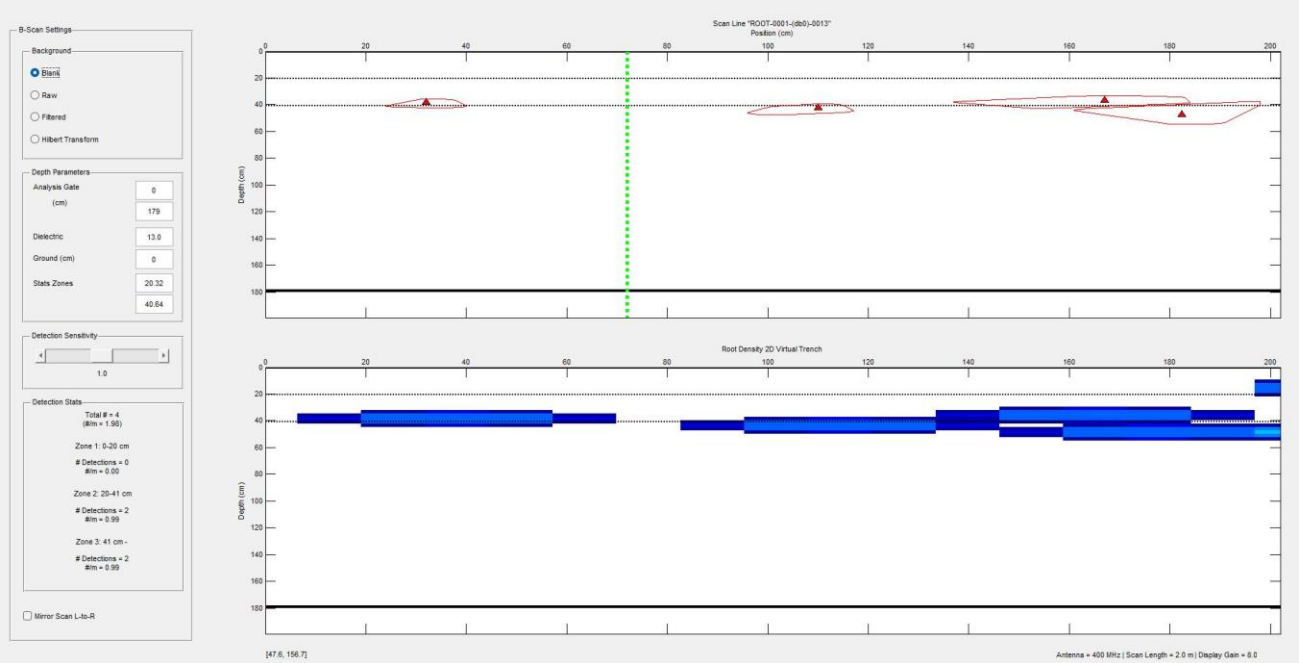
Scan line 0001_0011



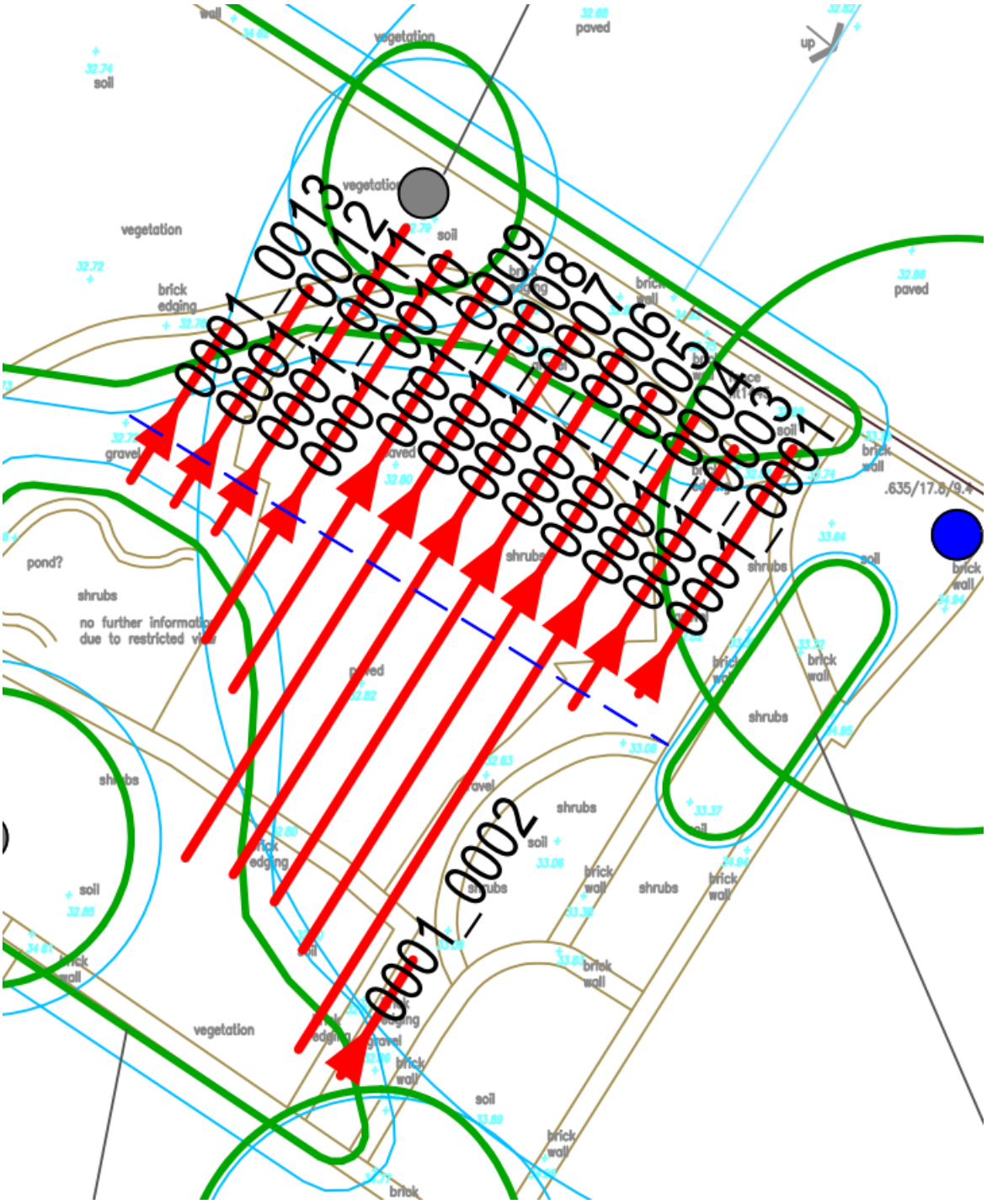
Scan line 0001_0012



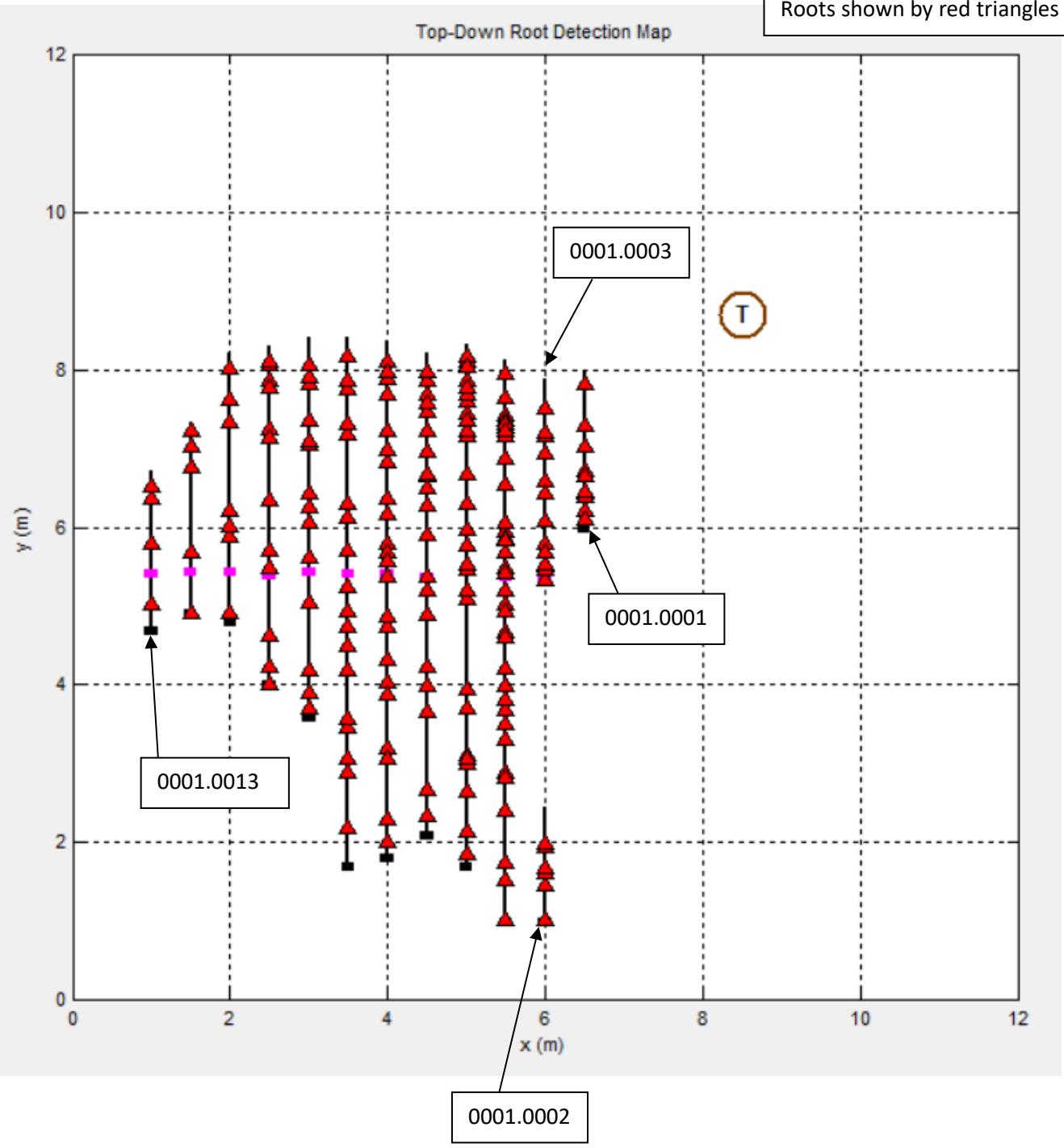
Scan line 0001_0013



SCAN LINES 0001_0001-0013 – LOCATIONS (DO NOT SCALE)

