Sharon Hosegood
ASSOCIATES

ARBORICULTURAL IMPACT ASSESSMENT REPORT INCORPORATING TREE RADAR REPORT

BS 5837:2012 'Trees in relation to design, demolition and construction. Recommendations'

report

SITE

52 Eton Avenue,

London

NW3 3HN

CLIENT

Izzy & Natalie Tepekoylu

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

Reviewed by Sharon Hosegood
FICFor FArborA BSc (Hons) Tech Cert (Arbor A)

DATE: 16.01.2019
OUR REF: SHA 921

OUR CONTACT DETAILS: 01245 210 420

sharon@sharonhosegoodassociates.co.uk

Executive summary

This report is submitted in connection with a planning application for the construction of a new basement, a small side extension and landscaping of the private garden at 52 Eton Avenue, London NW3 3HN. I have provided all information in accordance with the British Standard (BS 5837: 2012 ''*Trees in relation to design, demolition and construction. Recommendations*' (referred to as BS).

The site lies with the Belsize Park Conservation Area and at the time of writing we are still waiting for confirmation from the London Borough of Camden if any of the trees are protected by a Tree Preservation Order. The layout follows a pre-design site meeting with the relevant consultants to ensure that there is minimal impact on trees and a detailed TreeRadar report which is found at appendix 11.

There are 5 individual trees and 3 shrub groups which form the subject of this survey. 2 Individual trees have been categorised as B grade trees (those of moderate quality and value), while 3 trees and 5 shrub groups have been categorised as C grade trees (those of low quality and value).

To facilitate the development 1 C grade tree and 5 C grade shrub groups will be removed. The hawthorn (SHA reference T1) is protected by Tree Preservation Order Hampstead 27 TPO 1957 as T41 and will be retained and protected during works. All are located within the private, walled garden and as such their amenity value is significantly limited from public areas. Replacement planting is anticipated as part of the landscaping and creation of a family friendly garden.

The recent TreeRadar survey found that, although the new basement and side extension are located within the theoretical Root Protection Areas (RPAs) of two of the street trees, the physical barrier of the boundary wall and the site history have prevented root growth into the site from the pollarded off-site trees. Any roots in this area were found within the top 50cm of soils and are likely associated with the trees and shrubs to be removed. This is based on the fact that the street trees are rooting between 20 – 60cm deep, and the wall's foundations are likely to be at least 60cm deep.

The upper 1m of the excavation will be undertaken under arboricultural supervision and in the unlikely event that roots from T9 or T10 be found, root pruning will be undertaken by the supervising arboricultural consultant.

Contents

Appendices

1. Introduction:

1.1. This report accompanies a planning application made by Ambigram Architects, to London Borough of Camden for the construction of a new basement and small side extension at 52 Eton Avenue, London, NW3 3HN. The work is in accordance with BS 5837:2012 *'Trees in relation to design, demolition and construction. Recommendations'* (referred to as BS).

1.2. This report details tree condition, the impact of the proposal on, and from, the existing trees and the measures taken to protect trees to be retained. It also includes tree surgery recommendations.

1.3. The survey has resulted in a layout as shown in the tree protection plan at Appendix 3. Where technical terms are used, explanations are found in the glossary.

2. Statement of instructions and the issues addressed:

2.1. I was instructed by Ambigram Architects on behalf of their clients Izzy and Natalie Tepekoylu to:-

2.1.1. Undertake a review of the tree survey carried out by Tim Moya Associates, whose data was collected in accordance with BS 5837:2012 '*Trees in relation to design, demolition and construction – Recommendations*' (BS);

2.1.2. Analyse the proposals and the impact on trees to be retained;

2.1.3. Produce a tree protection plan, showing the location of the tree protection fencing in accordance with the BS and a specification for the protection of the existing trees;

2.1.4. Provide a tree surgery schedule which includes work to facilitate construction, based on the layout of, and works to, trees due to their condition or previous management;

2.1.5. Provide arboricultural method statements in as much detail as is practical at this stage.

2.2. The issues addressed are tree condition, and how the proposal impacts on the site and vice versa.

3. The site:

3.1. The site is located on the corner of Crossfield Rd and Eton Avenue. To the south lies Eton Avenue with residential properties beyond, to the west lies The Hall School, and to the north and east, residential properties. Lines of street trees run along both sides of Crossfield Road and Eton Avenue, creating part of the character of the area. The site itself is a 1960's residential property, with an 'L' shaped garden wrapping around the southern and western sides of the building and surrounded by a brick wall.

3.2. *Site soils:* An assessment of soils on-site was carried out by a desktop analysis using the National Soil Resources Institute website which identified the soils as likely to be slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. This is a guide only and detailed on-site soil analysis should be undertaken by the project engineer to inform the foundation design.

4. The trees:

4.1. *Generally:* There are five individual trees and five shrub groups which form the subject of this survey. 2 Individual trees have been categorised as B grade trees (those of moderate quality and value), while 3 trees and 5 shrub groups have been categorised as C grade trees (those of low quality and value). Full details are found in the survey sheets at appendix 1 and their location on the tree protection plan *SHA 921* at appendix 2.

4.2. *Legislation:* The hawthorn (SHA reference T1) is protected by Tree Preservation Order Hampstead 27 TPO 1957 as T41. The site lies with the Belsize Park Conservation Area. For further information on legislation, please see appendix 6.

4.3. *BS retention category:*

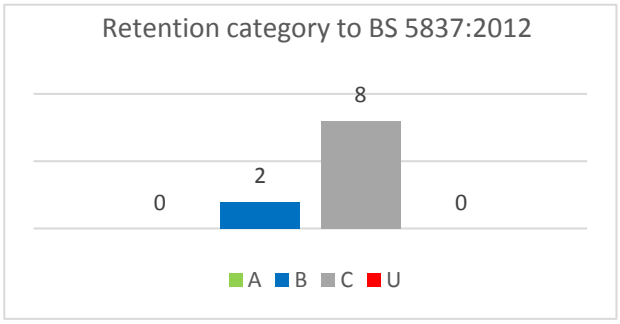


Table 1 – Retention category
A – high quality
B – moderate quality
C – low quality
U – unsuitable for retention

5. The Proposal

5.1. For the construction of a new basement with associated lightwells, a small side extension and landscaping of the private garden to create a more family friendly and usable garden space at 52 Eton Avenue.

6. Arboricultural impact assessment:

6.1. *Summary of the impact on trees*: Development can adversely impact on trees by causing them to be removed to facilitate the development, or in the future, by adversely affecting their potential for retention through disturbance in root protection areas (RPAs) or through post development pressure to prune or remove.

6.2. Tree roots can be asphyxiated and die if the rooting zone becomes compacted and soil structure damaged which can easily occur, particularly on clay soils, even with the passage of light vehicles. At the design stage, disturbance within the RPA should be avoided. If unavoidable (which may need demonstrating), consideration must be given to any construction activity such as demolition, including removal of existing hard surfaces, changing soil levels and the provision of services where within RPAs, as well as new surfaces and structures.

6.3. At the planning stage, any works proposed with RPAs must be shown to be achievable with minimal impact on retained trees. Areas should be identified where a detailed Arboricultural Method Statement will be required post planning consent.

6.4. Building lines ideally should be at least 2m outside of the RPA to allow for scaffolding and other build-ability issues and to allow for service runs and paths around the edge of buildings. Trees are long-lived organisms which take a long time to mature and if considered at an early stage can complement and increase the value of a development.

6.5. Arboricultural Impact Assessment: To facilitate the development the following trees will be removed: S2, T3 and T4. In addition, trees T1, S5, S6 and S7 will be removed to allow the levelling of the ground within the garden to allow the creation of a more usable and family friendly garden area. All trees and shrubs to be removed are categorised as C grade trees of low quality and value and are located within the walled private garden. Trees to be removed are identified on the tree protection plan (TPP) as red shapes. Replacement planting is anticipated as part of the landscape design for the garden.

6.6. Roots of retained, removed and newly planted trees have the potential to cause damage to structures, foundations and services. This should be taken into consideration by the project engineer when designing these elements.

6.7. Trees to be pruned: No trees require pruning works to facilitate the development.

6.8. Incursions into the root protection area: Excavations for the new basement and side extension is required within the RPAs of trees T9 and T10. Both are off-site street trees under the ownership of the local authority. Although both trees have been historically managed with heavily reduced crowns, the incursion into their theoretical RPAs was considered significant and consequently a TreeRadar survey has been undertaken to determine the extent and locations of tree roots within the site and within the adjacent highway environment. The TreeRadar Report (ref SHA 921 TreeRadar Report dated 15.01.2019) accompanies this Arboricultural Impact Assessment at appendix 11, and the findings contained within it have fed into the designs of the scheme and informed the AIA. Minor ground changes will take place under arboricultural supervision within the RPA of T1 hawthorn. The purpose of the supervision is to ensure that root integrity and function remains intact.

6.9. The conclusions of the TreeRadar report are as follows:

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

ii. "*The soils beneath the scan lines contain a large amount of non-root reflectors and services, while the soil horizons are poorly defined. This indicates that soils were significantly disturbed in the past, which is typical of soils and sites across London. From conversations with the design team it is understood the site previously contained a building with a basement in the area which was removed in the 1970's*."

iii. "*Beneath the site of the proposed new basement construction roots are found in low rooting densities and the majority of the roots clustered around towards the shrub beds containing the on-site trees and shrubs rather than the large London plane to the north west. Roots are also found at a relatively shallow depth beneath the patio and path, averaging in a band between 15-50cm deep. Given the standard construction of domestic patios and path and the proximity of the planted shrub bed*

it is likely that a number of the shallow detections are actually matts of fine roots exploiting the sandy material beneath the slabs rather than tree roots."

iv. "*The consistently shallow nature of the on-site roots in scan series 0001 and 0002 also indicate that the roots detected are unlikely to have been forced beneath the footings of the boundary wall, especially when compared to the depths found beneath the footpath. In this situation the wall appears to have formed a physical barrier to root growth."* N.B scan line series 0001 and 0002 refer to scans within the patio area and within the garden path

v. *"The trees are rooting well within the public highway, extending beneath the footpath and beneath the road, extending to the north and south within the pavement as is evident from the deflection of the surfacing*."

6.10. The findings of the TreeRadar report were that, although the excavation is within the theoretical RPAs of trees T9 and T10, the footings of the boundary wall and the previous building's basement level have provided a physical barrier to tree root encroachment of the street trees into the site, and that the low density of roots found beneath the footprint of the proposed new structure were associated with the on-site trees and shrubs. This is shown when the depth of roots beneath the footpath (20-60cm on average) is compared with the rooting depth beneath the patio area (15-50cm average) as it is highly unlikely that the roots will have grown straight down beneath the footings of the substantial boundary wall and then come straight back up and levelled off. Were roots found at depths of 50-100cm deep beneath the patio, these roots would be far more likely to be associated with the off-site trees, but this is not the case.

6.11. Although the results of the TreeRadar show it is unlikely that roots of T9 and T10 extend beneath the footprint of the proposed basement and extension, the excavation for the top 1m of soil will be undertaken under arboricultural supervision and if roots from T9 and T10 are found, these will be pruned only where appropriate and necessary. The edge of the excavation will be lined with impermeable plastic sheeting to prevent alkali burn to any roots in surrounding soils from the use of concrete. The impact of these works is reduced even further by the cyclical heavy crown reduction works undertaken on the trees.

6.12. Where the existing patio is to be removed, this will again be undertaken under arboricultural supervision.

6.13. Where the soil is be levelled within the theoretical RPA of T8 and T1, this will be undertaken under arboricultural supervision using hand held tools, or a mini digger with a toothless bucket located outside the RPAs or on suitable ground protection. Arisings should be pulled back away from the tree and root pruning carried out only where appropriate and necessary. Any exposed or cut roots will be wrapped with hessian or covered with good quality top soil as soon as practical to prevent them from drying out.

6.14. Precautions must be taken during facilitating works (including tree works) to avoid compaction or contamination of the soil which may be detrimental to the establishment and long term health of replacement trees.

7. Conclusions:

7.1. To facilitate the development 1 C grade tree and 5 C grade shrub groups will be removed. All are located within the private, walled garden and as such their amenity value is significantly limited from public areas. Replacement planting is anticipated as part of the landscaping and creation of a family friendly garden.

7.2. The hawthorn (SHA reference T1) is protected by Tree Preservation Order Hampstead 27 TPO 1957 as T41 and will be retained and protected during works

7.3. The TreeRadar survey found that, although the new basement and side extension are located within the theoretical RPAs, the physical barrier of the boundary wall and the site history have prevented significant root growth into the site from the pollarded off-site trees. Any roots in this area were found within the top 50cm of soils and are likely associated with the trees and shrubs to be removed. The upper 1m of the excavation will be undertaken under arboricultural supervision and should roots from T9 or T10 be found, root pruning undertaken.

8. Recommendations:

8.1. That a copy of this report, and subsequent more detailed arboricultural method statement, is kept on site, including an A3 colour copy of the tree protection plan. The arboricultural documents will be part of site induction by the main contractor to all sub-contractors.

8.2. That the arboricultural method statements are developed further and are observed by all site personnel and supervised at key stages by the project arboricultural consultant. Short supervision reports are to be written after each inspection as a record of compliance and audit trail to the Local Authority.

8.3. That the foundation design takes into account trees to be retained, trees to be removed and trees to be planted.

8.4. That the line of the underground services should be ideally located outside of Root Protection Areas, ideally served from the existing property. However, as a precaution the final service plan should be assessed by an arboriculturalist. If it is unavoidable that services are to be located in RPAs, then a method statement must be produced.

8.5. That the landscaping scheme includes a mix of native trees from a cross section of species to ensure biosecurity against host specific pests and diseases. The trees must be planted and maintained in accordance with BS 8545:2014 *Trees: from nursery to independence in the landscape – Recommendations.*

8.6. That no tree works take place until consent is granted.

8.7. That the tree protection fencing is installed before machinery enters the site and remains in place until the soft landscaping stage.

8.8. That the levelling of the garden within the RPA of T8 and the top 1m of the basement excavation is carried out under arboricultural supervision.

8.9. That the locations of the exploratory intrusive investigation for contamination are assessed by the arboricultural consultant and that the ground remediation methodology near trees is discussed with the arboricultural consultant.

8.10. That the drainage strategy detailing on and/or offsite drainage works, including SUDS, is reviewed by the arboricultural consultant to ensure minimum impact on trees to be retained and is mindful of new trees to be planted.

Appendix 1

Tree survey sheets by Tim Moya Associates, reproduced with permission

181122-PD-10-Tree schedule (BS5837)

TIM MOYA ASSOCIATES

181122 - 52 Eton Avenue

Tree ID	No.	Species	Height (m)	Stem diameter (cm)	No. of Stems	CROWN SPREAD (m) N	NE	E	SE	S	SW	W	NW	Crown clearance (m)	L.B. (m)	Life stage	Condition Notes	Survey date	RPA (m^2)	RPR (m)	Life expectancy (yrs)	BS Category
Tree T1	1	Crataegus monogyna (Common Hawthorn/Quick/May)	7.0	38	1	3.6		4.1		3.6		3.6		3.0		Mature	Structural condition Fair. Physiological condition Good. Access to inspect base - Restricted / obscured. Base / stems obscured - Vegetation. Decay / structural defect - Minor. Decay / structural defect - Open cavity / cavities. Suppressed crown - Minor. Dense ivy suppression	26/11/2018	65.3	4.6	10-20	C1/C2
Shrub S2	1	Laurocerasus lusitanica (Portugal Laurel)	4.0	15 COM	7	0.3		2.0		2.0		1.5		2.0		Early Mature	Structural condition Fair. Physiological condition Fair. Arboricultural work - Historic. Competition - Adjacent trees. Muliti stemmed at base	26/11/2018	11.4	1.9	10-20	C2
Tree T3	1	Pittosporum sp.	9.0	25	1	2.4		2.8		2.0		2.0		2.0	Branch	Mature	Structural condition Fair. Physiological condition Fair. Crown reduction - Historic. Fork - Suspected structurally sound. Stems - Co-dominant.	26/11/2018	28.3	3.0	10-20	C1/C2
Shrub S4	1	Mahonia aquifolium (Oregon Grape)	3.0	8 COM	5	1.2		1.2		0.7		0.5		2.0		Semi Mature	Structural condition Fair. Physiological condition Fair. Muliti stemmed at base	26/11/2018	3.6	1.1	10-20	C2
Shrub S5	1	Sambucus nigra (Elder)	3.0	7	1	2.2		0.7		0.2		2.06		1.5		Semi Mature	Structural condition Poor. Physiological condition Fair. Arboricultural work - Recent. Suppressed crown - Minor.	26/11/2018	2.2	0.8	10-20	C2
Shrub S6	1	other (Other)	3.0	10	1	1.5		0.5		1.0		2.0		1.5		Semi Mature	Structural condition Fair. Physiological condition Fair. Base / stems obscured - Vegetation. Decay / structural defect in crown limb / limbs - Suspected. Deadwood - Minor. Species Fatsia japonica. Dimensions - Stem diameter estimated at base.	26/11/2018	4.5	1.2	10-20	C2
Shrub S7	1	other (Other)	2.5	9 COM	6	1.0		1.5		1.0		1.0		0.0		Semi Mature	Structural condition Fair. Physiological condition Fair. Species Fatsia japonica. Muliti stemmed at base	26/11/2018	4.3	1.2	10-20	C2

Stem **green** Estimated value
Stem **AVE** Average stem diameter for tree groups
Stem **COM** Combined stem diameter in accordance with BS5837
L.B. Height of lowest branch attachment (m) - where relevant

The survey information in this schedule has been gathered following a BS5837 survey for planning purposes. Where hazardous trees have been noted recommendations for works may have been made but this survey cannot be relied upon as a full health and safety assessment of the trees.

Generated By MyTREES tree management software

181122 - 52 Eton Avenue

Tree ID	No.	Species	Height (m)	Stem diameter (cm)	No. of Stems	CROWN SPREAD (m) N	NE	E	SE	S	SW	W	NW	Crown clearance (m)	L.B. (m)	Life stage	Condition Notes	Survey date	RPA (m^2)	RPR (m)	Life expectancy (yrs)	BS Category
Tree T8	1	Tilia cordata (Small Leaved Lime)	13.0	56	1	3.0		2.8		2.5		2.3		3.0		Mature	Structural condition Fair. Physiological condition Fair. Epicormic growth - Base / bole / principal stems. Pollard - Regrown.	26/11/2018	141.9	6.7	20-40	B1/B2
Tree T9	1	Tilia cordata (Small Leaved Lime)	12.0	58	1	2.0		3.0		2.0		1.5		3.0		Early Mature	Structural condition Fair. Physiological condition Fair. Arboricultural work - Recent. Heavy crown reduction. Topped. Slight lean towards site, not considered significant. Stem divides at 3m, co-dominant. Current management mitigates any associated risk. No clear buttressing but pavement lifted slightly east and north. Adjacent low retaining wall cracked in places.	04/01/2019	152.2	7.0	10-20	C1/C2
Tree T10	1	Platanus x hispanica (London Plane)	15.0	83	1	5.2		4.5		6.3		5.5		5.0		Mature	Structural condition Fair. Physiological condition Good. Large prominent tree. Recent and historic pollard management. Evidence of large buttress roots in cardinal directions. Tension roots south. Vigorous regrowth from pollard points. Evidence of disruption to pavement. Cracks apparent in adjacent retaining wall which may be related.	04/01/2019	311.7	10.0	20-40	B1/B2

Stem **green** Estimated value
Stem **AVE** Average stem diameter for tree groups
Stem **COM** Combined stem diameter in accordance with BS5837
L.B. Height of lowest branch attachment (m) - where relevant

The survey information in this schedule has been gathered following a BS5837 survey for planning purposes. Where hazardous trees have been noted recommendations for works may have been made but this survey cannot be relied upon as a full health and safety assessment of the trees.

Generated By MyTREES tree management software

Summary table with retention category

	Shrub	Tree	Total
B1/B2	0	2	2
C1/C2	0	3	3
C2	5	0	5
Total	5	5	10

Summary table with life stage

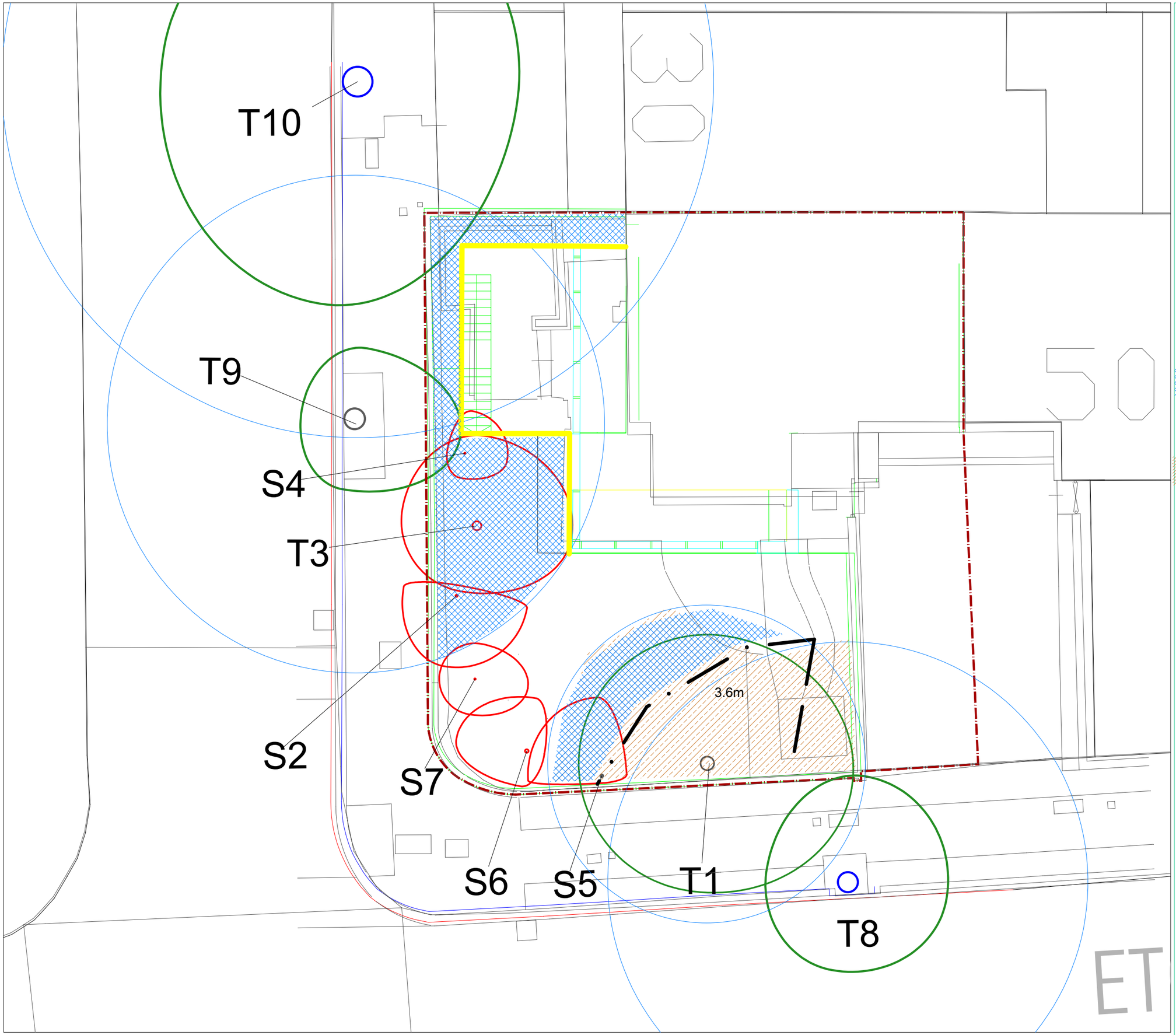
	Shrub	Tree	Total
Early Mature	1	1	2
Mature	0	4	4
Semi Mature	4	0	4
Total	5	5	10

Table 1 of BS5837 (2012) **Cascade chart for tree quality assessment**

Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see note)				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	* Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) * Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline * Trees infected with pathogens of significance to health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7			**RED**
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**	
Trees to be considered for retention				
Category A **Trees of high quality** with an estimated remaining life expectancy of at least 40 years	Tree that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue).	Trees, groups or woodlands of particular visual importance as arboricutural and/or landscape features.	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture).	**GREEN**
Category B **Trees of moderate quality** with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation.	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality.	Trees with material conservation or other cultural value.	**BLUE**
Category C **Trees of low quality** with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories.	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits.	Trees with no material conservation or other cultural value.	**GREY**

Appendix 2

Tree protection plan SHA 921 TPP



T1 - A Category A - high quality and value

T1 - B Category B - moderate quality and va

T1 - C Category C - low quality and value

T1 - U Category U - unsuitable for retention

Crown spread of trees to be retained

RPA - root protection area as defined by Table 2 BS 5837:2012 - refer to TreeRadar report for actual rooting

Trees to be removed

Area for arboricultural method statement for basement installation (essentially observation)

Tree protection fencing comprising braced Heras panels

Ground protection comprising geotextile membrane, overlaid with a layer of wood chip (from tree surgery arisings) 75mm deep, overlaid with Marine ply cut to fit

Method statement for modest ground level changes. As a precaution this will take place under arboricultural supervision.

