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TREE SURVEY AND ARBORICULTURAL ASSESSMENT REPORT

36 Heath Drive, London, NW3 7SD

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A report to accompany a Planning Application for development at 36 Heath Drive, London, NW2 7SD

Institute of Chartered Foresters
Registered Consultant

Contents

1. Introduction

1.1. Martin Dobson Associates were invited to produce a tree survey for 36 Heath Drive, NW3 3SD as part of a submission to the Local Authority seeking planning permission for building development at this site. The survey should anticipate potential conflicts that the proposed development might present to existing/remaining trees, following the code of practice contained in BS5837:2012.

1.2. A site visit was conducted by Dr A J Moffat of A J Moffat & Associates, on behalf of Martin Dobson Associates, on the 5th July 2013, by agreement with the owners of the property.

1.3. The British Standard 5837: 2012 *Trees in relation to design, demolition and construction – Recommendations* provides a framework for considering trees in the planning process. It gives guidance on categorising the qualities of trees in order to enable decisions to be made as to which trees are appropriate for retention within a development. It then advises on options for protecting trees to be retained during the development (at all stages including demolition, construction and hard landscaping), and the means of incorporating trees into the developed landscape.

1.4. Nineteen trees were surveyed. Thirteen of these were considered of low value (category C) and six were considered of moderate value (category B).

1.5. Since 2013, plans for development have been revised. This report takes these revisions into account in its recommendations for tree protection.

1.6. It is proposed that two C grade trees will require removal in order to facilitate the proposed development. The retained trees will be protected during development. Details of tree protection are contained in this report.

2. Tree Survey

2.1 On 5th July 2013, Dr Andy Moffat, acting for Martin Dobson Associates Ltd, carried out a survey of trees pertinent to the proposed development. The survey was carried out in line with British Standard 5837: 2012 *Trees in relation to design, demolition and construction - Recommendations*. Appended at **AM1** is a copy of the tree survey schedule which lists eleven individual trees. Details of tree dimensions and condition are also given. The explanation of abbreviations used in the schedule is given at the end of the table.

2.2 The site survey drawing appended at **AM2** shows the positions of the trees surveyed and gives a reasonable indication of their comparative branch spreads. The drawing has been colour coded as follows

A trees (high quality and value, minimum 40 years useful life) LIGHT GREEN

B trees (moderate quality and value, minimum 20 years useful life) MID BLUE

C trees (low quality and value, minimum 10 years useful life) GREY

2.3 It should be understood that no individual safety inspection has been carried out on any tree. Similarly, any suggestions for tree work should not be taken as a specification for tree works.

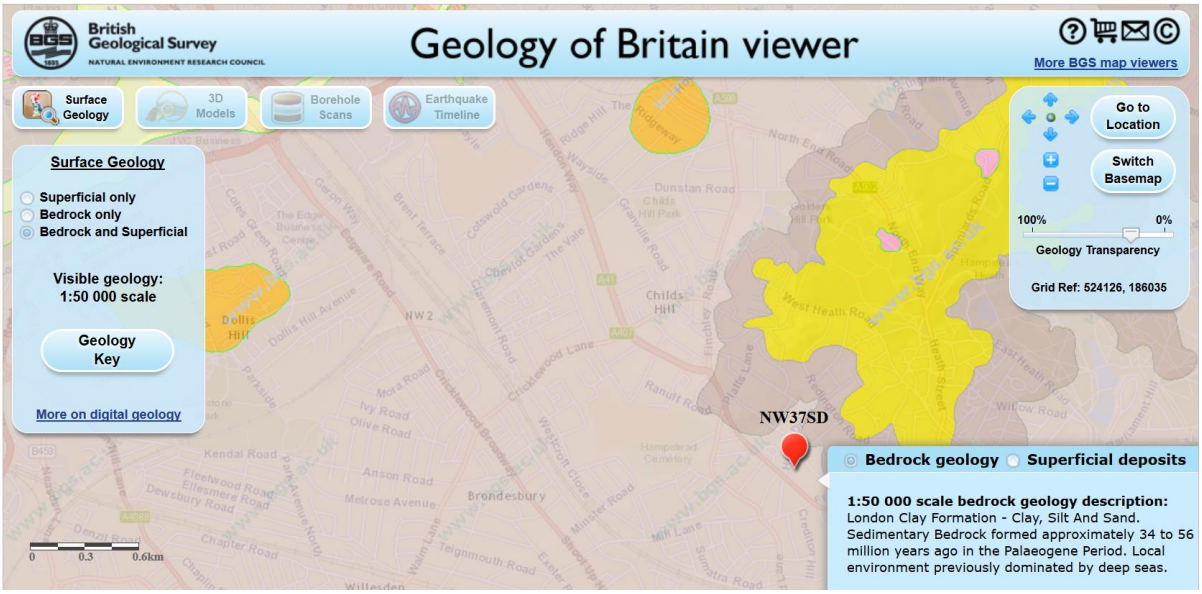
2.4 Adequate protection, both above and below ground, is essential for trees that are to be retained as part of a development. The British Standard BS5837: 2012 *Trees in relation to design, demolition and construction - Recommendations* advises that there should be a root protection area (RPA) around trees which is kept free of construction activities by means of a construction exclusion zone (CEZ) enforced by protective fencing and/or ground protection. The RPA is calculated as the area equivalent to a circle with a radius of 12 times the trunk diameter at a height of 1.5 m above ground level. Based on the tree survey data root protection areas (and radial distances from the trunk to be protected) have been calculated and these are shown as circles around the trees on the tree constraints plan at **AM2** and are tabulated at **AM3**.