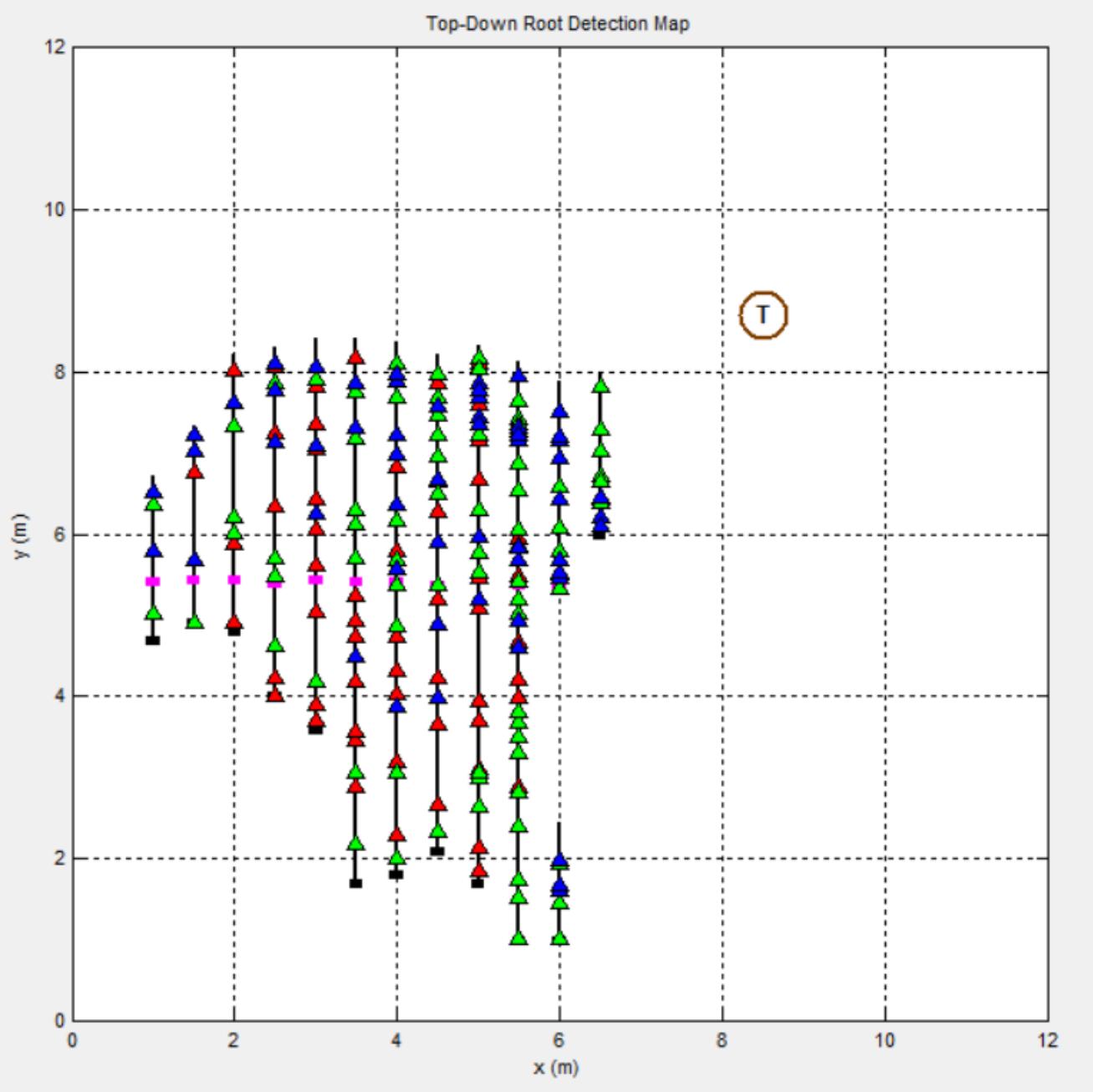


SCAN LINES 0001_0001-0013 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS



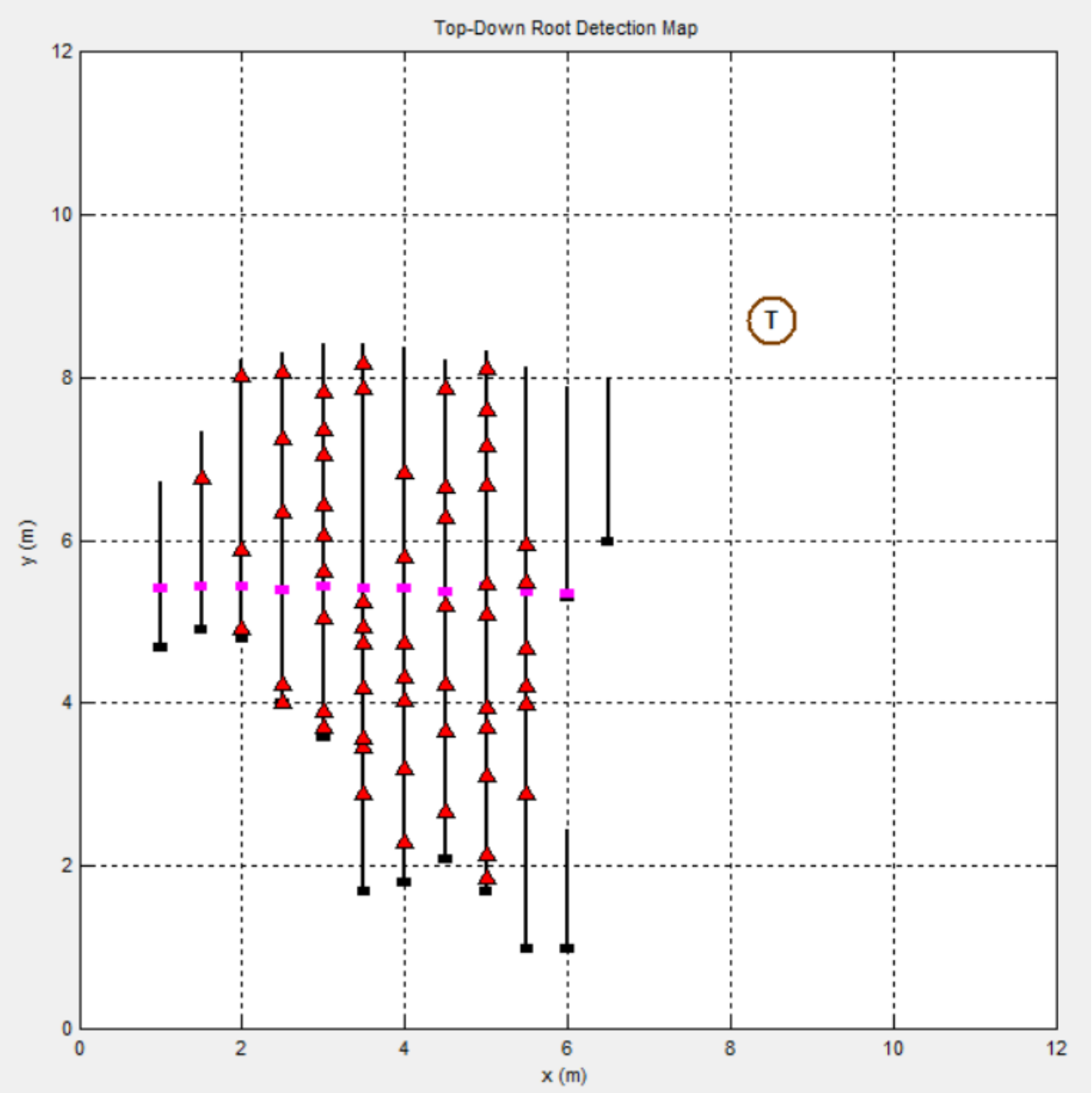
SCAN LINES 0001_0001-0013 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS

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



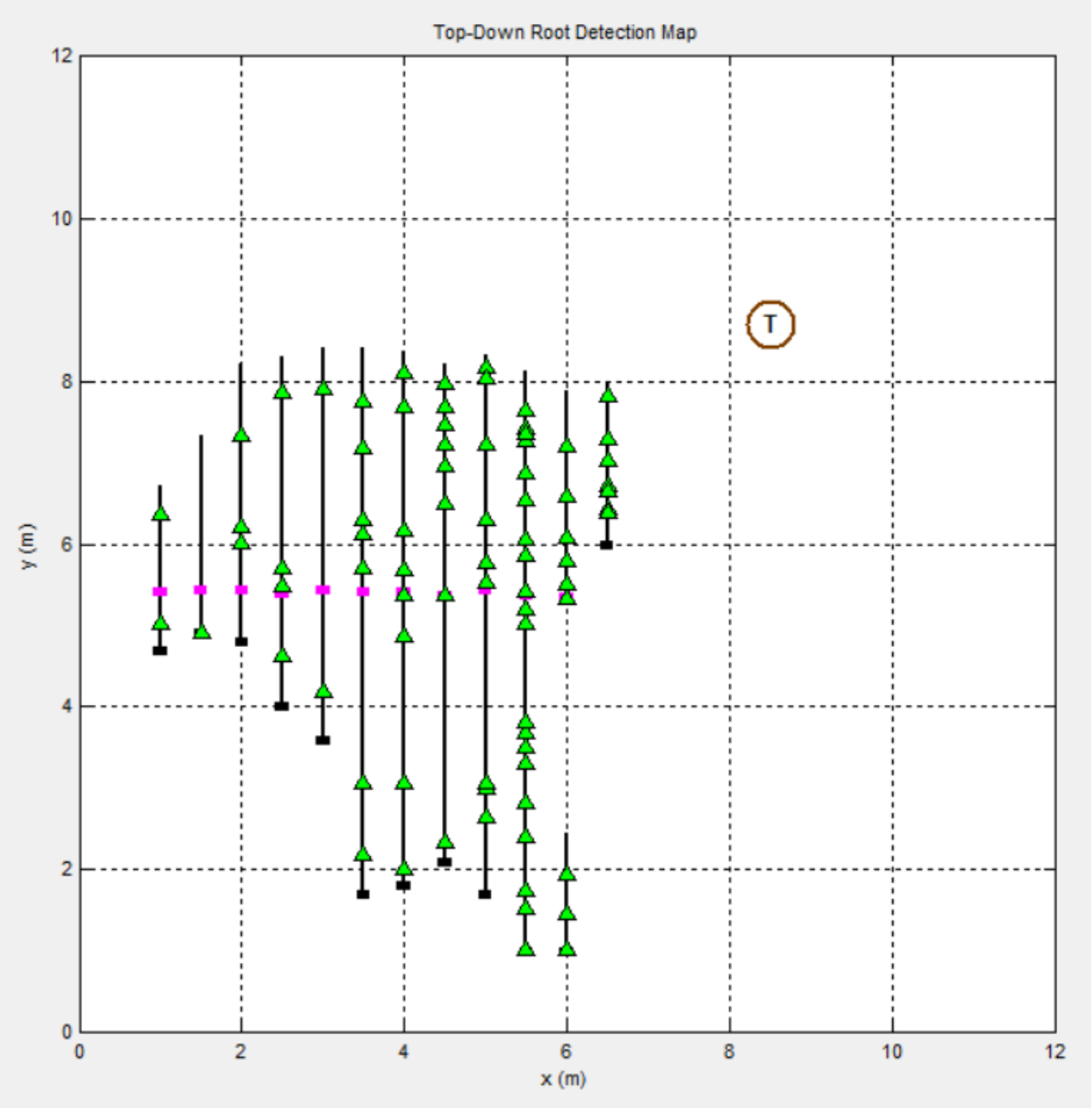
SCAN LINES 0001_0001-0013 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS

