

## **TREE SURVEY, ARBORICULTURAL IMPACT ASSESSMENT AND TREE PROTECTION PLAN**

**DRAFT**

A report to accompany a planning application for internal refurbishment and entrance extension to the existing property at 107 Highgate West Hill, London, N6 6AP.

**Report by Philip Walker**

Checked and approved by Dr Martin Dobson  
BSc (Hons) Biol, DPhil, FArborA, MEWI  
Registered Consultant of the Arboricultural Association

On the instructions of Kate Pocock

*19<sup>th</sup> October 2018*

MDA reference K34



## Contents

|        |  |         |
|--------|--|---------|
| Part 1 | Introduction   | Page 3  |
| Part 2 | Tree survey  | Page 4  |
| Part 3 | Soil assessment  | Page 5  |
| Part 4 | Arboricultural impact assessment                         | Page 6  |
| Part 5 | Arboricultural method statement and tree protection plan | Page 7  |
| Part 6 | Conclusions  | Page 12 |

### ***There are six appendices***

|     |                                    |         |
|-----|------------------------------------|---------|
| MD1 | Tree survey schedule (BS5837:2012) | Page 13 |
| MD2 | Tree constraints plan              | Page 14 |
| MD3 | Schedule of root protection areas  | Page 15 |
| MD4 | Tree protection plan               | Page 16 |
| MD5 | Induction sheet                    | Page 17 |
| MD6 | Qualifications and experience      | Page 18 |

## 1. Introduction

- 1.1 Martin Dobson Associates Ltd were instructed by John Senter, architect, on 17<sup>th</sup> September 2018 to carry out a survey of trees on or immediately adjacent to land at 107 Highgate West Hill, London, N6 6AP. The purpose of the survey was to inform architects of potential tree-related constraints on the site and to provide advice on tree protection during proposed internal works and entrance extension to the existing house.
- 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 Dartmouth Park 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. We have not been able to establish whether any trees are additionally protected by Tree Preservation Orders.
- 1.4 Nine trees were surveyed; three of these are considered to be category A and of high value (T7 and T8 lime and T9 sycamore) and four are considered to be category B and of moderate value (T1 and T3 sycamore and T4 – T5 lime). The remainder are category C and are of low value.
- 1.5 All trees will be retained and will be protected during development. Details of tree protection are contained in this report.