3. Soil assessment

3.1 BS5837: 2012 advises that soil properties should be considered as part of a tree survey report. This is necessary because trees can cause damage to structures founded on soils that shrink and swell with changes in moisture content (principally clays). Such movement is exacerbated by the influence of trees and therefore if a shrinkable soil is suspected, foundations should be deigned to extend below the likely zone of seasonal moisture change.

3.2 The British Geological Survey 1: 50,000 scale map indicates that the underlying 'solid' geology of the site is shrinkable London Clay (Figure 1). Hence, construction design should consider the effect of trees on the shrink-swell behaviour of the soil as it is likely to be significant. Site specific soil investigations may need to be undertaken to establish the precise nature of the soil. If clay is confirmed then foundations should be designed with reference to the National House Building Council's Standards Chapter 4.2 *Building near trees*.

Figure 1. British Geological Survey 1: 50,000 scale showing that the site is underlain by the London Clay Formation.



4. Arboricultural Impact Assessment

4.1. The property is a prestigious and substantial town house in a sought after area of north-west London.

4.2. The rear garden is laid down to lawn with shrub borders and mature ornamental shrubs and generally small trees forming the borders of the property. Nine trees and large woody shrubs form the south-eastern boundary of the rear garden. These consist of T1, a Viburnum, T2, T5 and T7 Laurels, T3, a Holly, T4, T6, T8 and T9 poplars. All were considered in good condition but otherwise unexceptional specimens and thus identified as of low (C category) value. T10, a Cypress of moderate (B category) value, occurs close to the property boundary in the rear garden of 37 Heath Drive.

4.3. The garden is fenced to a height of 2.4 metres along the western boundary, and is screened to the east by a brick wall and high Leylandii hedge. T11, a small birch is located at its southern limit. Trees T12 and T13 are good looking specimens of Cypress and Willow respectively and considered of moderate value (B category). None of the trees in the rear garden are visible from the road to the front of the garden and they thus are of limited amenity value.

4.4. Two large redwoods (T14, T15) within the boundary of 35 Heath Drive occur in close proximity to the planned new development in the north-east corner of 36 Heath Drive. These are considered of moderate value (B category).

4.5. The front garden consists of a set of two walled raised beds adjoining the property on either side of the main entrance with mature ornamental shrubs, together with a walled raised bed containing three reduced Lawson's Cypress trees (T16, T17, T18) at the entrance to the property boundary, and another walled bed with a large Bay tree (T19) at its western extent. The remainder of the property space in front of the house consists of driveway covered by tarmac.

4.6. In summary, none of the trees within the boundary of 36 Heath Drive are considered to be of high value in their own right - most trees are of low quality and have little or no especial redeeming features. The pollarded trees (T4, T6, T8, T9, T16, T17 and T18) are not particularly attractive specimens, but they provide screening and cannot reasonably be considered unsuitable for retention.

4.7. The proposal involves extending the footprint of the building to cover a relatively small area of the existing rear garden, and to install a basement extending across this footprint area. The principal issue with this proposal is to ensure protection of the RPAs of trees in the rear garden through the provision of protective fencing. This will also help in the protection of above-ground components of the trees.

4.8. Trees T10, T14, T15 and T19 are situated outside the property boundary. Tree T10 is of small comparative size and its RPA is well away from the proposed development. Trees T14 and T15 are closest to the development but it is judged that their root systems will already be restricted from extending into rear garden of 36 Heath Drive by virtue of the brick wall (and its footings) located along the site boundary. Nevertheless, ground protection will be employed in the zone where roots might be located in order to reduce the risk of damage. Tree T19 is located in a raised bed, but undoubtedly has some of its root zone below driveway and pavement areas in and outside the site boundary of 36 Heath Drive. These areas will be unaffected by the proposed development.

