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TREE SURVEY AND ARBORICULTURAL IMPACT ASSESSMENT IN RELATION TO PROPOSED DEVELOPMENT AT HEATH BUILDINGS, HIGH STREET, OXSHOTT, SURREY.

Revised January 2024.

Clive Fowler, Dip.Arb (RFS), F.Arbor.A, Tech. Cert.Arbor.A

Tree Survey and Arboricultural Impact Assessment in Relation to Proposed Development at Heath Buildings, High Street, Oxshott, Surrey.

1. I was previously instructed by Heath Buildings Limited to undertake an inspection of trees at the above site in connection with the proposed demolition of existing buildings and redevelopment works. I carried out my original inspection on the 29th November 2021 and subsequently prepared reports dated February, August & October 2022, and March 2023 in relation to earlier submissions to the Local Authority. This report has been prepared following the preparation of a revised proposal and my further visit to the site on the 4th January 2024. The majority of its content and recommendations are as set out in my last report dated March 2023 as the footprint adjacent to the principal group of trees in land to the north remains the same.

2. Before any works to trees specified within this report are undertaken it would be necessary to contact the Local Authority to determine whether any of the trees are protected by a Tree Preservation Order or if the site is situated within a Conservation Area. If either applies a written application to the Local Authority will be necessary.

3. I have been supplied with a copy of the existing site survey and enclose a copy of this drawing as appendix 'b' to this report which indicates the position of the trees with their respective identification numbers.

4. Details of individual trees are given in the attached schedule (appendix 'a'). Species are shown by their common names. All measurements are approximate and stem diameters are measured at 1.5 metres from ground level unless stated. The majority of the trees are situated in neighbouring land and, in such cases, measurements etc. are estimated.

5. The information contained within the schedule has been collected in accordance with recommendations given in BS 5837: 2012 'Trees in Relation to Design, Demolition and Construction - Recommendations'. I have also categorised each tree in accordance with the above Standard and they are colour coded on the enclosed site survey drawing (appendix 'b') to aid their recognition.

   The following categories apply;

   A - Trees of high quality. (Green)

   B - Trees of moderate quality. (Blue)

   C - Trees of low quality. (Grey)

   U - Trees in such a condition that they can not realistically be retained as living trees in the context of the current land use for longer than 10 years. (Red)

6. In addition to the above, each tree is assigned a subcategory (1 – 3) which are detailed in the table attached at appendix 'e'. It is intended that each subcategory carries equal weight – for example an A 1 category tree would have the same retention priority as an A 2 tree.

General.

7. The majority of trees the subject of this report are located in neighbouring land to the north of the site and, due to access not being gained to such land, inspections of trees T.16 – 20 were undertaken from the roof of Heath Buildings and to the front and rear of the subject property. Two small amelanchier trees located within the paved area to the east of the site were inspected and appeared to be in good condition, but would benefit from minor formative pruning works.

8. To the north of the site and in neighbouring land are a row of mixed species that include common lime (T.16 & 19), sycamore (T.17) and horse chestnut (T.18). A close growing row of four Leyland cypress (group 2) are also located in this garden and towards the west of the subject property and close to the boundary wall to which they appear to have contributed to direct structural damage. Common lime tree T.16 grows to the east of the group and appears to be in reasonable condition, when viewed from the subject property, although it has been cut back to the south on regular occasions which has unbalanced its crown. Sycamore T.17 to its west is a poor specimen with extensive crown dieback and two main stems arising at a height of around 5 metres. A large column of decay was noted in a main framework stem to the south at approximately 7 metres, in addition to areas of squirrel damage. It is anticipated that this tree has only a very limited safe useful life expectancy and its condition has declined since my original inspection.

9. Further to the west of the group is a large horse chestnut (T.18), which although given a 'b' category in appendix 'a', appears to have reducing vigour and less than average regrowth was noted from previous crown reduction points. It is recommended that the condition of this tree is monitored in the future. A large common lime (T.19) to the west of this group is in very poor condition with one large framework stem having already died and numerous fruiting bodies of the decay causing pathogen *Ganoderma* being visible on its main stem (see appendix 'a'). This tree has died back further in its upper crown since my original inspection and, having regard to the rapid degradation of the wood of this species once infected by the above fungal pathogen (particularly when under the stress that this tree is clearly experiencing), this specimen is regarded as hazardous and it should ideally either be removed or significant reduction / pollarding works undertaken (subject to a more detailed inspection) in the very near future.

10. It would appear that ground disturbance has occurred within neighbouring land close to the above group of trees in the form of the installation of an artificial grass covering within their Root Protection Areas (see appendix 'c'). Such surfacing usually requires the installation of a sub base beneath it, such as concrete or compacted hardcore, in order to stabilise the surface for everyday use and to prevent weed growth. Should this be the case, such action is highly likely to have caused damage to the root systems of the adjacent trees due to root severance and/or a gradual decline in their health and vigour as a result of long term soil compaction. The general condition of the trees, as detailed in appendix 'a', would appear to confirm that some form of ground disturbance, such as that detailed above, has occurred.

11. To the north west of this group and in a different neighbouring property is a mature blue Atlas cedar (T.20) that appears to have lost its leading stem in the past and which is of a good appearance when viewed from the subject property. To the west of the site and in neighbouring land adjacent to the car parking area is a fairly extensive row of Leyland cypress (group 3) that have been heavily cut back on a number of occasions and which are densely ivy clad in some areas.

Proposed Development/Methodology.

12. I have assessed the revised proposed site layout whilst having regard to tree protection measures recommended in BS 5837: 2012 'Trees in Relation to Design, Demolition and Construction - Recommendations' and taking into account the Root Protection Areas (RPA's) shown in appendix 'c' (please also see below). I have also prepared a further revised Tree Protection Plan which is enclosed as appendix 'f' to this report.

13. All trees are located outside the subject property and the only specimen requiring removal as a direct result of the development is amelanchier tree T.14 that grows in the public footpath / paved area to the front / east of the site. This tree will be replaced with a semi mature specimen of a species to be agreed with the Local Authority and such replacement will be of a size at least equal to the current specimen upon its planting. Amelanchier T.15 will now be retained and protected in accordance with BS5837: 2012 (see appendix 'f') following Local Authority feedback.

14. As can be seen on the attached Tree Protection Plan (appendix 'f'), conventional Root Protection Areas of trees situated in neighbouring land, when based upon a radius of 12 times the trunk diameter, would fall within the development area in many cases. However, as the existing building has been constructed following the establishment of the majority of such trees and it appears that the northern boundary wall is likely to have been constructed using conventional trench foundations, which would potentially have resulted in root severance in this area, Tree Radar investigations were undertaken by Peter Barton Associates and their

subsequent Report (dated November 2021) is attached as appendix 'g' to this document.

15. These investigations were undertaken in three areas, to the front of the property / Clay Hair Salon, in the rear car parking area, and within the basement of the building closest to the northern site boundary. These investigations scanned the ground to a depth of 2 metres and roots over 20mm were targeted. As can be seen in appendix 'g', very little root growth was found within the subject property, with only minor root growth to the front of the site (Section 1 – Scan lines 1 - 5) in the form of two 'positive root reflections' that have been attributed to the cherry laurel shrub growing close by (T.16a), and four 'positive root reflections' within the rear car parking area (Section 2 – Scan line 6, 12, 13 & 20), that have been attributed to the low quality Leyland cypress screen growing in neighbouring land (group 3). No 'positive root reflections' were found within the existing building itself (Section 3 – closest to the principal group of trees in neighbouring land that include the good quality horse chestnut T.18 – Scan lines 21 – 24), with the results indicating that the ground in this area consists of heavily compacted soil and building rubble (please see page 4 of appendix 'g').

16. As a result of the above, it is apparent that, due to previous significant ground disturbance during the construction of the existing building, that the proposed construction works would not be of detriment to the trees located in neighbouring properties to the north of the site. Some very minor root growth is to be found to the west of the property and is attributed to the row of poor quality Leyland cypress in neighbouring land (group 3) and consequently the proposed ramp to the basement has been located so as to avoid the four 'root reflectors' which were found within 0.5 metres of the site boundary (appendix 'g').

17. Careful demolition of the existing buildings will be required and all such work will be undertaken from within the site itself and pull the existing building southwards away from the northern boundary and adjacent trees. This work must be undertaken in accordance with Section 7.3 of BS5837: 2012 as detailed below;

7.3.1 Where demolition is proposed on a site where trees are to be retained, access facilitation pruning should be undertaken as necessary to prevent injurious contact between demolition plant and the tree (s). In some cases, working space may be provided by temporarily tying back tree branches. Pruning or tying should be undertaken in accordance with a specification prepared by an arboriculturalist.

Note: The local authority will be able to advise whether trees are under statutory protection such that consent for the tree works might be required.

7.3.2 When demolishing a structure (including underground structures) within what would otherwise be the RPA, barriers should be erected, and ground

protection installed (see 6.2.3), to protect the underlying soil to the edge of the structure.

7.3.3 All plant and vehicles engaged in demolition works should either operate outside the RPA, or run on the ground protection (see 6.2.3). Where such ground protection is required, it should be installed prior to commencement of operations.

7.3.4 Where trees stand adjacent to structures to be removed, the demolition should be undertaken inwards within the footprint of the building (often referred to as 'top down, pull back').

Note: Where there is a significant build up of dust on the foliage, it might be necessary to hose down the tree(s).

7.3.5 The advice of an arboriculturalist should be sought where underground structures are present within the RPA are, or will become, redundant. In general it is preferable to leave such structures in situ, as their removal could damage adjacent roots.

7.3.6 Where an existing hard surface is scheduled for removal, care should be taken not to disturb tree roots that might be present beneath it. Hand held tools or appropriate machinery should be used (under arboricultural supervision) to remove the existing surface, working backwards over the area, so that the machine is not moving over the exposed ground (see 7.2.2 for protection of exposed roots). If a new hard surface is to be laid, it might be preferable to leave any existing sub-base in situ, augmenting it where required.

18. The proposed building line was previously pulled back further from the northern boundary following the original Pre-Application submission and the latest January 2024 revision retains the 'reduced' roof section adjacent to the group of trees in neighbouring land to the north that provides clearance between the proposals and the canopies of retained trees (with only minor tree surgery works being required in relation to horse chestnut T.18 - appendix 'a').

19. The foundations for the new building to the north of the site are set back from the existing building line and therefore involve no disturbance to existing ground conditions beyond the footprint of the existing building, thus avoiding all root growth from the trees in neighbouring land.

20. The proposed location of any new services or soakaways etc. must be carefully considered at an early stage so as to ensure that excavation within Root Protection Areas (group 3) is avoided or kept to an absolute minimum. Where such works are unavoidable (and following consultation with the Project Arboriculturalist) any excavations in such areas must be carried out in strict accordance with

Sections 7.2 and 7.7 of BS5837: 2012 and in the presence of the said Arboriculturalist.

21. All tree protection will be installed prior to any site preparation works and must be maintained throughout the development process. Areas must also be designated for the delivery and storage of materials etc. avoiding Root Protection Areas.

Conclusions.

22. This development has been very carefully designed with access to appropriate Arboricultural information, including Tree Radar Investigations (which has demonstrated that root growth from the principal trees in neighbouring properties to the north of the site is not present within the subject property) being available from an early stage. Only minor root growth is present from the group of Leyland cypress to the west of the existing car parking area (group 3) and excavations have been carefully located in this part of the site so as to avoid them. One small amelanchier tree (T.14) to the front of the property will be removed as a result of this development and replacement planting will be undertaken, using semi mature stock, which will mitigate such loss.