RED = 0-20CM



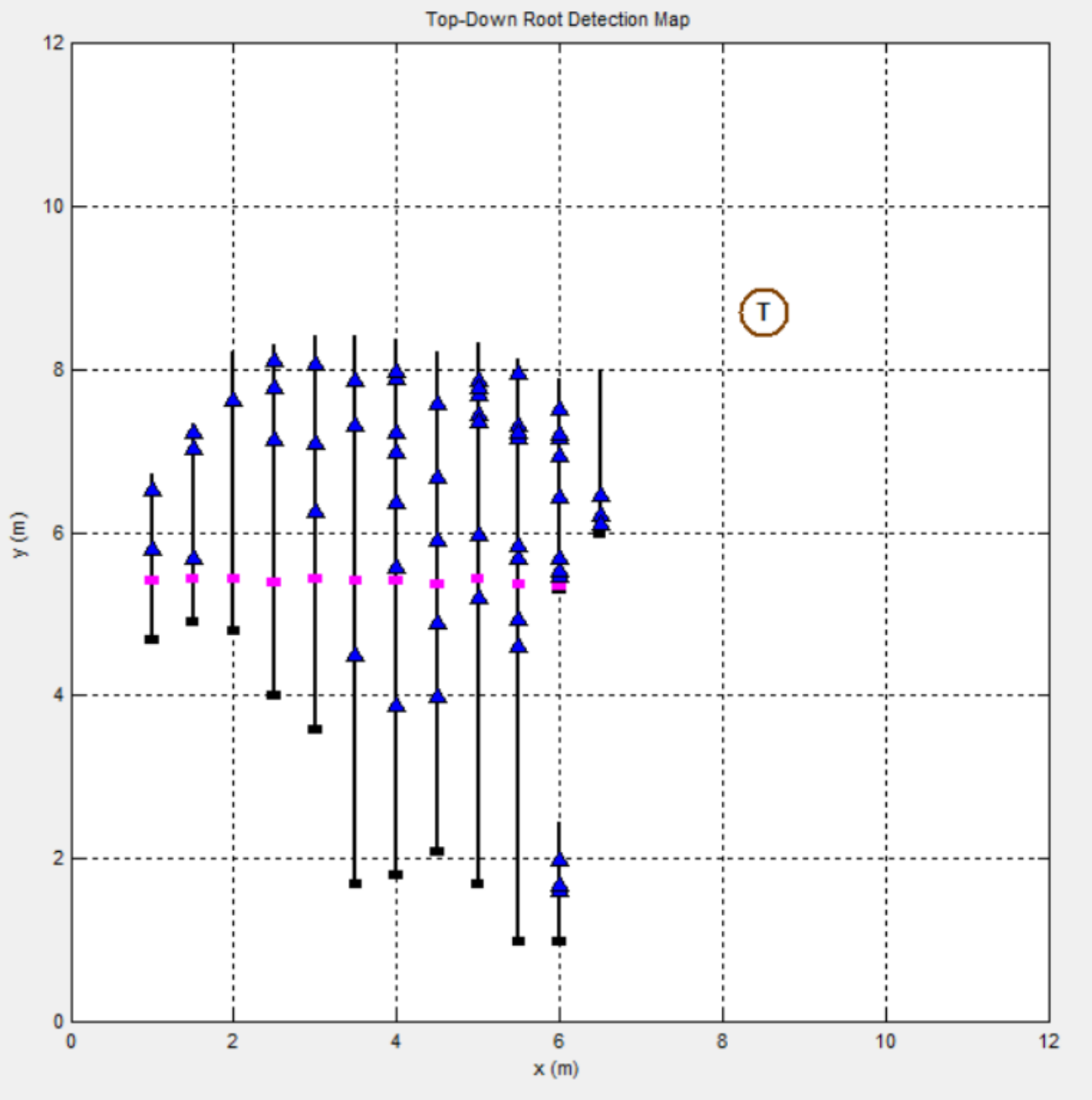
SCAN LINES 0001_0001-0013 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS

GREEN = 20-40CM



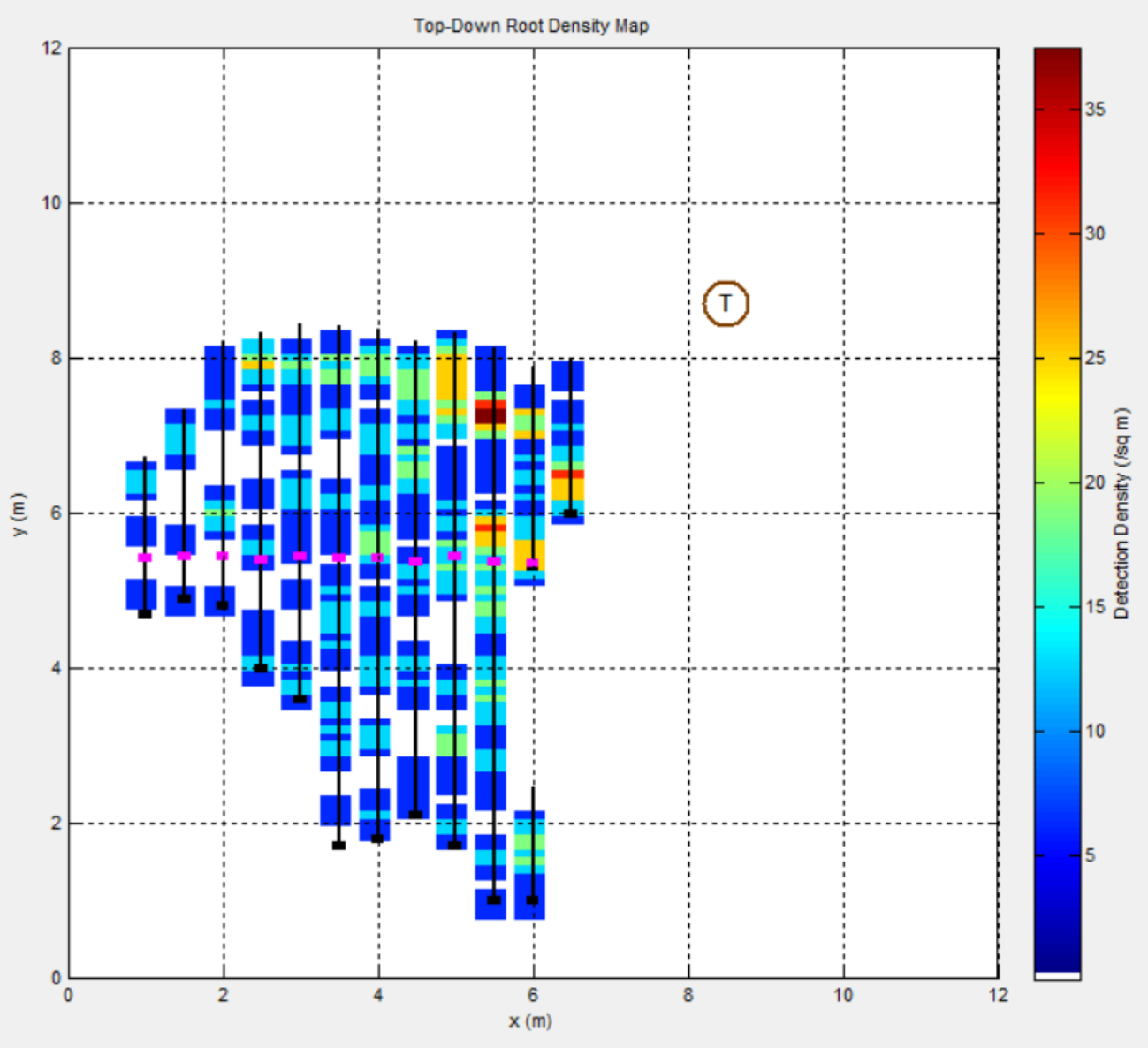
SCAN LINES 000001_0001-0013 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS

