Appendix G

Arboricultural Survey

Quaife Woodlands AR/3684/rg

Arboricultural Survey and Planning Integration Statement

at

Flat 1 44 Goldhurst Terrace, Camden, London, NW6 3HT

29th May, 2017

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ARBORICULTURAL REPORT

LOCATION	Flat 1, 44 Goldhurst Terrace, Camden, London, NW6 3HT	**REF: AR/3684/rg**
CLIENT	Mr Nir Agam & Ms Ayelet Sperling c/o Kokorelia Architects, 14A Coolhurst Road, London, N8 8EL	**DATE OF REPORT** 29th May, 2017
REPORT PREPARED BY	R. Gawthorpe BSc (Hons) Arb., M.Arbor.A	**DATE OF INSPECTION** 11th May, 2017
SURVEY INSPECTOR(S)	R. Gawthorpe BSc (Hons) Arb., M.Arbor.A	**SHEET No.** 1 of 8

LOCAL AUTHORITY	London Borough of Camden
CONTACT	Arboricultural Officer

Please note that abbreviations introduced in [square brackets] *are used throughout the report.*

INSTRUCTIONS

Issued by – Alexia Kokorelia on behalf of Kokorelia Architects, address as above.

TERMS OF REFERENCE – To survey the subject trees to assess their general condition and to provide a planning integration statement for the proposed development that safeguards the long-term well being of the retained trees in a sustainable manner.

Summary

The property is located on the west side of Goldhurst Terrace and comprises a mid-terraced house. The subject flat (number 1) is at lower ground floor level. The site is relatively flat and access to the rear of the property is through the flat itself. The property has extant planning permission (reference number 2014/722/P) for the erection of a single storey extension at rear lower ground floor level, granted 2nd February 2015.
The proposal is for the construction of basement extension throughout the existing flat and under the approved rear extension at lower ground floor level.
There are five off-site trees and one group of small trees and shrubs growing onsite to the front of the property which are all are to be retained.
Some pruning is required to G6 at the front of property to provide access, but this pruning is minor and will not detract from the character and appearance of the local landscape. Accordingly, the arboricultural landscape impact will be negligible.
The protection of retained trees can be effected in accordance with current standards and guidance, and there are no matters of post development pressure upon retained trees that could not be managed with routine maintenance. The proposal is sustainable in arboricultural terms.

Documents Supplied

- Topographical Survey drawing no. TS16-309B\1 by Terrain Surveys Ltd., dated August 2016
- Existing Layout drawing set AP100-120 by Kokorelia Architects, dated 28/10/2014
- Proposed Basement Plan drawing no. AP200 R00 by Kokorelia Architects, dated February 2015

Scope of Survey

1.1 The survey is concerned with the arboricultural aspects of the site and adjoining land only.

1.2 I am not aware of any Tree Preservation Orders [TPO] affecting the site.

1.3 The site falls within South Hampstead Conservation Area [CA], designated 1/8/1988.

1.4 Discussions took place between the surveyor and the property owner.

1.5 The trees were inspected on the basis of the Visual Tree Assessment method expounded by Mattheck and Breloer (The body language of trees, DoE booklet Research for Amenity Trees No. 4, 1994).

1.6 The survey was undertaken in accordance with British Standard 5837:2012 Trees in relation to design, demolition and construction – Recommendations [BS5837].

1.7 This report sets out the Root Protection Area [RPA], described by the RPA radius [RPR] derived from Section 4.6 of BS5837.

1.8 Pruning works will be required to be in accordance with British Standard 3998:2010 Tree work - Recommendations [BS3998].

1.9 Underground services near to trees will need to be installed in accordance with the guidance given in BS5837 together with the National Joint Utilities Group Publication Volume 4 'Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees', August 2007 [NJUG 4].

1.10 This report does not cover the arrangements that may be required in connection with the laying or removal of underground services.