C. F owler.

C.E. Fowler Dip. Arb (RFS), F. Arbor.A, Tech. Cert. (Arbor.A).
January 2024.

Appendix ‘a’
Tree details

Clive Fowler Associates: Tree Survey at Heath Buildings, High Street, Oxshott, Surrey.
(Revised January 2024).

No.	Species	Diameter @ 1.5 m (cm)	Age Class	Crown radius (m)	Height to 1st branch (m)	Crown height (m)	Height (m)	Condition / vitality	Estimated remaining contribution (years)	Category	Works	Notes.
14	Amelanchier	13	Young	2.5 north 2.5 east 1.25 south 2.5 west	1.55	2	3.75	Good	10>	C 1	Remove to allow development.	Trunk incline towards the north west. Limited growth to the south. Crossing branches at 1.7 metres. Would benefit from formative pruning works. Girdling roots with slight instability noted.
15	Amelanchier	13	Young	1.75 north 2.5 east 2 south 2.5 west	1.5 north	1.6	4.5	Good	20>	C 1	Formative prune.	Local Authority owned tree forming its main crown framework at around 1.5 metres. Slight incline towards the south west. Sucker growth rapidly developing in middle crown to the west. Would benefit from formative pruning.
16	Common lime	45 (est.)	Mature	6.5 north 4.5 east 3 south 4 west	2.6 east	2	15.5	Good - fair	20>	C 2 (est.)	No action - in neighbouring ownership.	End tree in row which has been cut back to the south on regular occasions. - unbalancing crown. Large low limb to the south east. Possibly pollarded at around 4.5 metres in the distant past. Well defined dominant stem. Not fully inspected.

Notes: Diameter at 1.5 metres refers to trunk diameter. Categories are as defined in BS 5837 (2012) - **A = High quality - B = Moderate quality - C = Low quality - U = Less than 10 years life expectancy - poor quality.** Crown height clearance / height to first branch = from ground level - Estimated remaining contribution = probable life expectancy as assessed at time of inspection. All measurements are approximate.

Clive Fowler Associates: Tree Survey at Heath Buildings, High Street, Oxshott, Surrey.
(Revised January 2024).

No.	Species	Diameter @ 1.5 m (cm)	Age Class	Crown radius (m)	Height to 1st branch (m)	Crown height (m)	Height (m)	Condition / vitality	Estimated remaining contribution (years)	Category	Works	Notes.
16a	Cherry laurel	20 (est)	Middle aged	3	Ground level	Ground level	3	Good	20>	C 2	No action - in neighbouring ownership.	Shrub growing close to wall in neighbouring land. Regularly clipped back to the south.
17	Sycamore	35 est.	Middle aged	4 north 3.75 east 3 south 2 west	7.5 north east	7.5	14	Poor	<10	U	No action - in neighbouring ownership.	Poor quality tree with two main stems arising at around 5 metres. Large column of decay on south side of northern stem at 7 metres. Larger stem to the south has extensive die back following squirrel damage. Further declined since previous inspection.
18	Horse chestnut	85 (est.)	Mature	6.5 north 6 east 5 south 6 west	4.5 south west	4	16	Fair	20>	B 2 (est.)	Prune back overhanging growth only where necessary to allow construction works - cutting back to suitable side growth and retaining as near to a natural appearance as possible.	Main crown framework arises between 4.5 and 6 metres with a number of congested main stem unions. Previously reduced with less than average regrowth. Small pockets of decay / bark dieback at old pruning points. Scattered dead wood. Not fully inspected.

Notes: Diameter at 1.5 metres refers to trunk diameter. Categories are as defined in BS 5837 (2012) - **A = High quality - B = Moderate quality - C = Low quality - U = Less than 10 years life expectancy - poor quality.** Crown height clearance / height to first branch = from ground level - Estimated remaining contribution = probable life expectancy as assessed at time of inspection. All measurements are approximate.

Clive Fowler Associates: Tree Survey at Heath Buildings, High Street, Oxshott, Surrey.
(Revised January 2024).

No.	Species	Diameter @ 1.5 m (cm)	Age Class	Crown radius (m)	Height to 1st branch (m)	Crown height (m)	Height (m)	Condition / vitality	Estimated remaining contribution (years)	Category	Works	Notes.
19	Common lime	85 at 1.1 m (est.)	Mature	6 north 4.5 east 3.5 south 4.5 west	6.5 south east	7	16	Poor	<10	U	No action - in neighbouring ownership.	Two main stems at 1.3 metres with a potentially weak union. Large south western stem has died and appears to be vulnerable to failure. Numerous *Ganoderma* fruiting bodies on main stem. Declined significantly in condition since last inspection. Not fully inspected. Hazardous tree.
20	Atlas cedar	80 (est.)	Mature	6.5 (est.)	6 east (tallest.)	6	16	Good	20>	B 2 (est.)	No action - in neighbouring ownership.	Large blue foliaged specimen with large lateral limbs in upper crown - possibly following the loss or removal of its leading stem in the distant past. Only limited views of tree from site. Partially suppressed to the south east. Good appearance when viewed from subject property.

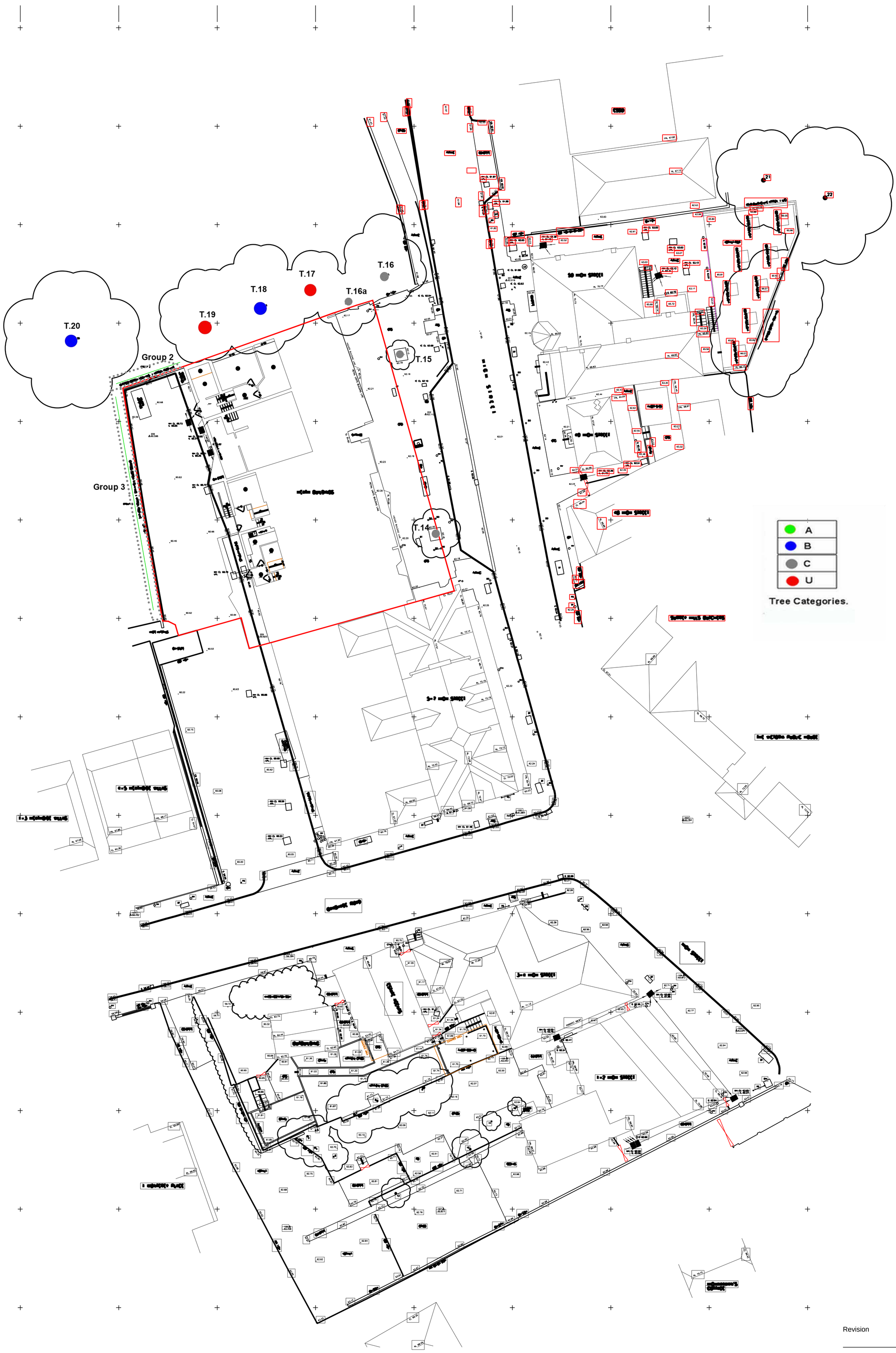
Notes: Diameter at 1.5 metres refers to trunk diameter. Categories are as defined in BS 5837 (2012) - **A = High quality - B = Moderate quality - C = Low quality - U = Less than 10 years life expectancy - poor quality.** Crown height clearance / height to first branch = from ground level - Estimated remaining contribution = probable life expectancy as assessed at time of inspection. All measurements are approximate.

Clive Fowler Associates: Tree Survey at Heath Buildings, High Street, Oxshott, Surrey.
(Revised January 2024).

No.	Species	Diameter @ 1.5 m (cm)	Age Class	Crown radius (m)	Height to 1st branch (m)	Crown height (m)	Height (m)	Condition / vitality	Estimated remaining contribution (years)	Category	Works	Notes.
Group 2	Leyland cypress	28. - largest (est.)	Middle aged	4.25 south	1.8 north (est.)	3 over site	15.5	Good	10>	C 2 (est.)	No action - in neighbouring ownership.	Four close growing trees that have been planted to form a screen and appear to have contributed to direct damage to the adjacent wall. Eastern tree has a tight stem union at around 3.75 metres. Reduced on a number of occasions at various levels. Poor form. Not fully inspected.
Group 3	Leyland cypress	30. - larger tree (est.)	Middle aged	2.25 over site	Ground level	Ground level	10 - tallest	Good	20>	C 2 (est.)	No action - in neighbouring ownership.	Close growing group which has been heavily cut back on a number of occasions and have numerous pruning stubs in lower crown to the east. Densely ivy clad in some areas. Not fully inspected.

Notes: Diameter at 1.5 metres refers to trunk diameter. Categories are as defined in BS 5837 (2012) - **A = High quality - B = Moderate quality - C = Low quality - U = Less than 10 years life expectancy - poor quality.** Crown height clearance / height to first branch = from ground level - Estimated remaining contribution = probable life expectancy as assessed at time of inspection. All measurements are approximate.

Appendix ‘b’
Tree Locations.



PROPOSED SITE PLAN

0 2 4 6 8 10

1:200

Scale Bar

Tree Location Plan.
Clive Fowler Associates.
January 2024.
Originally produced in colour.

Revision Date

Project

Heath Buildings,
High Street,
Oxshott,
Surrey.

Title

Existing Site Plan

Scale	Drwg No	Date
1:200@A1	**HBL/00**	Jan 2022

WOLSEY HOUSE DESIGNS

Appendix ‘c’
Recommended Root Protection Areas

Clive Fowler Associates : Recommended Root Protection Areas (Radius) at Heath Buildings, High Street, Oxshott, Surrey.
(Revised January 2024).