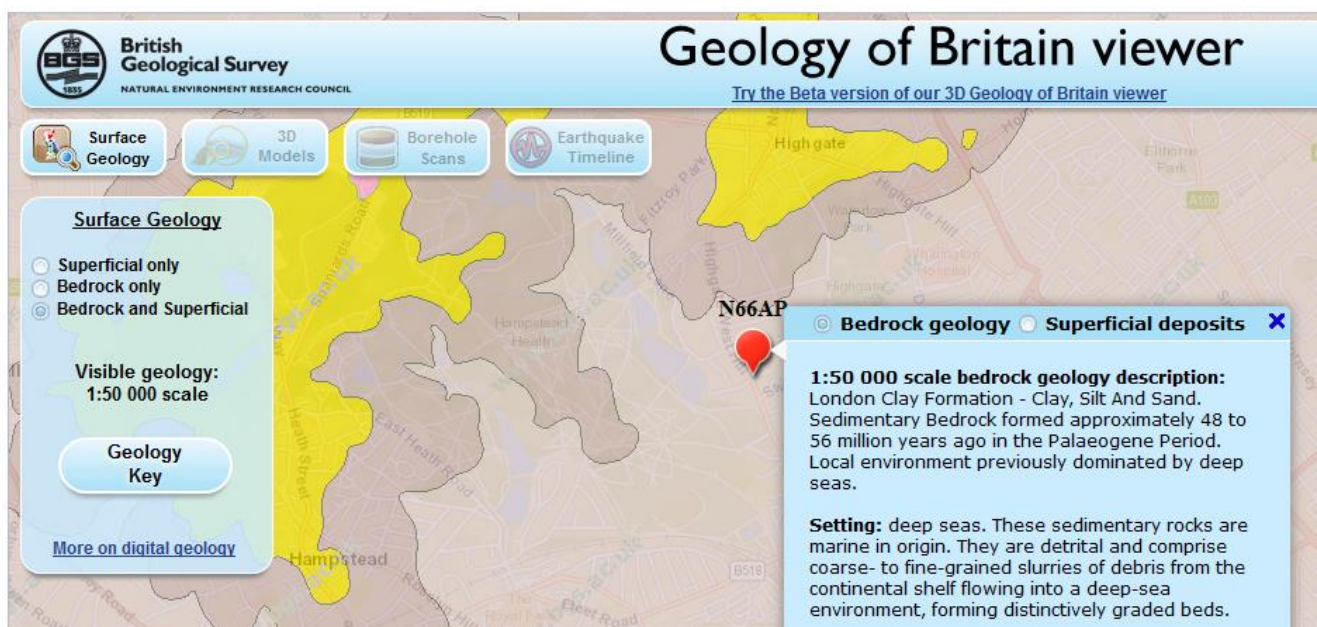
## 2. Tree survey

- 2.1 The tree survey was carried out by Philip Walker on 20<sup>th</sup> September 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 than 10 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**.

### 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 designed 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 shrinkable London Clay Formation – Clay, Silt and Sand (Figure 1). Thus, if foundations are to be altered or new ones constructed they will need to be deepened beyond 1 m to take account of trees. If site specific investigations confirm shrinkable clay 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 map showing that the site is underlain by London Clay Formation – Clay, Silt and Sand





#### **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 No removals are required to facilitate the proposed extension as there is sufficient distance to the nearest tree.

##### ***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.

##### ***Tree protection***

- 4.5 Trees T1 – T9 are to be retained and will be protected from mechanical damage to their trunk, branches and roots by the installation of 2 m high protective fencing 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 Space will be needed for construction workers to access the building and therefore parts of the RPAs will be protected by ground protection rather than fencing. The purpose of ground protection is to create a physical barrier between the soil and construction activities and to create a load-suspension platform to prevent compaction of the underlying soil.

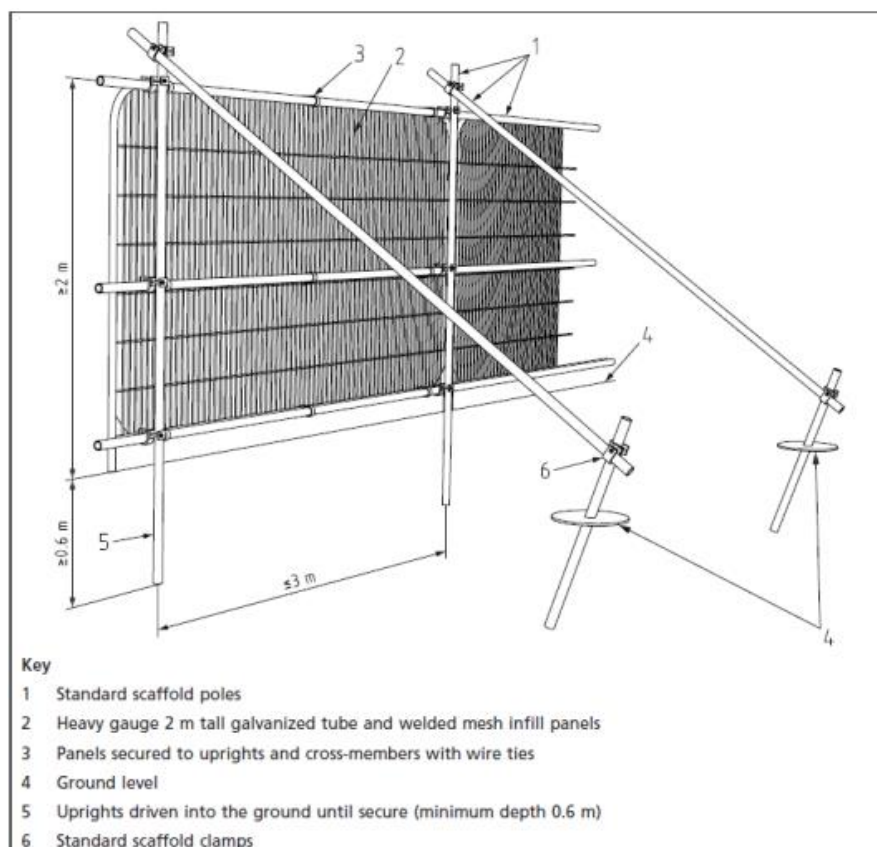
## 5. Arboricultural method statement and tree protection plan

