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# TREE SURVEY, ARBORICULTURAL IMPACT ASSESSMENT AND TREE PROTECTION PLAN

A report to accompany a planning application for the construction of an extension at lower ground floor level at 16 Rosecroft Avenue, London, NW3 7QB

**Report by**

**Dr Martin Dobson**
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*Registered Consultant of the Arboricultural Association*

Instructed by 5D Architects on behalf of Mr and Mrs Appleton

*11th June 2018*

MDA reference J71


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# Contents




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## 1. Introduction

1.1 Martin Dobson Associates Ltd were instructed by 5D Architects on behalf of Mr and Mrs Appleton on 22nd May 2018 to carry out a survey of trees on or immediately adjacent to land at 16 Rosecroft Avenue, London, NW3 7QB. The purpose of the survey was to inform architects of potential tree-related constraints on the site and to provide advice on design options for the construction of a lower ground floor extension.

1.2 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.

1.3 The property is within the Redington Frognal Conservation Area and this means that all trees with a trunk diameter of 75 mm or more benefit from statutory protection and no work can be carried out to them (including cutting roots or branches or felling) without statutory notification to the local planning authority. However, the granting of planning permission allows trees to be removed if they are shown as being removed on approved plans.

1.4 Nine trees were surveyed; three of these are considered to be category A and of high value (T1 and T2 plane and T8 lime) and one is considered to be category B and of moderate value (T7 sycamore). The remainder are category C and are of low value, with the exception of T9 cherry which is unsuitable for retention and has been classified U (it is on neighbouring land and therefore is not proposed for removal).

1.5 In general category C trees should not be considered a material constraint to development.

1.6 The proposed development requires the removal of a single small category C tree (T3 willow leafed pear).

1.7 The retained trees will be protected during development. Details of tree protection are contained in this report.


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## 2. Tree survey

2.1 The tree survey was carried out by Martin Dobson on 1st June 2018.

2.2 Appended at **MD1** is the tree survey schedule which provides details of the nine trees present within or immediately adjacent to the property.

2.3 The site survey drawing appended at **MD2** shows the positions of the surveyed trees 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 |
| U trees (unsuitable or dead/dying/dangerous, less than10 years useful life) | RED |

2.4 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.

2.5 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 an exclusion zone 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 **MD2** and are tabulated at **MD3**.


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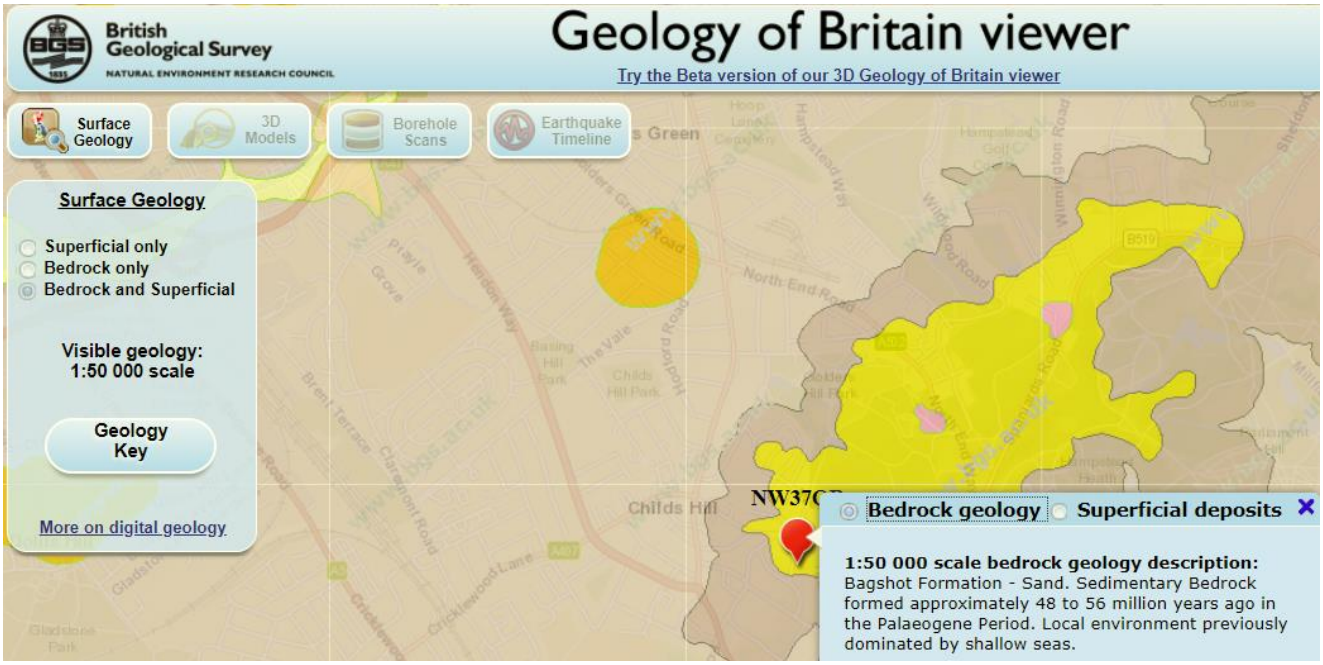
## 3. Soil assessment

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 geology of the site is non-shrinkable Bagshot Formation - Sand (Figure 1). Thus, foundations should not need to be deepened to take account of trees. However, shrinkable London clay is very close by and therefore soils tests will need to be carried out. If site specific investigations detect shrinkable clay then foundations must 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 map showing that the site is underlain by the Bagshot Formation – Sand.