Tree No	Species	Recommended Distances for Root Protective Areas (Metres).	Comments.
14	Amelanchier	n/a	Remove to allow development.
15	Amelanchier	1.6	No work required within RPA.
16	Common lime	5.5	No root growth detected within site area (please see Tree Radar Investigations Report by Peter Barton Associates). Scan lines - 1 - 5 & 21 - 24. Careful demolition of existing building required in accordance with Section 7.3 of BS5837: 2012.
16a	Cherry laurel	2.5	Low quality shrub.
17	Sycamore	4.25	As per. tree T.16 above. Poor condition.
18	Horse chestnut	10.25	As per. T.16 above. Please see scan lines 1 - 5 & 21 - 24.
19	Common lime	10.25	Poor / hazardous condition.
20	Atlas cedar	9.75	As per. T.16 above. Please see scan lines 6, 12, 13 & 20.
Group 2	Leyland cypress	3.5	As previous.
Group 3	Leyland cypress	3.75	As previous. No root growth detected within proposed construction / development area.

Note 1. Root Protection Area Radii are shown in ¼ metre graduations. Note 2. It should be emphasised that the above relates to the distance from the centre of the tree to protective fencing.
Note 3. With appropriate precautions, temporary site works can occur within the protected area, e.g. for access for scaffolding (see BS 5837 - 2012).
Note 4. N/a = not applicable.

Appendix ‘d’
Extracts from BS5837: 2012

Extracts from BS5837: 2012.

6.2 Barriers and ground protection

6.2.1 General

6.2.1.1 All trees that are being retained on site should be protected by barriers and/or ground protection (see 5.5) before any materials or machinery are brought onto the site, and before any demolition, development or stripping of soil commences. Where all activity can be excluded from the RPA, vertical barriers should be erected to create a construction exclusion zone. Where, due to site constraints, construction activity cannot be fully or permanently excluded in this manner from all or part of a tree's RPA, appropriate ground protection should be installed (see 6.2.3).

6.2.1.2 Areas of retained structural planting, or designated for new structural planting, should be similarly protected, based on the extent of the soft landscaping shown on the approved drawings.

6.2.1.3 The protected area should be regarded as sacrosanct, and, once installed, barriers and ground protection should not be removed or altered without prior recommendation by the project arboriculturist and, where necessary, approval from the local planning authority.

6.2.1.4 Where required, pre-development tree work may be undertaken before the installation of tree protection measures, with the agreement of the project arboriculturist or local planning authority if appropriate (see also 8.8.1).

6.2.1.5 It should be confirmed by the project arboriculturist that the barriers and ground protection have been correctly set out on site, prior to the commencement of any other operations.

6.2.2 Barriers

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

6.2.2.2 The default specification should consist of a vertical and horizontal scaffold framework, well braced to resist impacts, as illustrated in Figure 2. The vertical tubes should be spaced at a maximum interval of 3 m and driven securely into the ground. Onto this framework, welded mesh panels should be securely fixed. Care should be exercised when locating the vertical poles to avoid underground services and, in the case of the bracing poles, also to avoid contact with structural roots. If the presence of underground services precludes the use of driven poles, an alternative specification should be prepared in conjunction with the project arboriculturist that provides an equal level of protection. Such alternatives could include the attachment of the panels to a free-standing scaffold support framework.

6.2.2.3 Where the site circumstances and associated risk of damaging incursion into the RPA do not necessitate the default level of protection, an alternative specification should be prepared by the project arboriculturist and, where relevant, agreed with the local planning authority. For example, 2 m tall welded mesh panels on rubber or concrete feet might provide an adequate level of protection from cars, vans, pedestrians and manually operated plant. In such cases, the fence panels should be joined together using a minimum of two anti-tamper couplers, installed so that they can only be removed from inside the

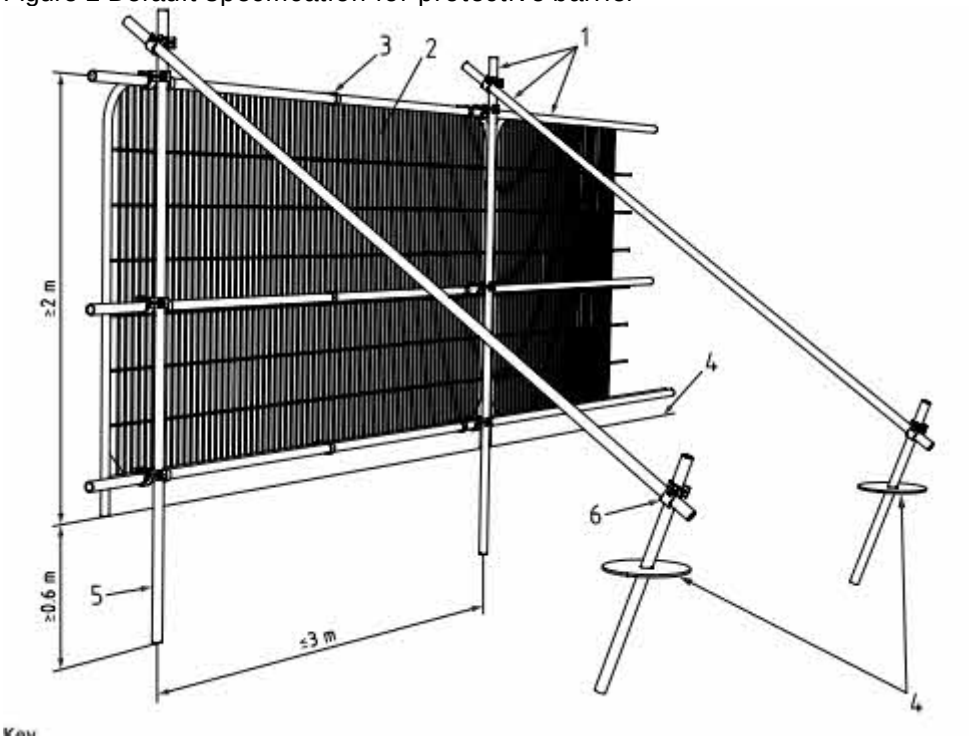
fence. The distance between the fence couplers should be at least 1 m and should be uniform throughout the fence. The panels should be supported on the inner side by stabilizer struts, which should normally be attached to a base plate secured with ground pins (Figure 3a). Where the fencing is to be erected on retained hard surfacing or it is otherwise unfeasible to use ground pins, e.g. due to the presence of underground services, the stabilizer struts should be mounted on a block tray (Figure 3b).

NOTE 1 Examples of configurations for steel mesh perimeter fencing systems are given in BS 1722-18.

NOTE 2 It might be feasible on some sites to use temporary site office buildings as components of the tree protection barriers, provided these can be installed and removed without damaging the retained trees or their rooting environment.

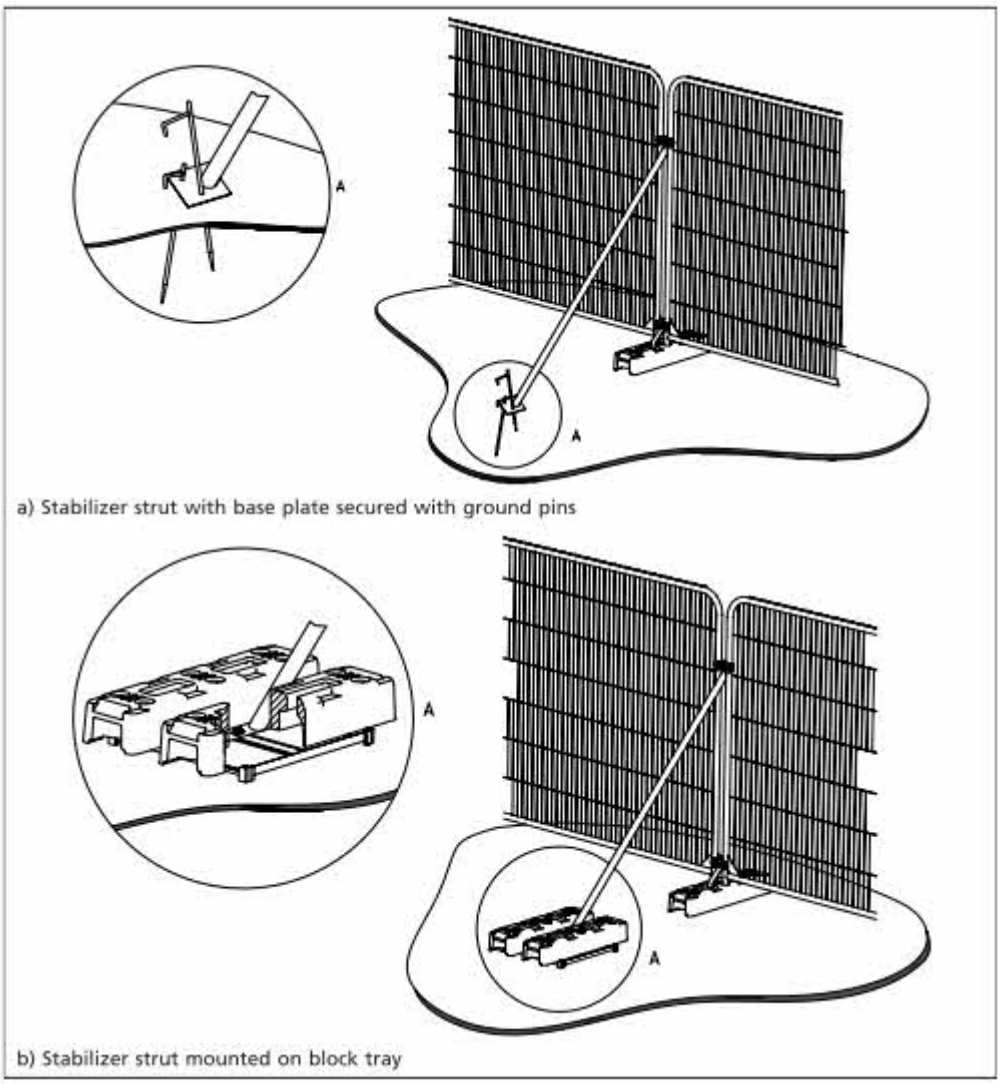
6.2.2.4 All-weather notices should be attached to the barrier with words such as:
"CONSTRUCTION EXCLUSION ZONE – NO ACCESS".

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

Figure 3 Examples of above-ground stabilizing systems



6.2.3 Ground protection during demolition and construction

6.2.3.1 Where construction working space or temporary construction access is justified within the RPA, this should be facilitated by a set-back in the alignment of the tree protection barrier. In such areas, suitable existing hard surfacing that is not proposed for re-use as part of the finished design should be retained to act as temporary ground protection during construction, rather than being removed during demolition. The suitability of such surfacing for this purpose should be evaluated by the project arboriculturist and an engineer as appropriate.

6.2.3.2 Where the set-back of the tree protection barrier would expose unmade ground to construction damage, new temporary ground protection should be installed as part of the implementation of physical tree protection measures prior to work starting on site.

6.2.3.3 New temporary ground protection should be capable of supporting any traffic entering or using the site without being distorted or causing compaction of underlying soil.

NOTE The ground protection might comprise one of the following:

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. 100 mm depth of woodchip), laid onto a geotextile membrane;

b) for pedestrian-operated plant up to a gross weight of 2 t, proprietary, inter-linked ground protection boards placed on top of a compression-resistant layer (e.g. 150 mm depth of woodchip), laid onto a geotextile membrane;

c) for wheeled or tracked construction traffic exceeding 2 t gross weight, an alternative system (e.g. proprietary systems or pre-cast reinforced concrete slabs) to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.