1.11 This report does not set out the working specifications of tree protection measures and engineering and design features, but provides enough detail in principle to demonstrate the feasibility of the scheme.

Survey Method

2.1 The survey was conducted from ground level with the aid of binoculars.

2.2 No tissue samples were taken nor was any internal investigation of the subject trees undertaken.

2.3 No soil samples were taken.

2.4 The height of each subject tree was estimated with a laser clinometer.

2.5 The stem diameters [SD] were measured in millimetres at 1.5 metres above ground level and otherwise in accordance with Annex C of BS5837.

2.6 The crown diameters were estimated using a laser rangefinder or visually where access was difficult.

2.7 The positions of the subject trees are plotted at Appendix B derived from the supplied topographical survey plan. Please note that the attached plan is for indicative purposes only.

Bat Informative

3.1 In February 2016 I received appropriate training in accordance with British Standard 8596:2015 Surveying for bats in trees and woodland [BS8596] and whilst I am not a licensed bat handler and do not regard my knowledge of bats as being equivalent to an ecology professional, I am very familiar with the observational requirements and cognisant of BS8596, and more particularly the introduction – Micro guide to surveying for bats in trees and woodland, issued in respect of non-professional ecologists.

3.2 Bats are protected under the Wildlife & Countryside Act 1981 and subsequent legislation and The Conservation of Habitats and Species Regulations 2010 and it is an offence to deliberately or recklessly disturb them or damage their roosts. Trees should be inspected before any works commence and if the presence of bats is suspected advice will need to be sought from the Natural England Bat Line on 0845 1300228. Further advice on bats is available from The Bat Conservation Trust (020 7627 2629).

3.3 I carried out a scoping survey of the subject trees and in my estimation there are none with high potential bat roost features [PRFs]. The recommended pruning work to G6 will be carried out by competent arborists who will be aware of bat legislation, although they will be advised of my scoping survey observations.

The Site

4.1 The property is located on the west side of Goldhurst Terrace and comprises a mid-terraced house. The subject flat (number 1) is at lower ground floor level. The north and south boundaries meet residential properties along Goldhurst Terrace and the west boundary meets a triangular plot of land fairly treed with predominately broadleaved trees. The east boundary fronts Goldhurst Terrace itself.

4.2 The site is relatively flat and access to the rear of the property is through the subject flat itself.

4.3 The property has extant planning permission (reference number 2014/722/P) granted on the 2nd February 2015, for the erection of a single storey extension at rear lower ground floor level.

4.4 With reference to the British Geological Survey Geology of Britain Viewer, the soil parent material is London Clay which comprises clay, with some sand and silt. Clay is a shrinkable soil susceptible to compaction which is harmful to tree roots, however, generally this soil type is good for tree root growth and one would expect a normal root distribution where not impeded by the site characteristics and subterranean obstructions.

4.5 I am not an expert on soils and although I have some working knowledge of them, if accurate soil analysis is required then a soil specialist should be contacted.

Subject Trees

5.1 There are five subject trees which are growing off site and one shrub group growing to the front of the property, as listed at Appendix A and plotted at Appendix B.

5.2 Overall the subject trees are in a reasonable condition, although I did not have access to the stem bases and therefore all stem diameter measurements are estimated and their structural condition is based on those parts visible to me from within the rear garden of the subject property.

5.3 I have summarised the subject trees and group of small trees and shrubs in Table 1 below and have graded them in accordance with BS5837[1].

Table 1. Subject Trees – species and grades

Species	A	B	C	U	Totals
Silver birch	-	1	-	-	1
Sycamore	-	2	2	-	4
Shrub Group	-	-	1G	-	1G
Totals	**0**	**3**	**2 & 1xG**	**0**	**5 & 1xG**

The Proposal

6.1 The proposal is for the construction of basement extension throughout the existing flat and under the approved rear extension at lower ground floor level.

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[1] BS5837 Tree Category Classes

U – Existing condition is such that any existing value would be lost within 10 years and should therefore be removed for reasons of sound arboricultural management.