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## 4. Arboricultural impact assessment

4.1 The purpose of an arboricultural impact assessment (AIA) is to evaluate the direct and indirect effects of proposed development on trees and, where necessary, to consider appropriate mitigation. It should set out which, if any, trees are to be removed to facilitate the development and should consider the possible effects on retained trees of potentially damaging activities on the site (for example changes in ground level and installation of below ground services). Requirements for access around trees should be considered and potential conflicts identified, for example, where branches overhang the development area and may require pruning.

4.2 Mitigation for any issues identified should be proposed and addressed in the arboricultural method statement (AMS).

***Tree removals***

4.3 The proposed development requires the removal of one category C tree (T3 willow leafed pear). The tree is small (Figure 2), planted in the relatively recent past and cannot be seen from any public vantage point and therefore it has no public amenity benefit. Removal of the tree will therefore have no impact on public amenity.

**Figure 2**. Willow leafed pear T1, which is to be removed from the rear garden.

***Tree pruning***

4.4 No pruning work is required to facilitate the proposed development as there is sufficient space between the buildings and retained trees.


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***Tree protection***

4.5 Trees T1, T2 and T4 – T9 are to be retained and will be protected from mechanical damage to their trunk and branches and from damage to roots, through soil compaction or root severance, by the installation of 2 m high fencing/hoarding and/or ground protection to create a construction exclusion zone (CEZ) to exclude site workers, machinery and storage of materials. There is sufficient space outside the CEZ for all construction activities to take place without creating pressure on tree protection.

4.6 The RPAs of T4 – T8 will be protected by the erection of 2 m high fencing to act as a barrier to prevent construction workers entering the CEZ. T1 and T2 located in the pavement have their roots protected from compaction damage by the existing hard surfacing but their trunks will be protected from impact damage by the erection of plywood hoarding.

4.7 There is a change of level between the trunk of T4 ginkgo and the existing wooden decking (Figure 3). The soil level under the decking is about 800 mm lower than the retained soil around the tree's trunk and there is another 600 mm step down at the edge of the decking near to the house. It is believed that the retaining walls at each level change will act as a partial root barrier so that very few roots, if any, will extend under the decking. Nonetheless, it is proposed that the deck area will be retained throughout the development and will act as ground protection, preventing harm to any roots that may be below the deck.

**Figure 3**. Wooden decking adjacent to T4 which includes two level changes, each with a masonry retaining wall which will serve as a partial root barrier.

4.8 The RPAs of T1 and T2 theoretically extend under the front garden of the property. However, the boundary of the property is marked by 1 m high retaining walls, which are likely to have foundations sufficiently deep to prevent most roots growing onto the property. Any roots that do grow onto the property will be small in diameter and will be at a significant depth (relative

to soil level on the property) and are therefore unlikely to be harmed by works. It is nonetheless proposed that the front garden should be protected by ground protection which will prevent soil compaction. Existing hard surfaces may not need to be covered, but that will be assessed by an arboriculturist in advance of implementing any works that may be approved.

**Figure 4**. Photographs showing retaining walls and steps at the front of the property.



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## 5. Arboricultural method statement and tree protection plan

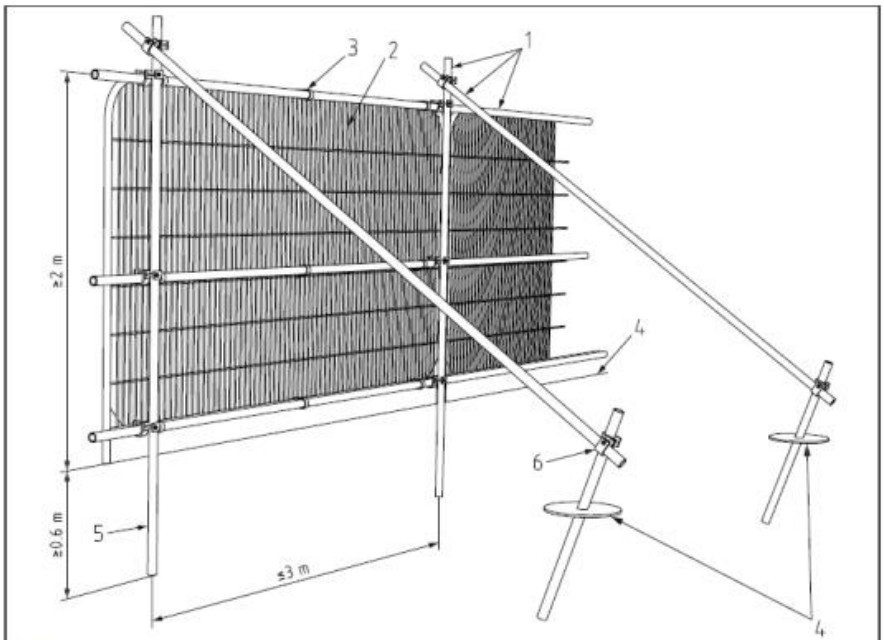
5.1 Trees can very easily be damaged during construction activities through their branches being broken by construction traffic passing close to the canopy or by root severance during the digging of foundation or service trenches. The majority of roots are to be found in the upper 600 mm of soil and so even relatively shallow trenches can sever a significant number 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 few 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. Protection of the soil around trees by means of a construction exclusion zone (CEZ) is therefore vitally important in order to preserve roots undamaged.