Rev :	Description :	Authorized :

Sharon Hosegood Associates
4th floor Victoria House,
Victoria Road,
Chelmsford, CM1 1JR

t: 01245 210420
www.sharonhosegoodassociates.co.uk

Client

Izzy & Natalie Tepekoylu

Site Address

52 Eton Avenue London NW3 3HN

Drawing Title	Orientation	Drawn	Authorized
Tree Protection Plan		IL	SMH
Date	**Drawing Number**	**Scale**	**Drawing Status**
16.1.19	SHA921 TPP	1:100@A3	For Issue

Revision

Appendix 3

Tree surgery schedule

Tree surgery schedule

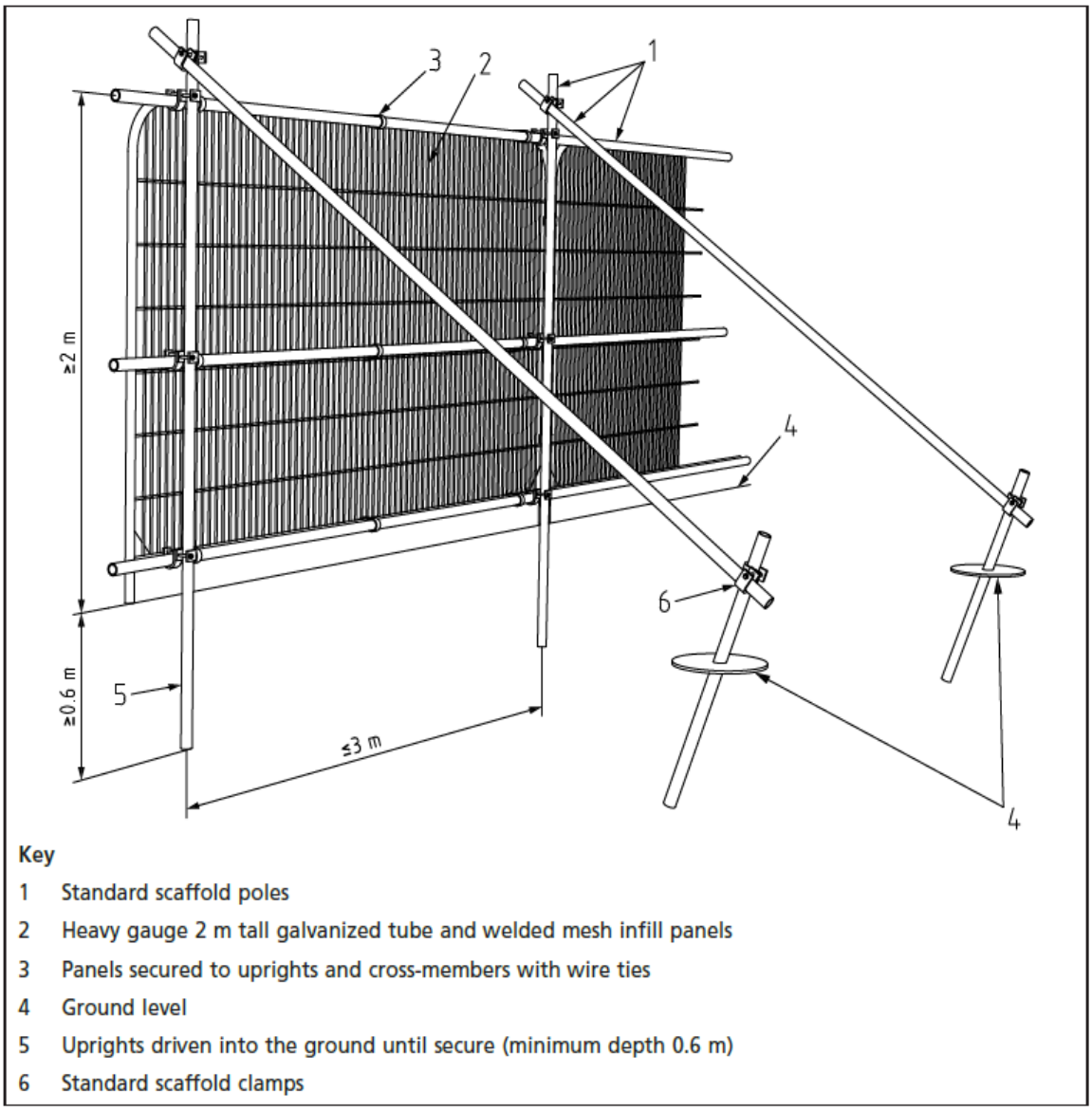
All works to be carried out in accordance with BS 3998:2010 'Tree works – Recommendations'. All pruning cuts to be made at suitable growing points in the line with the principles of 'Natural target pruning'. An ecological check is required by a competent person prior to tree works being carried. Works should not take place until planning permission is granted and all pre-commencement conditions are discharged.

Tree no.	Species	Proposed works	Reason
T 1	Common Hawthorn TPO T41	Sever ivy and remove dead wood with a diameter greater than 25mm and remove any defective branches Crown lift secondary branches to achieve 2m clearance. Crown reduce only by pruning elongated branches back to the main crown form	For safety reasons and to improve aesthetics.
S2	Portugal Laurel	Fell and grind out stumps.	To facilitate development.
T3	Pittosporum sp.	Fell and grind out stump.	To facilitate development.
S4	Oregon Grape	Fell and grind out stumps.	To facilitate development.
S5	Elder	Fell and grind out stumps.	To facilitate landscaping works.
S6	Unknown	Fell and grind out stumps.	To facilitate landscaping works.
S7	Unknown	Fell and grind out stumps.	To facilitate landscaping works.
T8	Small Leaved Lime	No works required.	-
T9	Small Leaved Lime	No works required.	-
T10	London Plane	No works required.	-

Appendix 4

Tree protection specification

Figure 2 **Default specification for protective barrier**



Key

1 Standard scaffold poles
2 Heavy gauge 2 m tall galvanized tube and welded mesh infill panels
3 Panels secured to uprights and cross-members with wire ties
4 Ground level
5 Uprights driven into the ground until secure (minimum depth 0.6 m)
6 Standard scaffold clamps

Tree protection fencing specification from BS 5837:2012 Figure 2

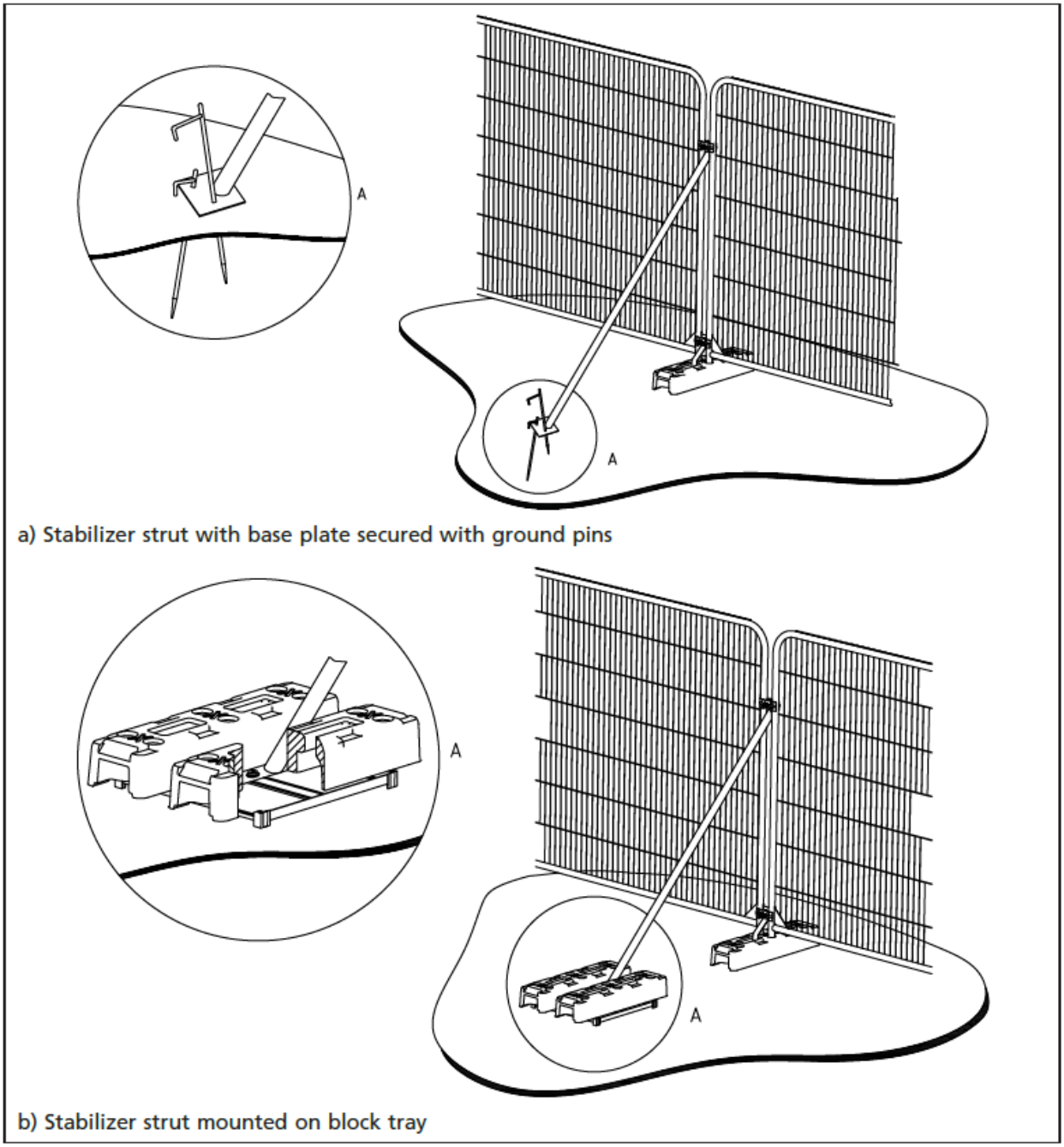
Section 6.2.2 of BS.

Barriers should be fit for purpose of excluding construction activity and appropriate to the degree and proximity of work taking place around the retained trees(s). Barriers should be maintained to ensure that they remain rigid and complete.

The default specification is shown above at Figure 2. Care should be taken when locating the vertical poles to avoid underground services and structural roots. Where it is not possible to drive a pole into the ground, for example on hard surfacing, figure 3 overleaf, applies.

The location for the tree protection fencing is shown on the tree protection plan delineated by a black dashed line. The location of the fencing is out the outer edge of the root protection area and the dimensions from fixed points are shown on the drawings. All weather signs should be affixed to the barriers, no more than 12m apart.

Figure 3 **Examples of above-ground stabilizing systems**



a) Stabilizer strut with base plate secured with ground pins

b) Stabilizer strut mounted on block tray

Suggested site warning sign format

Ground protection during demolition and construction

Where working space 'temporary access' is needed within the root protection area during works, fencing should be set back the minimum amount to achieve the required room. If there is existing hard surfacing in this area, it should remain during the works as ground protection. The suitability of this surfacing for ground protection, and whether it needs to be reinforced to bear the weight of machinery, should be assessed by an engineer and discussed with an arboriculturist.

Where the set back of the fencing exposes unmade ground, the ground must be protected before any works take place on site. This is to prevent root damage and soil compaction.

The ground protection might comprise of one of the following: (section 6.2.3.3 of BS)

A) For pedestrian movements only, a single thickness of scaffold boards placed either on top of a driven scaffold frame, so as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100mm depth of woodchip), laid onto a geotextile membrane;
B) For pedestrian-operated plant up to a gross weight of 2 tonnes, proprietary, inter-linked ground protection boards placed on top of a compression-resistant layer (e.g. 150mm depth of woodchip), laid onto a geotextile membrane;

I recommend using the woodchip from the tree surgery arisings to be sustainable and to save costs.

The location for ground protection is shown on the tree protection plan by blue cross hatching, identified in the key.

Appendix 5

Draft arboricultural method statement

Tree works:

Recommendations for tree works can be found in the tree surgery schedule in Appendix 5. All works shall be in accordance with BS 3998:2010 '*Tree work. Recommendations'*. The use of a competent and insured tree surgery contractor is necessary to comply with this. The main contractor and tree surgery contractor must ensure that any necessary consents have been received from the local authority and that no protected species are harmed whilst carrying out site clearance or tree surgery works. Within root protection areas, stumps, shrubs and other vegetation must be removed by hand or using stump grinding machinery to minimize root damage of retained trees. Where poisoning of stumps is specified, this must be carried out by competent operatives. Only chemicals approved for this purpose and used in accordance with the manufacturer's instructions will be used.

The following information must be sought:

- Current employers, public and product liability insurance
- Waste carriers' licence
- Qualification and experience of key personnel, including relevant NPTC certificates
- COSHH assessment
- Tool and task based risk assessment, including a Working at Height Risk Assessment
- Site specific risk assessment
- Emergency procedure plan
- Method Statement

A list of suitable tree surgeons is found at:
http://www.trees.org.uk/find-a-professional/Directory-of-Tree-Surgeons
Bio security measures are important and found at:
https://www.forestry.gov.uk/biosecurity

Fires: Fires on site should be avoided if possible. If unavoidable, they should be situated far enough so that there is no risk of damage to the trees, taking into consideration the wind direction.

Site and fuel storage, cement mixing and washing points: All site storage areas, cement mixing and washing points for equipment and vehicles and fuel storage areas should be outside root protection areas unless otherwise agreed with the Local Planning Authority. No discharge of potential contaminants should occur within 10m of a retained tree stem or where there is a risk of run off into Root Protection Areas.

Protection of tree canopies: Piling rigs and cranes are often used close to trees. Work must be carefully planned so that there is sufficient room to avoid hitting the canopy during transportation or operation. Arboricultural supervision may be required, however, it is the responsibility of the contractor to assess and plan the work. Any access facilitation pruning required is detailed in the tree surgery schedule.

Observation of installation of the basement:

- Ground protection installed
- Basement marked out
- Basement dug with a digger with a smooth bucket under arboricultural supervision
- Any roots found will be almost certainly from the removed trees and shrubs (refer to the TreeRadar report at appendix 11). In the very unlikely event that any roots are found below 1m, they will be pruned by the arboricultural consultant. Note no deep roots were found by the TreeRadar survey.
- Edge of basement nearest the street trees T9 and T10 to be protected by impermeable plastic sheeting (or similar impermeable material) to prevent the concrete from locally raising the PH of soil. This is important as the PH value can spread to adjacent soil below the wall's foundations.

New landscaping: Within the root protection areas of trees to be retained, the preparation of soil for planting and turfing will be carried out by hand. Leveling of ground within the RPA of T8 will be carried out under arboricultural supervision. Any other level changes must be assessed by the arboricultural consultant. Cultivation will be kept to a minimum and new topsoil must not exceed 100mm in depth within 1m of the stem. Top soil and other materials will be transported by wheelbarrow on running boards when working near trees.

Arboricultural site supervision

An initial site meeting:

Before works have started, but after the tree surgery and tree protection measures are in place. At this meeting the site manager, contractor, arboricultural consultant should discuss methodology and the tree protection measures will be examined. A '*What you need to know about working near trees at 52 Eton Avenue, London NW3 3HN*' sheet will be issued which includes contact details.

Site supervision is recommended during the installation of basement and the modest change to ground levels.

After each site supervision, a short report will be sent to the contractor, client and local authority as a record of compliance.

Appendix 6

Tree related legislation

Tree preservation orders

The Town and Country Planning (Tree Preservation) (England) Regulations 2012.
Tree Preservation Order Hampstead 27 TPO 1957 protects the hawthorn as T41 and also protected a flowering apple T40 (not present). The last tree works consent at this address was in 1996 to crown thin the hawthorn by 35 – 40% (reference T9601613).

Conservation Area:

The site lies within the Belsize Park Conservation Area. This means that before any tree work can take place, six weeks' notice (a section 211 notice) must be given to the Local Planning Authority (LPA). The LPA can either raise no objection, or if they object, they must serve a tree preservation order. A section 211 application is not required to carry out works list within the tree surgery schedule of this report provided that this report is submitted as part of the planning application and that planning permission is granted. All pre-commencement conditions must be met prior to undertaking such works.

Ecological considerations

The Wildlife and Countryside Act 1981, as amended, The Conservation of Habitats and Species Regulations 2010 and the Countryside and Rights of Way Act 2000, provide statutory protection to species of flora and fauna including birds, bats and other species that are associated with trees.

Occupiers Liability Act 1957 and 1984

The Occupiers Liability Act (1957 and 1984) places a duty of care to ensure that no reasonably foreseeable harm takes place due to tree defects. Therefore, this report includes recommendations within the tree tables for work required for safety reasons. 'Common sense risk management of tree (National Tree Safety Group 2012)' states that *'The owner of the land on which a tree stands, together with any party who has control over the tree's management, owes a duty of care at Common Law to all people who might be injured by the tree. The duty of care is to take reasonable care to avoid acts or omissions that cause a reasonably foreseeable risk of injury to persons or property'.*

Common law enables pruning back to the boundary line providing the work is reasonable. Other restrictions, such as tree preservation orders/conservation areas still apply.

The owner of a tree is not obliged to trim their trees or hedges to prevent them from crossing over a boundary. Whilst the tree owner is not obliged to cut back the branches, the person whose property is overhung has the right to cut back the branches to the boundary providing there are no planning or legal restrictions on the trees such as Tree Protection Orders or if they are located in a church yard, in which case suitable consent must be obtained. Such pruning works must be undertaken to a suitable standard and must not cause damage to the tree.

The resulting debris remains the property of the tree owner, but you must not cause any damage to their property when returning it back to them and you do not have the right to trespass on the tree owner's property in carrying out the works. In the interests of good neighbourly relations, we would encourage neighbours to discuss their intentions with each other before carrying out such works, providing the work is reasonable and that the trees are not subject to TPO or Conservation Area protection.

Appendix 7

Statement of methodology and reference material

Statement of methodology

Review of architects plans and previous survey by E. Cleverdon, of TMA Consultancy.
Site visit to undertake TreeRadar survey made by Ian Lee on 3.1.2019.

Tree survey using Visual Tree Assessment carried out in accordance with BS 5837:2012 '*Trees in relation to design, demolition and construction – Recommendations*' (BS). All investigations were from ground level only and binoculars were used when necessary. All trees with a trunk diameter of 75mm or above were surveyed. Obvious hedges and shrub masses were identified where appropriate. Information collected is in accordance with recommendations in subsection 4.4.2.5 of BS and include species, height, diameter, branch spread, crown clearance, age class, physiological condition, structural condition and remaining contribution. Each tree was then allocated one of four categories (U, A, B or C).

Received material

TMA Report and plans
2014_52 Eton Avenue_ Victorian_House_Archive_Extracts
AA_1814_S_SK-0001_Basement Floor Plan Overlay_01
planning history from 1930s onwards
Planning documents from 1962
2056.01-52EtonAvenue-SiteSurvey
aa_1814_S_PL-0102_Ground Floor Plan
TPO 1957

Reviewed text

BSI. BS 3998:2010 *Tree work-Recommendations.*
BSI. BS 5837:2012 *Trees in relation to design, demolition and construction – Recommendations*
R.G.Strouts and T.G.Winter 'Diagnosis of ill-health in trees' TSO 1994
London Borough of Camden website
C. Mattheck 'The body language of trees' 2015

Appendix 8

Caveats & Exclusions

Specific report caveats

1. At the time of writing this report, the protected tree status is correct. However, this can change. Therefore, I advise that a further check is made with London Borough of Camden before any works to trees take place.
2. No internal diagnostic equipment was used other than a sounding mallet and probe and all inspections where from ground level only, with the aid of binoculars where necessary.
3. The survey is concerned solely with arboricultural issues.
4. 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.
5. 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.
6. Only the trees listed in this report have been examined.
7. The measure of offsite trees has been estimated, except any crown within the site overhang which is measured. Where the crown of an onsite tree overhangs the boundary, the crown spread in this direction is also estimated.
8. The base and trunk of the offsite trees could not be examined, and therefore a full assessment of the trees condition could not be made.
9. Dense ivy and undergrowth prevent a full condition survey being carried out. The vegetation may be hiding structural defects.
10. The tree information is from the time of the survey. Some pests, diseases and fungi only appear seasonally, therefore it is possible not all issues that may affect the health of the trees could be observed.