A – High quality and value (40 + yrs).
1) Mainly arboricultural values 2) Mainly landscape values 3) Mainly Cultural values including conservation.

B - Of moderate quality and value (20+ years).
1) Mainly arboricultural values 2) Mainly landscape values 3) Mainly Cultural values including conservation.

C – Those of low quality and value (10+ years).
Whilst C category trees will usually not be retained where they would impose a significant constraint on development, young trees with a SD of less than 15cm could be considered for relocation.

6.2 The proposal is set out at Appendix C.

Arboricultural Landscape Integration

7.1 As noted at 5.1 above, the five subject trees are growing off site and are all to be retained.

7.2 Pruning is required to group G6 growing to the front of the subject property to allow access through the flat. The crown should be pruned back in line with the access path providing sufficient clearance. I do not anticipate any work that would be visually discernible or that would cause any physiological harm.

7.3 In summary, the proposed pruning will not have any significant detrimental visual impact upon the character and appearance of the area and the arboricultural landscape impact will be negligible.

Post Development Pressure

8.1 The concept of post development pressure is not that routine maintenance work to maintain clearances and the proportionality of trees is unacceptable. The term should more accurately be one of irresistible post development pressure where the spatial or physical relationship of a retained tree to a structure or feature demands pruning or removal that is inappropriate, but to which the local planning authority could not reasonably refuse consent.

8.2 Due regard has been given to shading and dominance and as the proposed is at basement level and beneath the approved rear extension, there will be very little change to the existing and approved situation.

8.3 In consideration of these matters, there will be no appreciable post development pressure, and certainly none that would oblige the Council to give consent to inappropriate tree works.

Tree Protection Measures

9.1 The BS5837 gives a Root Protection Area [RPA] for each retained tree by reference to Section 4.6 in the BS. The RPA is an estimation of the area of the root system that would need to be retained to sustain the condition of the tree if all the other roots outside it were to be severed. The RPA represents a smaller proportion, (on average only a third), of a tree's root system and consequently whilst the RPA is particularly important to ensure that there are no adverse effects upon stability, if an encroachment does not reduce the overall assimilative function of the root system significantly it is unlikely to cause harm. However, as with any factor relating to trees each individual situation must be justified in site-specific terms.

9.2 The RPA is usually described as a circle with a radius (Root Protection Area Radius [RPR]) of the prescribed distance within which no unspecified activity should occur, though the shape and position of the RPA can be modified by an arboriculturist to meet individual site conditions according to the probable distribution of the tree roots. Intrusion into the RPA can take place only where the ground is adequately protected in accordance with the requirements of Section 6.2.3 of BS5837 or where work is carried out to an agreed design and working method.

9.3 Quaife Woodlands uses a tabular method to derive rounded-up RPA radii in half-metre graduations (Appendix D).

9.4 **RPA Encroachment** There are no encroachments from the proposed basement into the RPAs of any of the retained trees.

9.5 **Tree Protection Fencing** The combined zones of RPAs form the Construction Exclusion Zone [CEZ] and will be protected by a Tree Protection Fence [TPF] comprising steel mesh panels of 1.8 metres in height ('Heras'). These panels can be mounted on a scaffolding frame as shown at Figure 2 of BS5837 (Appendix E).

9.6 The TPF is to be erected before any work commences on site in the location shown by the dashed blue lines at Appendix C.

9.7 **Ground Protection** The CEZ can be safely protected using TPF, as discussed above, and no additional ground protection is required.

9.8 Should additional space within the rear garden be required for the storage of materials and machinery then the TPF can be set back and the area within the RPAs protected in accordance with Section 6.2.3 of BS5837 as shown at Appendix F.

9.9 **New Surfacing** There are no areas of proposed new surfacing within the RPAs of the retained trees growing close to the rear of the property. The existing surfacing within the RPAs of G6 will be retained *in situ* during the proposed construction works to protect the underlying RPAs, and resurfaced post construction if required, using the existing sub-base.