**Fencing and ground protection**

5.3 Tree protection will comprise of 2 m tall fencing installed in the positions shown at **MD4**/**MD5** before the building is stripped out or 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 5). Onto this, weld mesh panels or 2 m high shuttering board will be securely fixed with wire or scaffold clamps. Un-braced weld mesh panels 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. An alternative system of bracing which does not require a scaffold framework is shown in Figure 6.

**Figure 5.** Diagram to illustrate design of protective fencing with scaffolding anchored into the ground




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


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**Figure 6.** Diagram to illustrate alternative design of protective fencing

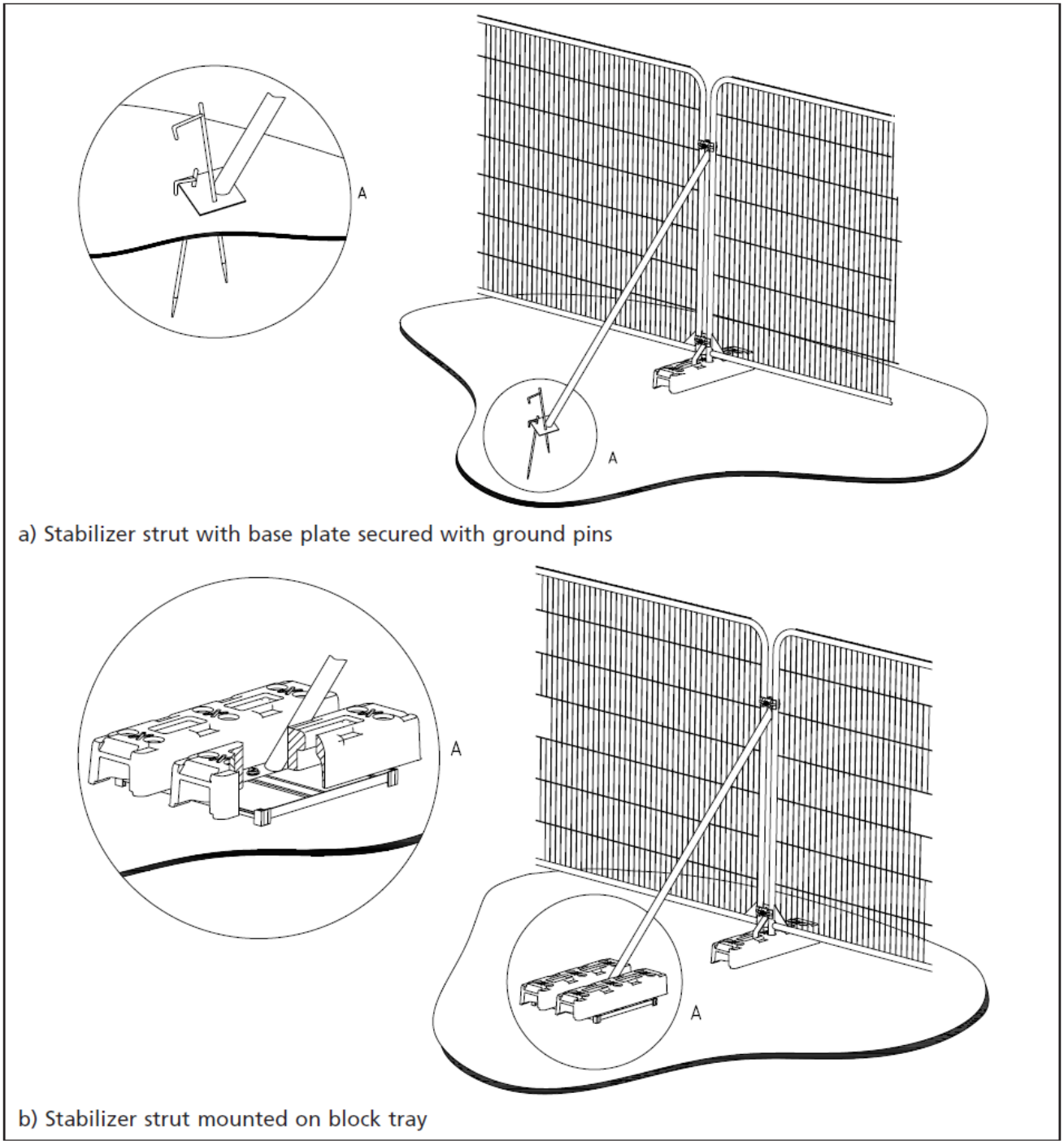


**Figure 7**. Photograph to illustrate installed protective fencing


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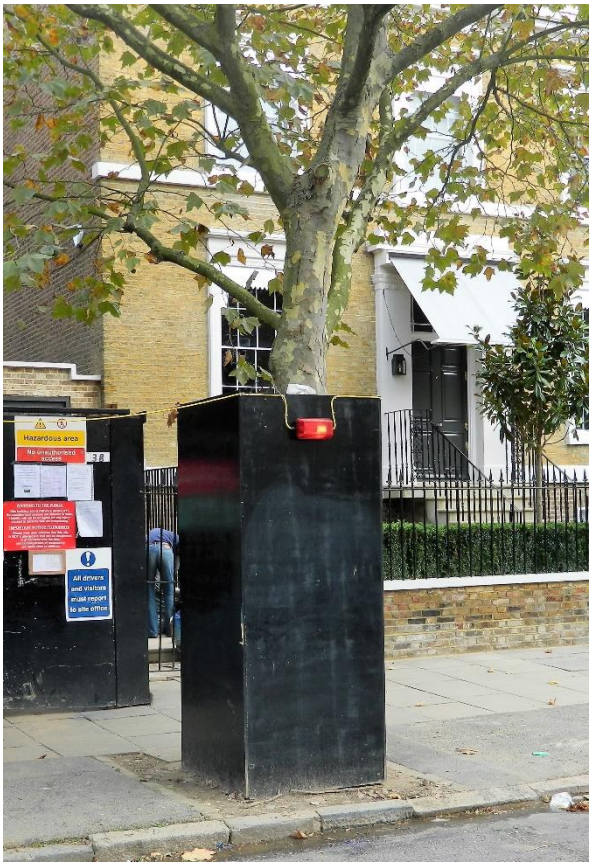
5.4 Hoarding will be erected around the trunks of T1 and T2 to a height of 2 m to prevent accidental damage to the trunks (Figure 8) using a timber framework and 20 mm plywood. The hoarding may be braced against the tree but no part of it may be attached to the tree.