6.2.3.4 The locations of and design for temporary ground protection should be shown on the tree protection plan and detailed within the arboricultural method statement (see 6.1).

6.2.3.5 In all cases, the objective should be to avoid compaction of the soil, which can arise from the single passage of a heavy vehicle, especially in wet conditions, so that tree root functions remain unimpaired.

Appendix ‘e’
Table 1 from BS5837: 2012

Table 1 **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 the 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**.*			See Table 2
	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	Trees 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 arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	See Table 2
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	See Table 2
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	See Table 2

Appendix ‘f’
Tree Protection Plan.

RPA's shown by yellow circles.

Please see Tree Root Mapping Report prepared by Peter Barton Associates which details actual extent of root growth into subject property.

Tree Protective fencing along this boundary provided by existing boundary treament - reinforced if necessary.

Areas protected by fencing in accordance with figure 3 of BS 5837: 2012 'Trees in Relation to Design, Demolition and Construction - Recommendations' - shown in brown.

Tree T.14 to be removed and replacement planting undertaken.

Residential Bins to be stored down side access on bin collection day only. Bins to be bought up ramp from basement by Caretaker of Building Management Company.

T.15 T.16 T.16a T.18 T.19 T.20

Group 2 Group 3

External Sheffield Bike Stands

1 in 12 Ramp down

Commercial Bin Store

HEATH BUILDINGS

1 MIDGARTH CLOSE

2 MIDGARTH CLOSE

50 HIGH STREET 49 HIGH STREET 48 HIGH STREET 5-7 HIGH STREET 3-4 HIGH STREET 1-2 HIGH STREET HIGH STREET

ESSO

SURREY HILLS BUTCHERS

THE VICTORIA PUBLIC HOUSE

4-5 HEATHSIDE VILLAS 1-3 HEATHSIDE VILLAS

OAKSHADE ROAD

1 MONTEREY PLACE

ESTATE AGENTS OUTBUILDING

HIGHWAYMAN'S COTTAGE

PROPOSED SITE PLAN

0 2 4 6 8 10

1:200

Scale Bar

Tree Protection Plan.
Clive Fowler Associates.
Revised January 2024.
Originally produced in colour.

Revision Date

Project

Heath Buildings,
High Street,
Oxshott,
Surrey.

Title

Proposed Site Plan

Scale 1:200@A1

Drwg No **HBL/04F**

Date Dec 2023

WOLSEY HOUSE DESIGNS

Appendix ‘g’
Tree Radar Investigations Report.

TreeRadar® Investigations
Peter Barton Associates

TreeRadar^{R} GPR
Tree Root Investigations

Heath Buildings
Tree Root Mapping Report

November 2021

Clive Fowler Associates
39 Warren Road, Whitton,
Twickenham, Middlesex,
TW2 7DH

Peter Barton Associates
TreeRadar^{R} Investigations
Bryn Gardens
Liss, GU33 7HB

CONTENTS **Page**

Complete data set including Plans and Visuals as used in this report are given in associated zip file: - LLP233 - Addendum A7 - Trench View Radargrams & Associated Data.

1. Introduction

1.1 On instructions received from Clive Fowler Associates, Peter Barton Associates carried out a TreeRadar^{R} GPR root investigation at Heath Buildings, Oxshott, KT22 0JP.

2. The Site

2.1 The GPR survey was carried over root zones associated with specific trees. The survey area has been divided into 3 sections to aid analysis and presentation:

Section 1 – Infront of Clay Hair Salon (scan-lines 1-5)
Section 2 – Rear parking area (scan-lines 6-20)
Section 3 – Basement area (scan-lines 21-24

2.2 Full details are shown on the scan-line layout schematics at Appendix A1.

3. The Survey

3.1 The survey was carried out on the 3rd of November by the TreeRadarR GPR team of Peter Barton Associates. The weather conditions at the time of the survey were Clear with good visibility.

3.2 All scan-lines were set out at 1m centres and were plotted to the ground along with synchronisation marker lines to the centre of trees and other site features. Details are shown on the scan-line layout schematics at Appendix A1.

3.3 Scanning was carried out using the TreeRadar^{R} GPR field unit fitted with the 400MHz antennae. Scanning was to 2m depth. Roots of 20mm diameter and over were targeted.

3.4 A total of 24 scan-lines were surveyed. Details are shown on the scan-line layout schematics at Appendix A1.

4. GPR Data Processing

4.1 The data outputs from the TreeRadar^{R} root-scanning were processed by bespoke software (TreeWin TBA). This software provides a high degree of accuracy as to plotting the location and presence of tree roots.

4.2 The current analysis process provides accuracy of more than 85%. Majority of inaccuracies are in plotting root clusters as one root as outlined below.

- Root clusters so plotted as part of the GPR survey are gatherings of live roots with root diameters of less than 10mm which have a spatial separation of less than 5mm. Such groupings can be recorded as a single root plot location. Therefore, clusters of roots from significant garden plants can also be recorded as a single root plot.

- Dead roots having different reflective qualities are not plotted; dead roots are defined as non-active decedent roots of more than 12 months.

5. Data out-puts

Cut Face Trench Radargrams

5.1 As part of the root analysis, scaled, cut face spatial view radargrams were generated for each line scanned. These provide visual scaled 2D view of root locations including linear position and depth.

Detailed information is shown on the example spatial view trench visuals given in Appendix A5. Information includes a brief overview of findings including average root density counts (roots per metre) and noted non-root reflectors (services, rocks/rubble etc.).

Multi-trench View visuals

5.2 As part of the root analysis, multi-trench view visuals are generated for groups of scan-lines where practical. These provide an across site visual of root locations and depth. Multi-trench visuals are given at Appendix A4.

Top-Down View Root Maps

5.3 The top-down view (TDV) Root position and density plots are also generated by the TBA software. These have been annotated to the site plan provided and shown at Appendix A2, A3 and A4.

Root Position maps

5.4 Root positioning TDVs give an indication of roots along the scanlines. These provide a visual indication in plan-view of root position, root-free zones related to existing trees and site features. TDVs are key to providing a holistic assessment of the site.

- *Root Position TDVs*: identified root positions are shown along the scan-lines as small triangles. These are colour coded according to depth of the roots within the profile:

  Red: 0-67cm depth
  Green: 67cm-133cm depth
  Blue: Below 133cm depth

Root Density Maps

5.5 Root Density TDVs give an indication of root density along scan-lines. These provide a visual indication in plan-view of higher/lower root densities/root-free zones related to existing trees and site features.

5.6 Interpretation of radargrams, root densities and root position maps require due consideration to be given to adjacent sapling trees and coarse vegetation that may be growing on site. These are not necessarily shown in detail on the topographical survey drawings. Saplings, shrubs, and non-target trees will impact on the root density counts.

5.7 A complete data set including Plans and Visuals as used in this report are given in associated zip file: - LLP233- Addendum A7 - Trench View Radargrams & Associated Data.

6. Overview of findings

6.1 The GPR survey was carried over root zones associated with specific trees.

6.2 Following Stage 1 and 2 data processing the following was evident:

There is indication of service runs, subsurface clutter and past profile disturbance throughout the scan-lines. Very few positive root reflectors were detected.

Section 1 – Highstreet (Scan-lines 1-5)

Scan-line 1-5 are located between Clay Hair Salon and the pelican crossing (see Appendix A1). The ground conditions of the scanned area consist of paving. Two positive root reflections were detected at around 100-120cm depth on scan-line 1 (600mm from the boundary wall). These are likely attributed to the Laurel hedge adjacent to the reflection positions.

Section 2 – Rear carpark (Scan-lines 6-20)

Scan-lines 6-20 are located in the parking area behind Clay Hair salon (See Appendix A1). The ground conditions over the scanned area consisted of tarmac. 4 root reflectors ranging from 79-150cm depth on scan-lines 6 and 13 (500mm from boundry). These are likely attributed to the conifer hedge on the adjacent property.

Section 3 – Basement (Scan-lines 21-24)

Scan-lines 21-24 are located within the basement on the North side of the building (see Appendix A1). Ground conditions consist of heavily compacted desiccated soil and building rubble. No positive root reflections were detected in this area.

6.3 Conclusions

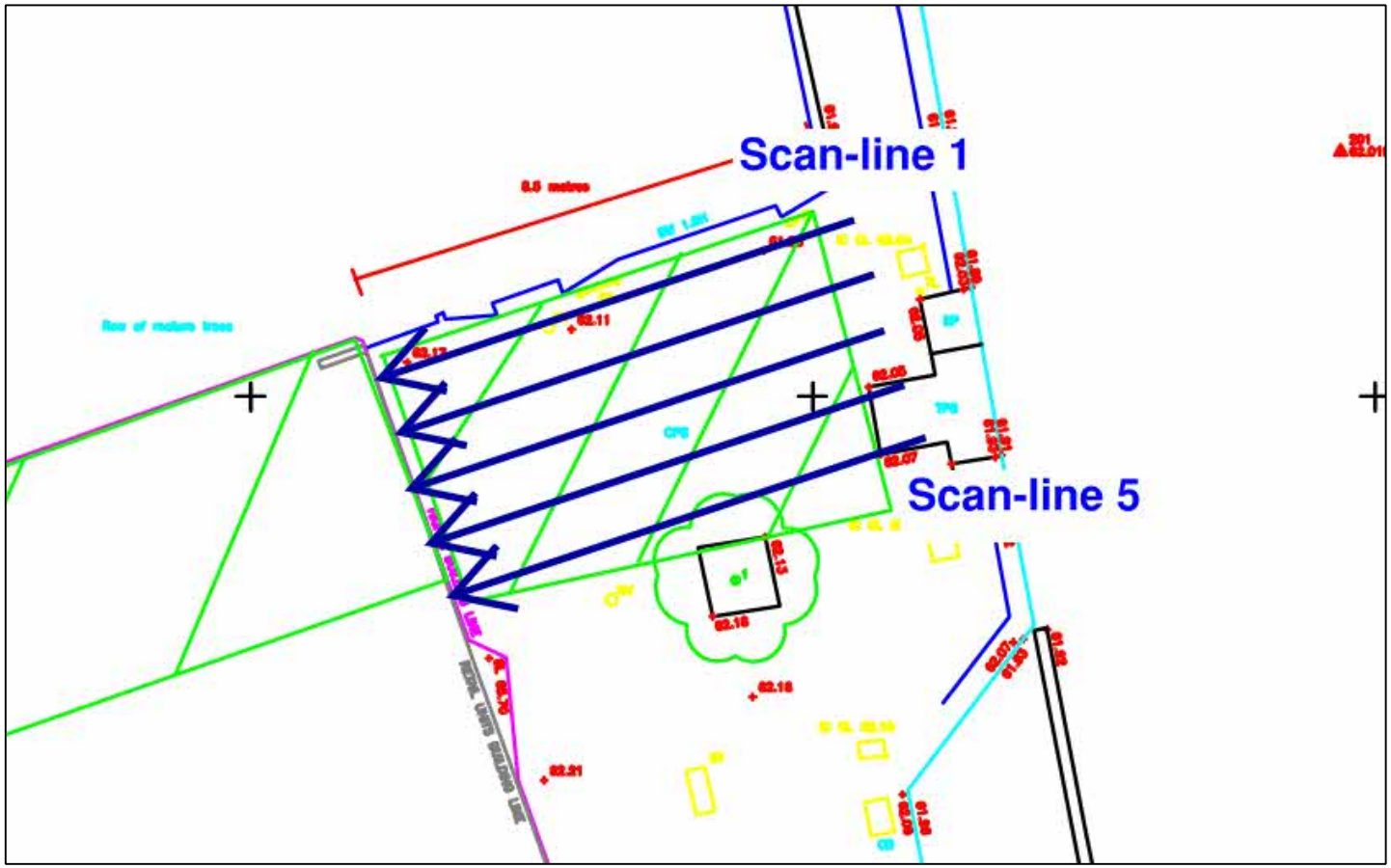
The above findings are typical of urban areas where tree roots are growing under pavements and hard surfaces.