This report has been prepared by Sharon Hosegood Associates Limited exclusively for its client under the terms of its contract with its client (incorporating Sharon Hosegood Associates Limited's Terms and Conditions). To the extent permitted under applicable law (and save as set out in its contract with its client), Sharon Hosegood Associates Limited excludes all liability (whether in contract or in tort, in negligence, for breach of statutory duty or otherwise) to its client and any third parties in respect of loss and/or damage relating to the use of, and/or reliance on, this report or any of its content. This report and its content are copyright of Sharon Hosegood Associates Limited and may not be distributed or copied (whether in full or in part) without the author's prior written permission.

Appendix 9

My experience and qualifications

Sharon Hosegood
ASSOCIATES

Ian Lee

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

Arboricultural
ASSOCIATION
Professional Member

PROFILE:

Ian has thirteen 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 will be continued in 2018 with international colleagues.

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

In 2018 Ian gained Chartership with the Institute of Chartered Foresters

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:

- Professional 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

Appendix 10

Glossary

Arboriculture	Formerly all aspects of the culture of trees, especially for forestry. Latterly, the art and science of cultivating and managing trees as groups and individuals, primarily for amenity and other non-forestry purpose**.**
Arboricultural method statement	Methodology for the implementation of any aspect of development that is within the root protection area, or has the potential to result in loss of or damage to a tree to be retained.
Arboriculturist	Person who has, through relevant education, training and experience in the field of trees in relation to construction.
Architecture	In a tree, a term describing the pattern of branching of the crown or root system.
Biodiversity	The variability among all living organisms of an ecological complex.
Biomechanical	Pertaining to the mechanical functions and properties of living organisms, such as trees.
Body language	In trees, the outward display of growth responses and/or deformation in response to mechanical stresses.
Branch	A limb extending from the main stem or parent branch of a tree.
Branch bark ridge	The raised arc of bark tissues that forms the acute angle between a branch and its parent stem
Branch collar	The swelling or roughened bark often found at the base of a branch which should be left intact if the branch is to be pruned off.
Canopy	The topmost layer of twigs and foliage in a tree.
Construction exclusion zone	An area based on the root protection area from which access is prohibited for the duration of the project.
Crown	In arboriculture, the main foliage-bearing portion of a tree.
Crown lifting	The removal of shortening of the branches that form the lower part of the crown of a tree.
Crown reduction	Pruning in order to reduce the size of the crown of a tree.
Crown thinning	Pruning inside the crown of a tree in order to reduce its density.
Defect	In relation to tree hazards, any feature of a tree which detracts from the uniform distribution of mechanical stress, or which makes the tree mechanically unsuited to its environment.
Dieback	The death of part of a plant, usually starting from a distal point and often progressing proximally in stages.
Direct damage	Direct physical damage to a structure of surface from pressure exerted by the trunk or growing roots.
Epicormic	Pertaining to shoots or roots which are initiated on mature woody stems; shoots can form tin this way from dormant buds or they can be adventitious.
Failure	In connection with tree hazards, a partial or total fracture within woody tissues or loss of cohesion between roots and soil.
Flush cut	A pruning cut close to the parent stem which removes part of the branch bark ridge.
Foreseeable	In hazard assessment, pertaining to failure and associated injury of damage which are predictable on the basis of evidence from a tree and its surroundings.

Fungi	Organisms of several evolutionary origins, most of which are multicellular and grow as branched filamentous cells within dead organic matter or living organisms.
Hazard	A thing, a process or a potential event that has the potential to cause harm.
Heartwood	The dead or predominantly dead central wood of various tree species whose outer living wood, sapwood, has a finite and pre-determined lifespan.
Level arm	A mechanical term denoting the length of the lever represented by a structure that is free to move at one end, such as a tree or an individual branch.
Landscape character	A distinct, recognisably and consistent pattern of elements in the landscape that make one landscape different from another, rather than better or worse.
Mulch	Material laid down over the rooting area of a tree or other plant to help conserve moisture, suppress weeds and encourage a beneficial microflora.
Pollard	A term for a pollarded tree
Pollarding	The complete or partial removal of the crown of a young tree so as to encourage the development of numerous branches; also, further cutting to maintaining this growth pattern.
Probability	A statistical measure of the chance that a particular event (e.g. a specific failure of a tree or specific kind of harm to persons or property) might occur.
Risks	The likelihood of the potential harm from a particular hazard becoming actual harm.
Root protection area	A layout tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority. BS 5837:2012 *'Trees in relation to design, demolition and construction – Recommendations'*.
Root flare	Thickened and expanded base of s tree stem at ground level form which buttress roots form.
Rootplate	The central part of the root system of a tree, consisting of the large-diameter main roots and a dense mass of smaller roots and soil.
Service	In construction, any above-or below-ground structure o apparatus for utility provision.
SULE	Safe useful life expectancy of a tree (Barrell)
Stress	In plant physiology, a condition under which one or more physiological functions are not operation within their optimum range, for example owing to lack of water, inadequate nutrition or extremes of temperature.
Stub cut	A pruning cut which is made at some length distal to the branch bark ridge.
Target pruning	The pruning of a twig or branch so that tissues recognisably belonging to the parent stem or branch are retained and not damaged.
Targets	In tree hazard assessment, persons or property or other things of value which might be harmed by mechanical failure of the tree or by objects falling from it.

Tree Preservation Order	In Great Britain, an order made by a local authority, whereby the authority's consent is generally required for the cutting down, topping or lopping of specified trees.
Tree protection plan	Scale drawing, informed by descriptive text where necessary, based upon the finalized proposal, showing trees for retention and illustrating the tree and landscape protection measures.
Utility	An undertaker by statute that has a legal right to provide customer services (e.g. communication, electricity, gas and water).
Vigour	In tree assessment, an overall measure of the rate of shoot production, shoot extension or diameter growth.
Vitality	In tree assessment, an overall appraisal of physiological and biomechanical processes, in which high vitality equates with near-optimal function, in which high vitality equates with healthy function.
Visual Tree Assessment (VTA)	In addition to the literal meaning, a system expounded by Matteck and Breloer (1995) to aid the diagnosis of potential defects through visual signs and the application of mechanical criteria.
Wound	Injury caused to a tree by a physical force.

Appendix 11

TreeRadar report

Sharon Hosegood

ASSOCIATES

radar

Root investigation by Tree Radar

SITE

52 Eton Avenue,

London,

NW3 3HN

CLIENT

Izzy Tepekoylu & Natalie Mason

Ian Lee

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

Reviewed by Sharon Hosegood

FICFor FArborA BSC (Hons) Tech Cert (Arbor A)

DATE: 15.01.2019

OUR REF: SHA 921

CONTACT DETAILS: 01245 210 420

Ian@sharonhosegoodassociates.co.uk

EXECUTIVE SUMMARY

This report provides information on the root spread of a London Plane and a lime tree growing off-site within the public highway (Crossfield Road), adjacent to the site of a proposed basement excavation at 52 Eton Avenue, London, NW3 3HN. The trees are growing within the pavement to the west of the property, separated from the site by a brick boundary wall.

Scans were undertaken within the property and on the pavements to Crossfield Road.

The soils beneath the scan lines contain a large amount of non-root reflectors and services, while the soil horizons are poorly defined, especially within the site. This indicates that soils were significantly disturbed in the past, which is typical of soils and sites across London.

Beneath the site of the proposed new basement construction roots are found in low rooting densities and the majority of the roots clustered around towards the shrub beds containing the trees and shrubs, rather than from the large London plane to the north west. Roots are also found at a relatively shallow depth beneath the patio and path, averaging in a band between 15-50cm deep. Given the standard construction of domestic patios and path and the proximity of the planted shrub bed it is likely that a number of the shallow detections are actually matts of fine roots exploiting the sandy material beneath the slabs rather than tree roots.

The consistently shallow nature of the on-site roots in scan series 0001 and 0002 also indicate that the roots detected are unlikely from the street trees. This is because the trees would preferentially root under the footpath rather than grow up and under wall's foundations. The wall is substantial, and likely to have deep foundations. In this situation the wall appears to have formed a physical barrier to root growth.

The trees are rooting well within the public highway, extending beneath the footpath and road, extending to the north and south within the pavement as is evident from the deflection of the surfacing.

This report concludes that it is highly unlikely that roots found within the site are from the street trees due the fact that the wall acts a root barrier.

Contents

1. INTRODUCTION:

1.1. This report provides information on the root spread of a London Plane and a lime tree, growing off-site within the public highway, adjacent to the site of a proposed basement excavation at 52 Eton Avenue, London, NW3 3HN.

1.2. The survey was carried out on 3rd January 2019 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 detail of root locations, and the use of this in developing any designs and assessing the arboricultural impact will be carried out in the accompanying Arboricultural Impact Assessment.

2. CURRENT SITE DESCRIPTION:-

2.1 The site of the proposed development is an 'L' shaped private garden wrapping round the western and southern sides of 52 Eton Avenue, London, at the junction with Eton Avenue and Crossfield Road. To the south Eton Avenue runs along the site boundary, while Crossfield Road runs along the western boundary. Both are tree lined roads, containing a mix of mature trees, predominantly London plane and limes. The garden consists of a lawn to the south, with a raised patio area in the north west corner of the site and a path running around the edge of the house. There are trees and shrubs near the patio which is the site of the proposed basement. The garden is surrounded by a substantial brick boundary wall with ivy and climbers growing above its top. Cracking of the wall is noted adjacent to the north west corner, possibly as a result of tree root damage.

2.2 The London plane is located within the footpath to the north west of the property, with deflection of the surfacing and recent patching showing where the roots of the tree are growing near the surface. The tree has been regularly crown reduced as are the other trees along the road. This tree is referred to as T10 within the Arboricultural Impact Assessment (AIA) and the same numbering will be used within this report.

2.3 The lime tree is an early mature specimen growing within the footpath approximately halfway along the southern boundary. This tree leans towards the site slightly and is managed as a pollard. The tree is referred to as T9 within the AIA. Given the age and location of the tree it is likely that the lime trees were planted as replacements for other trees lost within the avenues, which may also account for the slight lean when the young tree was growing towards the light.

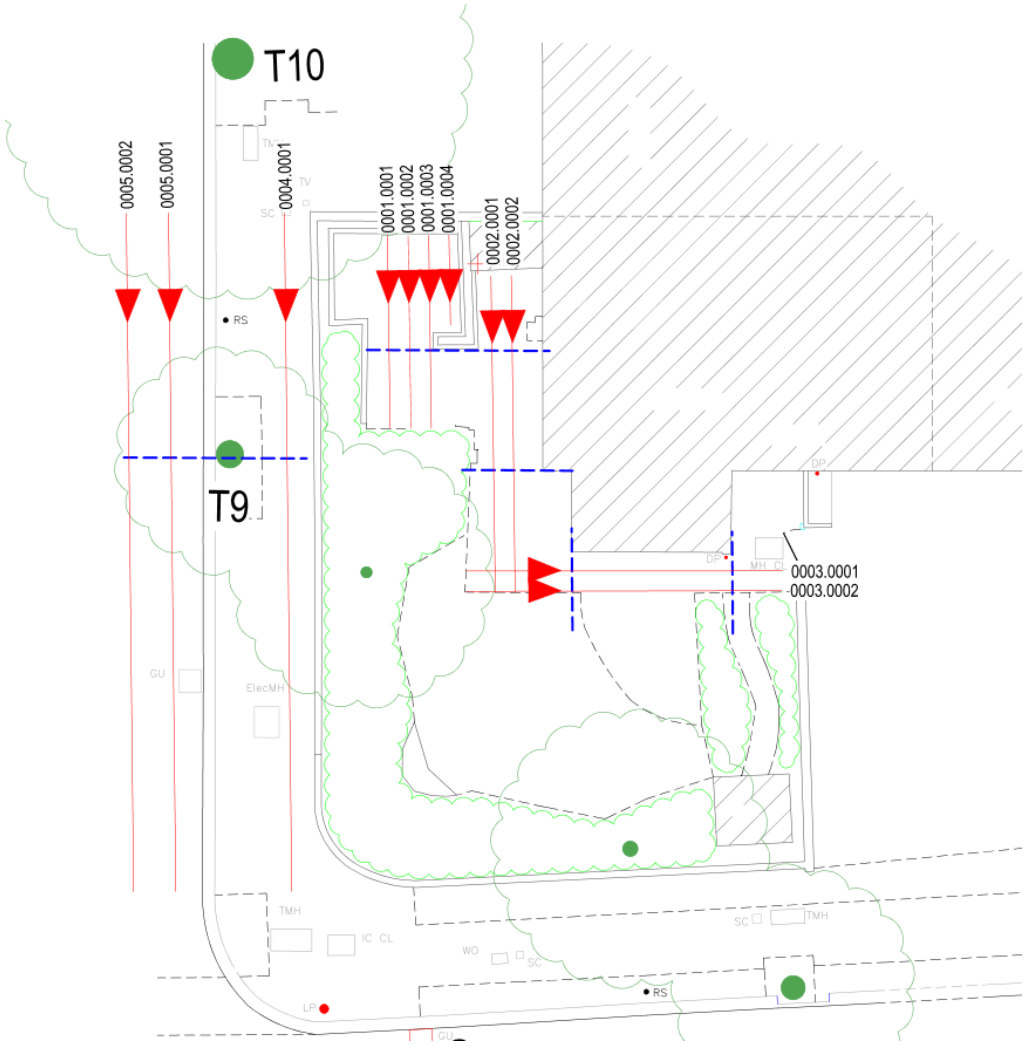
3. METHODOLOGY AND TREERADAR INFORMATION:-

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 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 of the TreeRadar cart (in a different setting)

3.2 Scanning conditions were relatively straightforward for the survey, but as is typical of urban areas, there were a very large number of non-root reflectors due to rubble/other objects, 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. Not all scan lines are within the root protection areas of the trees.

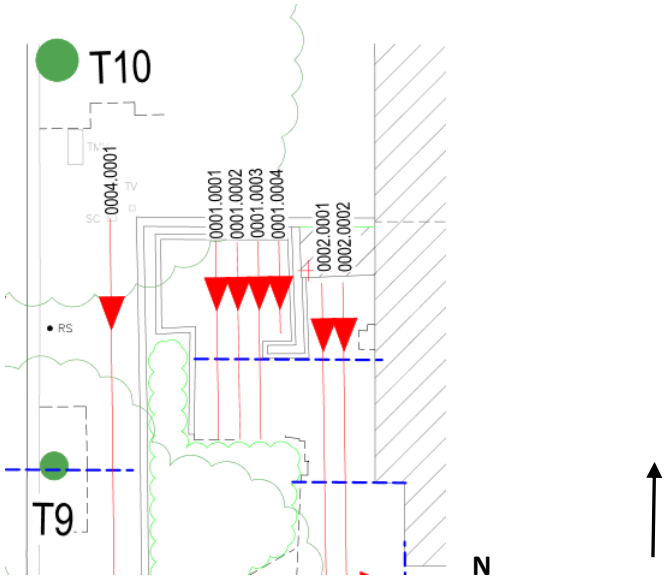
3.3 The locations of the scan lines are found at Appendix 1 on the TreeRadar plan (reference *SHA 921 TR* extract below), and the results super-imposed on the base plan (*SHA 921 TRR).* Top down views for the roots at various depths, along with the cross sections for each scan line are found at section 8. Details of how to read the results are found at section 7.



Plan 1 – extract from SHA 921 TR. Do not scale. North is vertical. Red lines are the scan lines and blue dashed lines are the markers (a surveying aid).

4. RESULTS:-

4.1 Scan lines 0001.0001 – 0004 – A series of parallel scan lines within the patio area running from north to south, starting 0.7m from the northern edge of the patio due to the length of the scanning cart, and ending at the southern edge. Line 0001.0001 is located 0.5m from the western wall of the patio and parallel to it, with each subsequent line located an additional 0.5m from the wall. A marker is made at the steps. An extract from the tree radar plan *SHA 913 TR* below shows the locations of the scan lines.



Plan 2. Extract from TreeRadar plan SHA 913 TR showing location of scan lines 0001.0001-0004. Do not scale.

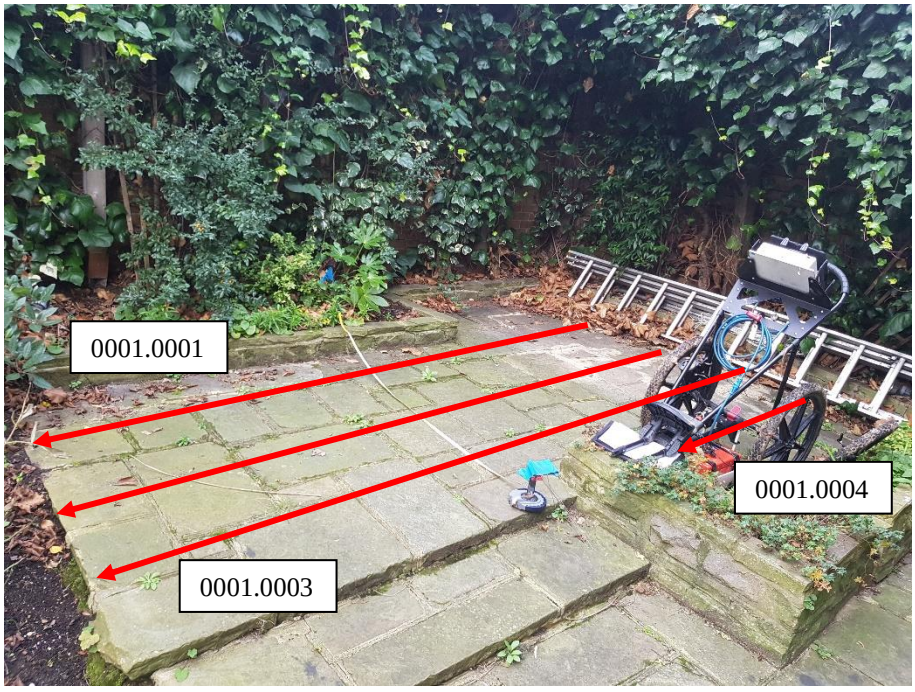
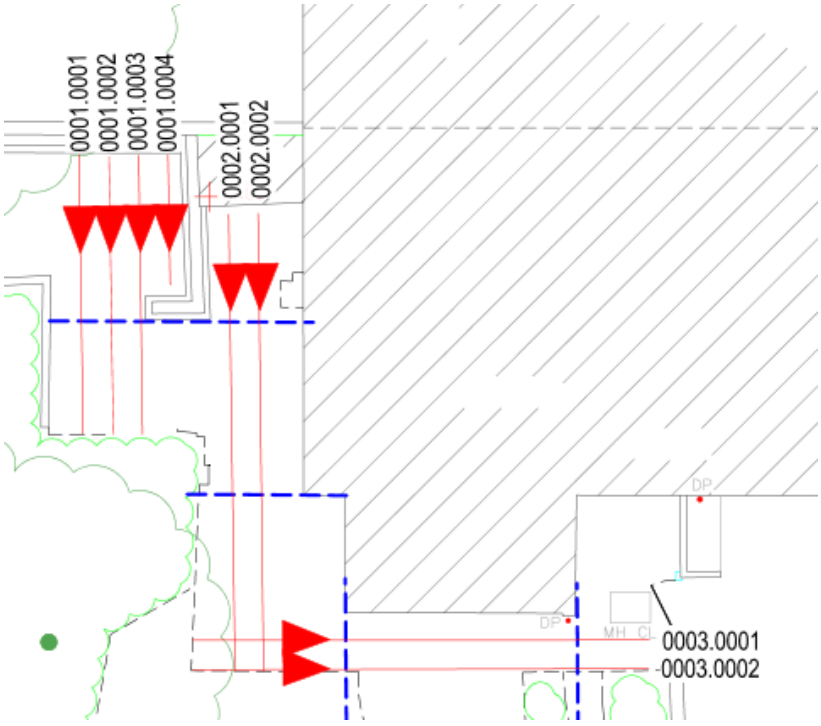


Photo 2. Scan lines 0001.0001-0004 within the patio.

4.1.1. **Results:** Roots are found in moderate/low densities, rapidly falling to low densities with increased distance from the edge of the patio and in an unevenly distributed band between 18-50cm deep. The majority of the roots are found within the southern half of the scan lines, coinciding with their approach towards the tree and shrubs in the shrub bed immediately south if the patio. Given the relatively shallow depth and the distribution it is considered likely that the majority of the roots are associated with the on-site tree and the shrubs, rather than the street trees whose roots would have been forced deeper to pass beneath the footings of the boundary wall. Soils in this location appear very disturbed with poor soil horizon definition.

4.2. Scan lines 0002.0001-0002

Scan lines 0002.0001-0002 are a pair of parallel scan lines within the path east of the patio, starting 0.6m south of the storage building and running south within the path to the edge of the lawn. Line 0002.0001 is located 3m from the western wall of the patio and runs parallel to it, with 0002.0002 located an additional 0.5m from the wall. Markers are made at the patio steps and at the southern end of the building. An extract from the tree radar plan *SHA 921 TR* below shows the locations of the scan lines.



Plan 3. Extract from TreeRadar plan SHA 921 TR showing location of scan lines 0002.0001-0002. Do not scale.

N

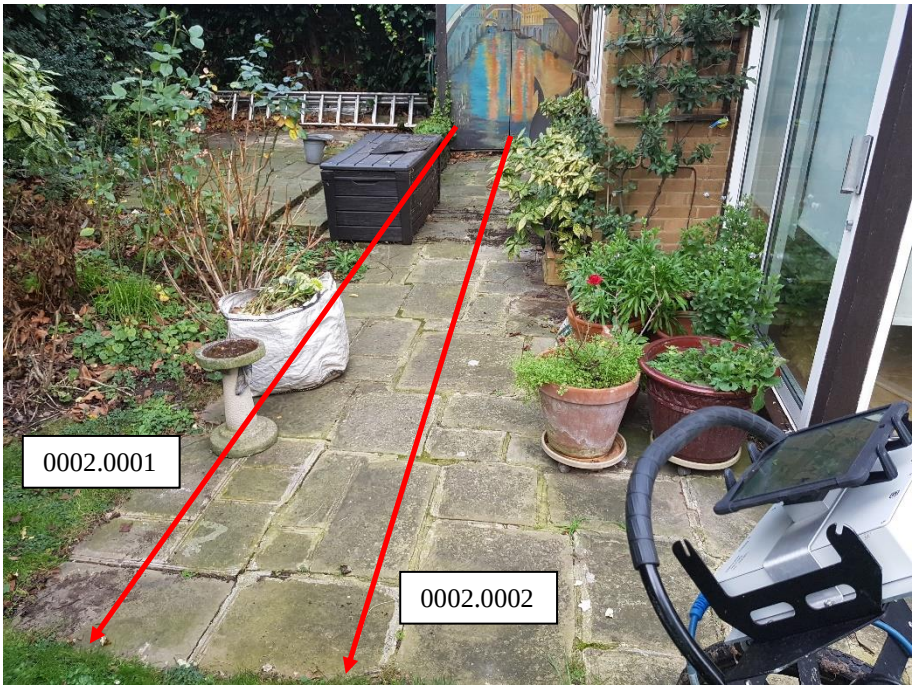
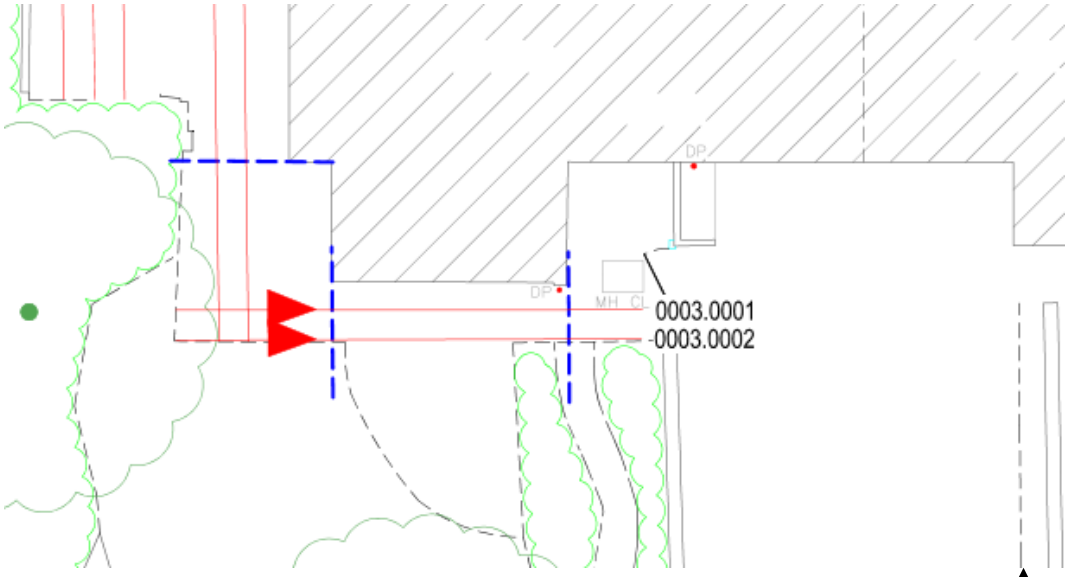


Photo 3. Scan lines 002.0002-0002 within the path.