BLUE = 40-250CM



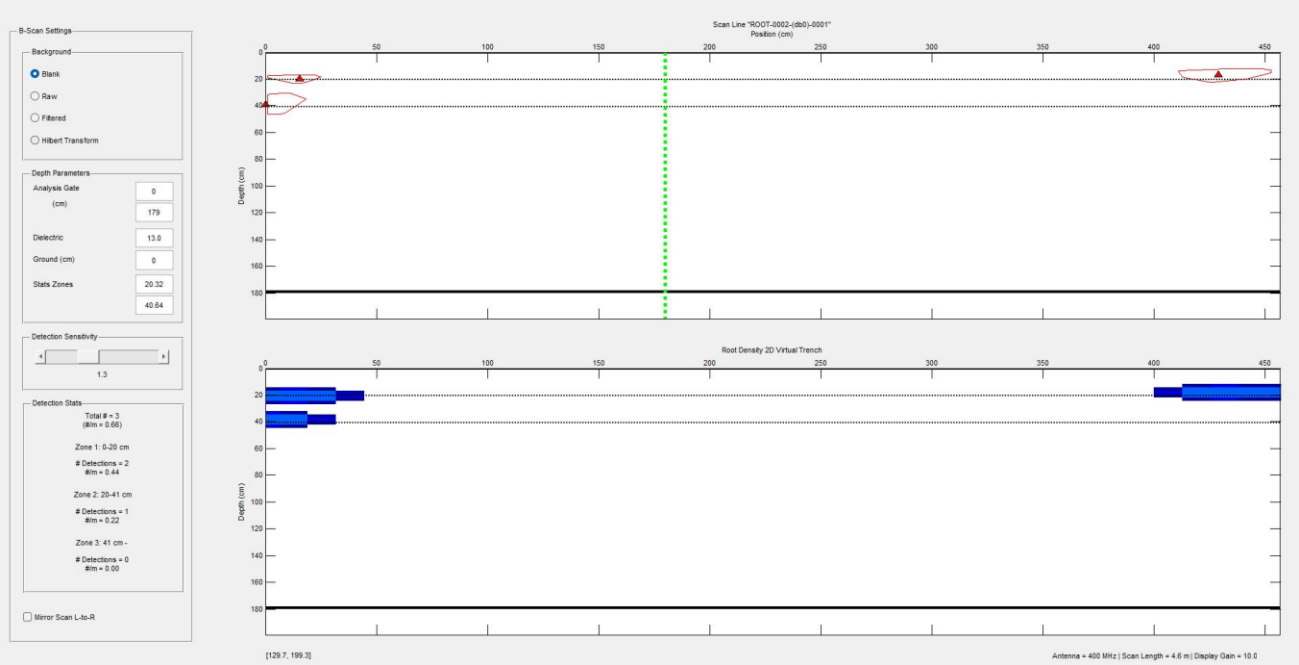
SCAN LINES 0001_0001-0013 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS - DIAGRAMMATIC REPRESENTATION OF ROOT DENSITY.