The installation and maintenace of hard landscaping, such as boundary walls, may have contributed to the low root density patterns shown and acted as barrier to root encroachment (specifically section 1).

The bases of the mature trees to the North of section 2 were on a much lower elevtion than the scanned surfaces, Whilst the Leylandii hedge to the West of section 2 has a peferable rooting environment within the neighbouring boundary. Also, cypruss trees form a compact fibrouse root system, rather than an extensive spreading root system.

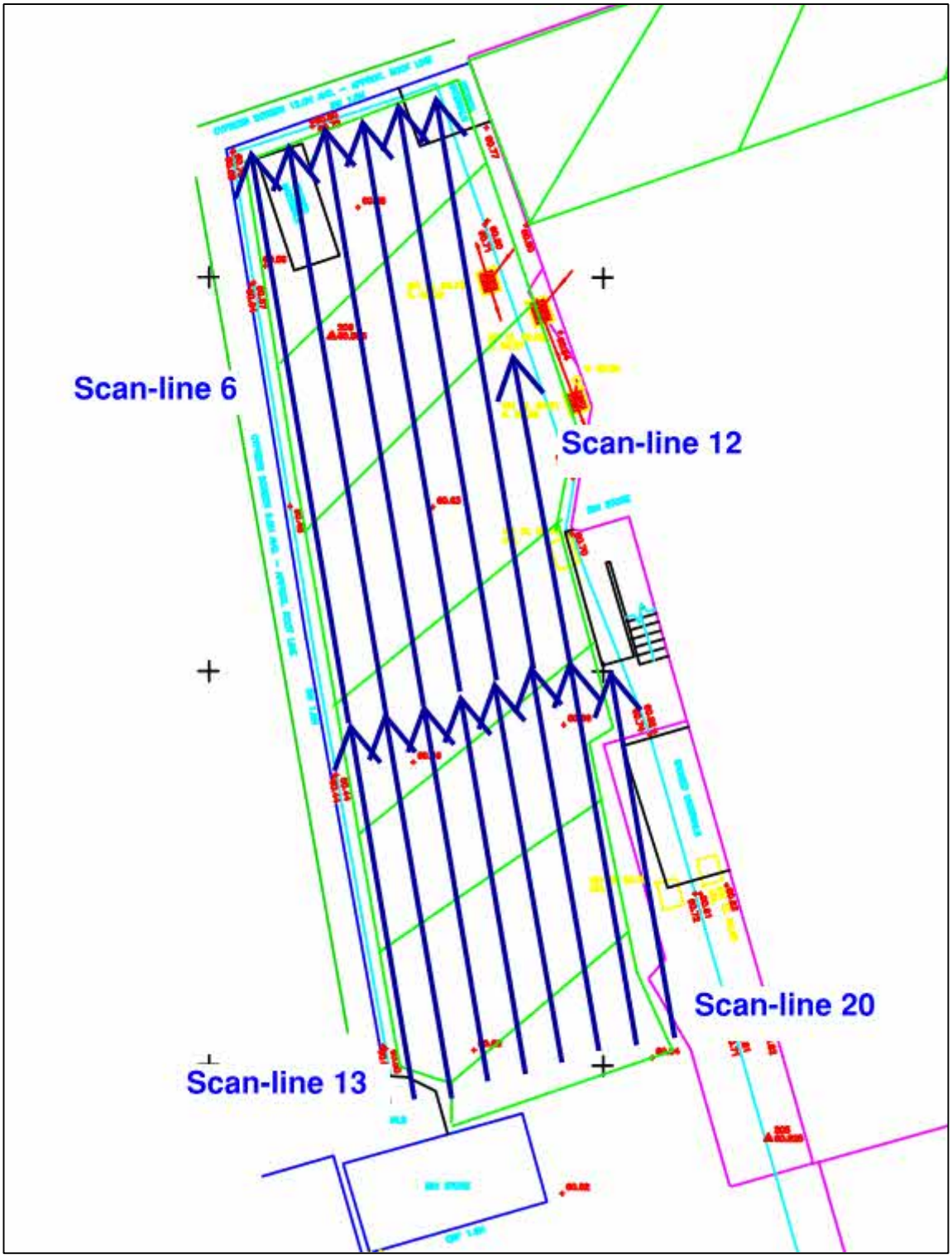
Appendix A1: Scan Line Layout Schematics