4.2.1. **Results:** The roots are found in a very low rooting density in an unevenly distributed band between 15-50cm deep. The majority of the roots are found in the southern half of the lines, nearest the trees and shrubs in the shrub bed. Soils in this location appear very disturbed with poor soil horizon definition.

4.3. Scan lines 0003.0001-0002

Scan lines 0003.0001-0002 are two scan lines running parallel to the southern building line, within the path. Line 0003.0001 is located 0.5m from the rear building line and runs from west to east parallel to it. The scan line starts at the western edge of the path and ends 70cm from the eastern boundary wall, with markers made level with the eastern and western sides of the conservatory. Line 0003.0002 runs parallel to line 0003.0001 with the same start, end and marker points, but located 1m from the building, along the southern edge of the path. An extract from the tree radar plan *SHA 892 TR* overleaf shows the locations of the scan lines.



Plan 4. Extract from TreeRadar plan SHA 921 TR showing location of scan lines 0003.0001-0002. Do not scale.

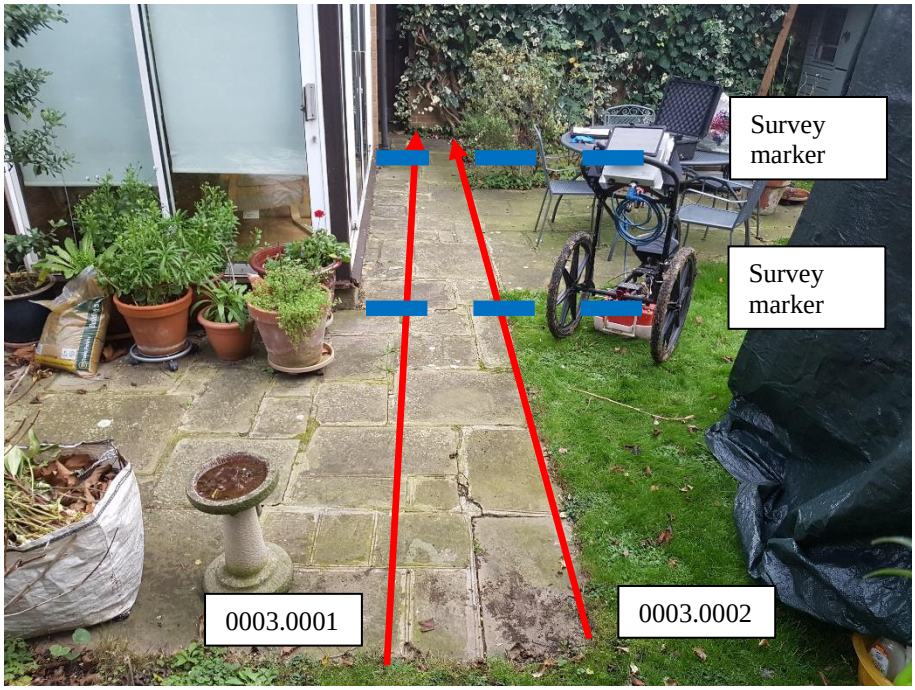
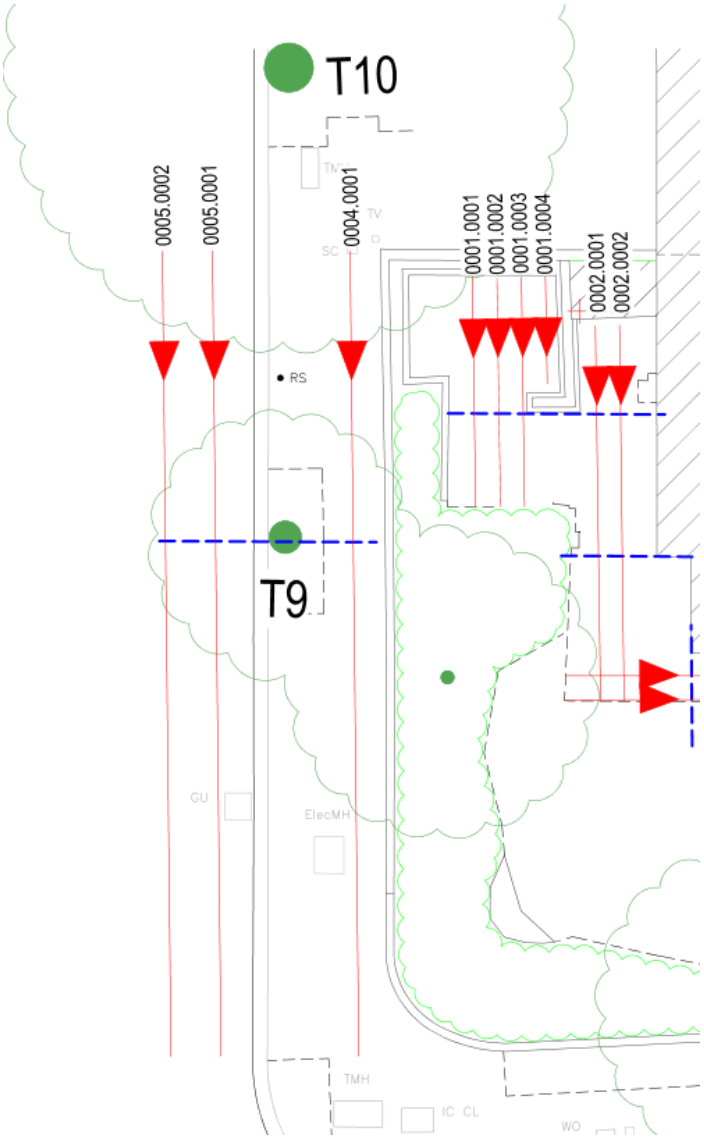


Photo 4. Scan lines 0003.0001-0002 within the path.

4.3.1. **Results:** The results of the scan lines found only one root within scan line 0003.0002, located at the eastern end of the scan line near the shrub bed. No other roots are found within the scan lines and the single root is most likely associated with the woody shrubs rather than a tree.

4.4. Scan lines 0004.0001 and 0005.0001-0002

Scan line 0004.0001 is a single line within the pavement outside the site boundary between tree T9 and the boundary wall. The scan line starts level with the northern boundary of the site and runs south within the footpath parallel to the western boundary wall and 0.5m from it, ending level with the southern boundary wall. A marker is made level with the base of T9. Lines 0005.0001-0002 run parallel to line 0004.0001 within the road with the same start, end and marker points but located 0.5m and 1.5m from the kerb line west of T9. An extract from the tree radar plan *SHA 921 TR* below shows the locations of the scan lines.



Plan 5. Extract from TreeRadar plan SHA 921 TR showing location of scan lines 0004.0001 and 005.0001-0002. Do not scale.

N

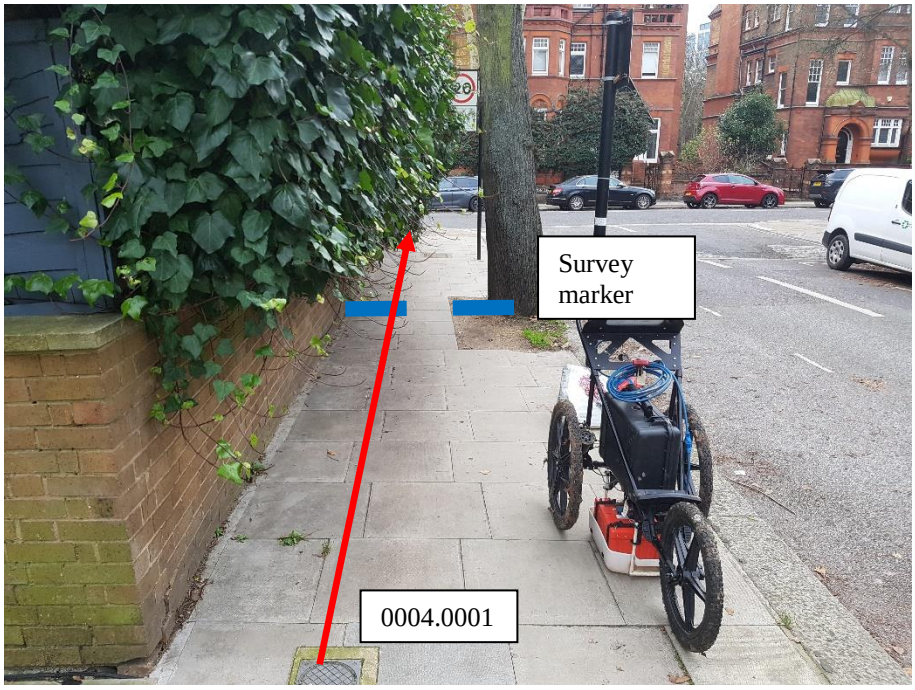


Photo 5. Scan line 0004.0001 within the footpath.

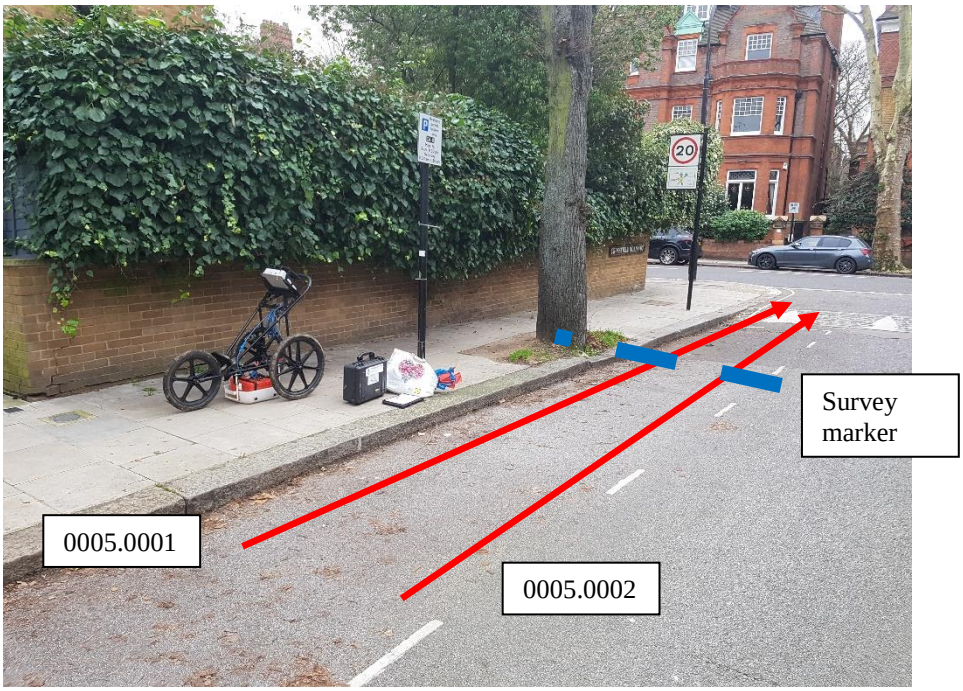


Photo 6. Scan lines 0005.0001-0002 in the road.

4.4.1. **Results:** Roots are found in an overall low rooting density but in very uneven distributions along all of the scan lines, with areas of higher rooting density found at the start of the scan lines closest to T10, and either side of the point at which the lines pass T9. Within the footpath the roots are found in a band between 25-60 cm deep, with a few shallower roots visibly causing slight lifting of the surfacing, while beneath the road the roots are found predominantly between 70-120cm deep.

5. CONCLUSIONS:-

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

5.2. The soils beneath the scan lines contain a large amount of non-root reflectors and services, while the soil horizons are poorly defined. This indicates that soils were significantly disturbed in the past, which is typical of soils and sites across London. From conversations with the design team it is understood the site previously contained a building with a basement in the area which was removed in the 1970's.

5.3. Beneath the site of the proposed new basement construction roots are found in low rooting densities and the majority of the roots clustered around towards the shrub beds containing the on-site trees and shrubs rather than the large London plane to the north west. Roots are also found at a relatively shallow depth beneath the patio and path, averaging in a band between 15-50cm deep. Given the standard construction of domestic patios and path and the proximity of the planted shrub bed it is likely that a number of the shallow detections are actually matts of fine roots exploiting the sandy material beneath the slabs rather than tree roots.

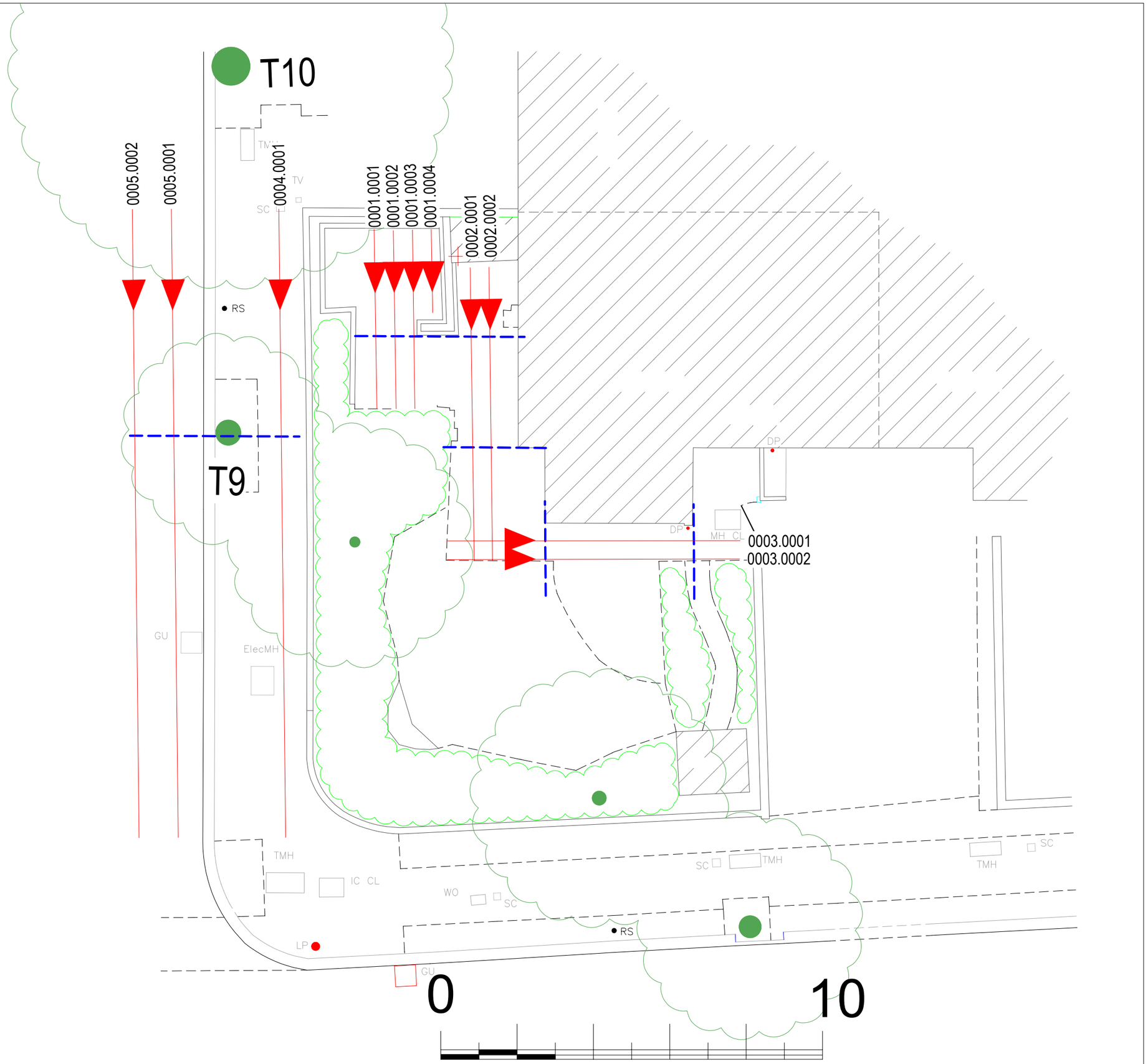
5.4. The consistently shallow nature of the on-site roots in scan series 0001 and 0002 also indicate that the roots detected are unlikely to have been forced beneath the footings of the boundary wall, especially when compared to the depths found beneath the footpath. In this situation the wall appears to have formed a physical barrier to root growth.

5.5. The trees are rooting well within the public highway, extending beneath the footpath and beneath the road, extending to the north and south within the pavement as is evident from the deflection of the surfacing.

5.6. The layout and structural design of the proposed new structure will be influenced by this report and the issues of both off and on-site trees discussed within the an arboricultural impact assessment for the scheme.

This report concludes that it is highly unlikely that roots found within the site are from the street trees due to the fact that the wall acts a root barrier.

6. APPENDIX 1 – TREE RADAR PLAN SHA 921 TR AND TREERADAR RESULTS PLAN SHA 921 TRR



Please refer to full arboricultural report for details

0006.0001

Scan lines and direction

Markers (a surveying aid)

Crown spread

Rev : Description : Authorized :

Sharon Hosegood Associates
4th floor Victoria House,
Victoria Road,
Chelmsford, CM1 1JR

t: 01245 210420
www.sharonhosegoodassociates.co.uk

Client

Izzy Tepekoylu & Natalie Mason

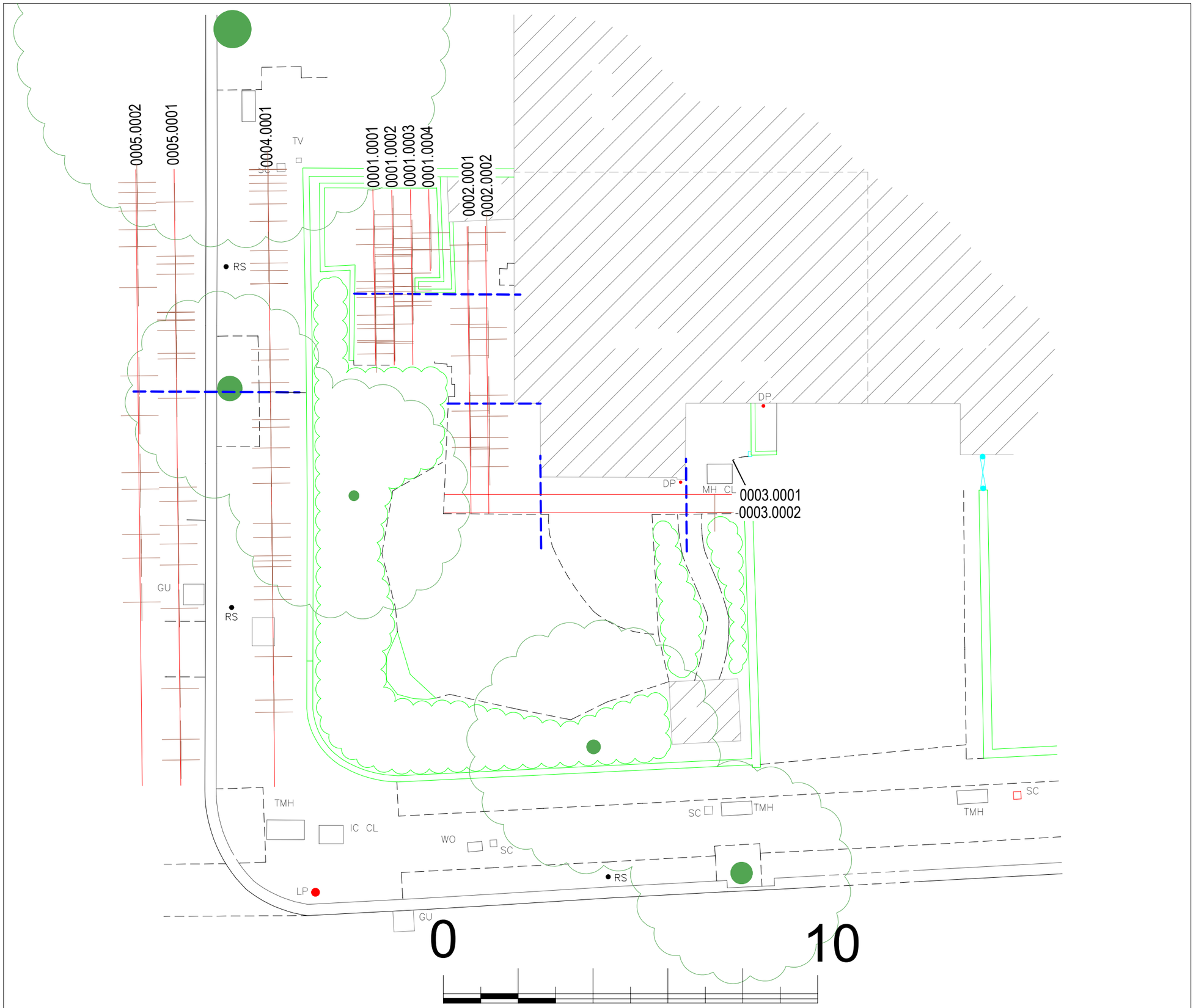
Site Address

52 Eton Avenue London NW3 3HN

Drawing Title	Orientation	Drawn	Authorized
Tree Radar Plan		IL	SMH
Date	**Drawing Number**	**Scale**	**Drawing Status**
7.1.19	SHA921 TR	1:100@A3	For Issue