**Figure 8**. Hoarding to be erected around the trunks of the street trees T1 and T2.




5.5 High visibility all-weather notices at a size no less than A3 will be securely attached to the hoarding and to every second panel of the barrier around the CEZ with wording as shown in Figure 9.

**Figure 9**. Wording to be included in high visibility all-weather sign attached to protective fencing


5.6 In order to allow access for construction workers around the development at the front it is proposed that part of the RPA will be protected by ground protection. This area, shaded orange on the tree protection plan (**MD4**/**MD5**), will be covered by a permeable geotextile such as Terram. Onto this will be placed treated timber (100 mm x 80 mm) at spacings of no more than 1 m. The area between the timber bearers will be filled with a compressible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material such as woodchips and will then be covered by 20 mm thick marine ply which will be screwed down onto the timber (Figures 10 and 11). At the rear the existing decking will be retained during construction and will act as ground protection (shaded orange on TPP).

**Figure 10**. Specification for ground protection

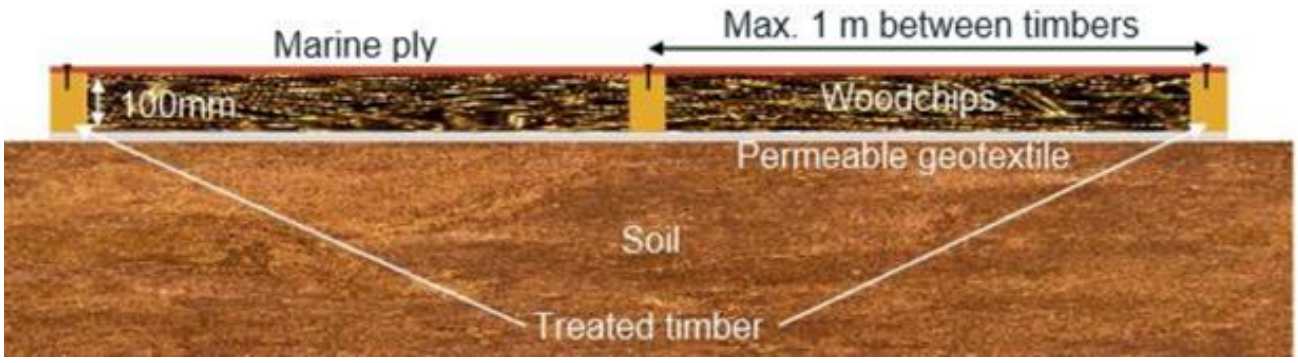


**Figure 11**. Plywood sheeting used as ground protection.

**Arboricultural supervision**

5.7 It is recommended that a project arboricultural consultant is appointed to oversee tree protection for the duration of the construction/landscaping contract(s). Alternatively, a designated person (site foreman or site owner) should take on the responsibility of overseeing tree protection. If appointed, the project arboriculturists 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;


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- 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;

- At the completion of construction works to confirm that tree protection may be removed to enable final landscaping;

5.8 A pre-start meeting should 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. Following induction, a copy of the Induction Sheet (**MD6**) will be provided to and be signed by the site manager/foreman in recognition of acceptance of their role in enforcing day to day tree protection.

5.9 All contractors involved in the project have a duty to comply with all the specified tree protection measures and all workers will be provided with induction by the site manager/foreman and be required to sign an Induction Sheet confirming they have understood the protection measures. Signed sheets will be kept on site for inspection.

5.10 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.

5.11 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 nominated arboricultural consultant.

***Burning of waste***

5.12 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, parking of vehicles, storage of materials and site huts***

5.13 All machinery required on site will operate outside of root protection areas or from the ground protection or the driveway. Site accommodation, if required, will be located outside root protection areas.

5.14 Delivery vehicles will park in the off-road parking space or off site and storage of materials will be outside root protection areas. At each delivery, where materials are unloaded by crane, a banksman will be present to ensure that sufficient clearance is allowed for to avoid conflict with branches of T1 and T2. Any incidents must be reported to the project arboriculturist.

***Services***

5.15 The proposed layout of incoming (water, gas and electricity) and outgoing (foul sewer) services is not yet established but if required they should be installed outside root protection areas. If it is necessary for a trench to be dug through an RPA a specific method statement will be required which will need to specify that the trench will be hand dug and that care will be taken to preserve all roots encountered which are larger than 25 mm diameter.

***Tree works***

5.16 Tree removals will be undertaken as preliminary works. This will be carried out by suitably qualified arboriculturists to the standards set out in BS3998: 2010 *Tree works – recommendations*. Heavy machinery must not be used on unprotected ground.