4.9. Trees T16, T17, T18 and T19 are situated in, or adjoining the front garden, in brick walled raised beds. Although the root protection zones for these trees extend beyond the perimeter of these walled beds, it is considered that the walls should help to provide protection to both above and below ground components of these trees. Protective fencing will be erected to increase their protection. Their roots probably extend under the tarmac drive which will also serve to protect them from damage.

5. Tree protection plan

5.1. Trees can very easily be damaged during construction activities through their branches being broken by construction traffic passing close to the canopy or by root severance during the digging of foundation or service trenches. The majority of roots are to be found in the upper 600 mm of soil and so even relatively shallow trenches can sever the majority of roots growing across the direction of the trench. Similarly, the diameter of tree roots tapers sharply within a few metres of the trunk of a tree, so that what might seem to an uninitiated site worker to be an insignificant root (perhaps only a couple of centimetres in diameter) may actually be highly important.

5.2. Tree roots can also be damaged indirectly, often inadvertently, through soil compaction, which disrupts soil structure and can lead to root death through the development of anaerobic soil conditions. Spillage of toxic materials (e.g. oil or diesel) can also result in root damage and ultimately the death of a tree. The establishment of trees planted as part of the proposed development is also dependent upon the prevention of soil compaction.

5.3. The Tree Protection Plan (**AM4/AM5**) has been produced according to the principles in BS5837:2012.

5.4. The Plans identify the intention to retain all but two (T1, T2) of the substantive trees identified in the tree survey. Hence the main issue regarding the development is associated with how excavation and construction materials, machinery and ancillary works (e.g. temporary buildings) interact with above and below ground parts of the trees to be retained.

Protective fencing

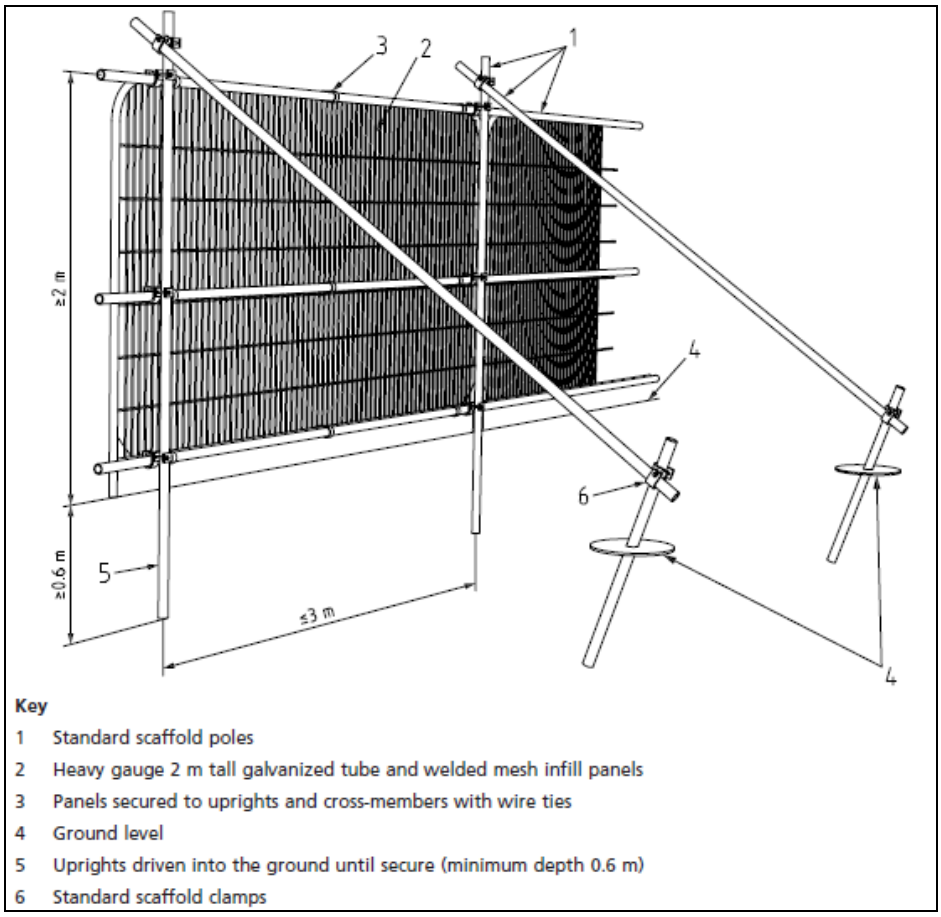
5.5. Given the close proximity of the trees in the rear garden and their intimate association with the other features, protective fencing should be erected following the position marked in **AM4/AM5**.