RED = RELATIVELY HIGH, BLUE = RELATIVELY LOW

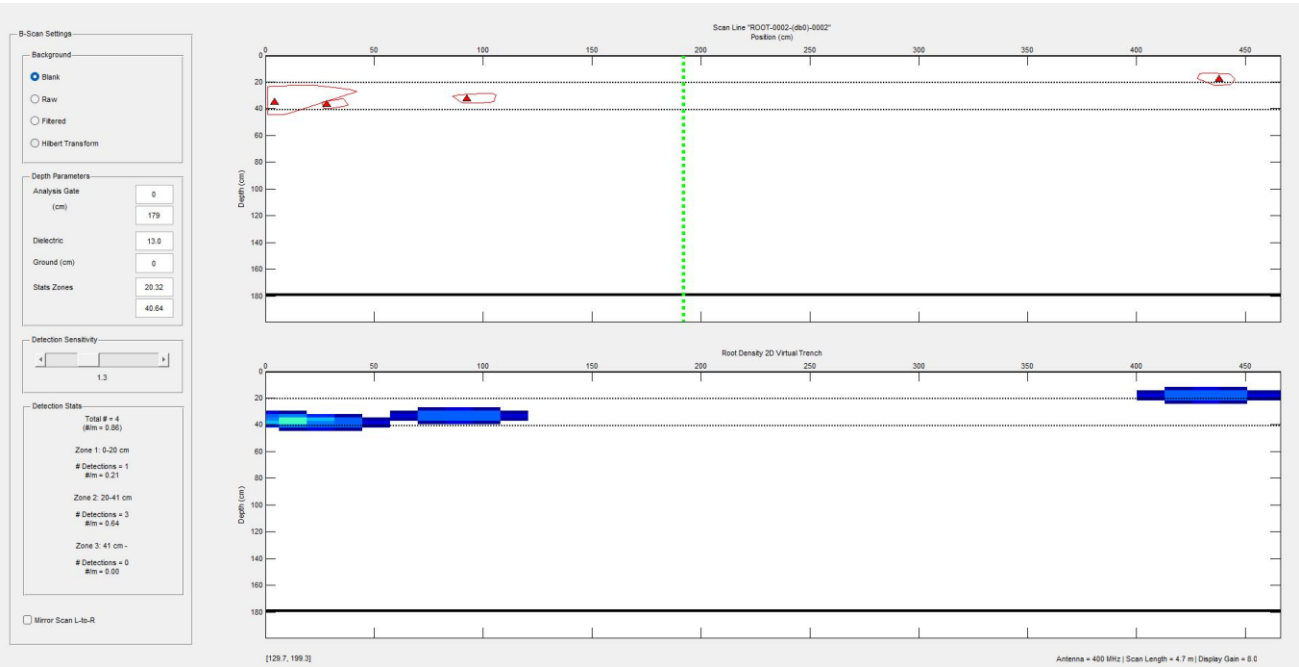


SCAN LINES 0002_0001-0009

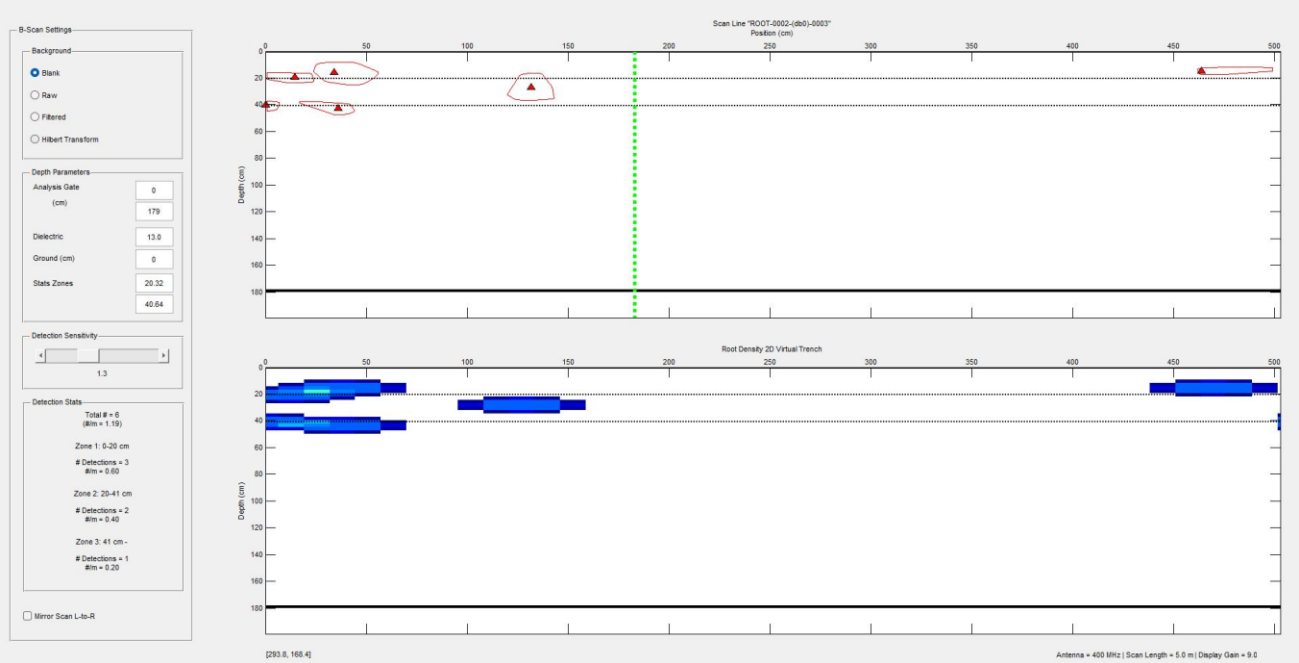
Scan line 0002_0001



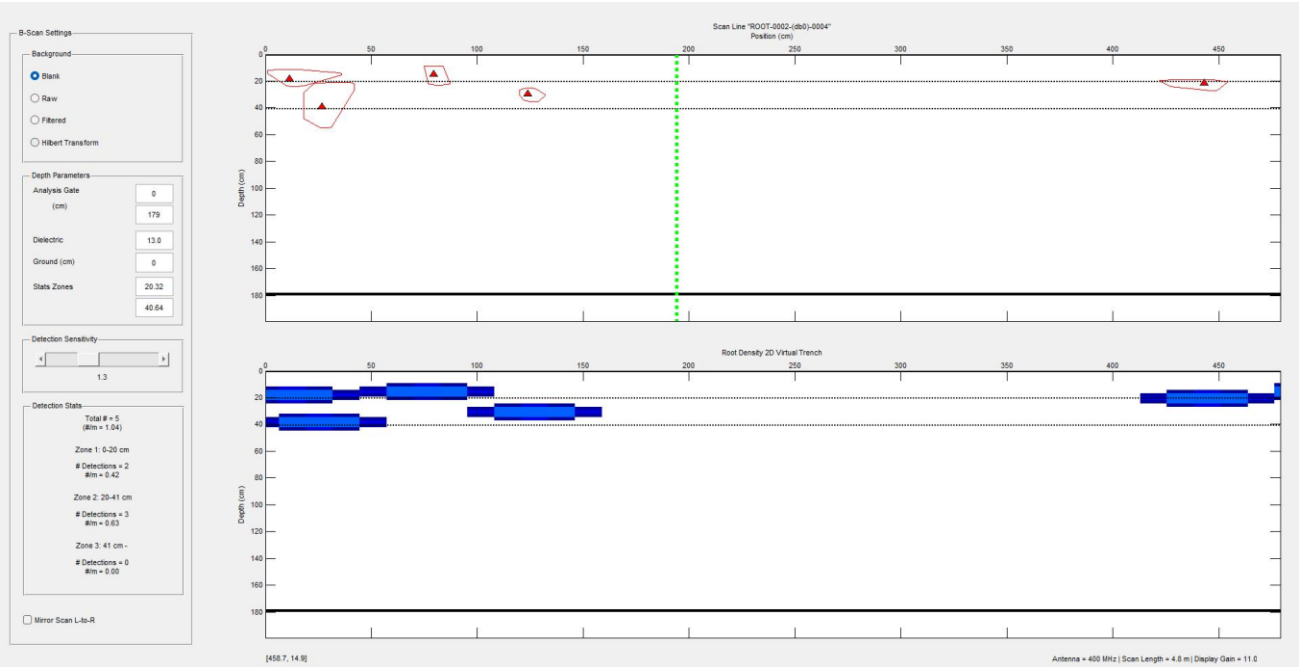
Scan line 0002_0002



Scan line 0002_0003



Scan line 0002_0004



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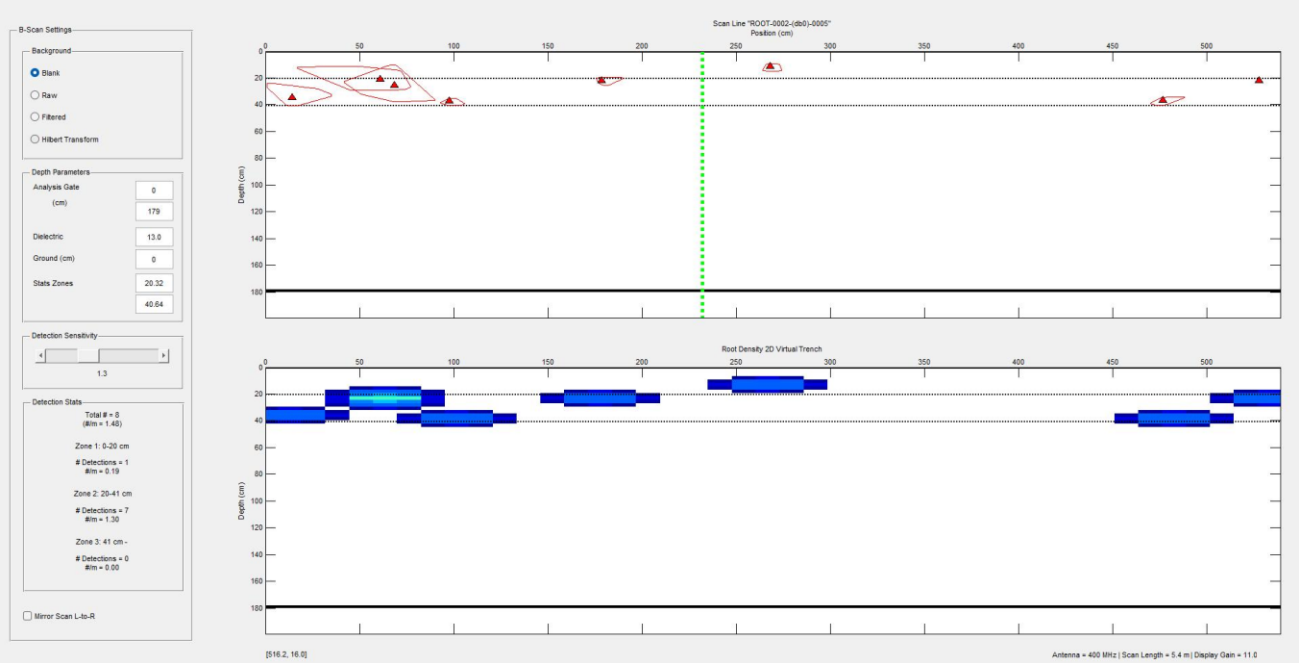
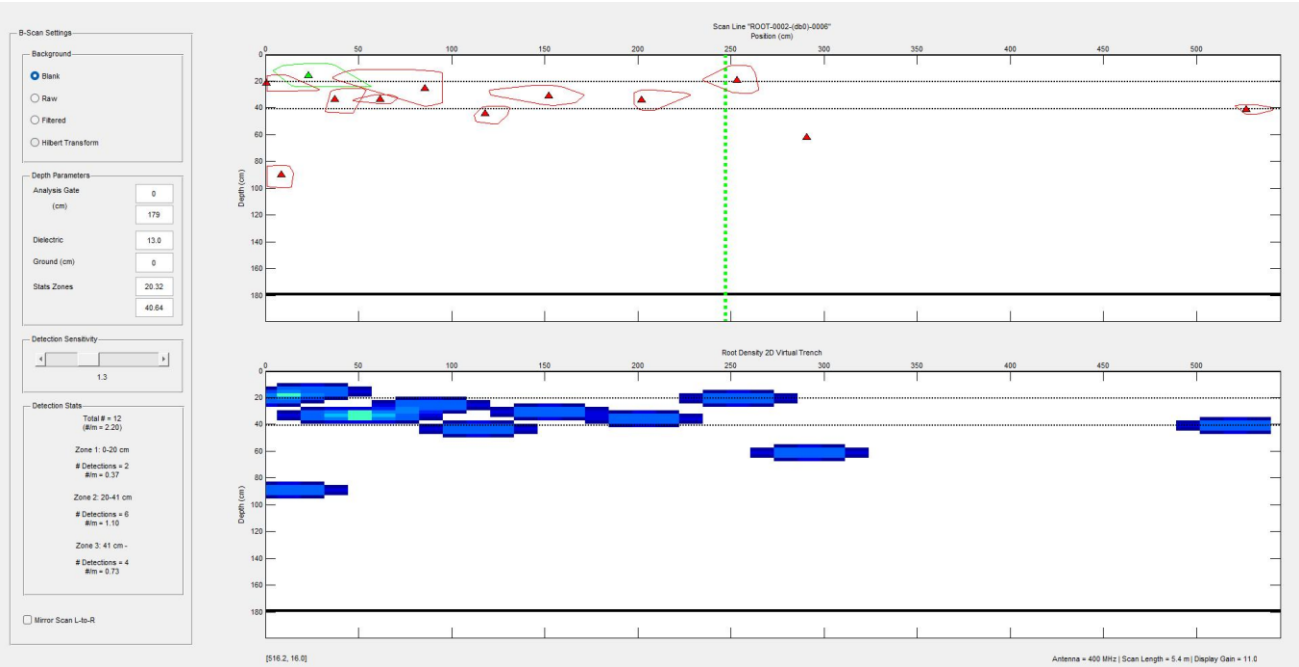


Scan line 0002_0006



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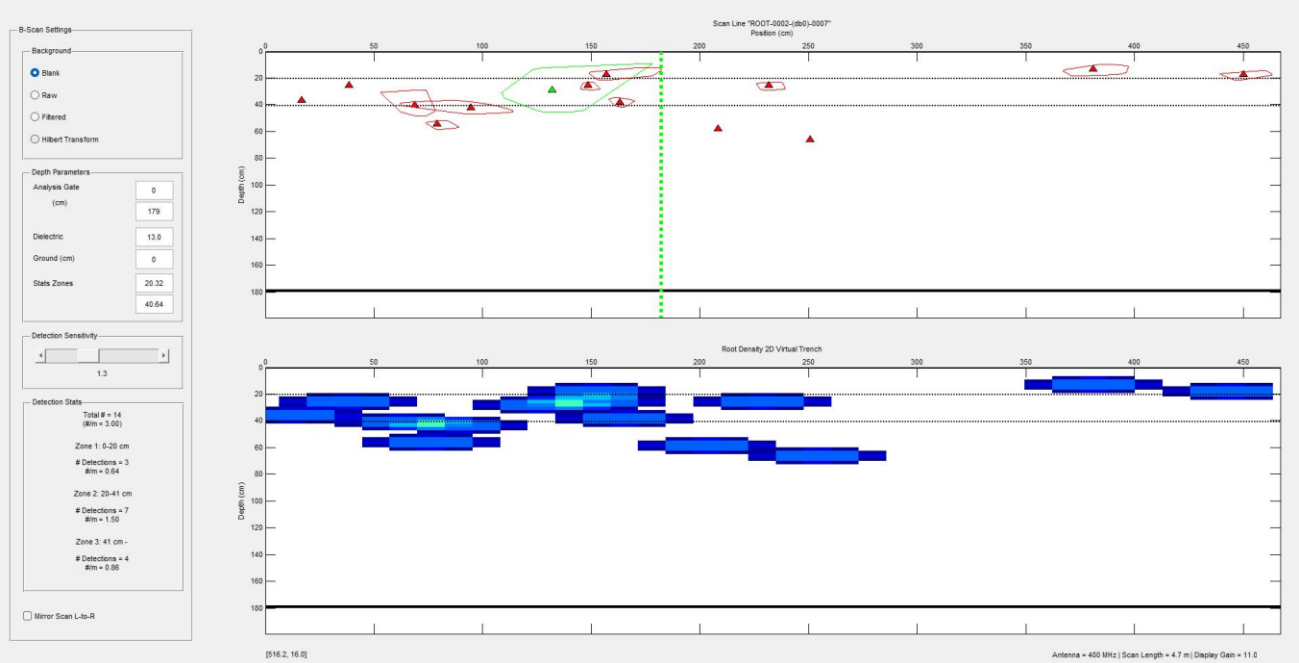

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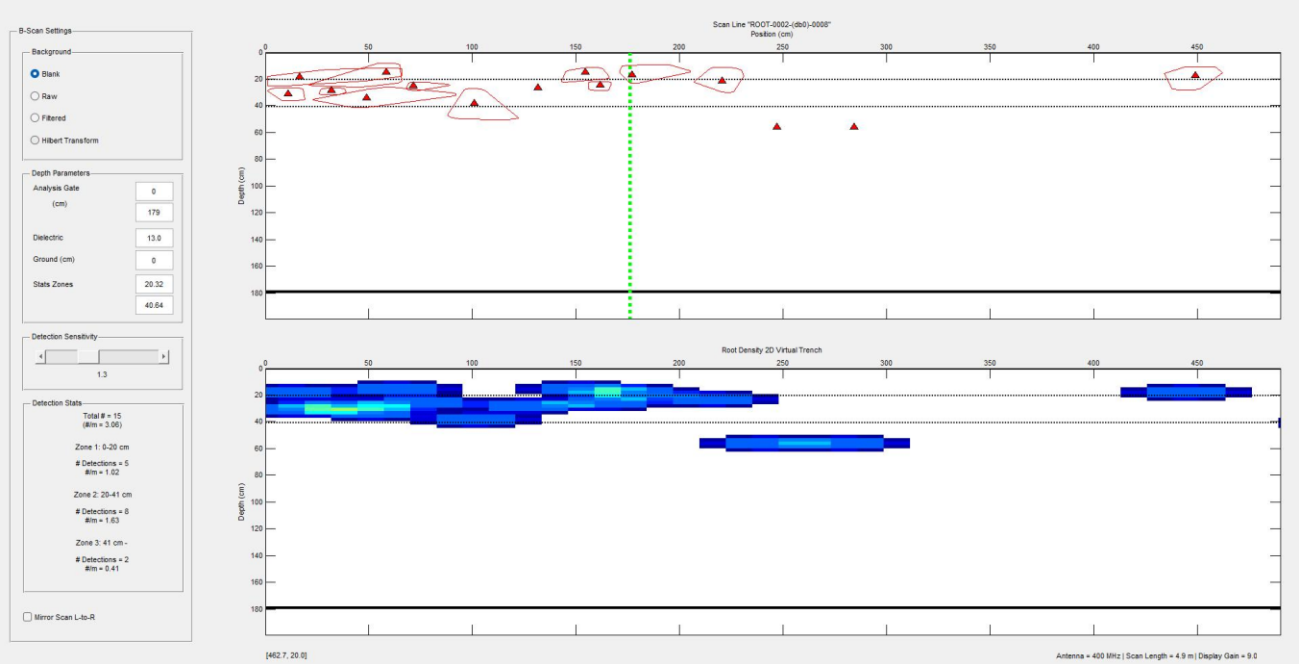