Scan-Line Layout Schematics – Section 1



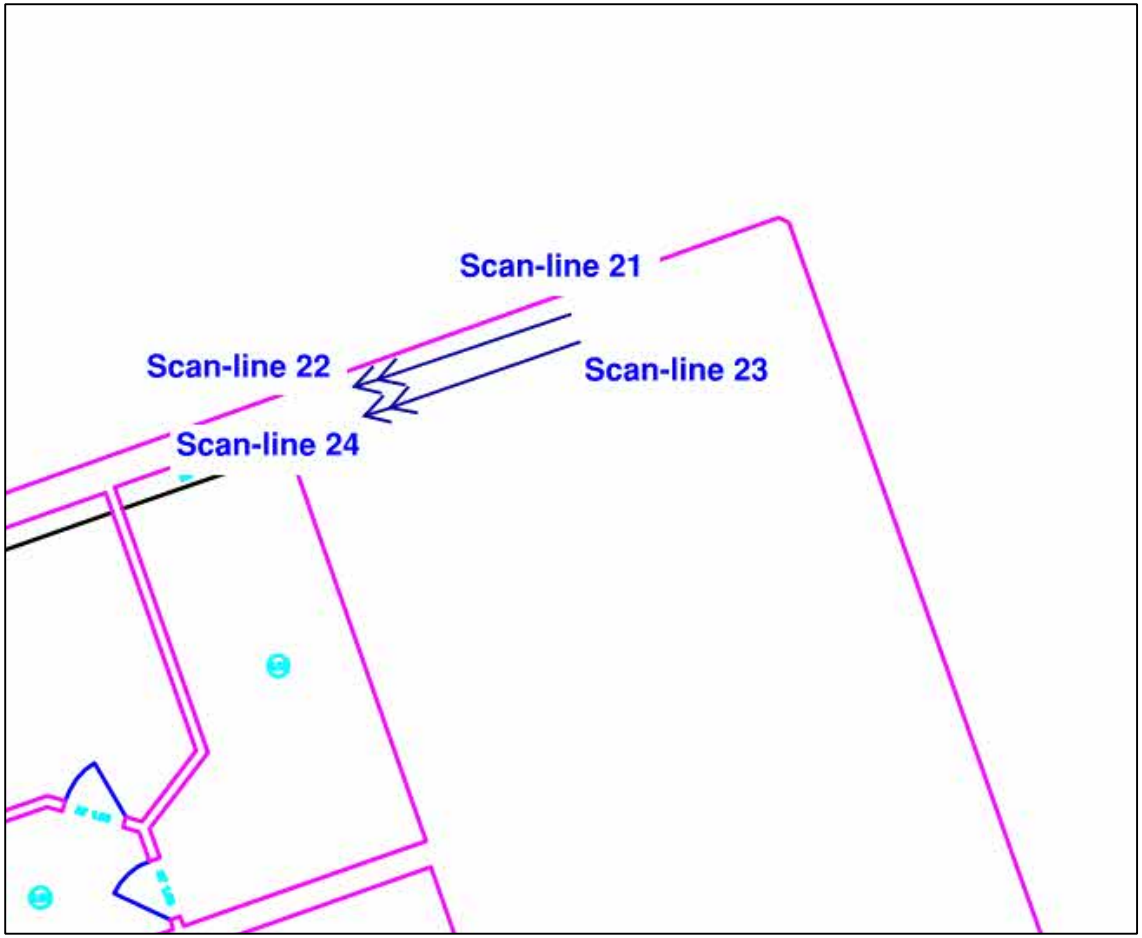
Scan-lines plotted to plan

Scan-Line Layout Schematics – Section 2



Scan-lines plotted to plan

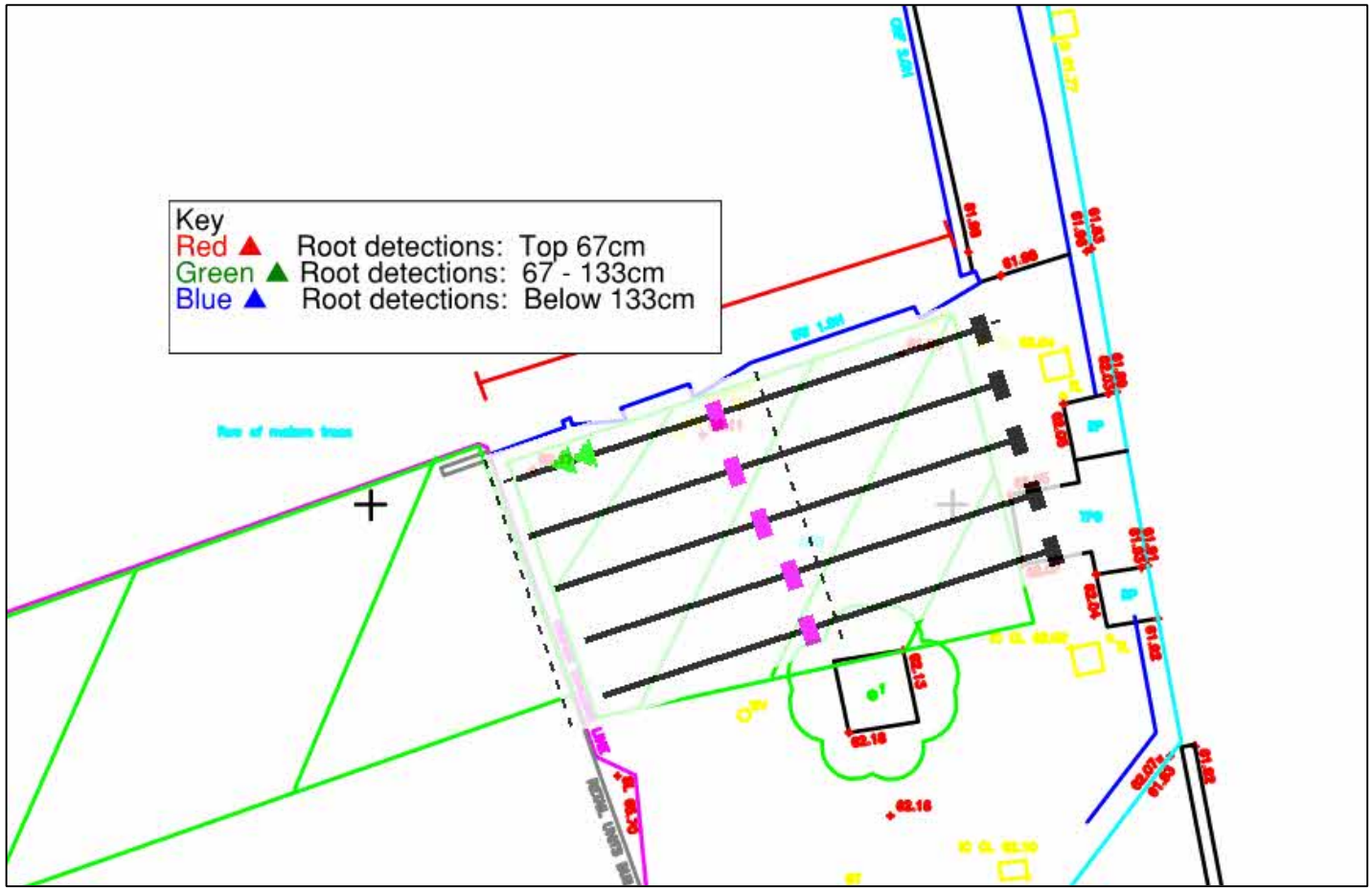
Scan-Line Layout Schematics – Section 3



Scan-lines plotted to plan

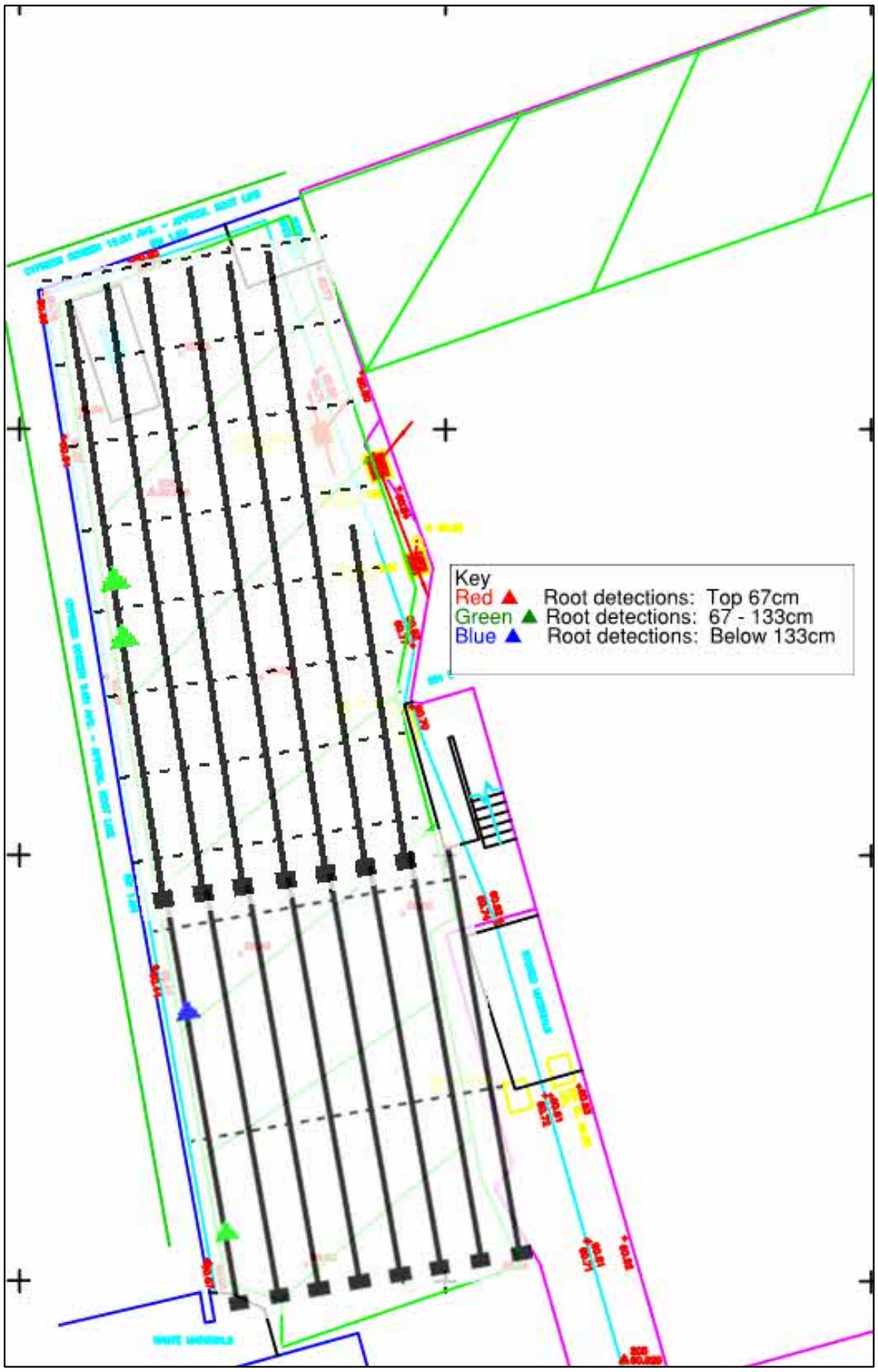
Appendix A2: Top-Down View Root Locations

Top-Down View Root Locations – Section 1



Root positions plotted to scan-lines/plan

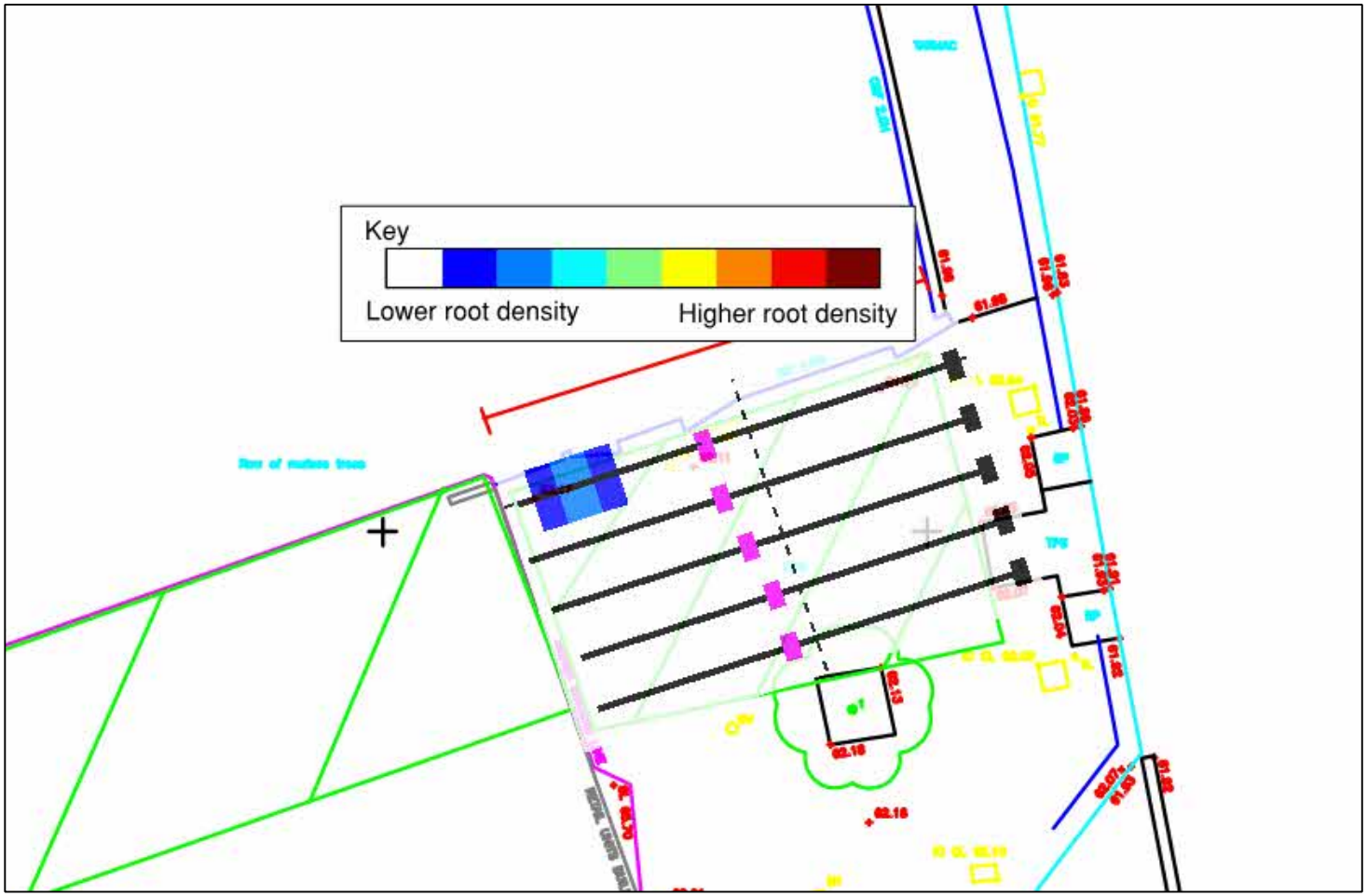
Top-Down View Root Locations – Section 2



Root positions plotted to scan-lines/plan

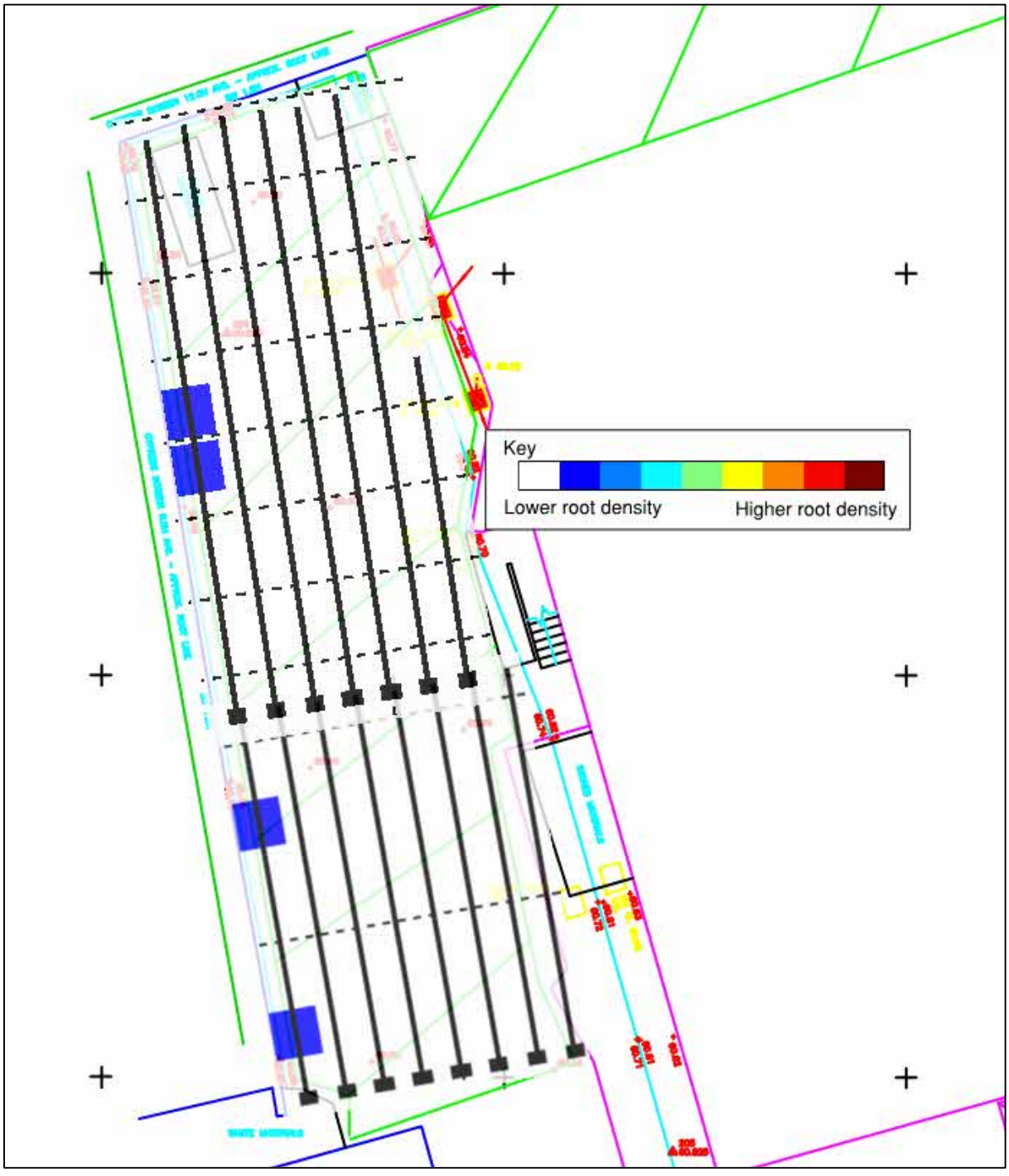
Appendix A3: Top-Down View Root Density Map