***Landscaping***

5.17 Once construction has demonstrably finished (to the satisfaction of the project arboriculturist) fencing may be removed in order to allow final landscaping to be undertaken. Landscaping plans will not involve any changes in soil levels, digging of any trenches or construction of masonry or retaining walls within root protection areas.


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## 6. Conclusions

6.1 A BS5837: 2012 survey of nine trees has been carried out on land at 16 Rosecroft Avenue, London, NW3 7QB. Three trees are considered to be category A and of high value (T1, T2 and T8) and one is considered to be category B and of moderate value (T7). The remainder are category C and of low value with the exception of T9 which is so poor as to be unworthy of retention and has been categorised U (although it will not be removed as it is a neighbour's tree).

6.2 The proposed development requires the removal of one category C tree (T3 willow leafed pear).

6.3 The trees to be retained will be protected during development and methods for ensuring their protection have been described.

6.4 It is considered that the proposed development will pose no threat to trees to be retained and is sympathetic to character of the Conservation Area.


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## APPENDIX MD1
### Tree survey schedule (BS5837: 2012)

| Tree No. | Species | Height (m) | Trunk diameter (mm) | N (m) | S (m) | E (m) | W (m) | Height of crown clearance (m) | Age class | Physiological condition | Structural condition | Useful life | BS5867 Grade | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | Plane | 13 | 390 | 3 | 3 | 3 | 3 | 10 | MA | Good | Good | >40 | A | Pollarded street tree |
| T2 | Plane | 15 | 670 | 3 | 3 | 3 | 3 | 10 | MA | Good | Good | >40 | A | Pollarded street tree |
| T3 | Pear | 5 | 200 | 2 | 1.5 | 0 | 5 | 2 | Y | Good | Good | >40 | C | Willow leafed pear. One sided canopy towards house |
| T4 | Ginkgo* | 11 | 361 | 3 | 4 | 3 | 3 | 3 | Y | Good | Fair | 20 - 40 | C | *Twin stem with acute union with included bark from ground to 1m. Potential weakness as tree matures. |
| T5 | Acer | 7 | 225 | 4 | 4.5 | 3 | 3.5 | 2 | Y | Good | Good | 20 - 40 | C | |
| T6 | Cherry* | 7 | 300 | 3 | 4 | 2 | 7 | 4 | MA | Good | Good | 20 - 40 | C | *Two stems |
| T7 | Sycamore* | 17 | 467 | 5 | 5 | 5 | 8 | 7 | MA | Good | Good | >40 | B | *Two stems |
| T8 | Lime | 24 | 800 | 6 | 5 | 6 | 4 | 8 | M | Good | Good | >40 | A | Much epicormic growth on lower trunk |
| T9 | Cherry | 2.5 | 280 | 0.75 | 0.75 | 0.8 | 0.75 | 1 | M | Poor | Poor | <10 | U | Excessive pruning |


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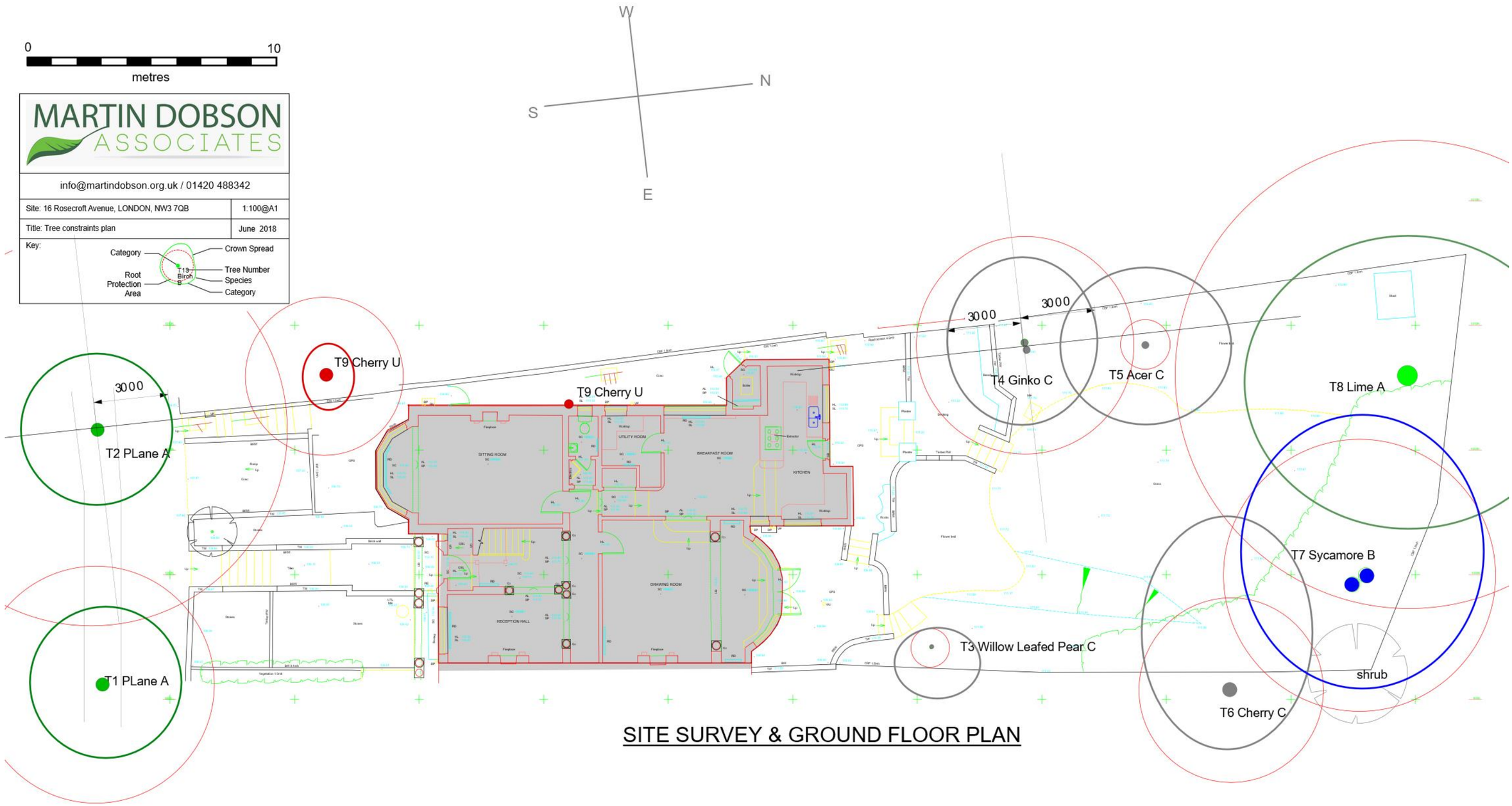
**APPENDIX MD2**