9.10 **General Matters** The surface water run-off and soil drainage have not been studied. However, due to the site topography and soil type, I do not foresee any detrimental effects to trees in hydrological terms as a result of this development.

9.11 I have not been advised of the underground service routes, but it seems logical to suppose that they will connect to existing service runs, or if new routes are to be installed they can avoid the RPA of those trees to be retained. Clearly if any underground service routes should need to enter RPAs, the provisions of BS5837 and NJUG 4 should be employed and if necessary, further arboricultural advice sought.

9.12 Where existing or proposed drains pass within the root system of a tree (not just the RPA), technical advice must be sought to assess the root-tightness of joints. Modern compression joints do not reliably prevent root ingress and it may be necessary to upgrade them.

9.13 The hard landscaping operations are part of the construction works and will be planned and carried out within the construction phase tree protection measures.

9.14 The protection of trees will also include recognition of other types of potentially damaging activities, such as the storage of materials (and other substances likely to be toxic to plants), parking, site-building requirements, and the use and parking of plant. Particular care and planning is necessary to accommodate the operational arcs of excavation and lifting machinery, including their loads, especially large building components such as beams and roof trusses. Operations like these have the potential to cause incidental damage and logistical planning is essential to avoid conflicts.

Conclusions

10.1 Of the five off-site subject trees and the onsite group all are to be retained and protected in accordance with current standards and guidance.

10.2 Some pruning is required to G6 to provide sufficient clearance for access through the subject property. This pruning will not be visually discernible from without the site nor will it cause the trees/shrubs any physiological harm.

10.3 The retained trees do not cause any significant conflicts in terms of construction activities, nor will any significant issues of post development pressure be likely to emerge that could not be managed with routine maintenance.

10.4 For trees to be sustainable within a development proposal they must be compatible with their surroundings, not just in terms of long-term spatial relationship but also in respect of minimising any potential conflicts to matters of routine maintenance. This proposal achieves this objective.

10.5 I have taken account of the information given to me and my own observations on site and I am satisfied that this scheme is arboriculturally sound and that the long-term well-being of the retained trees will be safeguarded in a sustainable manner.

Recommendations

11.1 The successful integration of the proposal with retained trees will need to take account of the following points:

i) Plan of underground service routes.
ii) Implementation of the tree protection measures and methods set out in this Report.
iii) Site logistics plan to include storage, plant parking/stationing, materials handling.
iv) Site supervision – Following an induction meeting conducted by the project arboriculturist with all those involved in attendance, an individual, e.g. the Site Agent, will be nominated to be responsible for all arboricultural matters on site. This person must:

a) be present on site for the majority of the time,
b) be aware of the arboricultural responsibilities,
c) have the authority to stop any work that is causing, or has the potential to cause harm to any tree,
d) be responsible for ensuring that <u>all</u> site operatives are aware of their responsibilities toward the retained tree and the consequences of any failure to observe those responsibilities,
e) make immediate contact with the local authority and/or the project arboriculturist in the event of any tree related problems occurring, whether actual or potential.

11.2 As a matter of course these points will be resolved in consultation with and subject to the approval of the planning authority through their Arboricultural Officer.

11.3 The sequence of works should be as follows:

i) tree pruning
ii) installation of TPF
iii) installation of underground services
iv) main construction phase
v) removal of TPF
vi) soft landscaping

KEY

Pre: Prefix: **T** = Tree **G** = Group **H** = Hedge

No Tree reference number.

Ht Tree Height in metres.

SD Stem diameter in millimetres at 1.5 metres above ground level or otherwise in accordance with Annex C of BS5837.

***** Estimated. **m** Multi-stemmed.

CrS Branch spread in metres to the four compass points (N-E-S-W) or **CrØ** Average crown diameter in metres or to compass points.

CrC Height in metres of crown clearance above adjacent ground level.