Top-Down View Root Density Map – Section 1



Root Density to scan-lines/plan

Top-Down View Root Density Map – Section 2



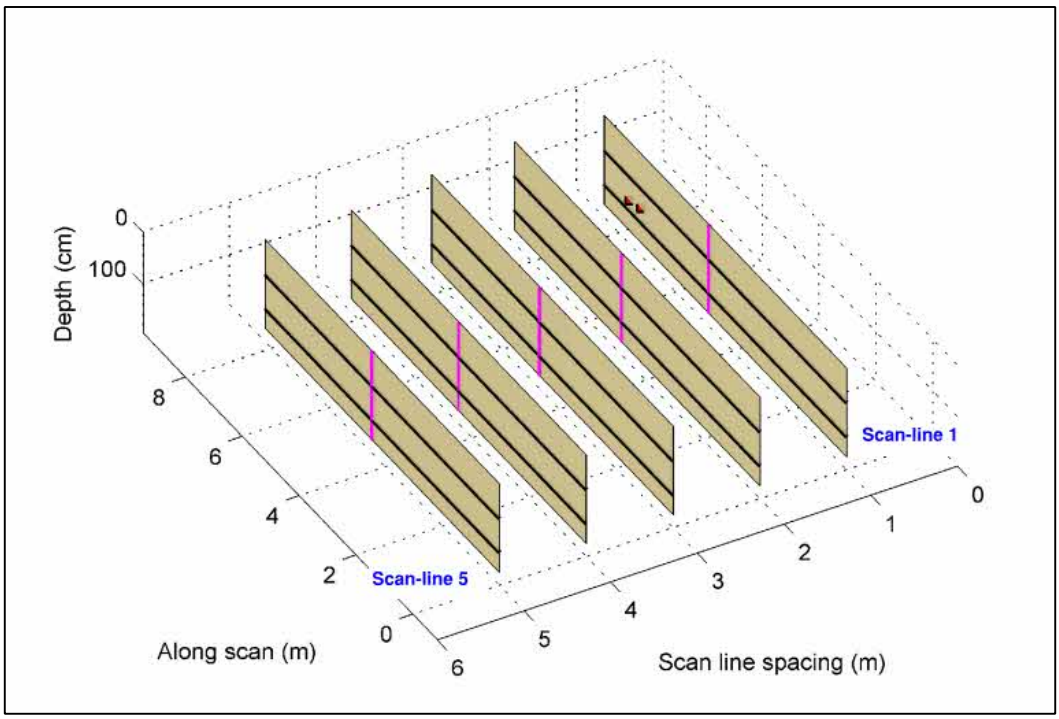
Root Density to scan-lines/plan

Appendix A4: Roots to Virtual Trench (3D)

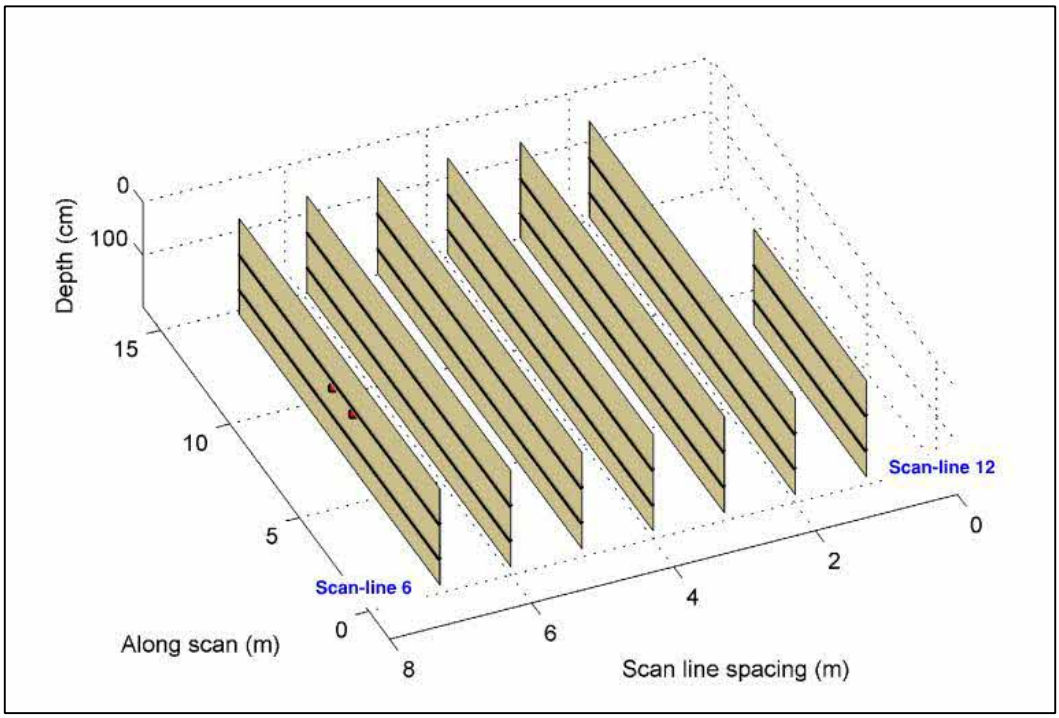
Multi-trench view visuals show roots in a 3D virtual trench-face view arrangement. These provide an overview of root positions, density, and depth. The horizontal line markers are set at 67cm and 133cm depth. Vertical markers align to the tree.

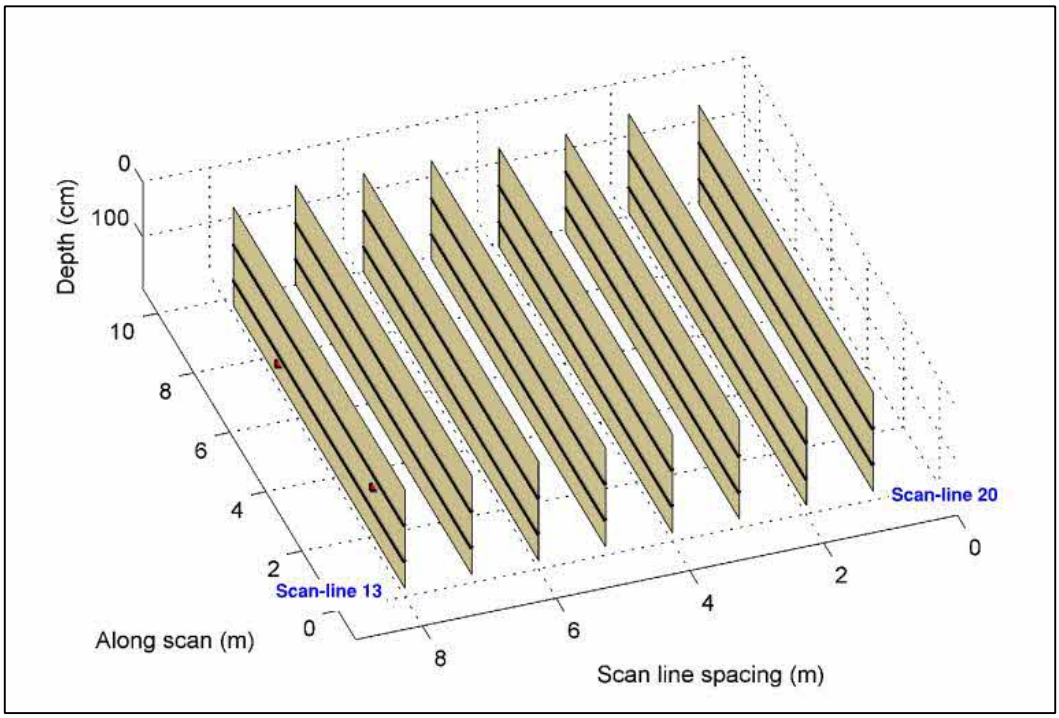
Multi trench view visuals provide for a quick review of findings - for a more precise and detail analysis of root positions please refer to the trench view radargrams in Appendix A5.

Roots to Virtual Trench – Section 1

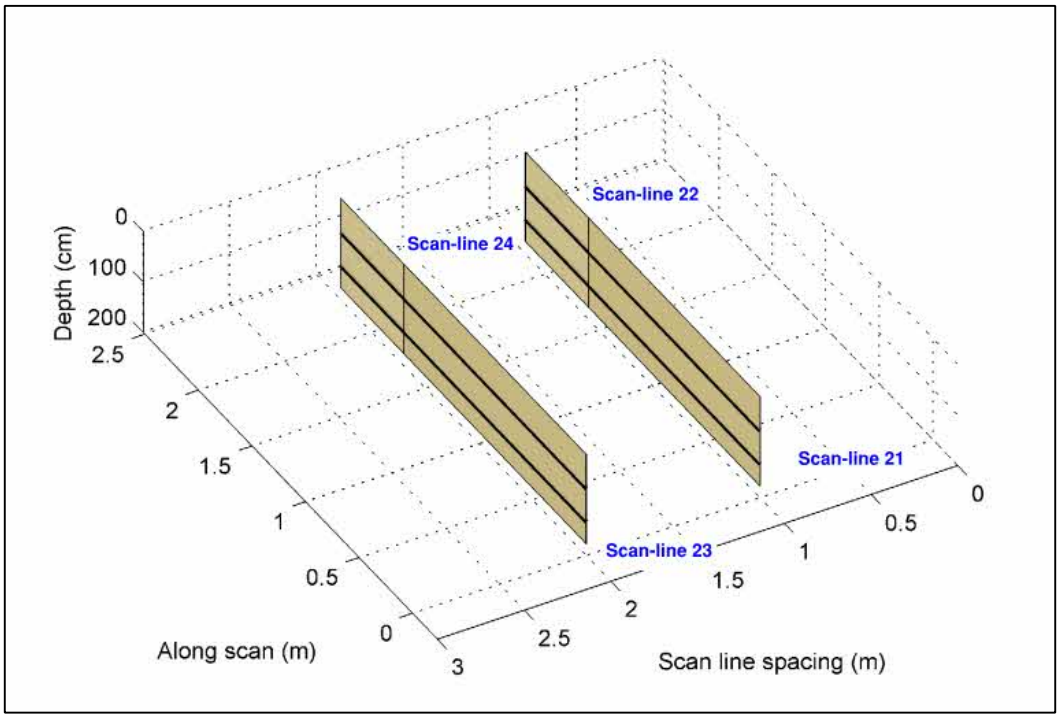


Roots to Virtual Trench – Section 2





Roots to Virtual Trench – Section 3



Appendix A5: Radargrams - 2D Virtual Trenches (Examples)