5.6. Tree and soil protection will comprise of 2 m tall Heras-type fencing before materials are delivered to site or construction commences. The fencing will consist of a scaffold framework, well braced to resist impacts, with vertical tubes spaced at a maximum interval of 3 m (Figure 2). Onto this, weld mesh panels or 2 m high shuttering board will be securely fixed with wire or scaffold clamps. Weld mesh panels alone on unsecured rubber or concrete feet will not be used as these are not resistant to impact and are too easily removed by site operatives.

5.7. High visibility all weather notices will be securely attached to the barrier around each protection zone with wording as shown in Figure 3. Where long lengths of barrier are erected a sign will be attached at intervals of no less than 6 m.

5.8. Fencing and ground protection will not be removed under any circumstances during construction unless with the express approval of the local authority. If in any doubt the site manager must contact the project arboricultural consultant (see section 5.14).

Figure 2. Diagram to illustrate design of protective fencing.



Key

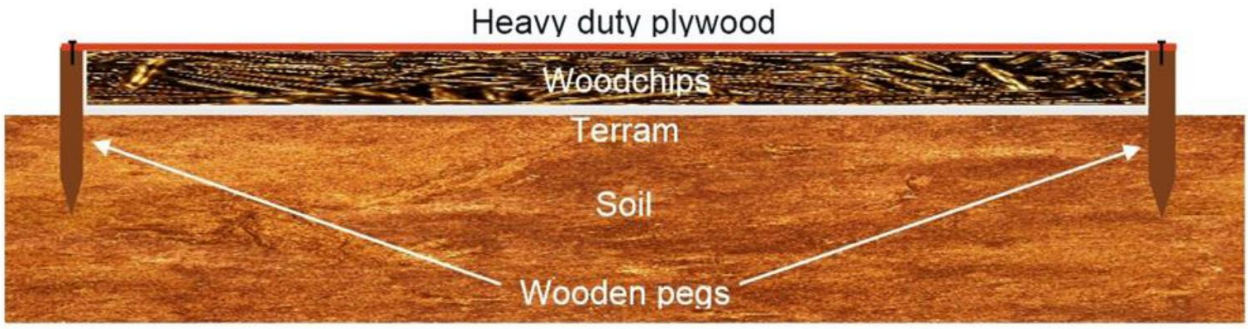
1 Standard scaffold poles
2 Heavy gauge 2 m tall galvanized tube and welded mesh infill panels
3 Panels secured to uprights and cross-members with wire ties
4 Ground level
5 Uprights driven into the ground until secure (minimum depth 0.6 m)
6 Standard scaffold clamps

Figure 3. Wording to be included in high visibility all-weather sign attached to protective fencing.

Ground protection measures

5.9 In order to allow access for construction in other parts of the site, it is proposed that part of the RPA of trees T14 and T15 will be protected by ground protection as a precautionary measure in case roots from these trees are present within the rear garden of 36 Heath Drive. This area, shown as a green tone on the tree protection plan (**AM4/AM5**), will be covered by heavy duty plywood boards laid over a 100 mm thickness of a compressible material such as woodchips laid onto a geotextile such as Terram (Figure 4). Once laid the plywood sheeting will be secured in place by wooden battens screwed into adjacent sheets. Other sections of tree RPAs not protected by fencing or ground protection are located under existing hardstanding which will remain during and after development (shown as blue tone in **AM4/AM5**).

Figure 4. Specification for ground protection.



Services

5.10 New services and drainage runs will be installed outside root protection areas identified on **AM4/AM5**.

Burning of waste

5.11 No fires will be lit on site within 3 m of root protection areas due to the danger of scorching of leaves and branches of overhanging trees.

Space for machinery and storage of materials

5.12 All machinery required on site will operate outside of root protection areas or from the ground protection. Materials to be used for construction of the proposed extension must not be stored within the fenced off area or on the ground protection zone identified on **AM4/AM5**.

Tree works

5.13 Tree removal (trees T1 and T2) should be performed sensitively and undertaken by professional arborists. It is suggested that this takes place before the erection of protective fencing takes place. The stumps should be left in the soil, and treated with Vitax SBK Brushwood and Tree Stump Killer or Roundup Tree Stump and Root Killer according to manufacturer's specifications.

Landscaping

5.14 Once construction has demonstrably finished, fencing may be removed in order to allow final landscaping to be undertaken. Landscaping will not involve any changes in soil levels, digging of any trenches or construction of masonry or retaining walls within root protection areas of retained trees.

Arboricultural supervision

5.15 It is recommended that a project arboricultural consultant be appointed to oversee tree protection for the duration of the construction/ landscaping contract(s). The appointed project arboriculturist will be consulted on any issues that may arise concerning trees and will visit the site as often as necessary to ensure that trees are protected and/or at the following key stages:

- Prior to contractors commencing works on site in order to meet with the supervising architect and/or the contractor's nominated site manager to ensure that the principles of tree protection are understood and the procedure, timescale and materials for installation of tree protection are agreed;
- Following installation of tree protection but prior to any works commencing on site to confirm that it is fit for purpose;
- At any time that there are potential conflicts with tree protection and/or at two weekly intervals during basement construction and at monthly intervals thereafter;
- At the completion of construction works to confirm that tree protection may be removed to enable final landscaping.