CrB Height in metres to first live branch above adjacent ground level.

AC Age Class **Y** – Young. **S** – Semi-mature. **M** – Mature. **O** – Over-mature. **V** – Veteran.

PC Physiological Condition **G** – Good **F** – Fair **P** – Poor **D** – Dead

SC Structural Condition **G** – Good **F** – Fair **P** – Poor **D** – Dead

BS Category grading

U – Existing condition is such that any existing value would be lost within 10 years and should therefore be removed for reasons of sound arboricultural management.

A – High quality and value (40 + yrs).
1) Mainly arboricultural values 2) Mainly landscape values 3) Mainly cultural values incl. conservation.

B - Moderate quality and value (20+ years).
1) Mainly arboricultural values 2) Mainly landscape values 3) Mainly cultural values incl. conservation.

C – Low quality and value (10+ years).
Whilst C category trees will usually not be retained where they would impose a significant constraint on development, young trees with a SD of less than 15cm should be considered for relocation.

Rad Root Protection Radius in metres.

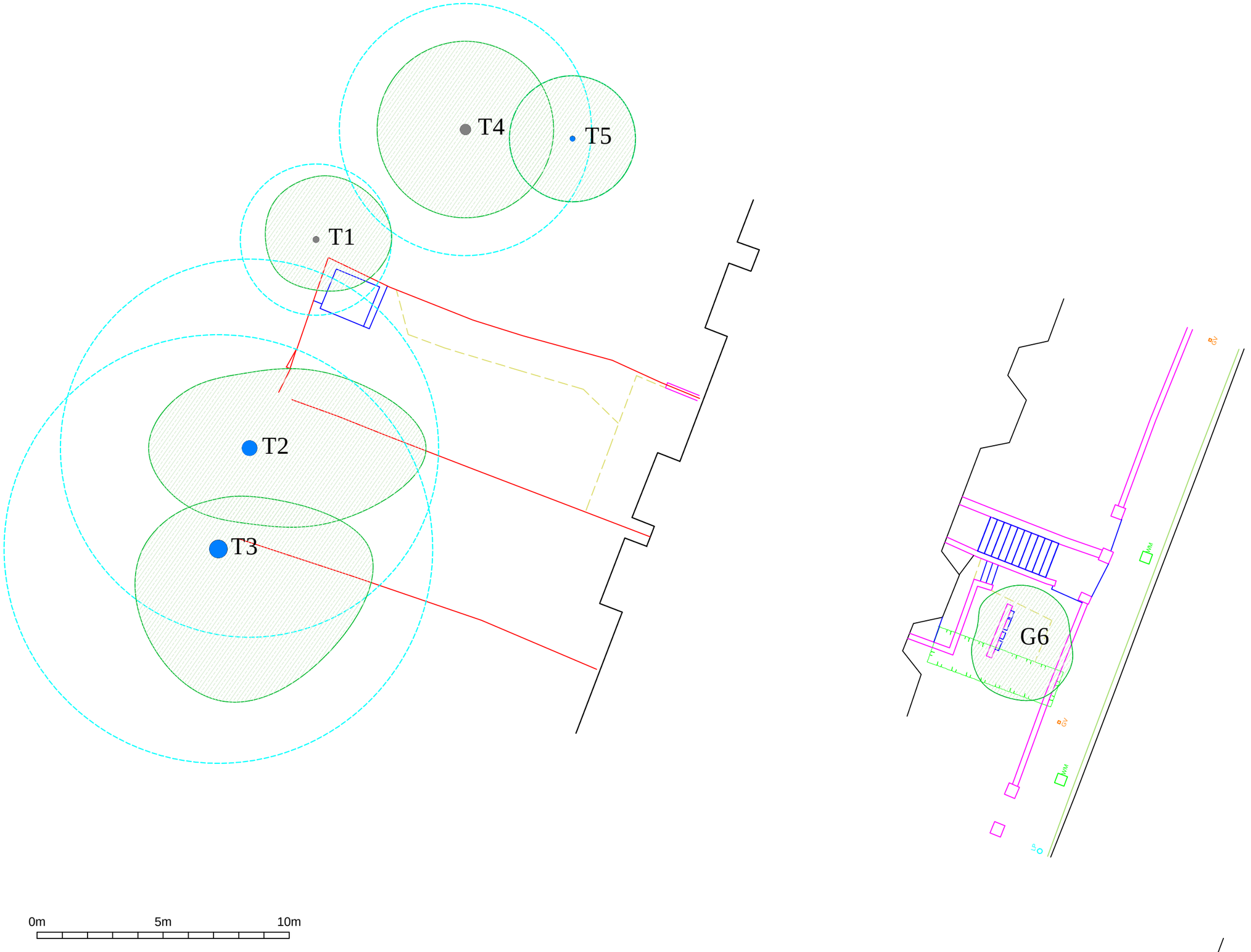
RPA Root Protection Area in square metres.