Revision

-



Please refer to full arboricultural report for details

0006.0001

Scan lines and direction

Markers (a surveying aid)

Crown spread

Detected roots with a diameter greater than 20mm

Rev :	Description :	Authorized :

Sharon Hosegood Associates
4th floor Victoria House,
Victoria Road,
Chelmsford, CM1 1JR

t: 01245 210420
www.sharonhosegoodassociates.co.uk

Client

Izzy Tepekoylu & Natalie Mason

Site Address

52 Eton Avenue London NW3 3HN

Drawing Title	Orientation	Drawn	Authorized
Tree Radar Results Plan		IL	SMH
Date	**Drawing Number**	**Scale**	**Drawing Status**
10.01.19	SHA921 TRR	1:100@A3	For Issue

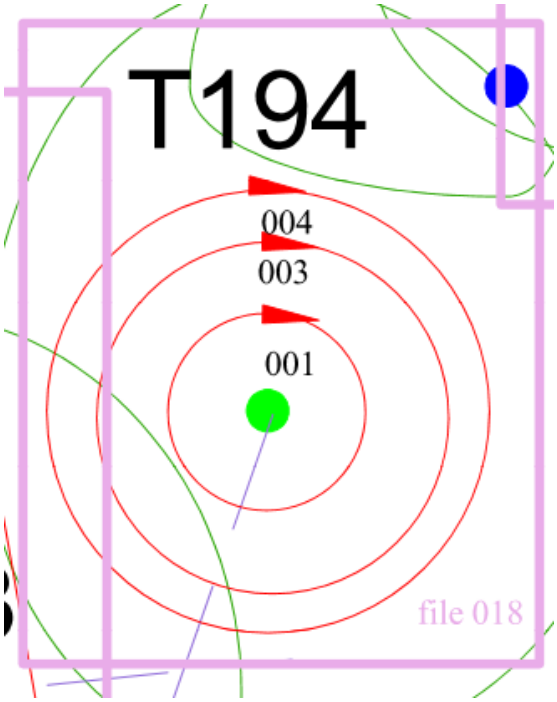
Revision

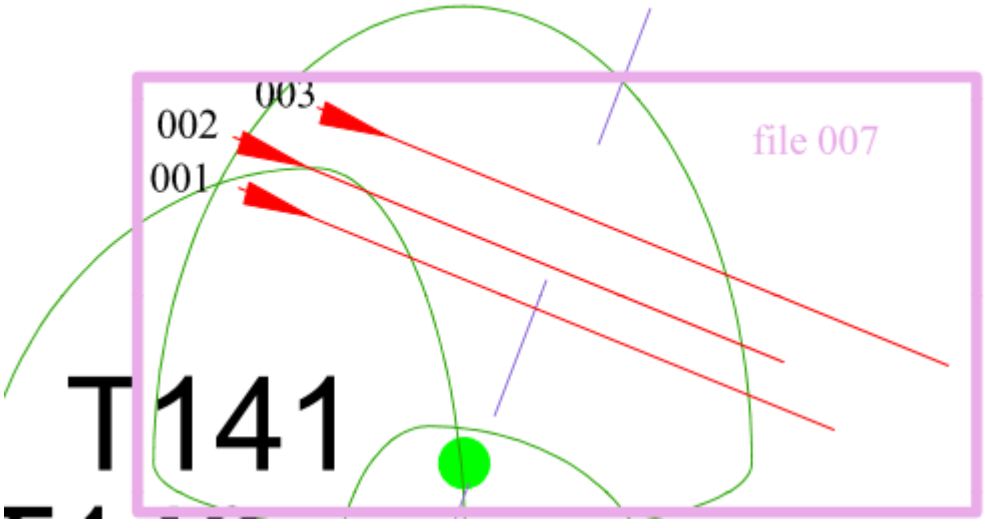
-

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.



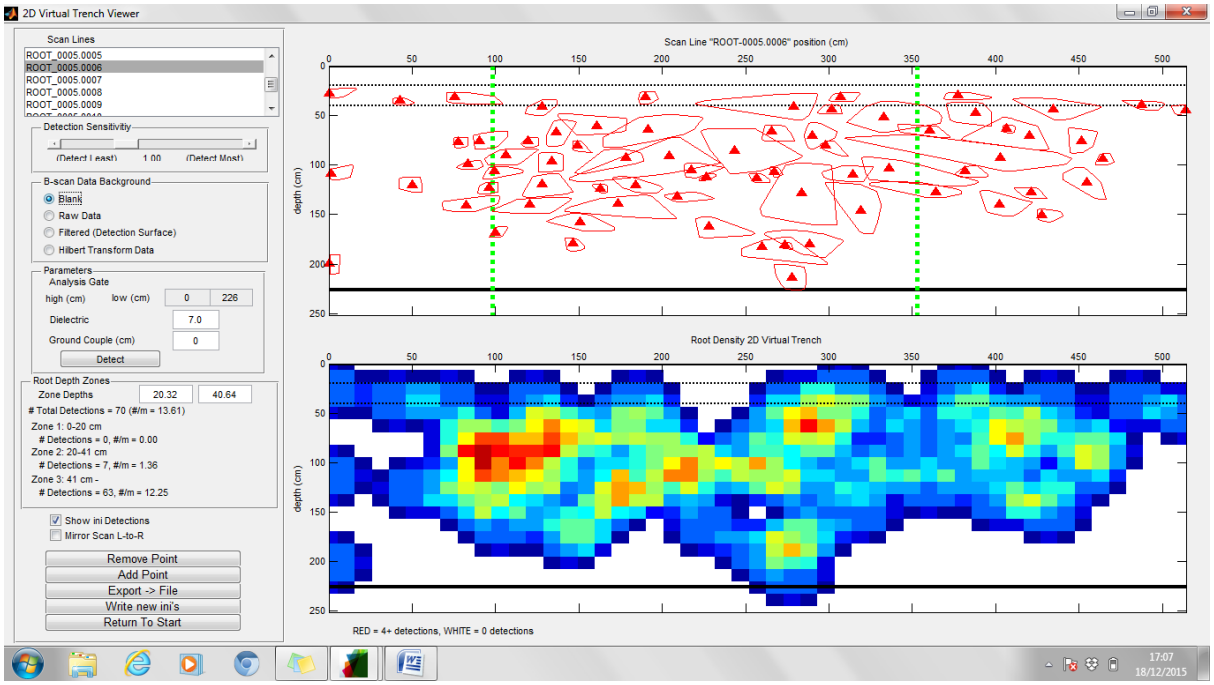


The cross section of each scan line shows where the roots are in relation to depth and distance. The coloured splodges are root density (relative to the scan area). An example is shown below:

Start

Distance in cm

Depth

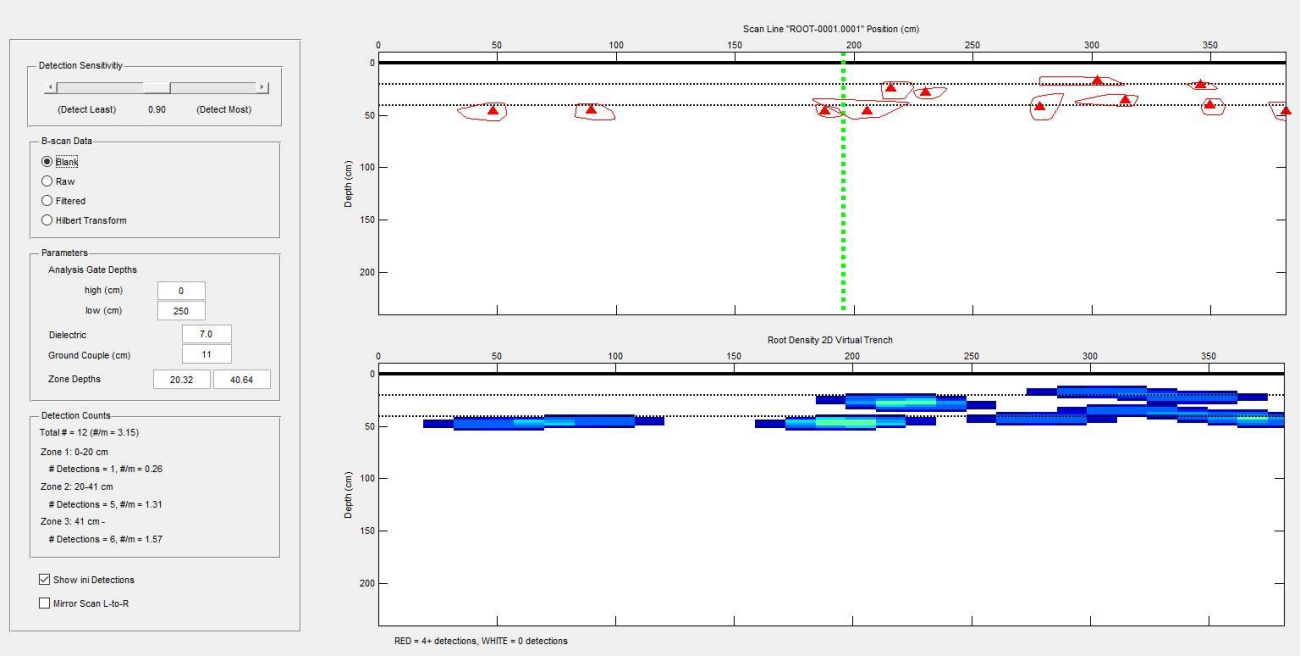


Red triangle = root

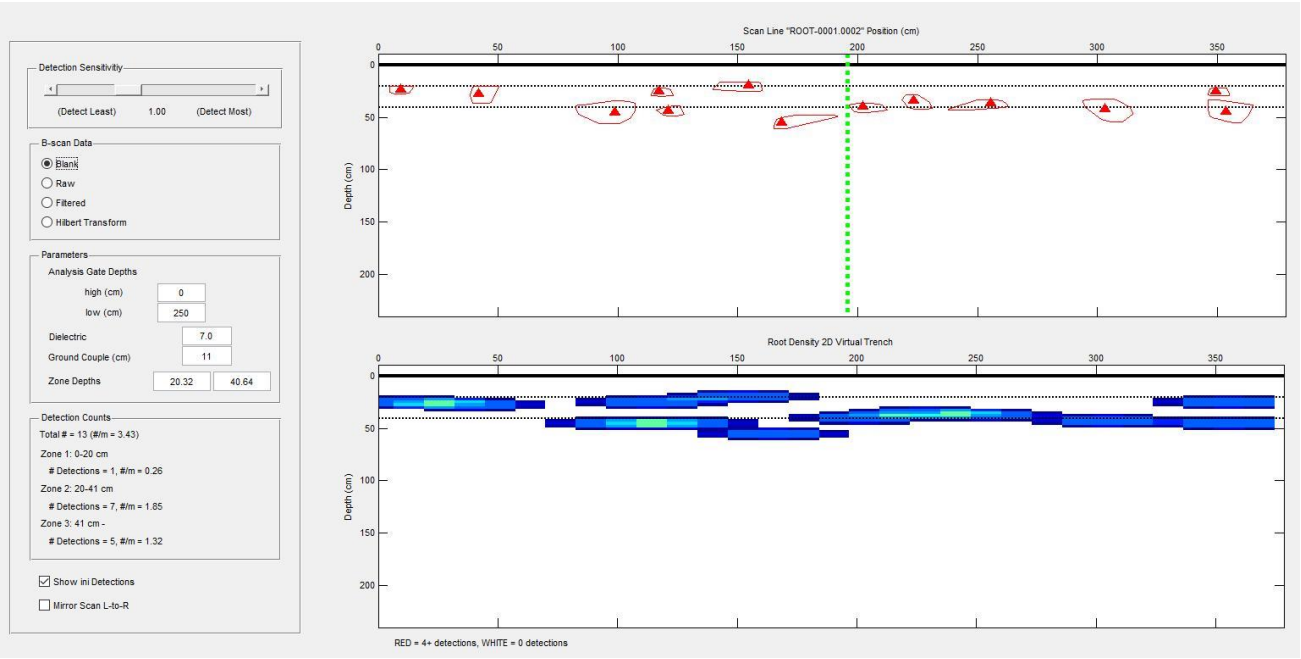
8. INDIVIDUAL SCAN LINE RESULTS

SCAN LINES 0001.0001-0004 – PARALLEL SCAN LINES WITHIN THE PATIO

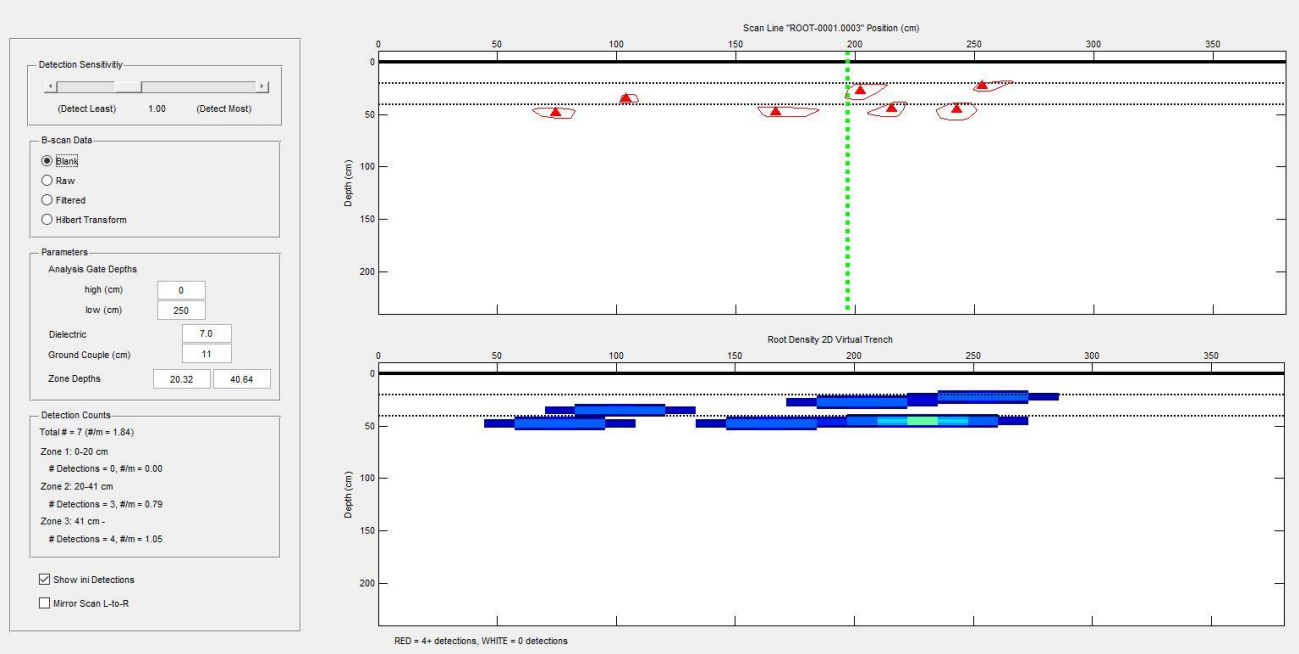
Scan line 0001.0001 0.5m from the western wall of the patio



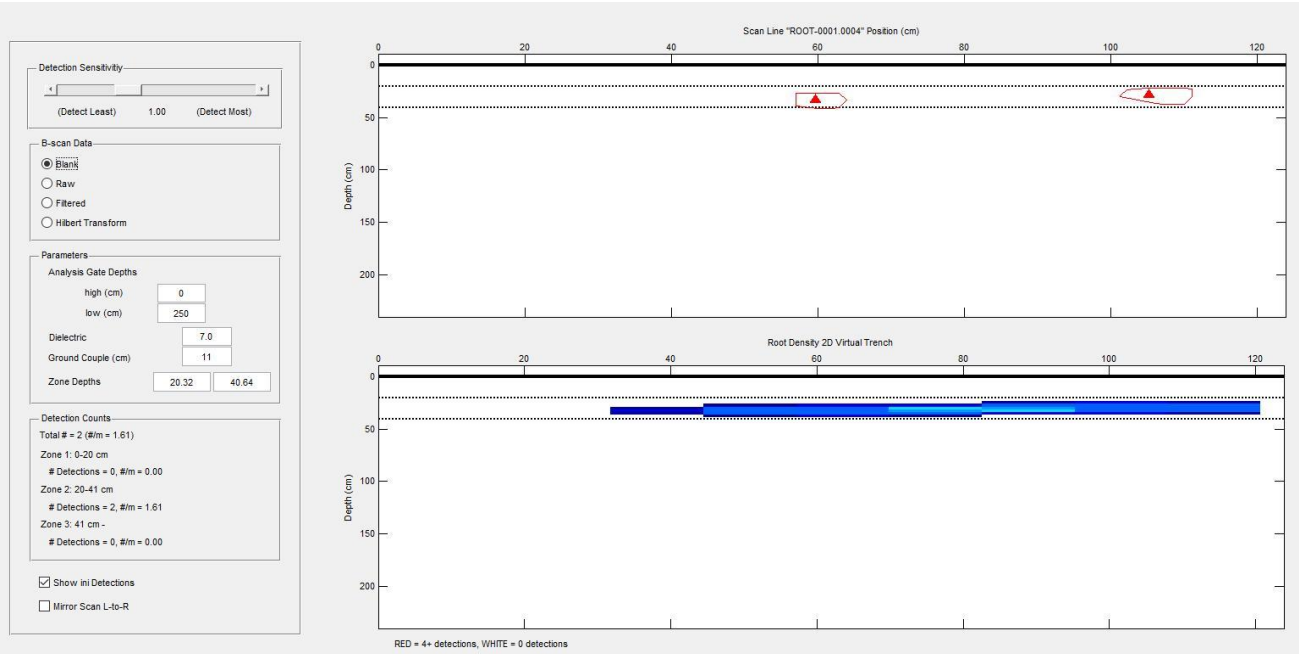
Scan line 0001.0002 1m from the western wall of the patio



Scan line 0001.0003 1.5m from the western wall of the patio

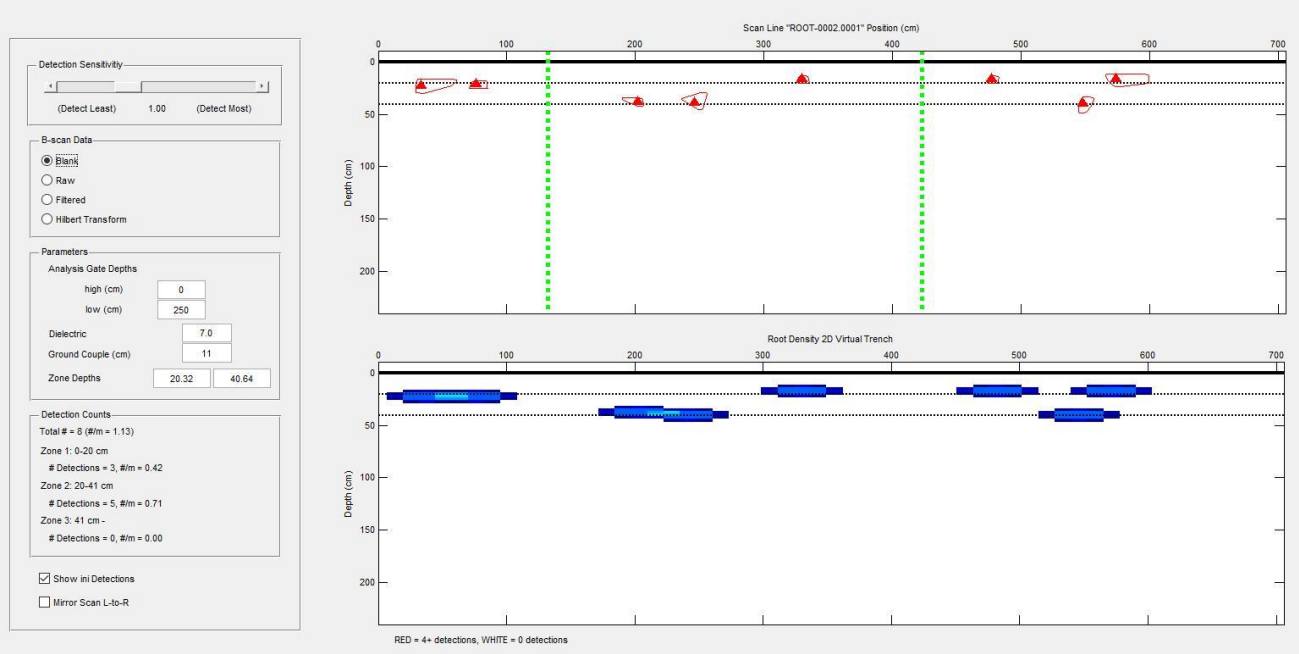


Scan line 0001.0004 2m from the western wall of the patio

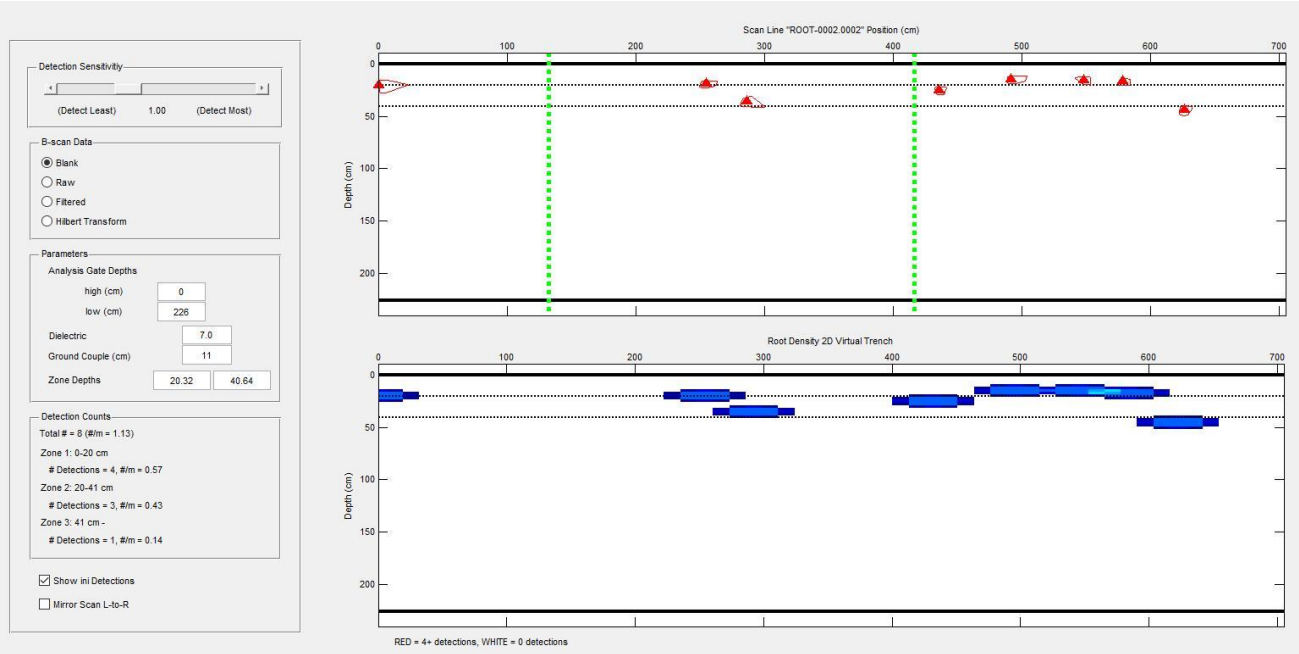


SCAN LINES 0002.0001-0002 – PARALLEL SCAN LINES WITHIN THE PATH BETWEEN THE HOUSE AND THE PATIO

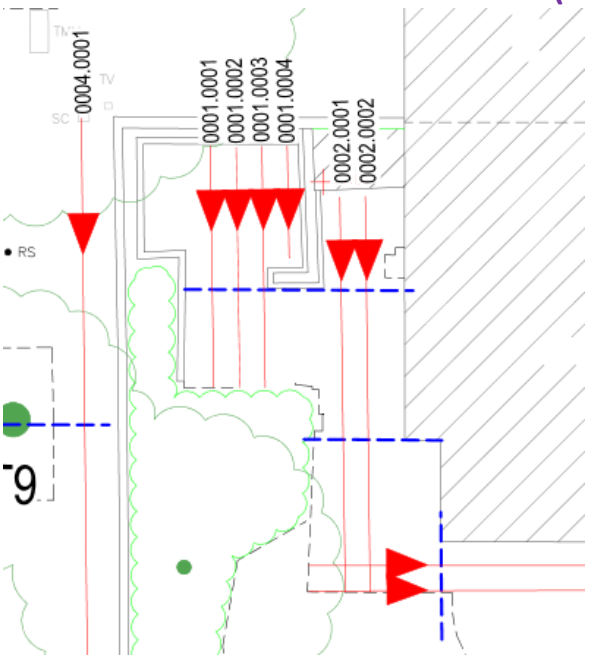
Scan line 0002.0001 3m from the western wall of the patio