5.16 A pre-start meeting will be held on site with the project arboriculturist and the contractor's representative(s) so that the precise details of the schedule of works together with details of installation of tree protection can be agreed and personnel induction carried out. The site manager/foreman will be fully briefed on tree protection measures and procedures before any workers or sub-contractors are permitted onto the site. All contractors involved in the project have a duty to comply with all the specified tree protection measures.

5.17 No enabling works will take place until after the meeting has been held and tree protection has been installed, inspected and approved as fit for purpose.

6. Conclusions

6.1 A BS5837: 2012 survey of nineteen trees has been carried out in the gardens of, and adjacent to, 36 Heath Drive, London, NW3 7SD.

6.2 Thirteen trees are considered to be and of low value (category C). Six trees are considered of moderate value (B category). Only two trees are proposed for removal, both C grade trees.

6.3 The RPAs of all retained trees will be protected during construction by existing hardstanding, protective fencing and ground protection. Detailed methods for achieving tree protection are provided in this report.

6.4 If the Tree Protection Plan is followed precisely, it is judged that the proposed development poses no threat to the retained trees, or to the current landscape values of the site.

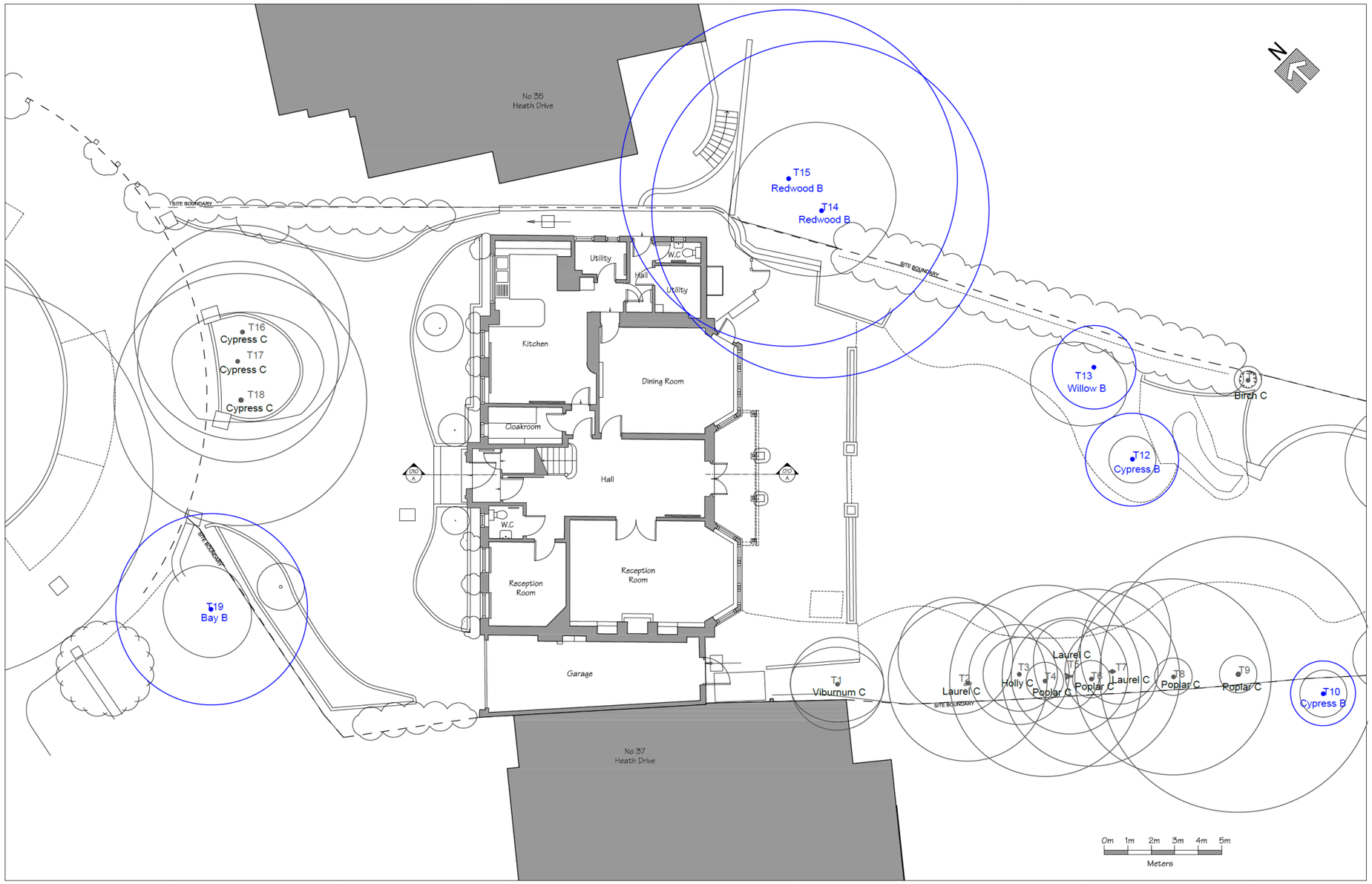
Annex AMI
Tree survey schedule (BS5837:2012)