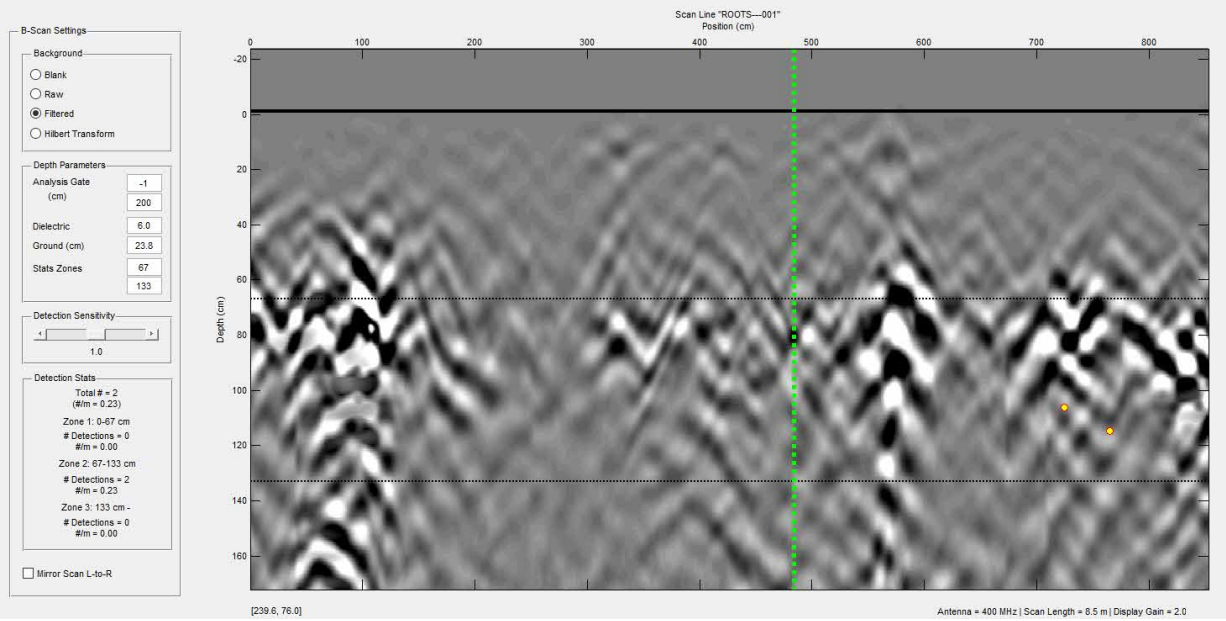
The following visuals show the GPR data outputs following analysis; these are “trench face” radargrams. These provide a detailed, below the scan line scaled spatial view showing the depth and distance of roots in a virtual trench face.

There is a distance scale along the top, and depth scale down the left axis. The horizontal broken lines indicate depths of 100cm and 200cm. The green broken lines are synchronisation markers to tree as indicated in the visuals at Appendix A2.

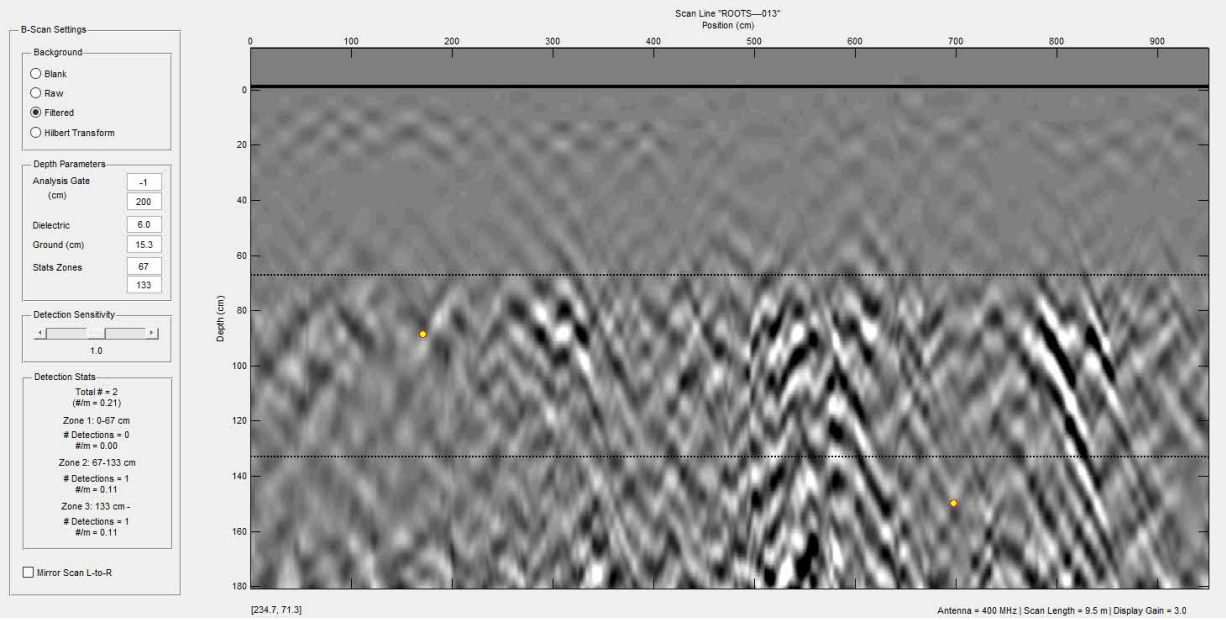
Root densities are shown left of the radargram.

Radargrams provide the most accurate distance/depth to scale in relation to roots below ground.

Scan-line 1


B-Scan Settings
Background
Blank
Raw
Filtered
Hilbert Transform
Depth Parameters
Analysis Gate (cm)
-1
200
Dielectric
6.0
Ground (cm)
23.8
Stats Zones
67
133
Detection Sensitivity
1.0
Detection Stats
Total # = 2
(#/m = 0.23)
Zone 1: 0-67 cm
Detections = 0
#/m = 0.00
Zone 2: 67-133 cm
Detections = 2
#/m = 0.23
Zone 3: 133 cm -
Detections = 0
#/m = 0.00
Mirror Scan L-to-R
Scan Line "ROOTS---001"
Position (cm)
Depth (cm)
[239.6, 76.0]
Antenna = 400 MHz | Scan Length = 8.5 m | Display Gain = 2.0

Scan-line 6


B-Scan Settings
Background
Blank
Raw
Filtered
Hilbert Transform
Depth Parameters
Analysis Gate (cm)
-1
200
Dielectric
6.0
Ground (cm)
15.3
Stats Zones
67
133
Detection Sensitivity
1.0
Detection Stats
Total # = 2
(#/m = 0.21)
Zone 1: 0-67 cm
Detections = 0
#/m = 0.00
Zone 2: 67-133 cm
Detections = 1
#/m = 0.11
Zone 3: 133 cm -
Detections = 1
#/m = 0.11
Mirror Scan L-to-R
Scan Line "ROOTS---013"
Position (cm)
Depth (cm)
[234.7, 71.3]
Antenna = 400 MHz | Scan Length = 9.5 m | Display Gain = 3.0

Appendix A6: Glossary of Common Terms Used

GLOSSARY OF COMMON TERMS USED:

Group/Tree No: Reference number given for individuals and small groups. Letter given for woodlands, shelterbelt, large young group planting and large linear groups.
Species: Common and scientific names given.
Approximate Height: In metres from ground level.
Crown Spread: In metres.
D.B.H: Diameter at Breast Height. Diameter of tree at 1.5m from ground level.
Group of: More than one tree in close proximity, including woodlands, shelterbelts and larger linear plantings.
Group effect: Canopies of trees in close proximity/touching. These trees often have uneven crowns and are more effective as part of a tree group than they would be as a single specimen.
No Visual Defect: No visible outward signs of stress, disease, decay, and no characteristics felt to be unusual of the species.
Increase in Soil Level: Raised ground above original level around the base of the tree.
Trenching/Excavations: Subterranean works potentially causing root severance.
Pruning Wounds: Scars left from previous tree surgery work.
Weak Fork: Stem and branch unions exhibiting potential structural weakness such as a tight V shaped fork and/or included bark.
Multi-Stemmed: More than one main stem.
Apical Die Back: Necrosis of branch tips.
Minor Dead Wood: Small dead twigs and branches within the crown.
Major Dead Wood: Large dead branches and stubs within the crown.
Low Hanging Branches: Branches, which obstruct passage underneath them.
Overall Condition: Condition of the tree assessed from ground level, inspecting for outward signs of stress, disease, and decay on the day of surveying. Physical condition and outward symptoms may change rapidly with climate and season. All trees should be inspected regularly and expect advice sought if damage and/or decline is detected.

Good: Showing excellent health and vigour for its species, age, and site conditions.
Fair: Showing normal vigour and health for its species, age, and site conditions.
Poor: Of low vigour and health but not yet considered dangerous.
Dangerous: Structurally unsound or dead, dying and decayed. Dangerous trees must be felled.
Varied: Varied condition is used for groups of trees where the individuals within the group may have different outward signs of stress, disease and decay but do not warrant individual surveying

Recommendations:

Remove: Take out a tree by felling or dismantling and remove bulk of root system.

Reduce Crown: Reduction of height and/or spread by judicious pruning, cutting back to appropriate live side shoots, retaining shape where possible.

Lift Crown: Raising of lower crowns and creating greater ground clearance either by the removal of whole lower branches, or by the removal of parts of lower branches. A clearance height may be given, as necessary. This operation should be carried out so as not to leave large wounds on tree trunk.

Prune back: Reduce length of branches to clear targets, buildings, lamp columns etc. Branches should be reduced to appropriate growing points.

Clear Services: Reduce length of branches to provide a safe clearance from overhead power cables etc. back to an appropriate growing point (observing all current safety regulations).

Monitor: Trees identified as needing regular observation to ensure condition or consider other actions (time period specified).

<u>GPR Surveys</u>

Antenna: Device used to propagate and receive electromagnetic waves (Radar pulses).

Cross section: Image that results from side-by-side display of several traces which are from adjacent spatial measurement positions.

GPR: Ground Penetrating Radar - a method which uses radar pulses to investigate and image the subsurface.

Hyperbola: Characteristic inverted “U” GPR response from a given target.

Noise: unwanted signals from non-root reflectors.

Non-root reflectors: Observed radar patterns not produced by roots.

Profile disturbance: Changes to the soil properties caused by activities such as excavations, construction, and instillation of services.

Radargram: where reflected radar signals are processed and converted into an 2D image showing the subsurface profile.

Aggregate: any hard, inert, mineral material used for mixing in graduated fragments. It includes sand, gravel, crushed stone, or slag. Materials often used in the creation of concrete or asphalt.

Root densities: measured in roots per meter and described by categories ranging from very low to very high.

Root reflectors: Observed radar patterns produced by roots.

Sapling trees: young trees often newly planted or self-seeded

Scan lines: The collection of lines scanned using GPR. Scan lines can be either parallel lines or circular or semi-circular lines at varying distances from tree trunks.

Service runs: Underground utilities such as: water, gas, electrical power, sewage, and telecommunications.
Spatial view: relationship of entities within a given space.
Subsurface clutter: reflected signals from non-root reflectors.
Subsurface: Material which is not exposed at the surface of the ground
Synchronisation markers: Fixed locational points plotted to provide facility for mapping root locations to scaled plans.
Voids: subsurface features such as basements, tunnels and pipes which create a significant hyperbolic reflection (see Hyperbola).