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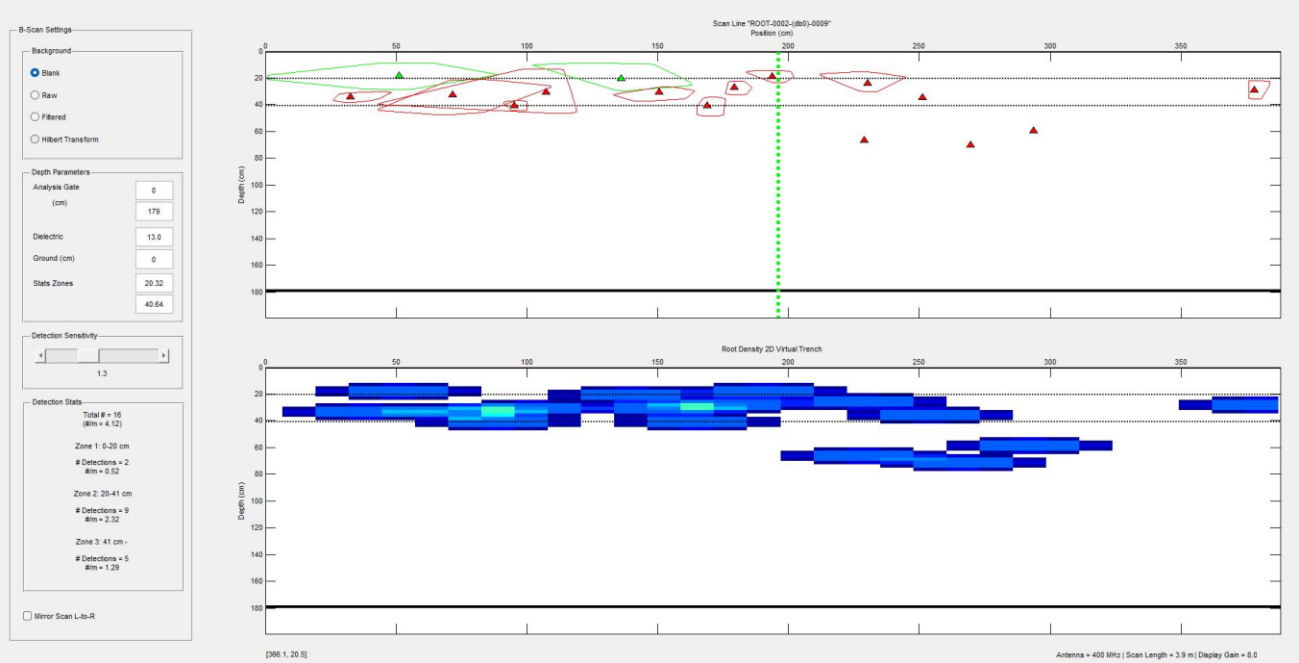
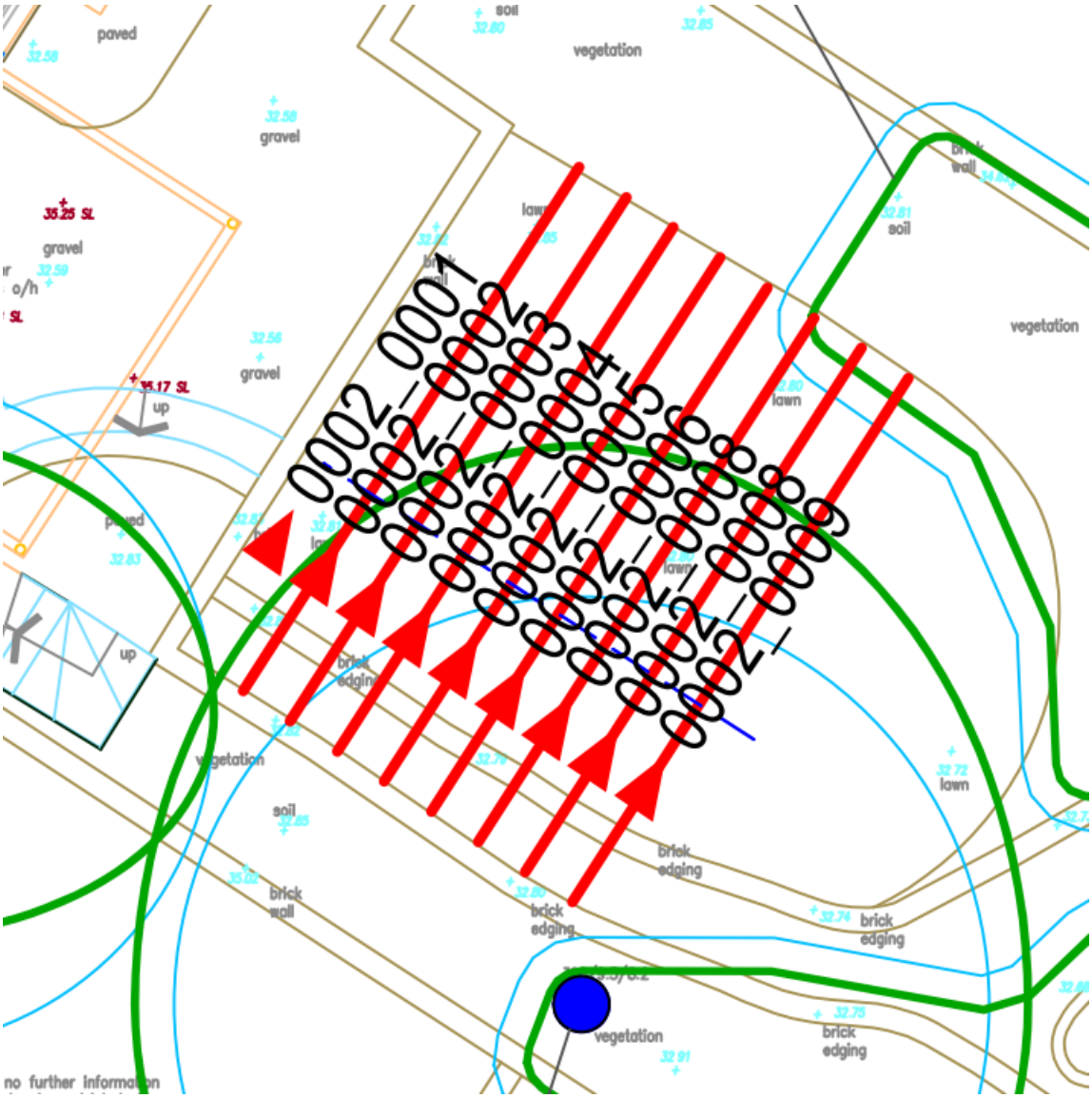
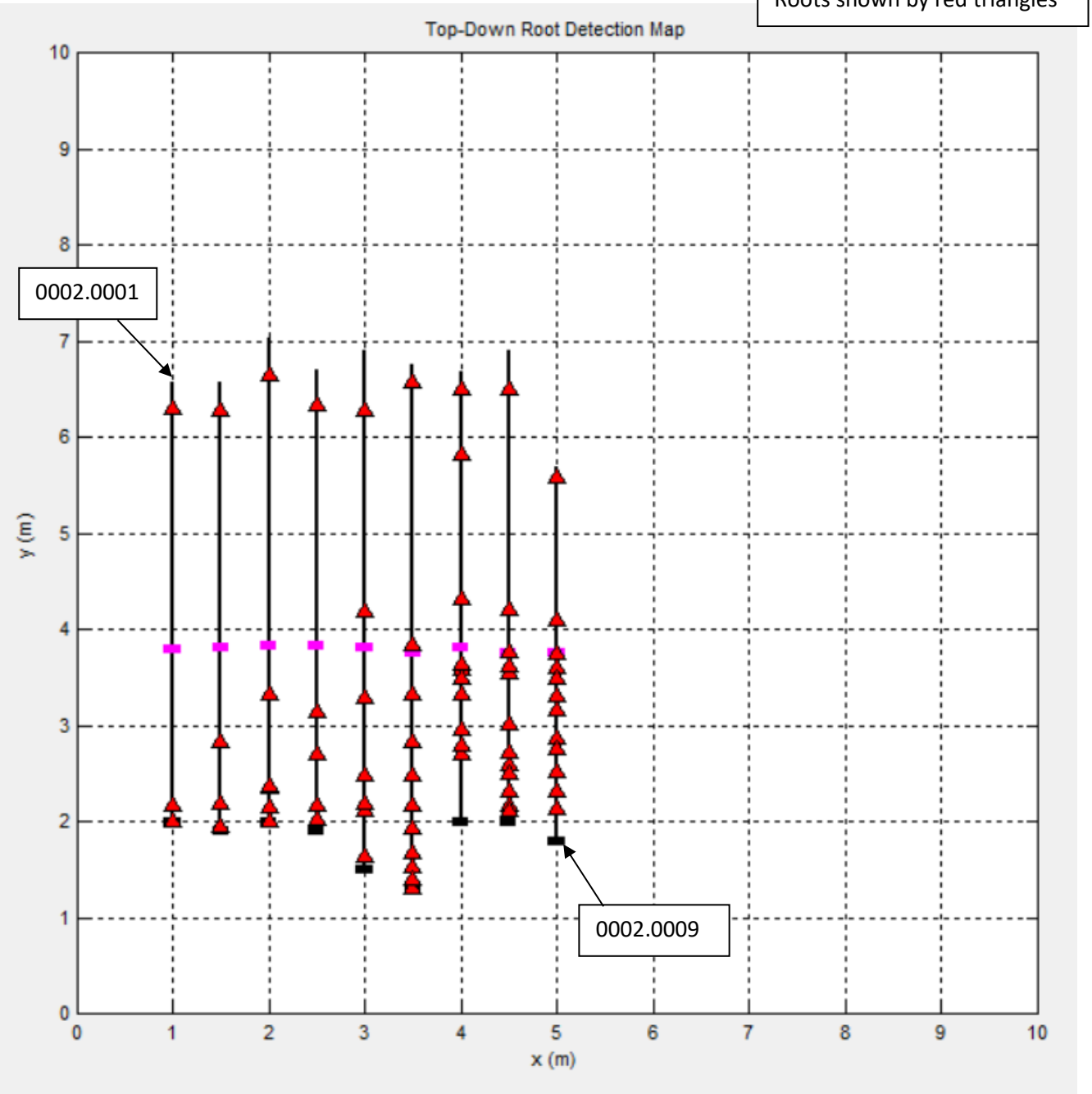