**Tree constraints plan (TCP) showing existing plot layout with tree numbers, BS5837: 2012 colour codes (A – Green, B – Blue, C – Grey, U - Red) and root protection areas (grey circles). The plan has been provided separately as a PDF at a scale of 1: 100 @ A1.**




SITE SURVEY & GROUND FLOOR PLAN



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## APPENDIX MD3
## BS5837 schedule of root protection areas

| Tree No. | Species | Trunk diameter (mm) | BS5837: 2012 Root protection area, RPA, ($m^2$) | BS5837: 2012 Radial protection distance (m) |
|---|---|---|---|---|
| T1 | Plane | 390 | 68.8 | 4.7 |
| T2 | Plane | 670 | 203.1 | 8.0 |
| T3 | Pear | 200 | 18.1 | 2.4 |
| T4 | Ginkgo* | 361 | 59.0 | 4.3 |
| T5 | Acer | 225 | 22.9 | 2.7 |
| T6 | Cherry* | 300 | 40.7 | 3.6 |
| T7 | Sycamore* | 467 | 98.7 | 5.6 |
| T8 | Lime | 800 | 289.6 | 9.6 |
| T9 | Cherry | 280 | 35.5 | 3.4 |


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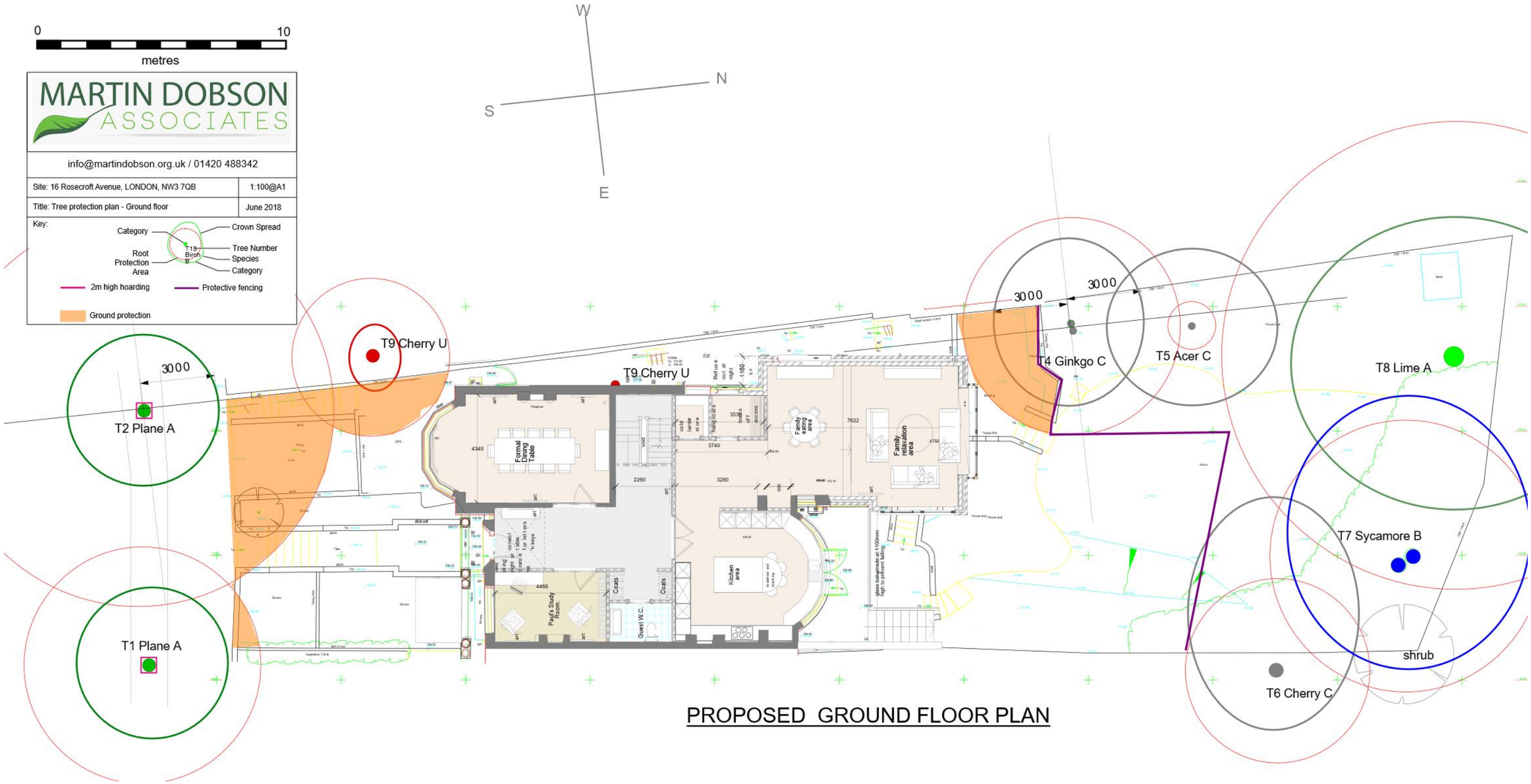
**APPENDIX MD4**