Bat RP at Roost Potential **L**- Low **M** – Moderate **H** – High

Appendix A

Pre	No	Species	Ht	SD	CrS	CrC	AC	PC	SC	Bat RP	BS	Rad	RPA	Observations
T	1	Sycamore	12m	*150mm *170mm	N2.5m E3m S2m W2m	7m	S	G	F	L	C (1)	3.0m	28m²	Off-site tree; multi-stemmed with one dead stem; ivy cut at base; high crown due to ivy suppression.
T	2	Sycamore	15m	*300mm *300mm *400mm	N3m E7m S3m W4m	3.5m	M	G	G	L	B (1)	7.5m	177m²	Off-site tree; multi-stemmed; ivy covered.
T	3	Sycamore	15m	*300mm *350mm *350mm *370mm	N2m E6m S6m W3m	1m	M	G	G	L	B (1)	8.5m	227m²	Off-site tree; multi-stemmed.
T	4	Sycamore	10m	*400mm	3.5m	2m	M	G	F	L	C (1)	5.0m	79m²	Off-site tree; heavily covered in ivy and unable to view trunk; appears crown reduced but ivy obscuring view of upper crown.
T	5	Silver birch	16m	*180mm	2.5m	2.5m	S	G	G	L	B (1)	2.5m	20m²	Off-site tree.
G	6	Cherry laurel & Mahonia	4m								C (1)			Small shrub group to front of property; crown overhangs access path.

Appendix B



KEY

T1 Tree Stem & Reference No

Root Protection Area (RPA)

BS5837 Tree Categories

- U Tree should be removed
- A Tree is highly desirable for retention
- B Tree is desirable for retention
- C Tree of no merit, could be retained

DO NOT SCALE FROM DRAWING

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TITLE: Appendix B
Site Plan - Existing Layout with Root Protection Areas

SITE: 44 Goldhurst Terrace, Camden, London, NW6 3HT

DWG NO: AR/3684/rg

REV:

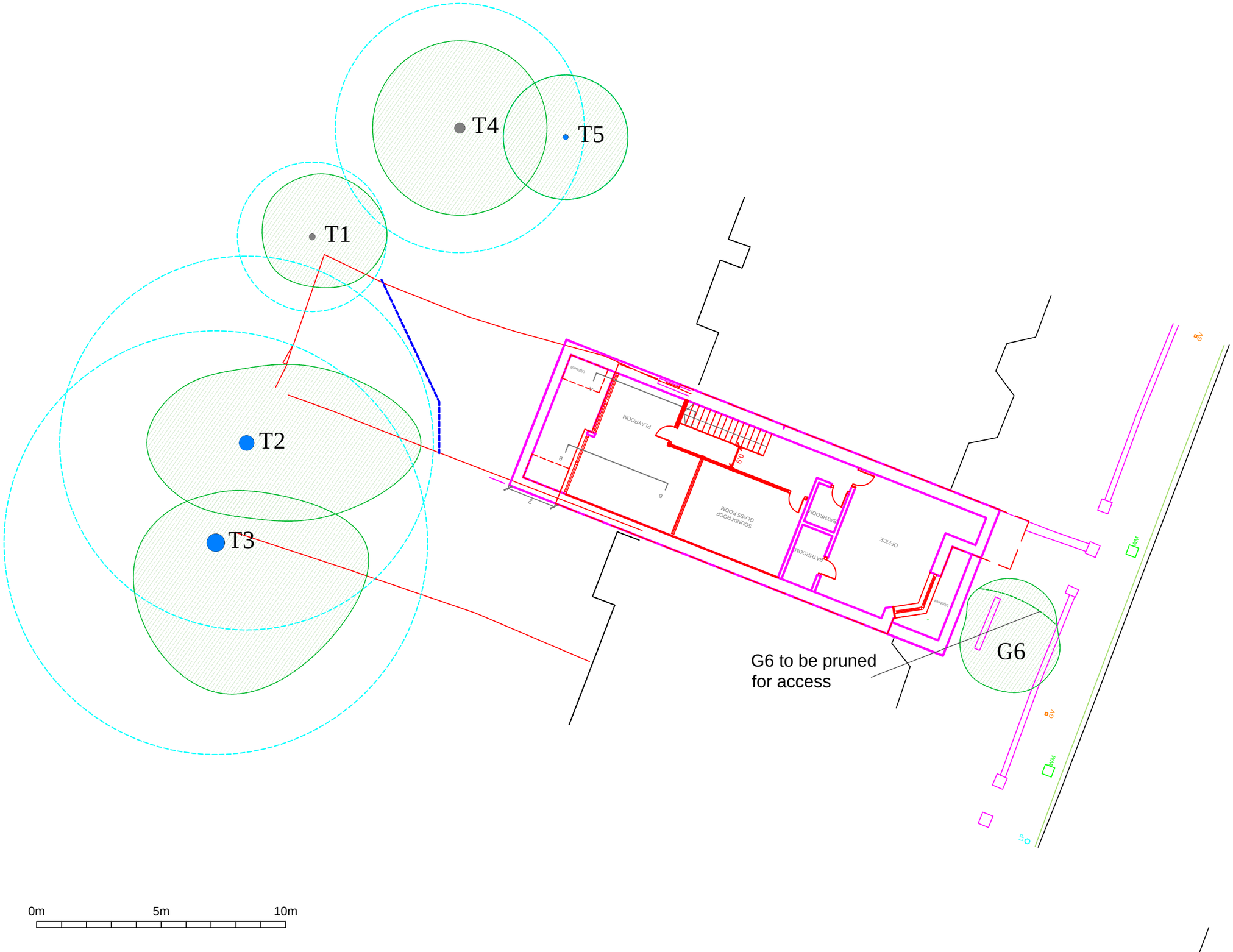
SCALE: 1:150

PAPER: A3

DATE: 26/05/17

DRAWN: RG

Appendix C



KEY

T1 Tree Stem & Reference No

Root Protection Area (RPA)

Tree Protective Fence (TPF)

BS5837 Tree Categories

- U Tree should be removed
- A Tree is highly desirable for retention
- B Tree is desirable for retention
- C Tree of no merit, could be retained

DO NOT SCALE FROM DRAWING

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TITLE: Appendix C
Site Plan - Proposed Layout with Tree Protection Measures

SITE: 44 Goldhurst Terrace, Camden, London, NW6 3HT

DWG NO: AR/3684/rg

REV:

SCALE: 1:150

PAPER: A3

DATE: 29/05/17

DRAWN: RG

Appendix D

BS5837:2012 (Paragraph 4.6.1)
Root Protection Area radii in ½ metre graduations

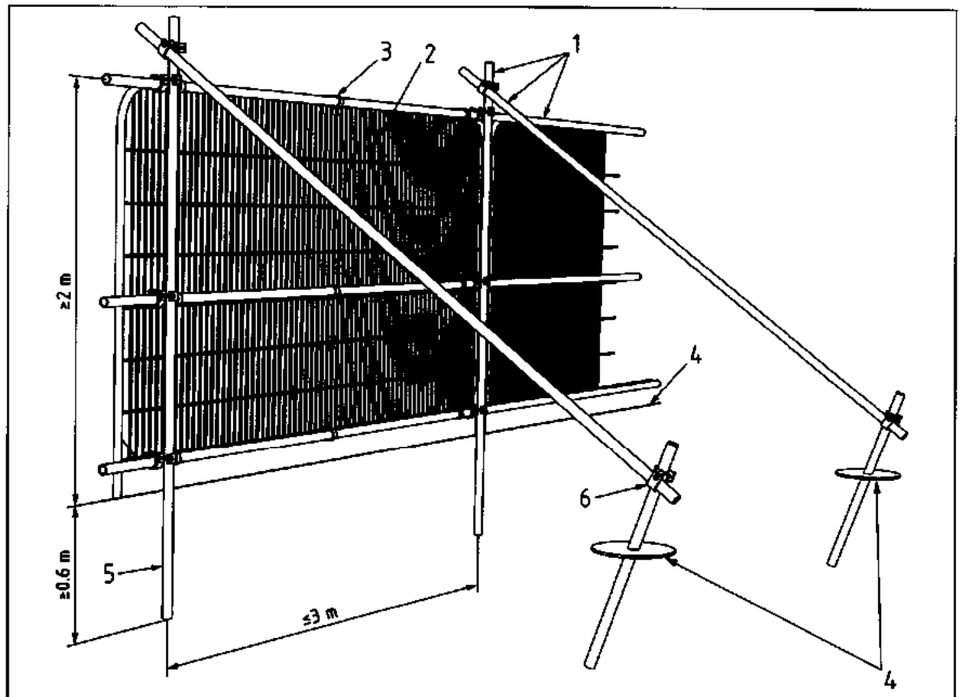
The ½ metre graduations of RPA radii have been calculated back to produce diameter dimensions, which in turn have been rounded down to the nearest centimetre. If the BS5837 multiplier factor is plotted on a graph it produces a straight gradient and if the ½ metre steps are plotted they are all above that line, thus ensuring that the RPA radii err on the generous side.

Single Stem up to diameter (mm)	*RPA Radius (m)*	*RPA (m^2)*
1250	15.0	707
1210	14.5	660
1170	14.0	616
1120	13.5	573
1080	13.0	531
1040	12.5	491
1000	12.0	452
960	11.5	416
920	11.0	380
870	10.5	346
830	10.0	314
790	9.5	284
750	9.0	255
710	8.5	227
670	8.0	201
620	7.5	177
580	7.0	154
540	6.5	133
500	6.0	113
460	5.5	95
420	5.0	79
370	4.5	64
330	4.0	50
290	3.5	38
250	3.0	28
210	2.5	20
160	2.0	13

Appendix E

Extract from British Standard 5837: 2012
Trees in relation to design, demolition and construction - Recommendations

Figure 2. **Default specification for Tree Protection Barrier**
Indicated framework support as the usual method of support for steel mesh panels ('Heras'). Some variation can be employed if appropriate, such as support by wooden posts (75mm x 75mm x 2.75m) dug or concreted into the ground (dry mix concrete contained within a plastic bag), or if there is no pressure of access a lighter form of netting on driven stakes.



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

Appendix F

Extract from British Standard 5837: 2012 Trees in relation to design, demolition and construction - Recommendations

Ground Protection

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.

Scaffolding

Where scaffolding is to be erected within an RPA of a retained tree, it may be necessary to place the feet directly onto the ground to achieve a stable working structure.
The collective footprint of the scaffolding footings on the soil will represent a minor proportion of the RPA and will not be a significant factor in terms of ground compaction.