SCAN LINES 0002_0001-0009 – LOCATIONS (DO NOT SCALE)



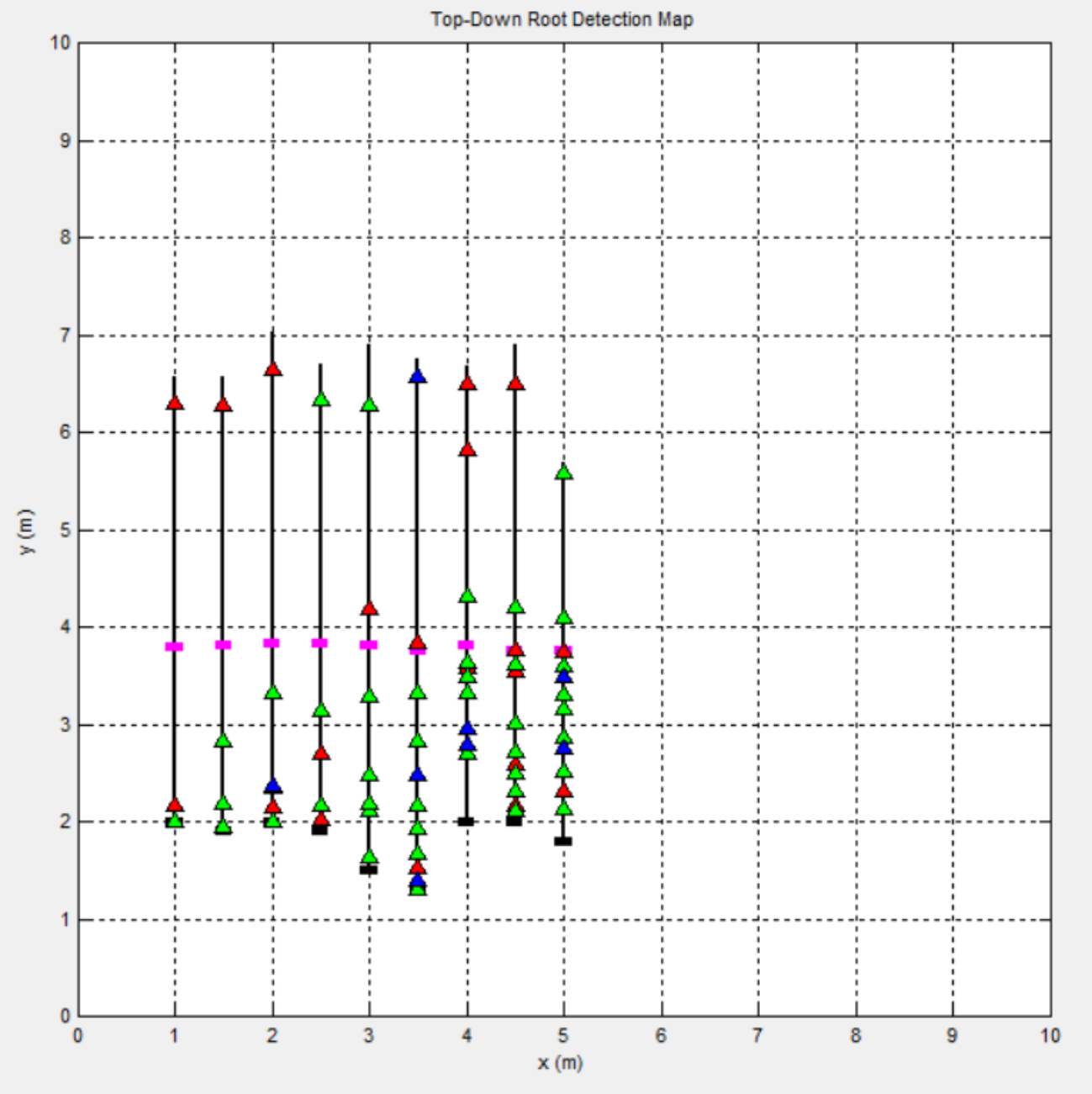
SCAN LINES 0002_0001-0009 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS

Roots shown by red triangles



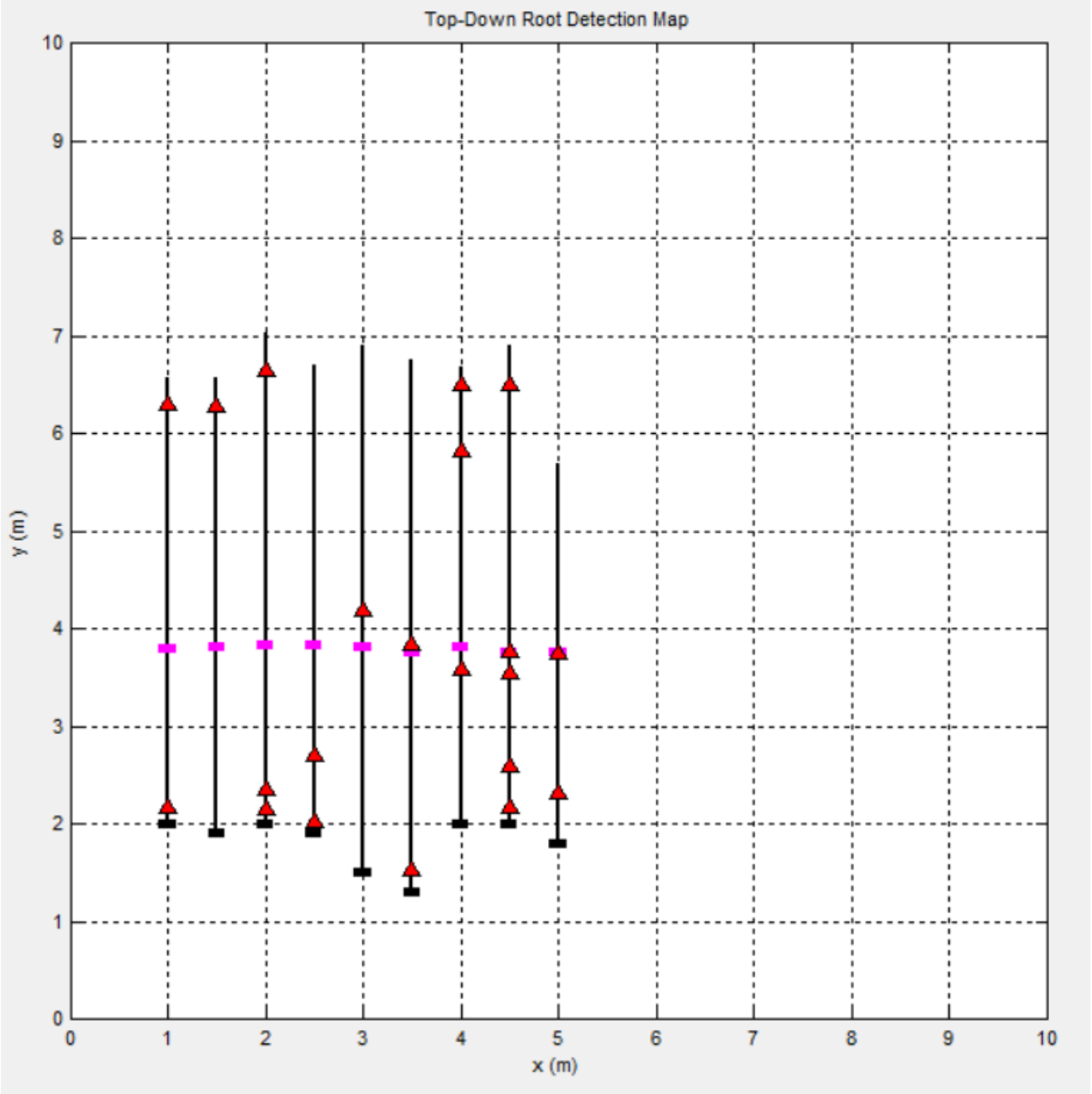
SCAN LINES 0002_0001-0009 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS

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



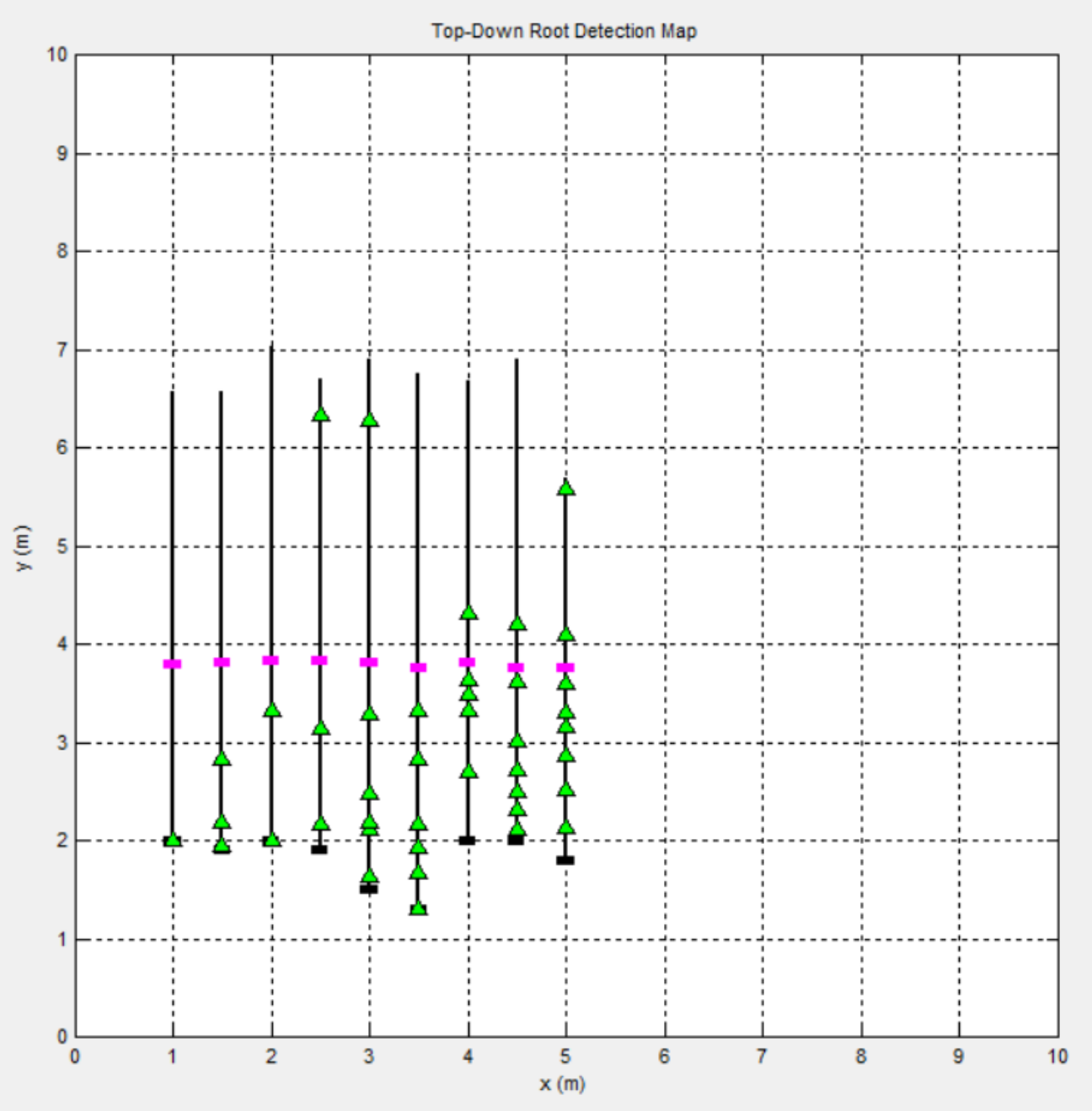
SCAN LINES 0002_0001-0009 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS

RED = 0-20CM



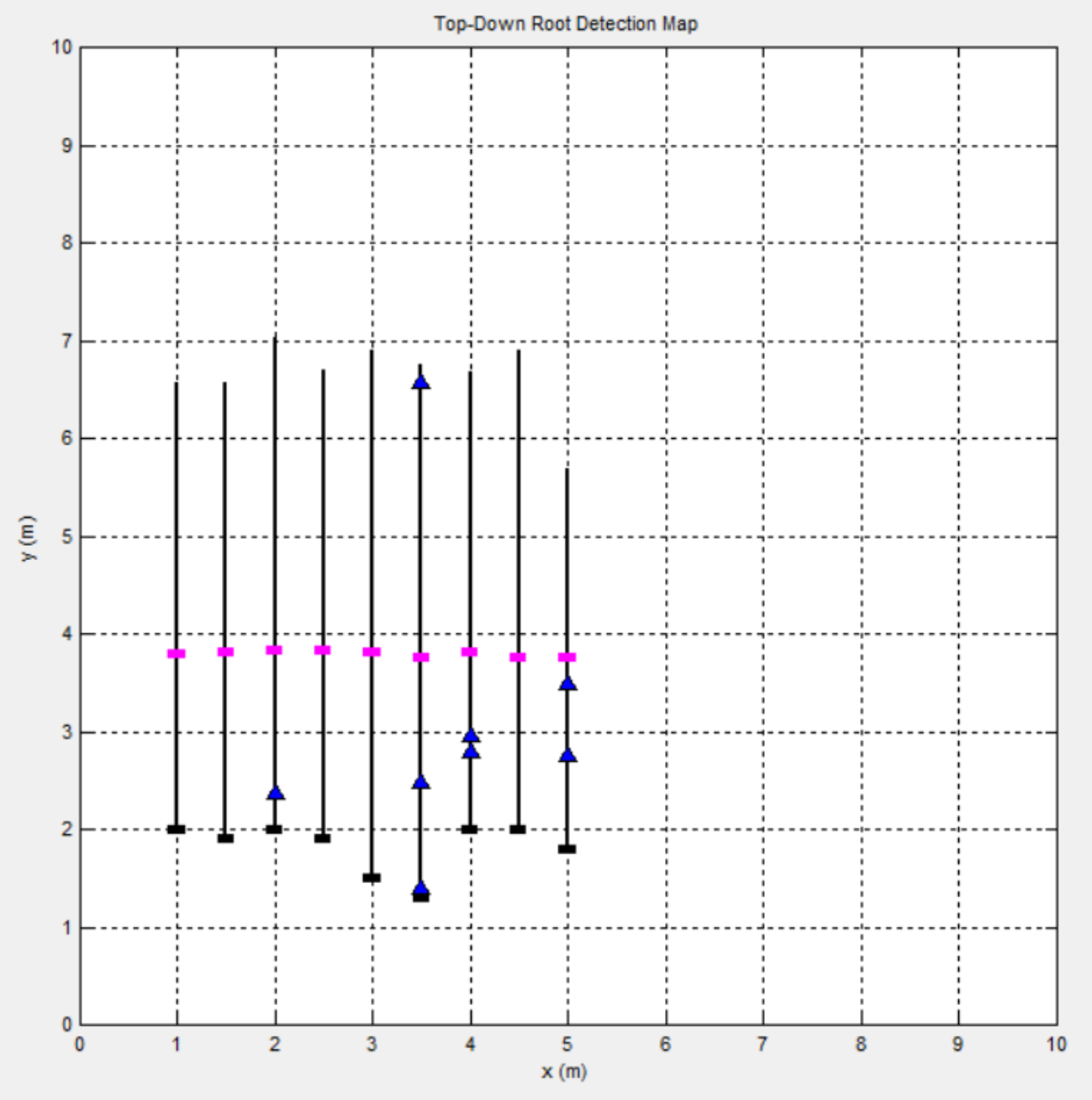
SCAN LINES 0002_0001-0009 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS

GREEN = 20-40CM



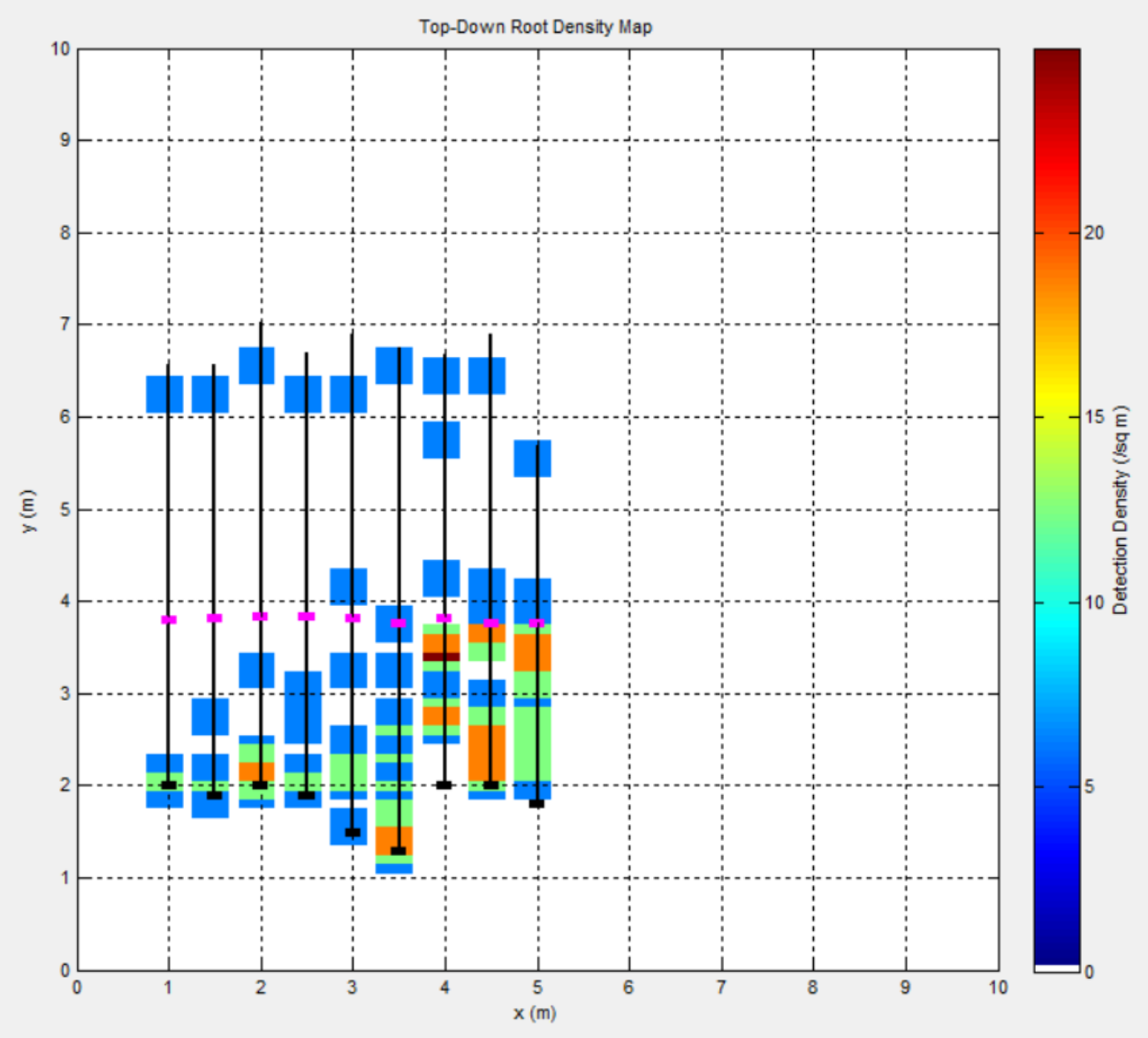
SCAN LINES 0002_0001-0009 – ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS

BLUE = 40-250CM



SCAN LINES 0002_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, though in sections 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 13th May 2025. The locations of the scan lines are found at appendix one, drawing reference *TRA 0479TR,* and the results are found in the report at section 4. The locations of the scan areas were identified by Orla McKeever of Michaelis Boyd 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: -

24031-001-SiteLocationPlan

15230-01.dwg

11. MY EXPERIENCE & QUALIFICATIONS: -

PROFILE: Ian Lee

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

Ian has nineteen 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 extending back to 2011 and has carried out two research and development visits with Sharon Hosegood Associates in 2016. This research continues with international colleagues.

Ian currently stands as the Institute of Chartered Foresters representative to the London Urban Forest Partnership.

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

TRA Consulting

Root Investigation by TreeRadar

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NW1 8YA

CLIENT

Bridget Plant

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

DATE: 22.05.2025
OUR REF: TRA 0479

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TRA Consulting is a trading name of Tree Radar UK Ltd
www.treeradaruk.com