Tree No.	Species	Height (m)	Trunk diameter (mm)	Age	Physiological condition	Structural condition	Useful life (y)	BS5837 Grade	Notes
T1	Viburnum sp.	5.3	170	mid	good	good	20	C	
T2	Laurel	5.2	280*	mature	good	good	20	C	8 stems
T3	Holly	4.7	130	young	good	good	40	C	
T4	Poplar	7.2	350	mid	good	good	10 to 20	C	
T5	Laurel	5.5	205*	mature	good	good	20	C	6 stems
T6	Poplar	6.2	320	mid	good	good	10 to 20	C	
T7	Laurel	5.3	164*	mature	good	good	20	C	5 stems
T8	Poplar	5	350	mid	good	good	10 to 20	C	
T9	Poplar	5.3	490	mid	good	good	10 to 20	C	
T10	Cypress sp.	5	120**	young	good	good	40	B	
T11	Birch	7	50	young	good	good	40	C	
T12	Cypress sp.	4.2	170	young	good	good	40	B	
T13	Willow sp.	4.2	150	young	good	good	20	B	
T14	Redwood	17.4	600**	mid	good	good	40	B	
T15	Redwood	21	600**	mid	good	good	40	B	
T16	Cypress	5.8	380	mid	good	good	10	C	
T17	Cypress	5.8	360	mid	good	good	10	C	
T18	Cypress	5.8	450	mid	good	good	10	C	
T19	Bay	10.8	340	mature	good	good	20	B	

* multistemmed
** estimated

Annex AM2

Tree constraints plan showing existing plot layout with tree numbers, BS5837: 2012 colour codes (A – Green, B – Blue, C – Grey, U - Red) and root protection areas (continuous circles)



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Drawing Scale = 1:100 @ A2, 1:200 @ A4

Scale	Date	Drawn by	Checked by
1:100 @ A2	04.04.2012	DS	DS

Drawing Title: Ground Floor Plan As Existing

Project: 36 Heath Drive, London NW3 7SD

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Project no.	Drawing no.	Revision
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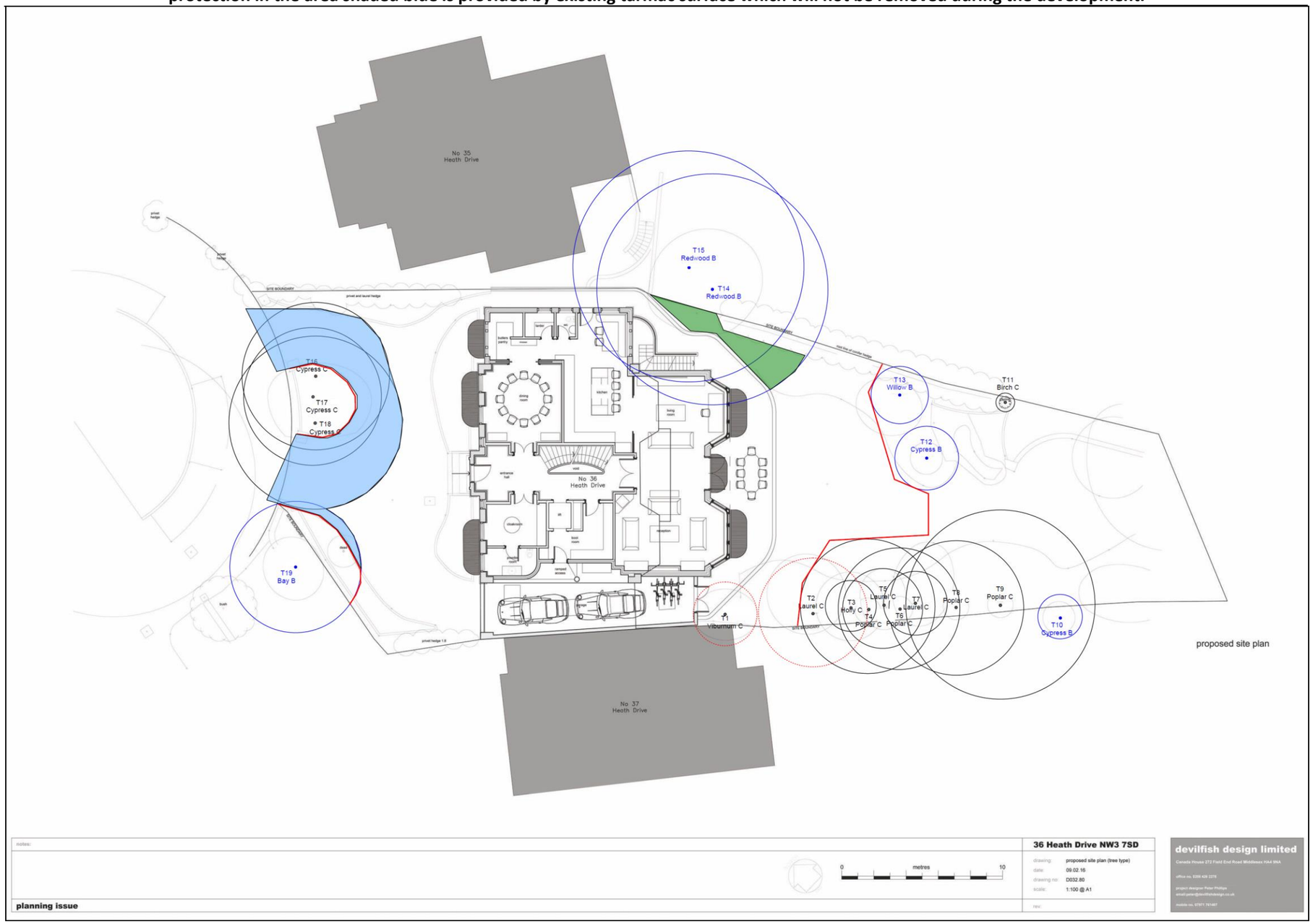
Annex AM3
Schedule of root protection areas