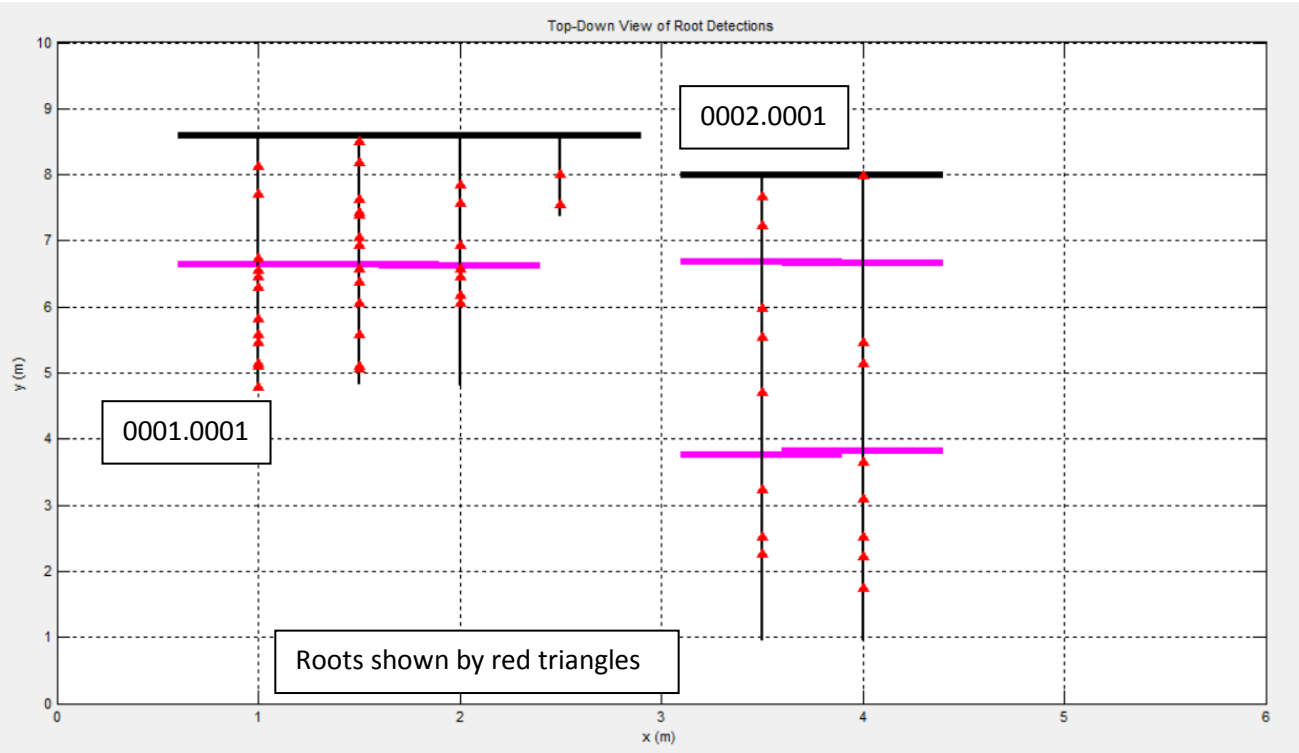
Scan line 0002.0002 3.5m from the western wall of the patio



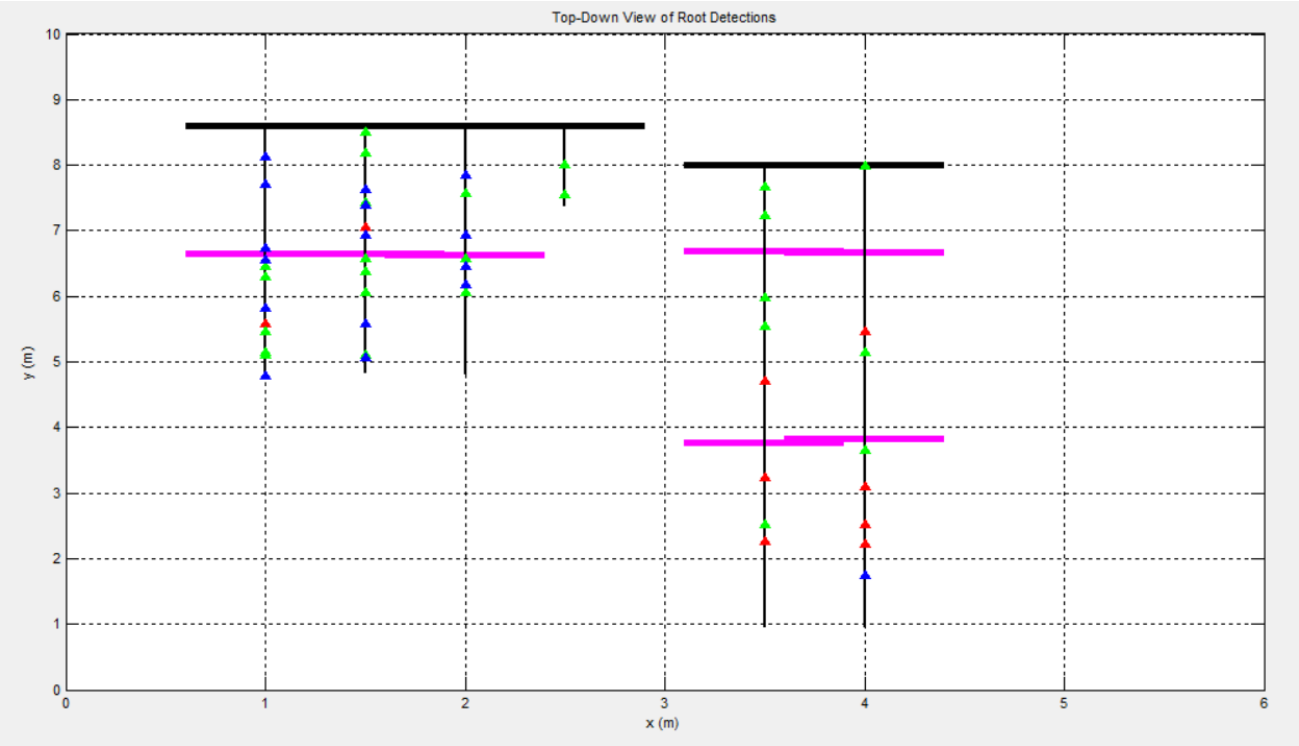
SCAN LINES 0001.0001-0004 AND 0002.0001-0002 LOCATIONS (DO NOT SCALE)



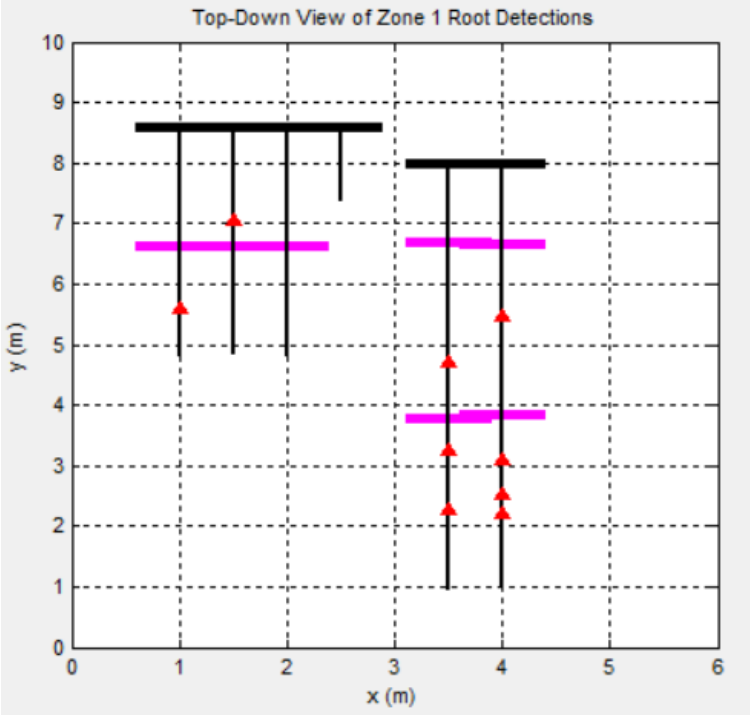
SCAN LINES 0001.0001-004 AND 0002.0001-0002- ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS



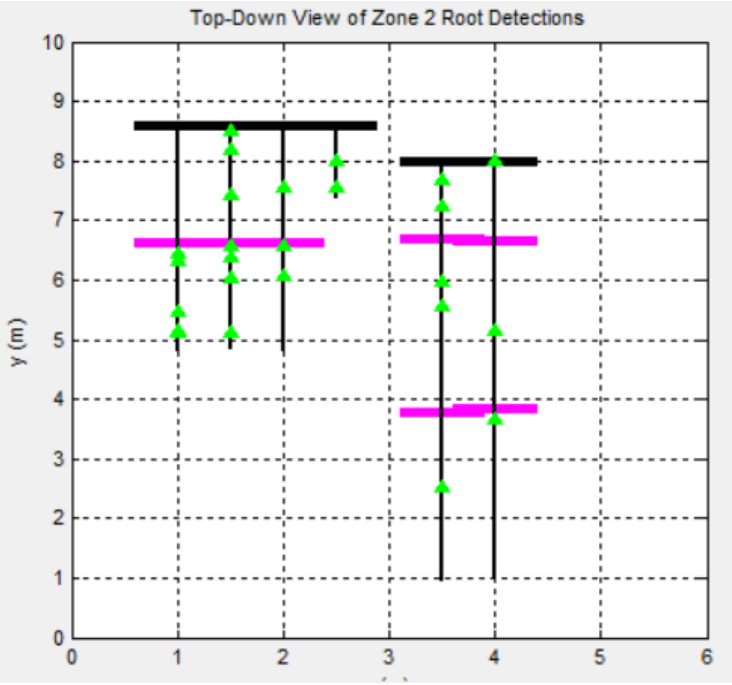
Scan lines 0001.0001-004 and 0002.0001-0002- Roots (with a diameter greater than 20mm) at all depths red = 0-20cm green=20-40cm Blue=40-250cm



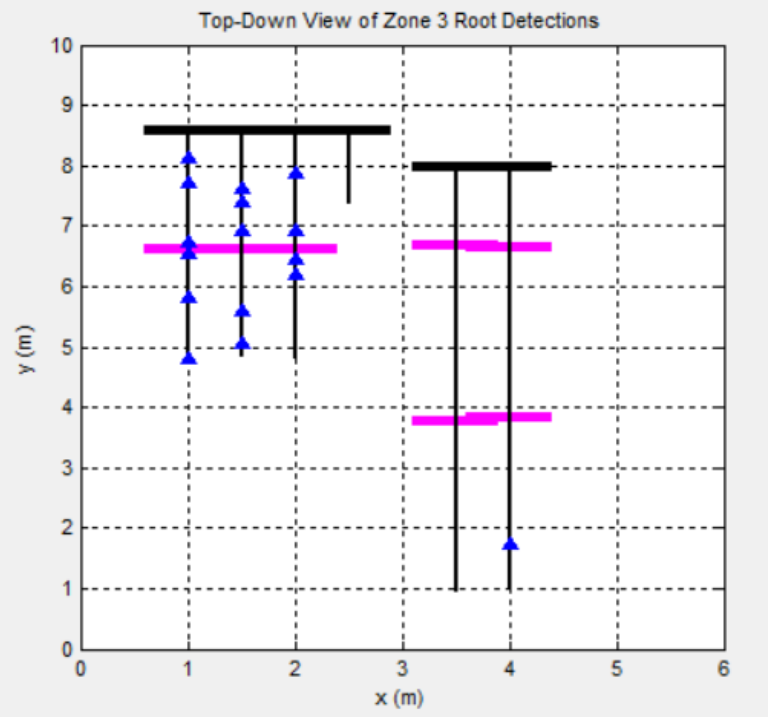
Scan lines 0001.0001-004 and 0002.0001-0002- Roots (with a diameter greater than 20mm) at depths red = 0-20cm



SCAN LINES 0001.0001-004 AND 0002.0001-0002- ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS GREEN=20-40CM



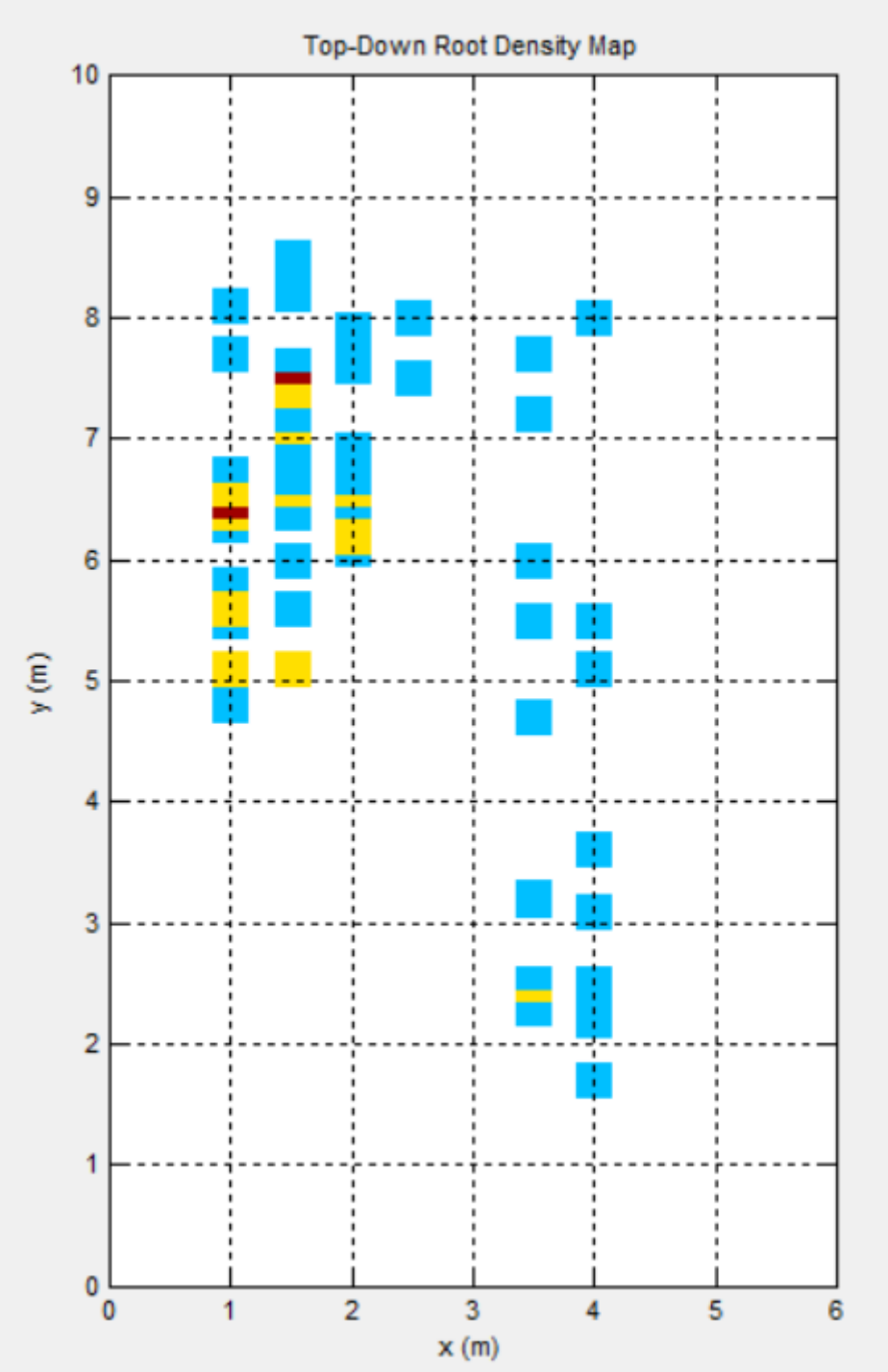
SCAN LINES 0001.0001-004 AND 0002.0001-0002- ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS BLUE=40-250CM



SCAN LINES 0001.0001-004 AND 0002.0001-0002 ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS

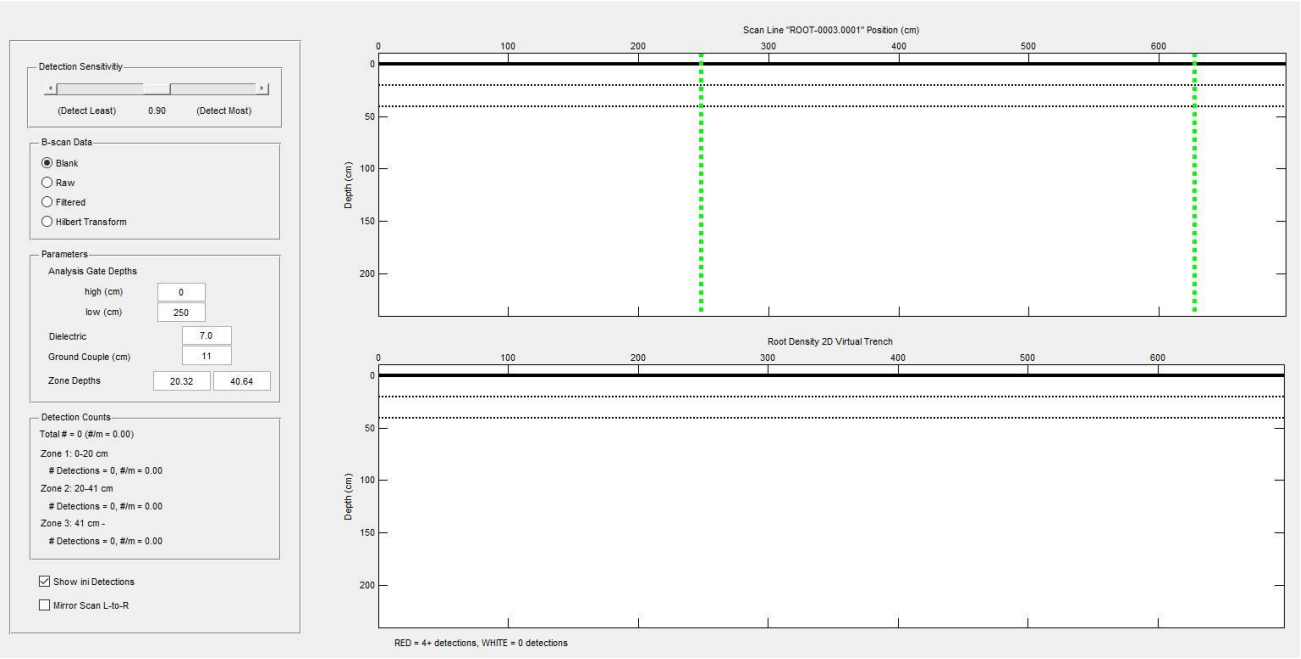
DIAGRAMMATIC REPRESENTATION OF ROOT DENSITY.