**Tree protection plan (TPP) – ground floor, showing retained trees, tree numbers and root protection areas (red circles). The location of protective fencing is shown as purple lines, ground protection as orange hatching, above-hoarding around tree trunks as magenta squares. The plan has been provided separately as a PDF at a scale of 1: 100 @ A1.**



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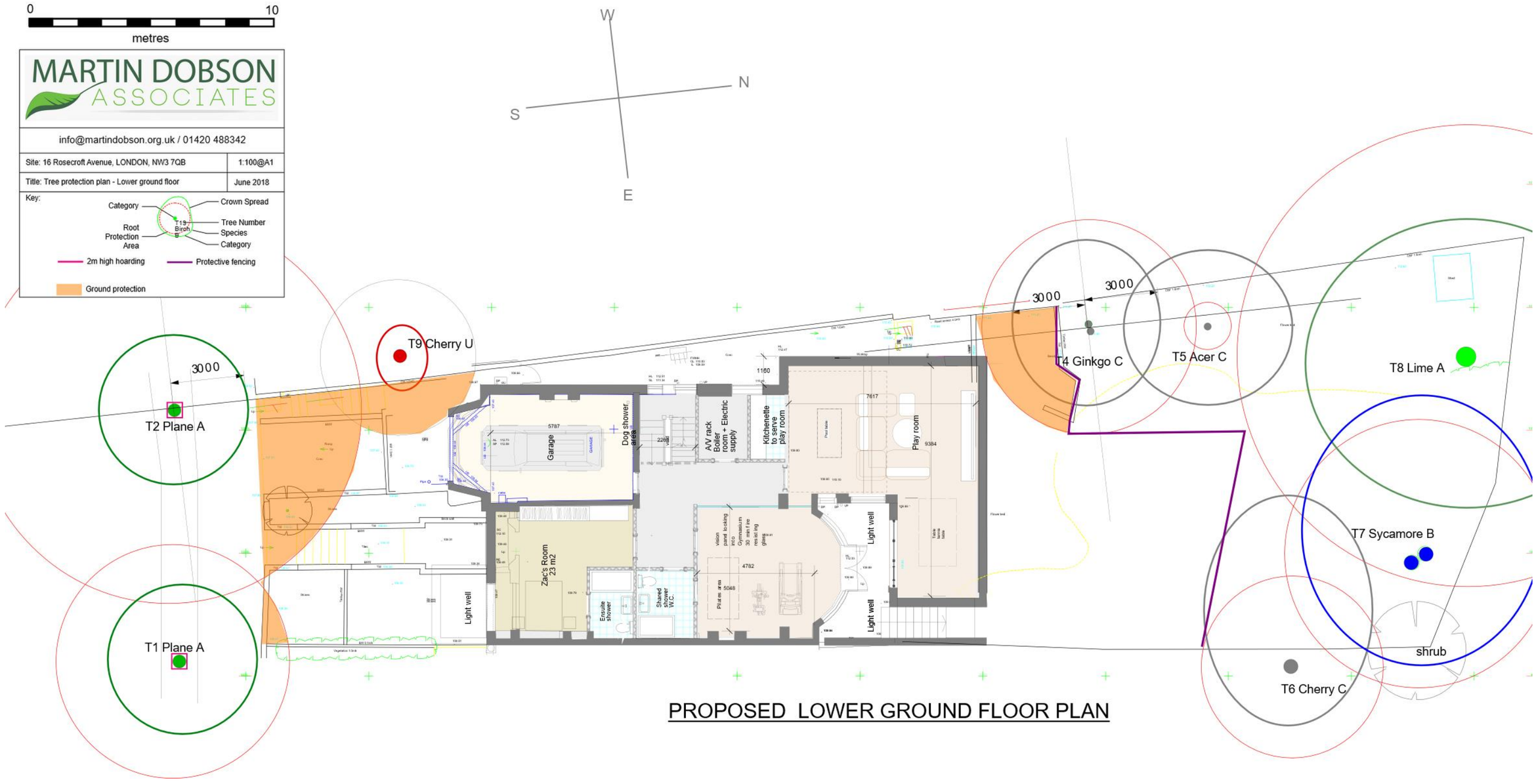
**APPENDIX MD5**

**Tree protection plan (TPP) – lower ground floor, showing retained trees, tree numbers and root protection areas (red circles). The location of protective fencing is shown as purple lines, ground protection as orange hatching, above-hoarding around tree trunks as magenta squares. The plan has been provided separately as a PDF at a scale of 1: 100 @ A1.**



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## APPENDIX MD6

# TREE AWARENESS – SITE INDUCTION SHEET

SITE NAME: 16 Rosecroft Avenue, London, NW3 7QB

**Trees are an important part of this development and all trees noted on the Tree Protection Plan are protected by planning conditions and by virtue of being in a Conservation Area. Trees must not be damaged in any way, including indirectly through compaction/contamination of soil, so that they can fully integrate into the finished project and stay healthy well into the future. All persons working on this site have a responsibility to be aware of trees and to abide by tree protection procedures.**

How can trees can be damaged?