Tree No.	Species	Height (m)	Trunk diameter (mm)	BS5837:2012 Root Protection Area (m^2)	BS5837:2012 Root Protection Radius (m)	BS5837:2012 Grade
T1	Viburnum	5.3	170	13.1	2.0	C
T2	Laurel	5.2	280	35.5	3.4	C
T3	Holly	4.7	130	7.6	1.6	C
T4	Poplar	7.2	350	55.4	4.2	C
T5	Laurel	5.5	205	19.0	2.5	C
T6	Poplar	6.2	320	46.3	3.8	C
T7	Laurel	5.3	164	12.2	2.0	C
T8	Poplar	5.0	350	55.4	4.2	C
T9	Poplar	5.3	490	108.6	5.9	C
T10	Cypress	5.0	120	6.5	1.4	B
T11	Birch	7.0	50	1.1	0.6	C
T12	Cypress	4.2	170	13.1	2.0	B
T13	Willow	4.2	150	10.2	1.8	B
T14	Redwood	17.4	600	162.9	7.2	B
T15	Redwood	21.0	600	162.9	7.2	B
T16	Cypress	5.8	380	65.3	4.6	C
T17	Cypress	5.8	360	58.6	4.3	C
T18	Cypress	5.8	450	91.6	5.4	C
T19	Bay	10.8	340	52.3	4.1	B