RED =RELATIVELY HIGH, BLUE = RELATIVELY LOW, WHITE = NO ROOTS

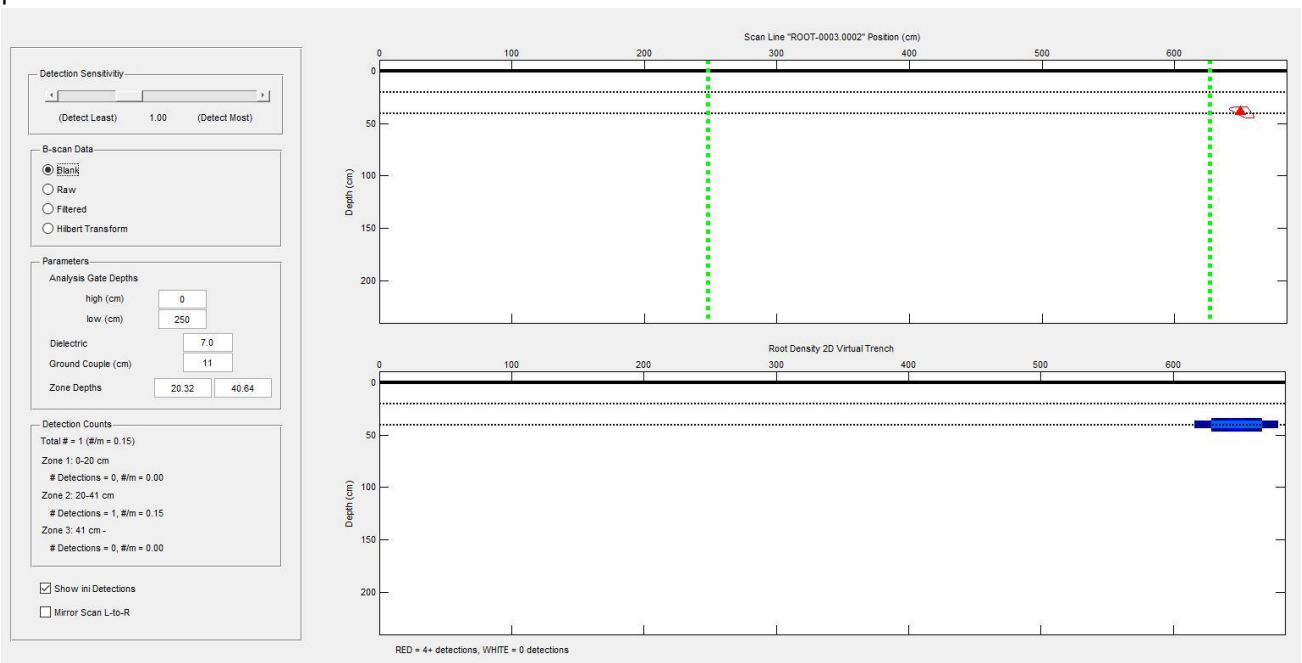


SCAN LINES 0003.0001-0002 – TWO PARALLEL LINES WITHIN THE PATH TO THE SOUTH OF THE PROPERTY

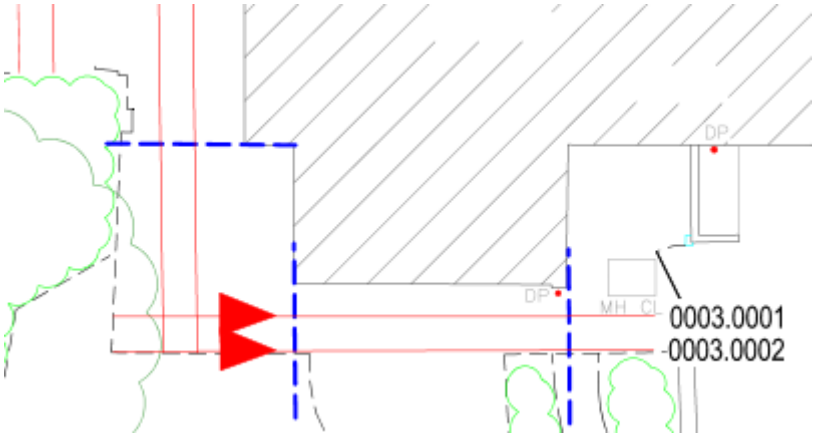
Scan line 0003.0001 – Running from west to east within the path 0.5m from the southern building line and parallel to it.



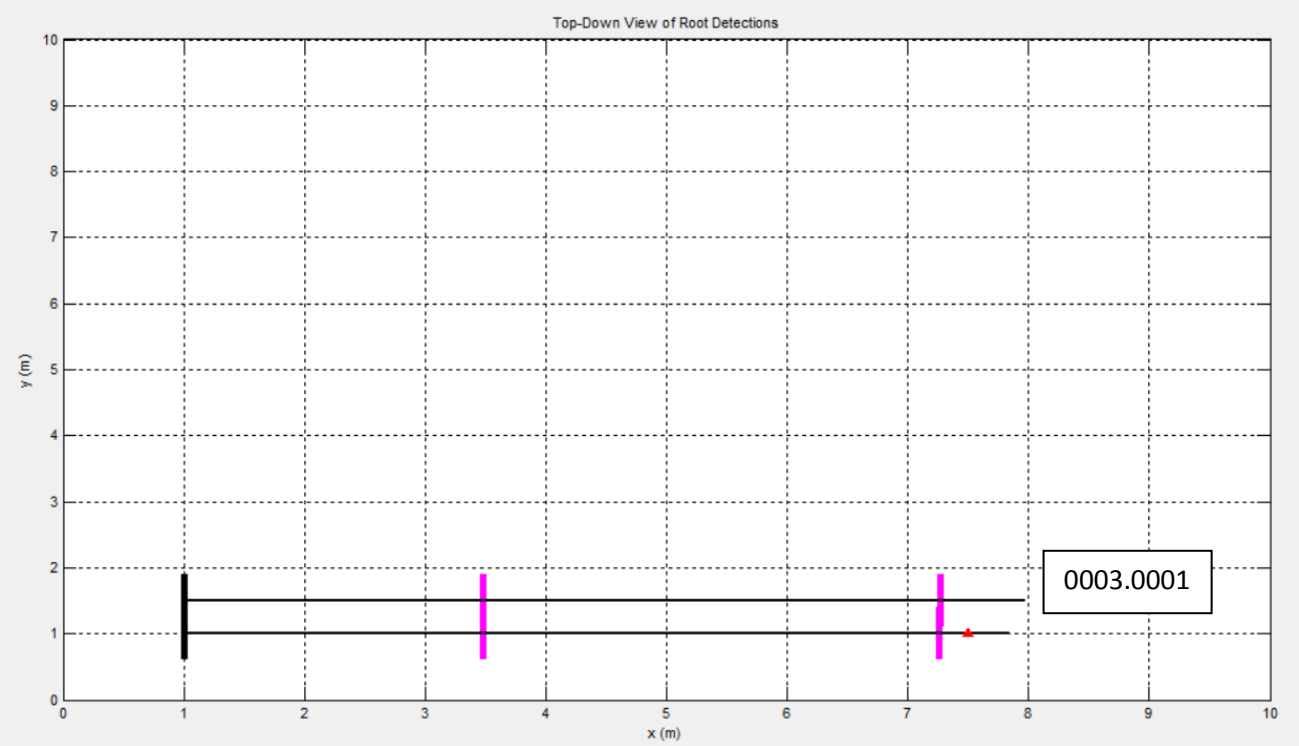
Scan line 0003.0002 – Running from west to east within the path 15m from the southern building line and parallel to it.



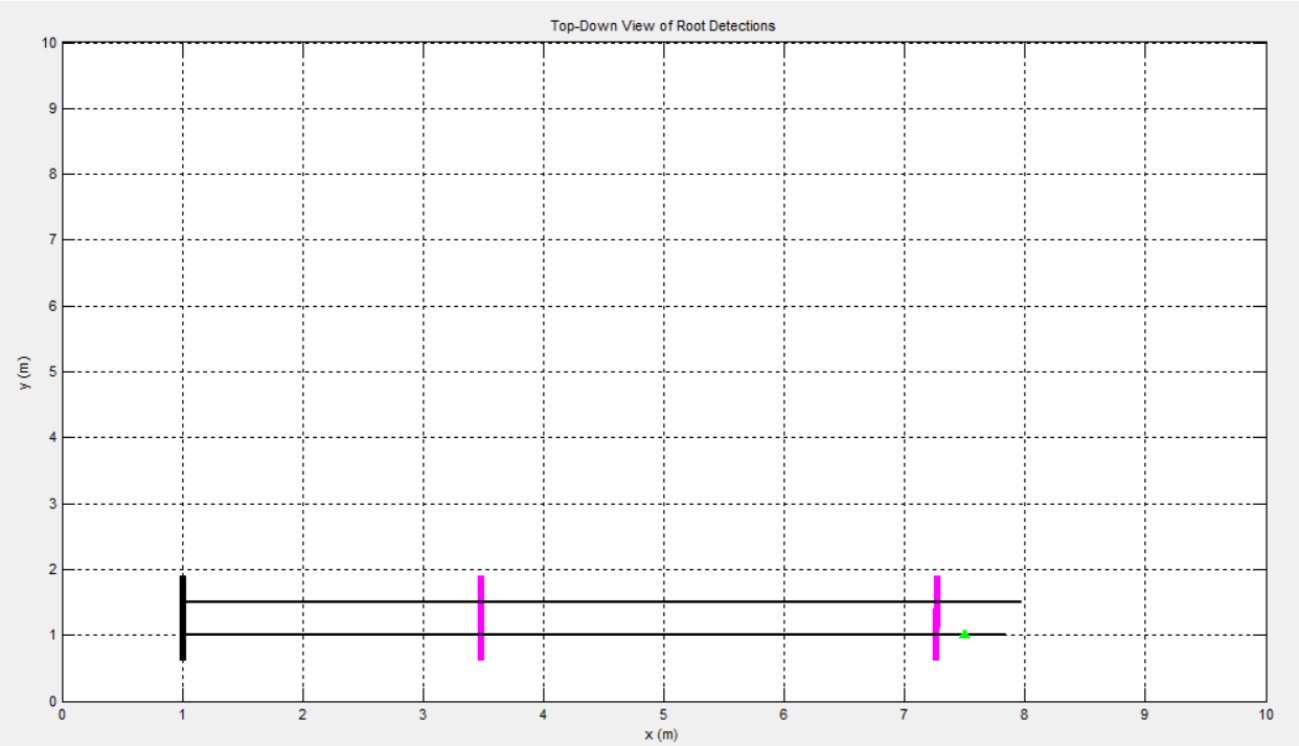
SCAN LINES 0003.0001-0002 LOCATIONS (DO NOT SCALE)



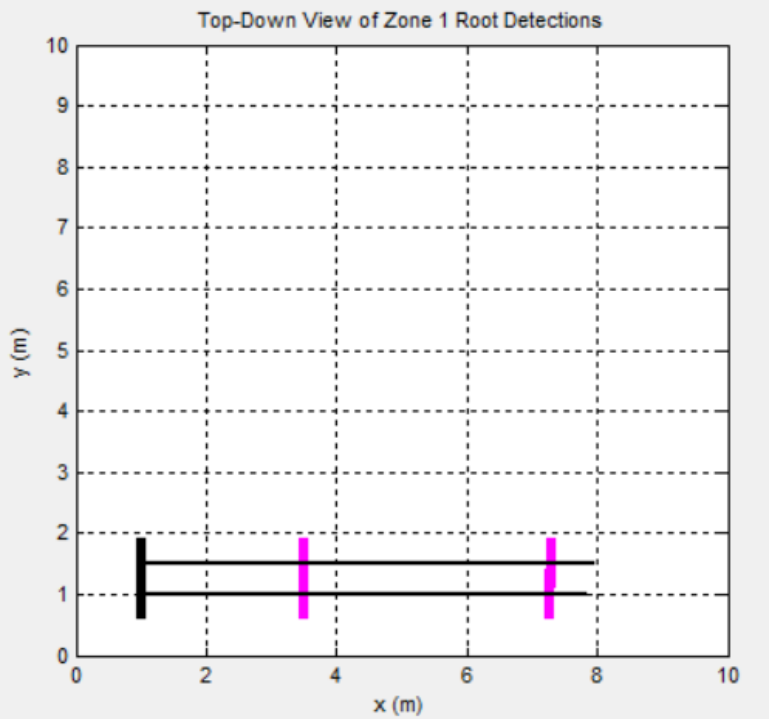
SCAN LINE 0003.0001-0002 - ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS



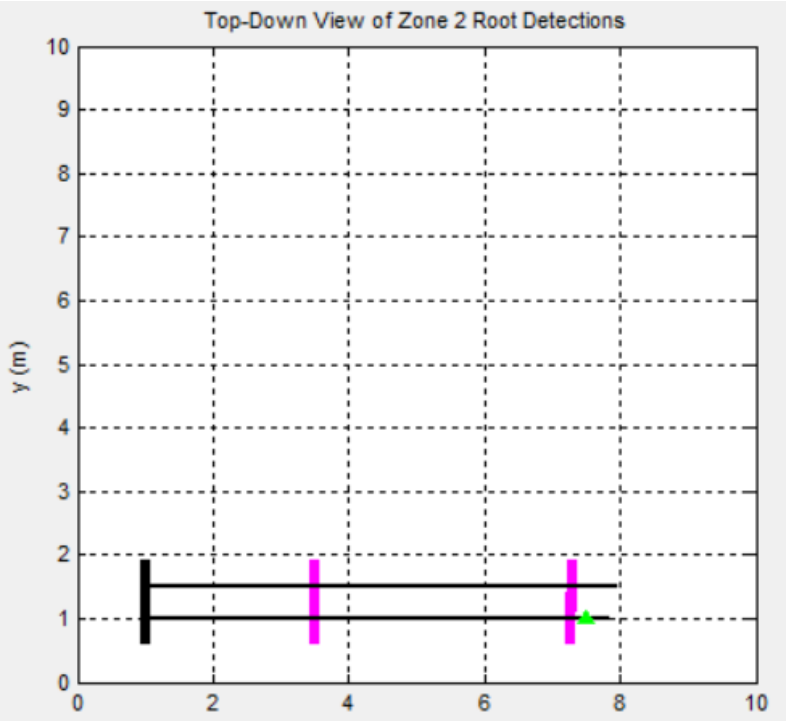
SCAN LINES 0003.0001-0002- ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS RED = 0-20CM GREEN=20-40CM BLUE=40-250CM



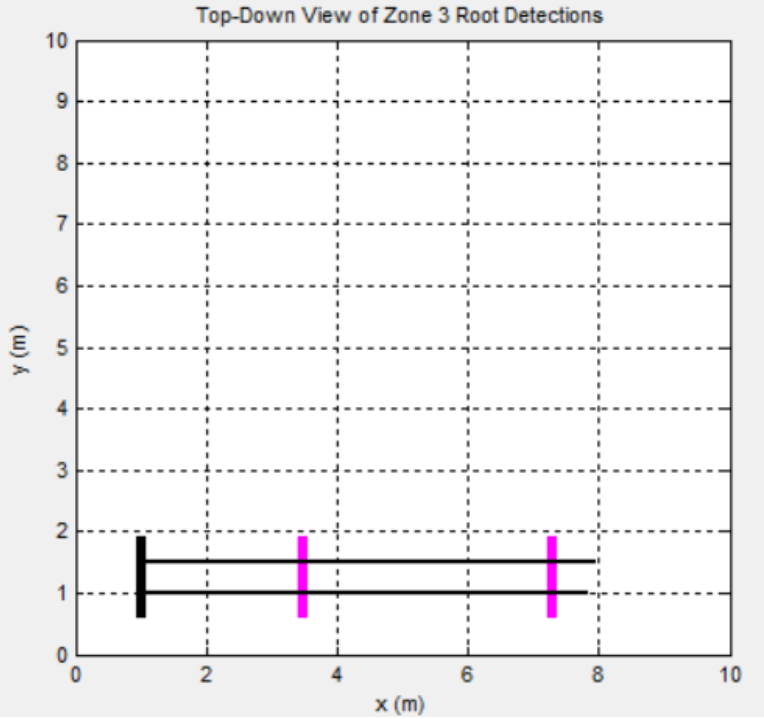
SCAN LINES 0003.0001-0002- ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS RED = 0-20CM



SCAN LINES 0003.0001-0002- ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS GREEN=20-40CM



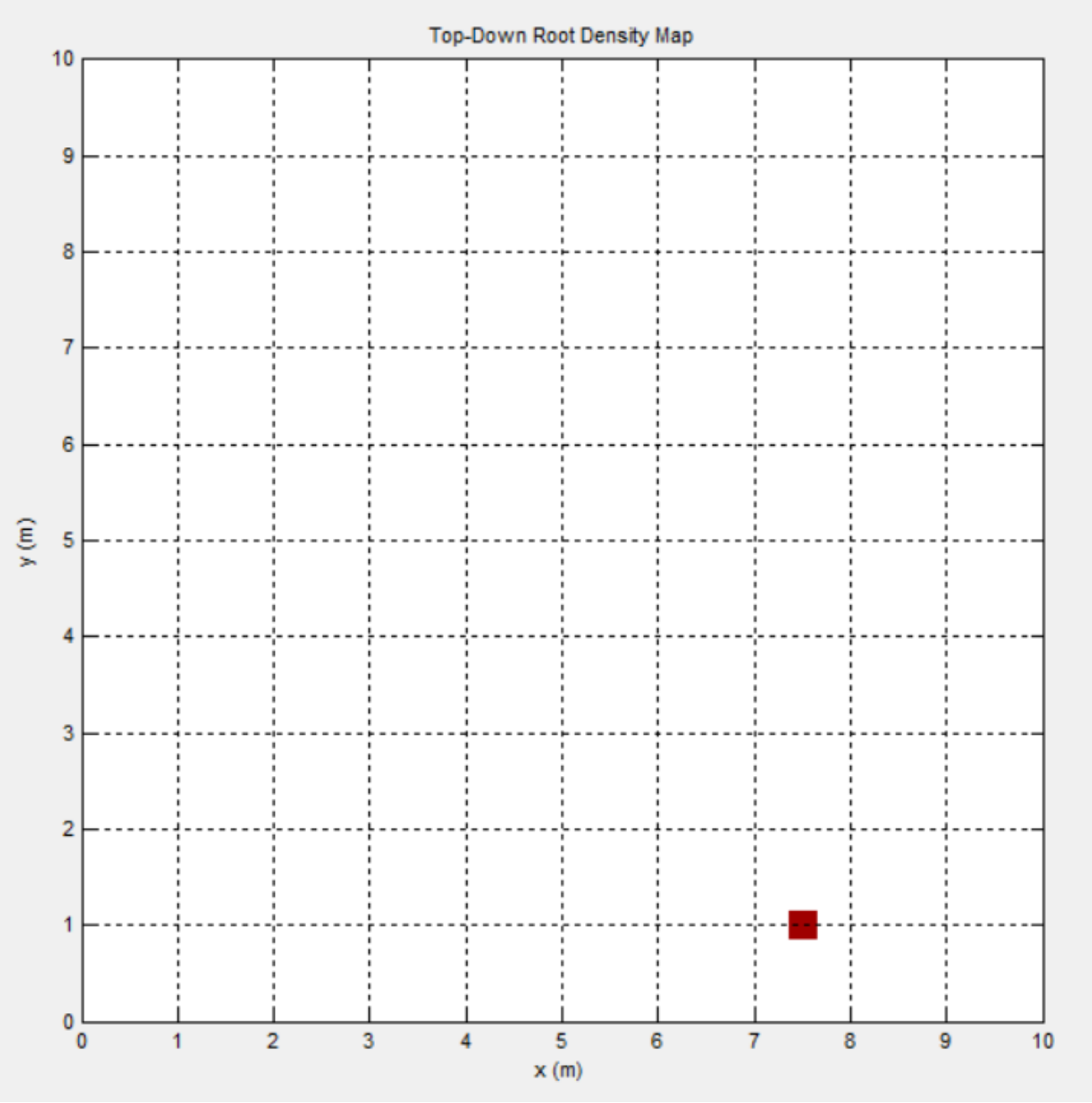
SCAN LINES 0003.0001-0002- ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS BLUE=40-250CM



SCAN LINES 0003.0001-0002 - ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS

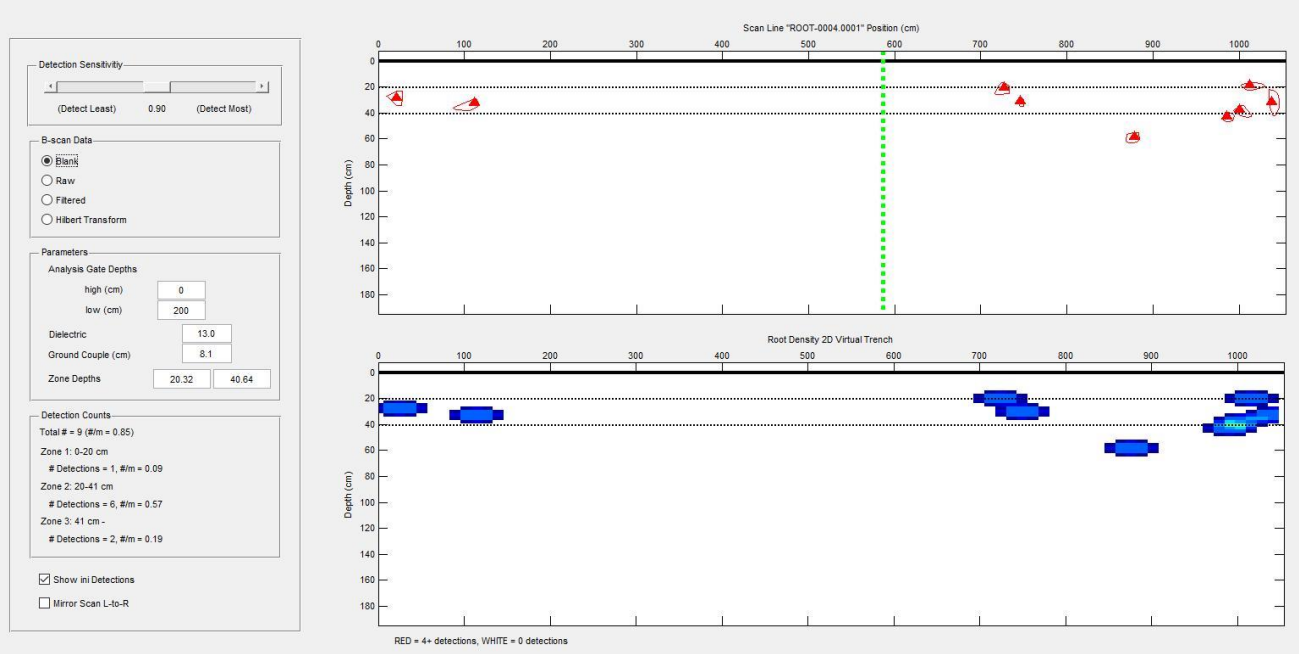
DIAGRAMMATIC REPRESENTATION OF ROOT DENSITY.