*Above the ground* – contacts and impacts with branches and trunk (for example by machine operations: piling rigs, high-sided vehicles, crane use, fixings to trunk, unauthorised cutting back of branches). Make sure there is adequate clearance under the tree canopy and don't stray close to the trunk. Damage to bark allows infections to enter the tree.

*Below the ground* – roots spread out from the trunk horizontally at shallow depth and are therefore easily damaged. Vehicle and pedestrian movements and storage of materials on unprotected ground causes compaction, especially in wet weather, and must be avoided. Soil stripping during site clearance or landscaping is prohibited in root protection areas. The effects of root damage may take some time to become obvious, but can result in disfiguring dieback of leaves and branches, or even death.

Tree protection procedures

Provided that the simple steps below are followed most tree protection is straightforward:

- Stay out of tree Construction Exclusion Zones (CEZs). These are the areas of ground surrounding retained trees that are protected by barriers and/or ground protection. If you need to go into a CEZ, you must first gain authorisation from the Site Manager.
- No construction activity of any description within CEZs, e.g. soil stripping, cement mixing, services installation, storage of materials etc.
- No fires within 20m of trunk of any retained tree.
- If authorised to work within a CEZ, for example, for installation of an above-ground no-dig driveway you must follow the procedures set out in the **Arboricultural Method Statement.**
- If damage occurs, you must inform the Site Manager who must, in turn, inform the project arboriculturist.

Planning Authority enforcement action needs to be avoided:

- 'Breach of Conditions' notices can prevent a site from being signed-off.
- 'Temporary Stop Notices' halt site operations and result in associated high costs.
- Wilful damage/destruction of TPO/Conservation Area trees can result in company and/or individual prosecutions - fines can me anything up to £20,000 (County Court fines are unlimited). Remember that fines may apply to the person committing the offence as well as the site owner and main contractors!

I have received site induction in tree awareness and tree protection procedures

PRINT NAME

SIGN

DATE


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## APPENDIX MD7

### Qualifications and Experience

Dr Martin Dobson has been engaged in research and advisory work on trees since graduating in 1986 with a BSc (Hons) Degree in Biology. Subsequent postgraduate research led to the award of a Doctor of Philosophy (DPhil) Degree in Tree Physiology in 1990.

Postgraduate studies began in 1986 at the University of Ulster and continued in 1987 at the Forestry Commission's Research Station in Hampshire and focussed on the influence of air pollution on trees. Upon completion of this research in 1989 Dr Dobson was employed by the Forestry Commission and worked in both the Tree Pathology and Environmental Research Branches. During the next six years he was responsible for Department of Environment research contracts focussing on air pollution, climate change, de-icing salt damage to trees, woodland establishment on landfills and tree root research. He has authored two books: *De-icing Salt Damage to Trees and Shrubs* and *The Potential for Woodland Establishment on Landfill Sites.* He concluded his time at the Forestry Commission as Project Manager for research into the interaction between trees, roots and clay soils which included laboratory investigations, testing of root barriers and a three-year field-scale monitoring programme investigating the influence of woodland and grassland on the moisture status of clay soils.

In 1995 Martin joined the Arboricultural Advisory and Information Service as a senior Arboricultural Advisor. The AAIS advised the (then) Department of the Environment on matters concerning amenity trees and was the principal source of technical advice and information to the arboricultural profession as well as landscape architects, engineers, the horticultural industry and private individuals. A large proportion of advisory work focussed on issues relating to tree diseases and interactions between trees and buildings.

In 1997 Martin started an arboricultural consultancy practice specialising in subsidence and tree root claims, planning and development, tree safety and disease diagnosis. He was a local authority retained consultant providing expertise on tree protection practice and legislation from 1999 - 2006 and has dealt with several thousand Tree Preservation Order and Conservation Area applications.

He has extensive experience as an Expert Witness in the High Court, County Court and Magistrates Court. Notable recent cases he has been involved in include Robbins v London Borough of Bexley and Khan v London Borough of Harrow and Kane.

From 1995 to 2011 he was an examiner for the Professional Diploma in Arboriculture for the Royal Forestry Society/ABC Awards and he is currently an assessor for the Arboricultural Association Registered Consultant scheme. He has been a guest lecturer for the Middlesex University Countryside Management MSc course and for Portsmouth University. Together with Dr Giles Biddle he has devised and teaches introductory and advanced courses on trees and subsidence and co-presents seminars on trees and climate change with Professor Andy Moffat for the Arboricultural Association.

In addition to over 30 publications in scientific and technical journals he is the author of Arboriculture Research and Information Note 130/95/ARB *Tree Root Systems*, and leading author of:

*Driveways Close to Trees.* Arboricultural Practice Note 1. AAIS, Farnham.
*Trees in Dispute.* Arboricultural Practice Note 3. AAIS, Farnham.
*Root Barriers and Building Subsidence*. Arboricultural Practice Note 4. AAIS, Farnham.

He is a Fellow and Registered Consultant of the Arboricultural Association and is a Member by examination of the Expert Witness Institute.