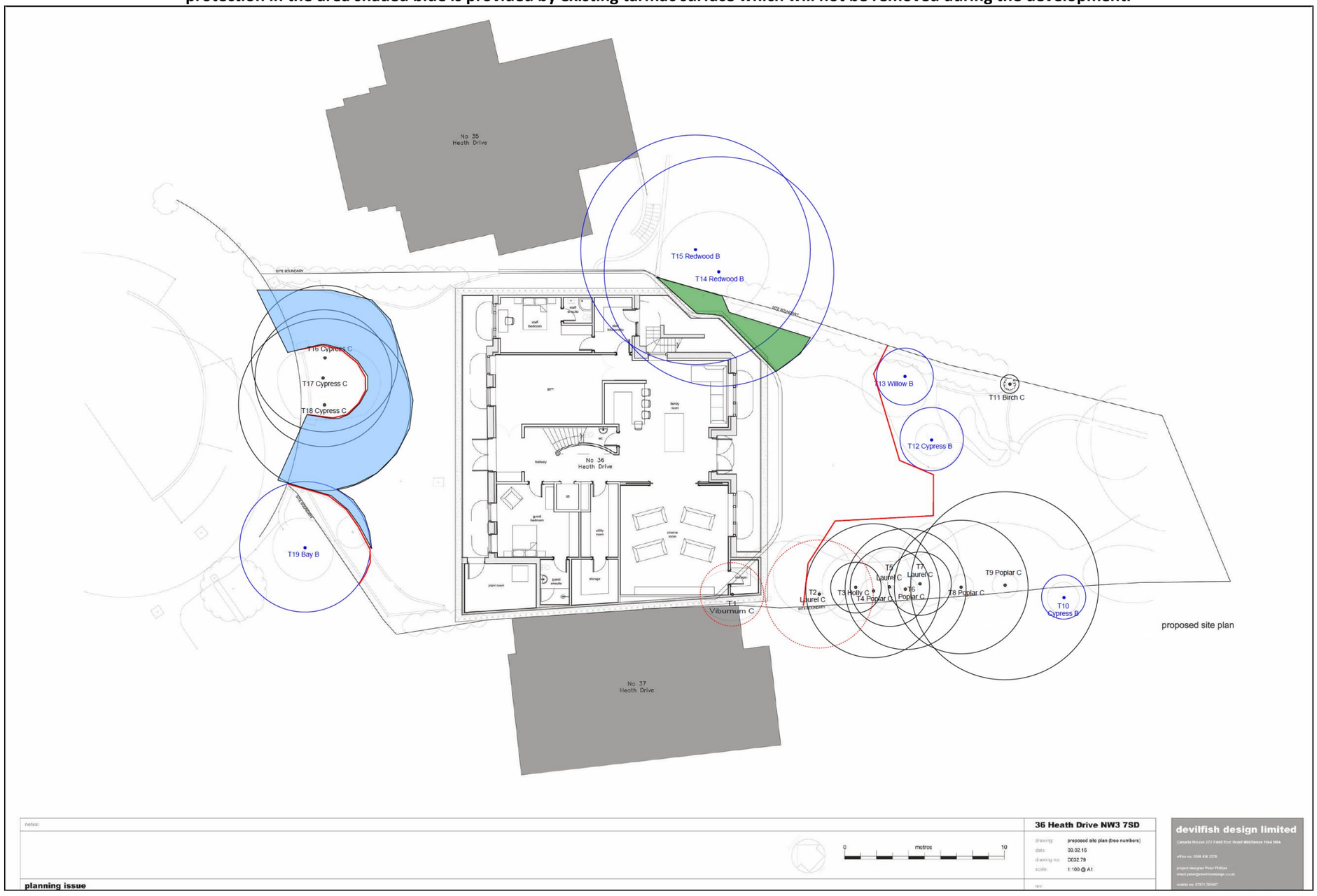
Annex AM4

Tree Protection Plan, Ground floor showing tree numbers, BS5837: 2012 colour codes (A – Green, B – Blue, C – Grey, U - Red) and root protection areas (continuous circles). Locations of protective fencing identified as continuous red line and ground protection (blue and green shading). Area shaded green will be protected by woodchips covered by plywood sheeting. Ground protection in the area shaded blue is provided by existing tarmac surface which will not be removed during the development.



Annex AM5

Tree Protection Plan, Lower ground floor showing tree numbers, BS5837: 2012 colour codes (A – Green, B – Blue, C – Grey, U - Red) and root protection areas (continuous circles). Locations of protective fencing identified as continuous red line and ground protection (blue and green shading). Area shaded green will be protected by woodchips covered by plywood sheeting. Ground protection in the area shaded blue is provided by existing tarmac surface which will not be removed during the development.



Annex AM6
Qualifications and Experience

Dr Andy Moffat has been engaged in research and advisory work on trees since joining the Forestry Commission Research Division in 1985. He has a BSc (Hons) in Geography and Soil Science and a PhD in Geography.

Dr Moffat began his research career with the Forestry Commission studying the interaction of trees in urban and peri-urban environments, focusing particularly on man-made soils and land reclamation. He was a contributor to Urban Forestry Practice, published by the Forestry Commission, and several other government guidance documents. Subsequently, he has led research projects on a variety of subjects relevant to arboricultural policy and practice, notably in the areas of trees and soil contamination, air pollution, tree rooting and root barriers, trees, drought and moisture abstraction, soil shrinkage and species suitability. He has recently been involved in the areas of climate change impacts and ecosystem services. Dr Moffat has published widely, and is the author of some 75 peer reviewed papers, 40 Government publications, 45 books, book chapters and published conference proceedings, 65 out-reach, trade and other publications and 40 contract reports. During his time with the Forestry Commission, he had a close working relationship with both forestry and arboricultural practitioners, and with arboricultural policy advisors to government (in the Department for Communities and Local Government).

In 2013, Dr Moffat set up his own consultancy company, specialising in trees and the built environment. He works closely with arboricultural practices, notably Martin Dobson Associates, and delivers Workshops on behalf of the Arboricultural Association. He is a Fellow of the Royal Geographical Association and of the British Society of Soil Science, and is a Member of the Institute of Chartered Foresters. He enjoys Chartered Consultancy status from the latter.