RED =RELATIVELY HIGH, BLUE = RELATIVELY LOW

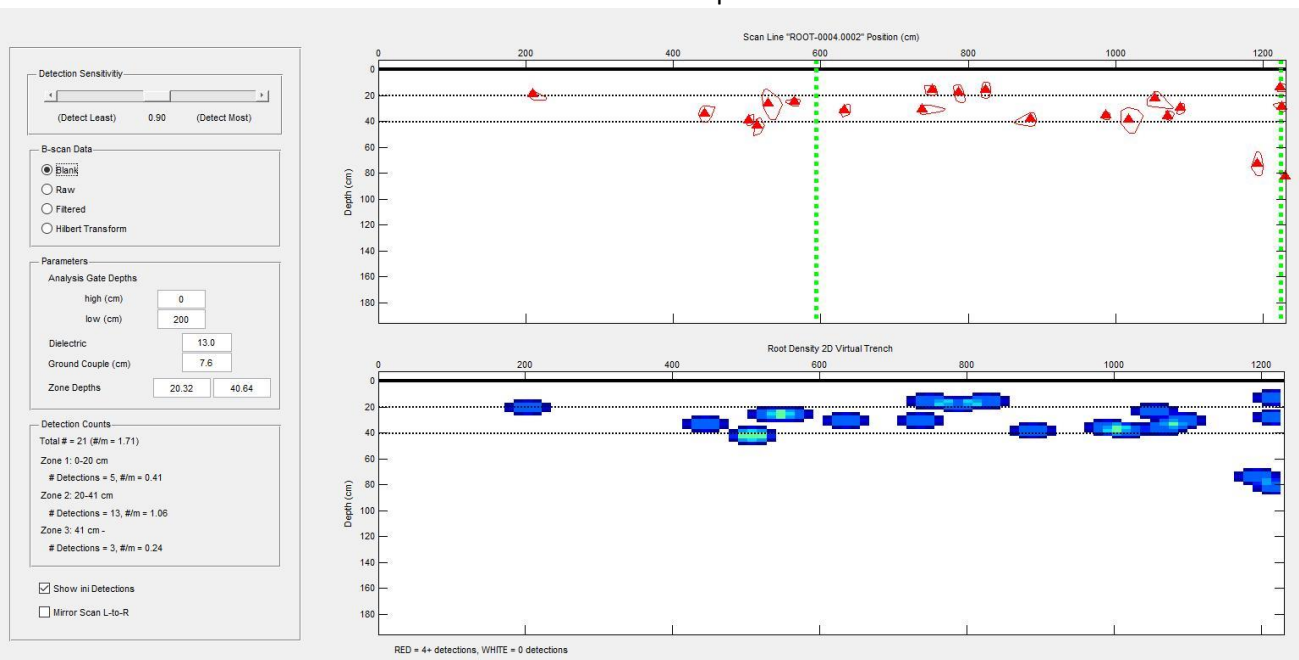


SCAN LINES 0004.0001 AND 0005.0001-0002 PARALLEL LINES WITHIN THE HIGHWAY WEST OF THE SITE BOUNDARY

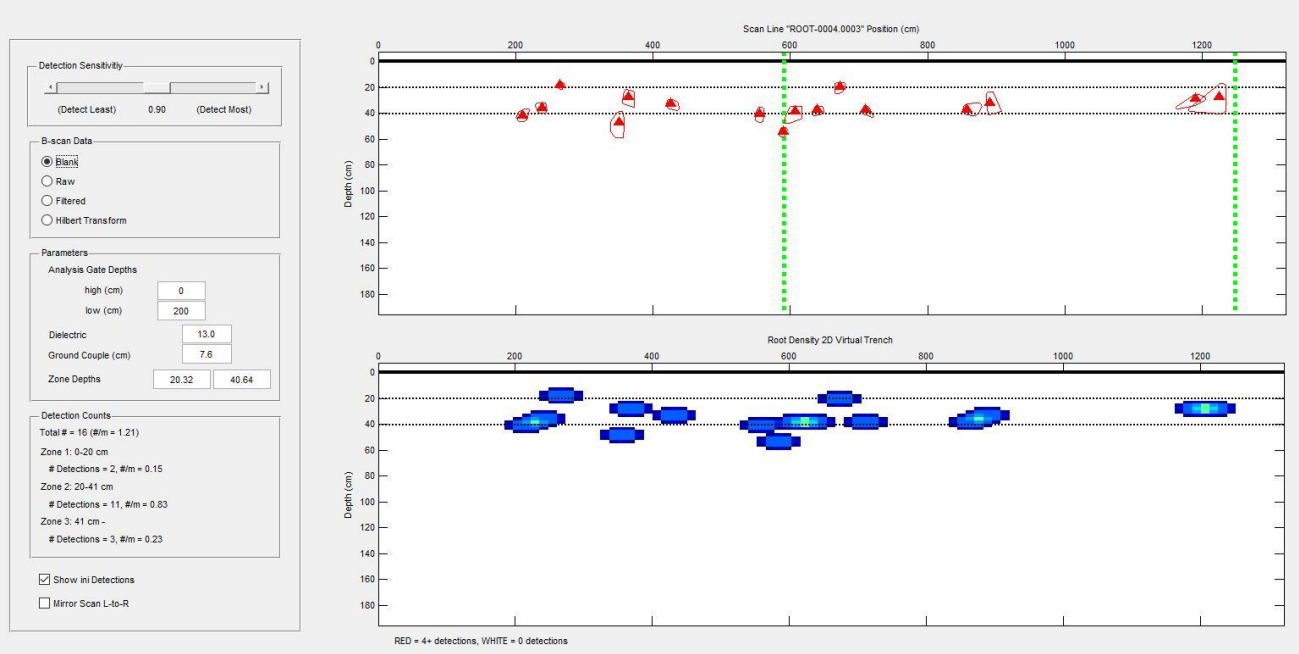
Scan line 0004.0001 in the footpath 0.5m from the western boundary wall and parallel to it.



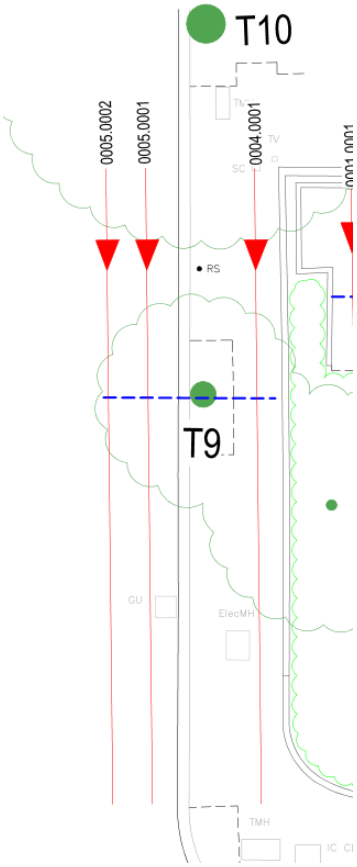
Scan line 0005.0001 0.5m from the kerb line west of T9 and parallel to it.



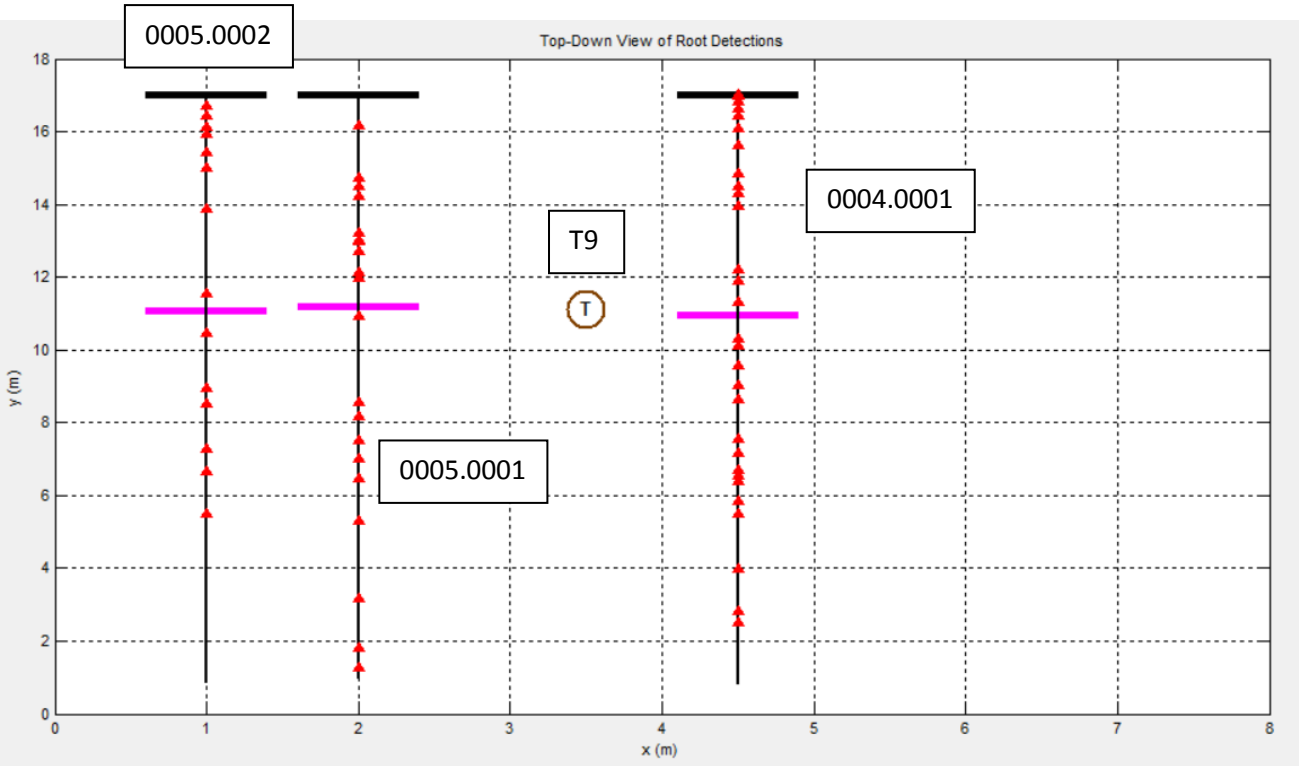
Scan line 0005.0002 1.5m from the kerb line west of T9 and parallel to it.



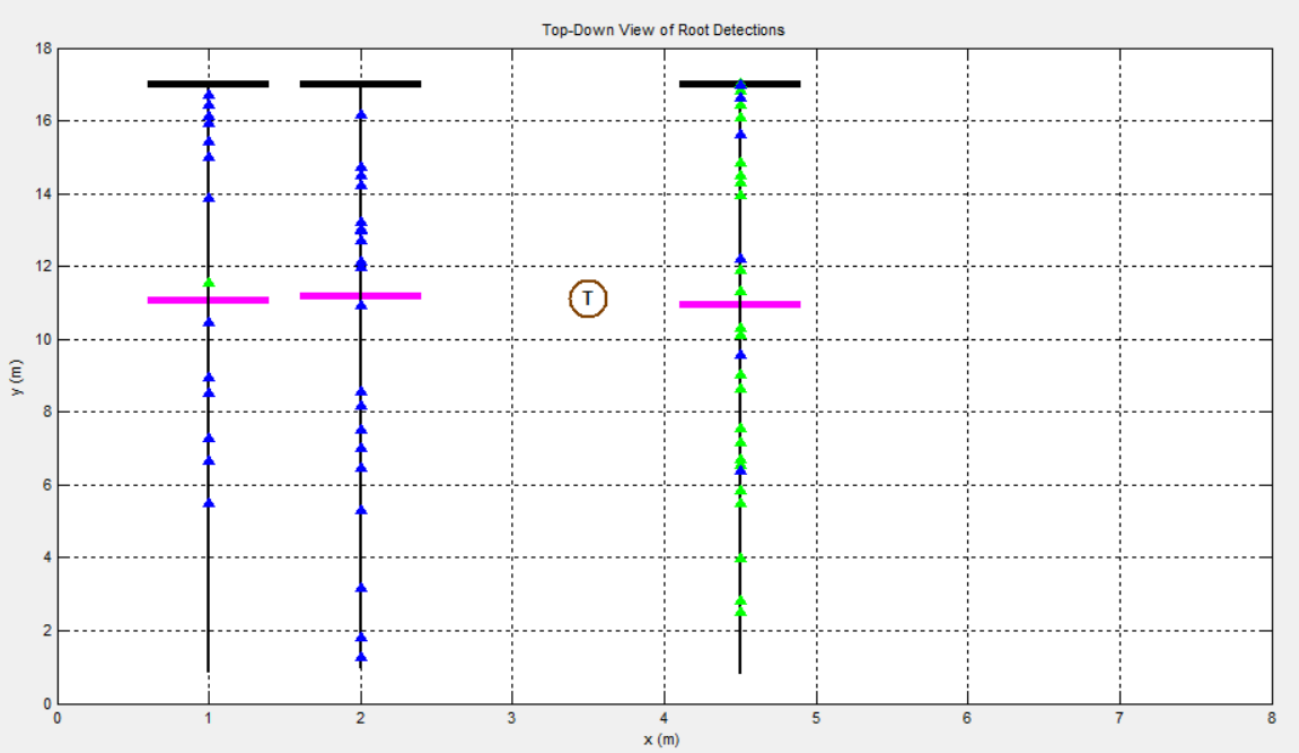
SCAN LINES 0004.0001 AND 0005.0001-0002 LOCATIONS (DO NOT SCALE)



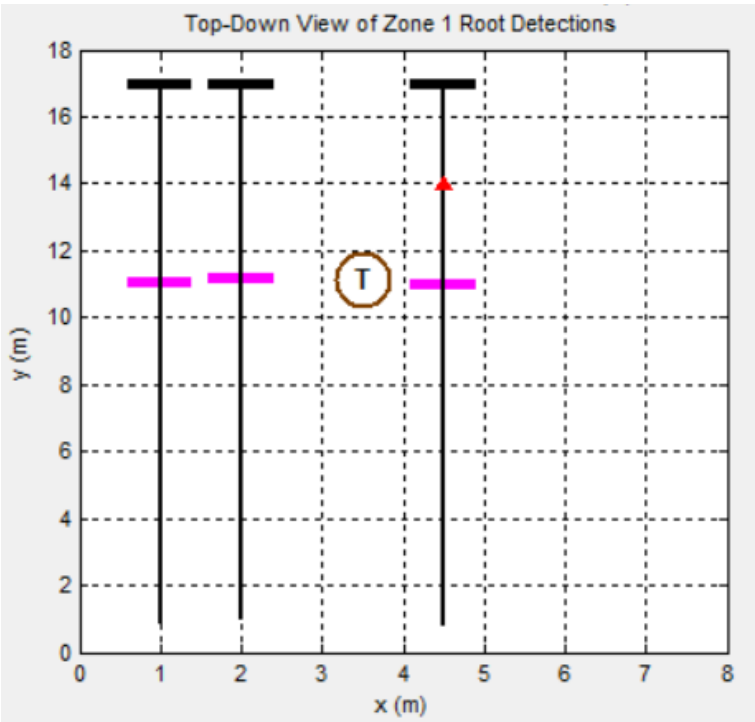
SCAN LINES 0004.0001 AND 0005.0001-0002 - ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS



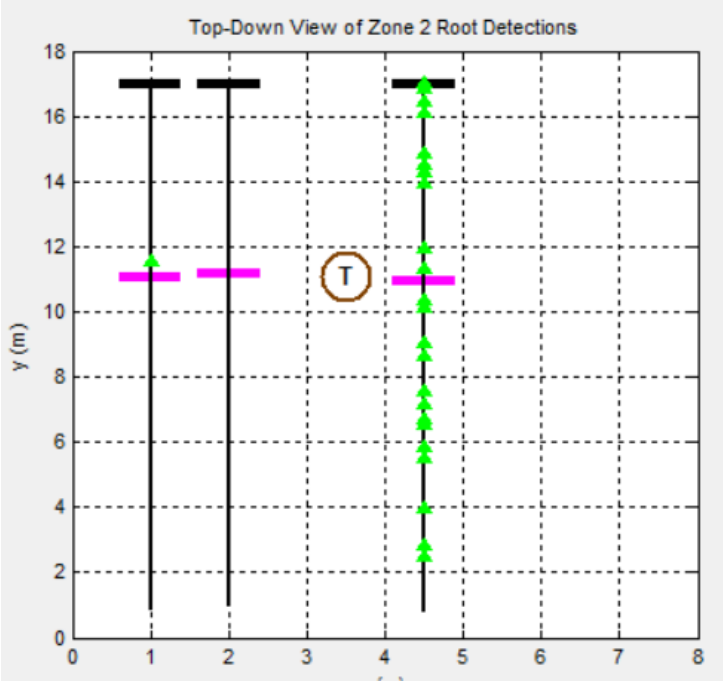
SCAN LINES 0004.0001 AND 0005.0001-0002 - ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT ALL DEPTHS RED = 0-20CM GREEN=20-40CM BLUE=40-250CM



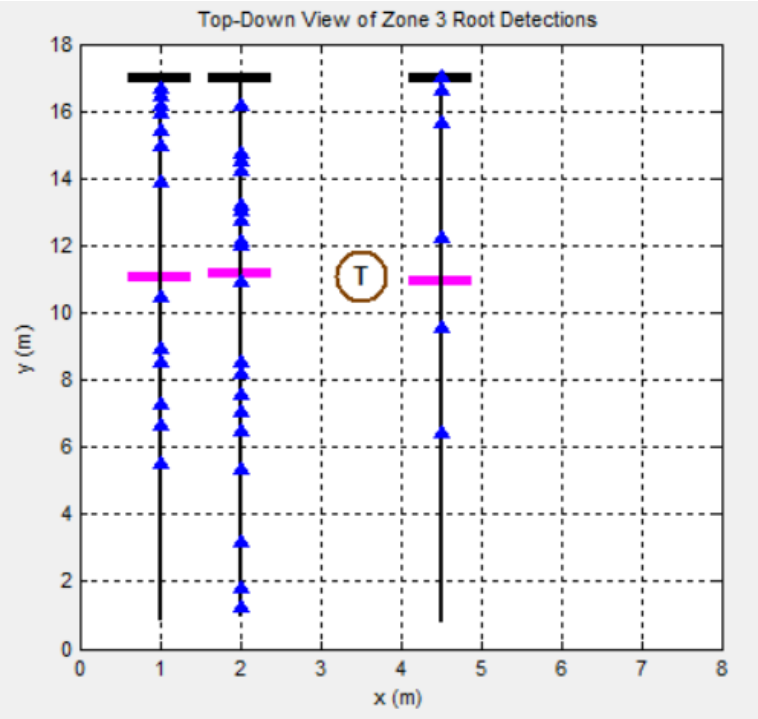
SCAN LINES 0004.0001 AND 0005.0001-0002 - ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS RED = 0-20CM



SCAN LINES 0004.0001 AND 0005.0001-0002 - ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS GREEN=20-40CM

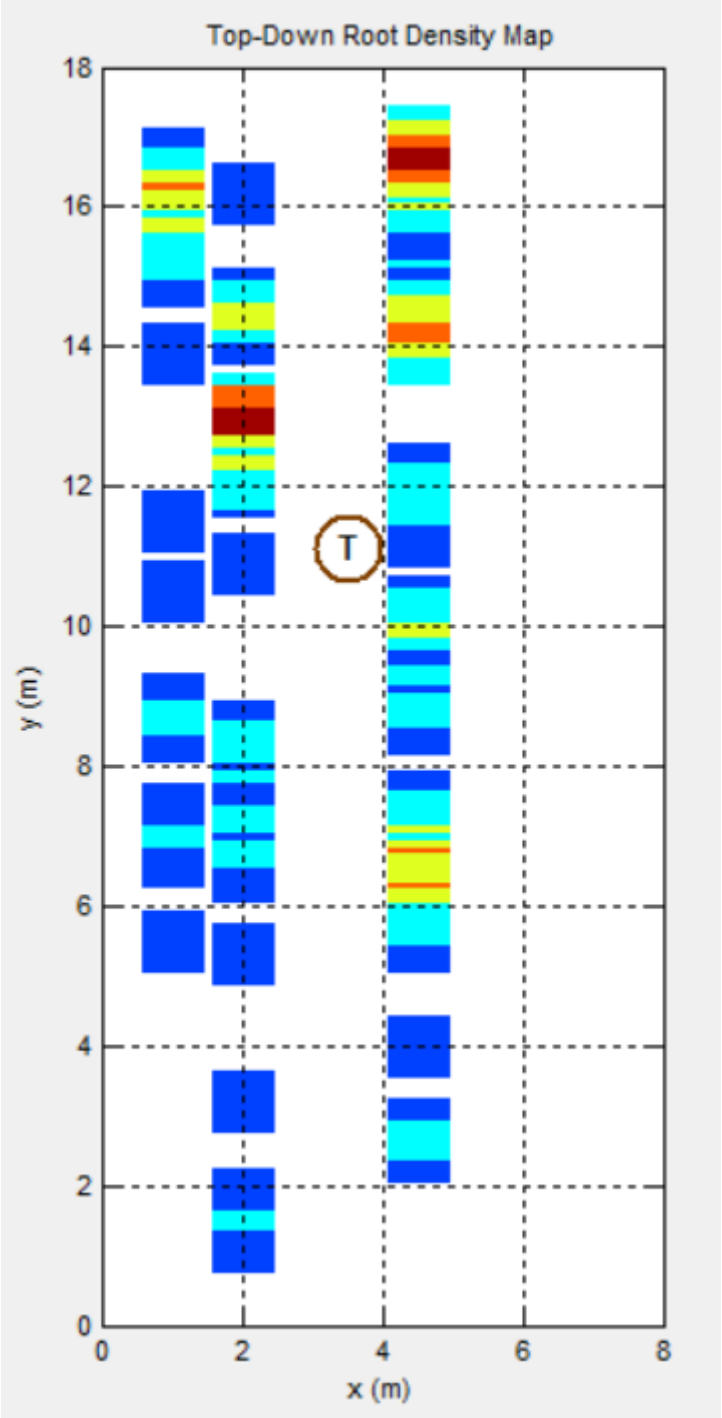


SCAN LINES 0004.0001 AND 0005.0001-0002 - ROOTS (WITH A DIAMETER GREATER THAN 20MM) AT DEPTHS BLUE=40-250CM



SCAN LINES 0004.0001 AND 0005.0001-0002 - 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 Tree Radar.
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 listed in this report have been examined by TreeRadar.
5. All arboricultural issues other than tree roots are a matter for the arboricultural impact assessment which this report accompanies.
6. Scanning conditions were straightforward for the survey, but as is typical of urban areas, there were a large number of non-root reflectors due to rubble/other objects, which were filtered out of the data as far as was reasonably practical. This may slightly affect the accuracy of the results.

10. BACKGROUND and STATEMENT OF METHODOLOGY

A TreeRadar investigation was carried out by Ian Lee on 3rd January 2019. The locations of the scan lines are found at appendix one, drawing reference *SHA 921 TR,* and the results are found for the tree in the report at section 4.

Not all scan lines were in the root protection areas of the trees. 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. 005) 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

Topographical survey

11. MY EXPERIENCE & QUALIFICATIONS:-

Sharon Hosegood
ASSOCIATES

PROFILE: Ian Lee

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

Ian has twelve 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 will be continued in 2019 with international colleagues.

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:

- 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

52 Eton Avenue,

London,

NW3 3HN

CLIENT

Izzy Tepekoylu & Natalie Mason

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

DATE: 15.01.2019
OUR REF: SHA 921

CONTACT DETAILS: 01245 608 362
ian@sharonhosegoodassociates.co.uk

Sharon Hosegood Associates: Victoria House, Victoria Rd, Chelmsford, CM1 1JR
T: 01245 210420 www.sharonhosegoodassociates.co.uk
Registered Office: Fisher Michael Chartered Accountants, The Old Grange, Warren Estate,
Lordship Rd, Writtle, Chelmsford, Essex CM1 3WT
Company Registration Number: 9361038 Director: Sharon M.Hosegood

Sharon Hosegood
ASSOCIATES

ARBORICULTURAL IMPACT ASSESSMENT REPORT
BS 5837:2012 'Trees in relation to design, demolition and construction. Recommendations'

SITE

52 Eton Avenue, London NW3 3HN

CLIENT

Izzy & Natalie Tepekoylu

DATE: 16.01.2019
OUR REF: SHA 921

Sharon Hosegood Associates 4th floor Victoria House, Victoria Road, Chelmsford, CM1 1JR
T: 01245 210420 www.sharonhosegoodassociates.co.uk
Registered Office: Fisher Michael Chartered Accountants, The Old Grange, Warren Estate, Lordship Rd, Writtle, Chelmsford, Essex CM1 3WT
Company Registration Number: 9361038 Director: Sharon M.Hosegood