- 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.

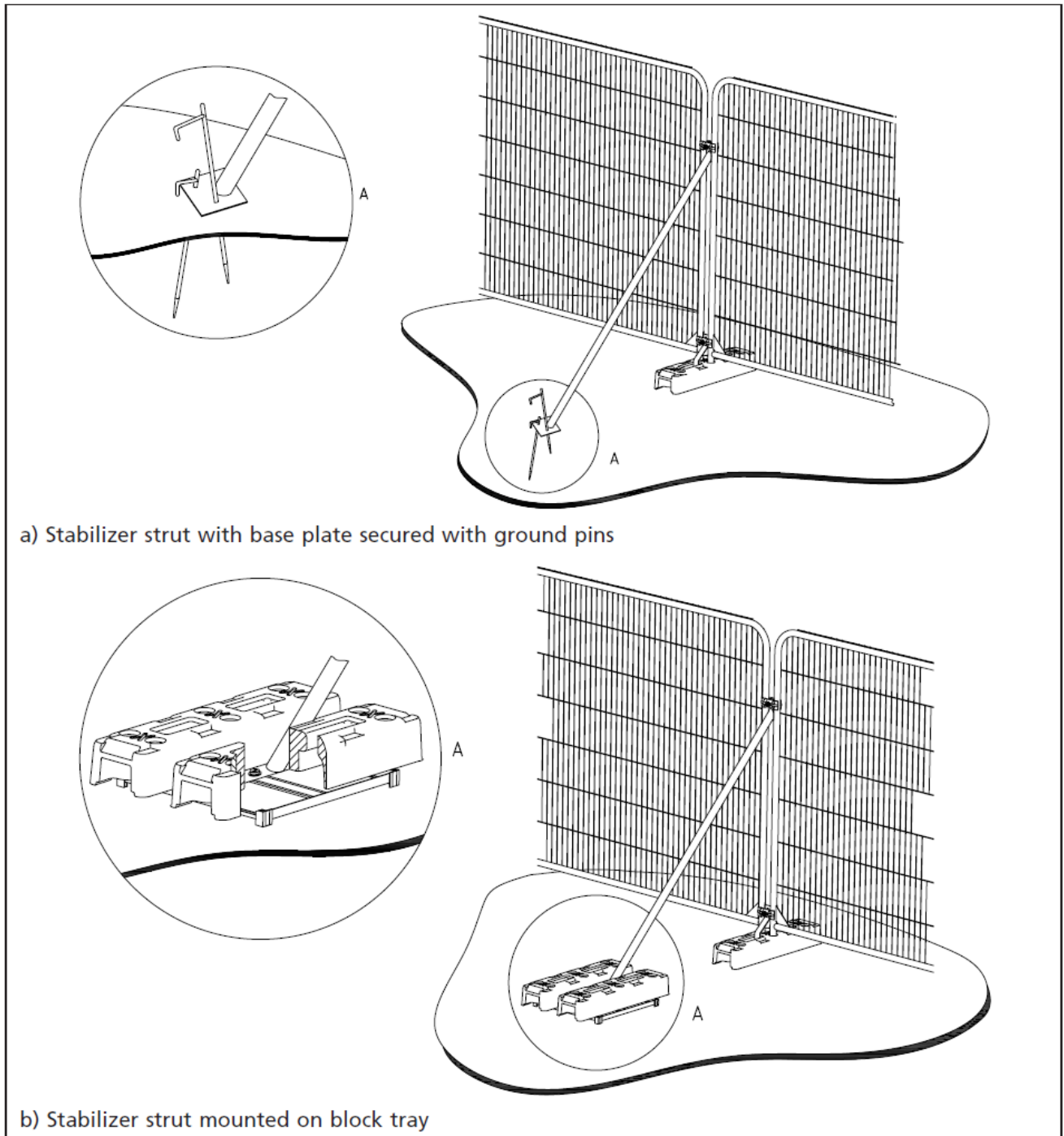
### Fencing and ground protection

- 5.3 Tree protection will comprise of 2 m tall fencing installed in the positions shown at **MD4** 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 2). 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 3.

**Figure 2.** Diagram to illustrate design of protective fencing with scaffolding anchored into the ground



**Figure 3.** Diagram to illustrate alternative design of protective fencing



**Figure 4.** Photograph to illustrate installed protective fencing





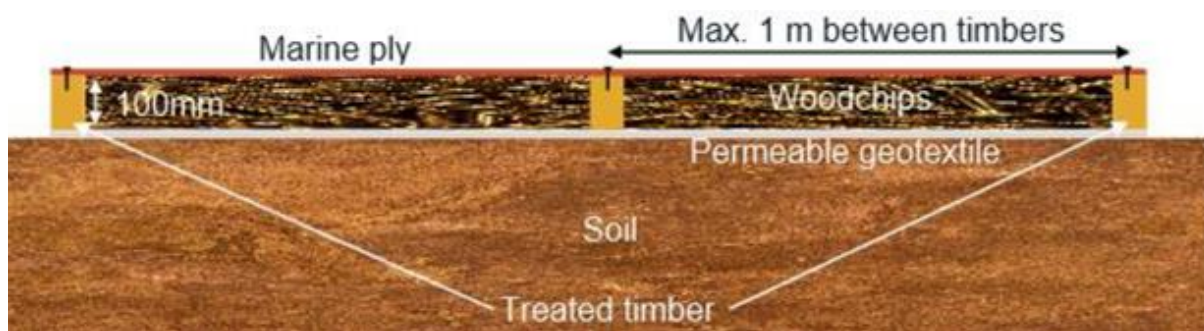
- 5.4 High visibility all weather notices at a size no less than A3 will be securely attached to each panel of the barrier around the CEZ with wording as shown in Figure 5.

**Figure 5.** Wording to be included in high visibility all-weather sign attached to protective fencing



- 5.5 In order to allow access for construction workers around the development it is proposed that part of the RPA will be protected by ground protection. This area, shaded blue on the tree protection plan (**MD4**), 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 material such as woodchips and will then be covered by 20 mm thick marine ply which will be screwed down onto the timber (Figures 6 and 7). The plywood may need to be coated with a non-slip paint.

**Figure 6.** Specification for ground protection



**Figure 7.** Plywood sheeting used as ground protection.



## **Arboricultural supervision**

- 5.6 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;
  - 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;
- 5.7 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 (**MD5**) 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.
- 5.8 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.
- 5.9 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.
- 5.10 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***

- 5.11 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, parking of vehicles, storage of materials and site huts***

- 5.12 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.

5.13 Delivery vehicles will park in the drive 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 trees. Any incidents must be reported to the project arboriculturist.

### ***Services***

5.14 It is anticipated that existing services will be used. But if new incoming (water, gas and electricity) or outgoing (foul sewer) services are 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.

## **6. Conclusions**

- 6.1 A BS5837: 2012 survey of nine trees has been carried out on or immediately adjacent to land at 107 Highgate West Hill, London, N6 6AP. Three trees are considered to be category A and of high value and four are considered to be category B and moderate value. The remainder are considered to be category C and are of low value.
- 6.2 No tree removals are required.
- 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 the leafy character of the area.

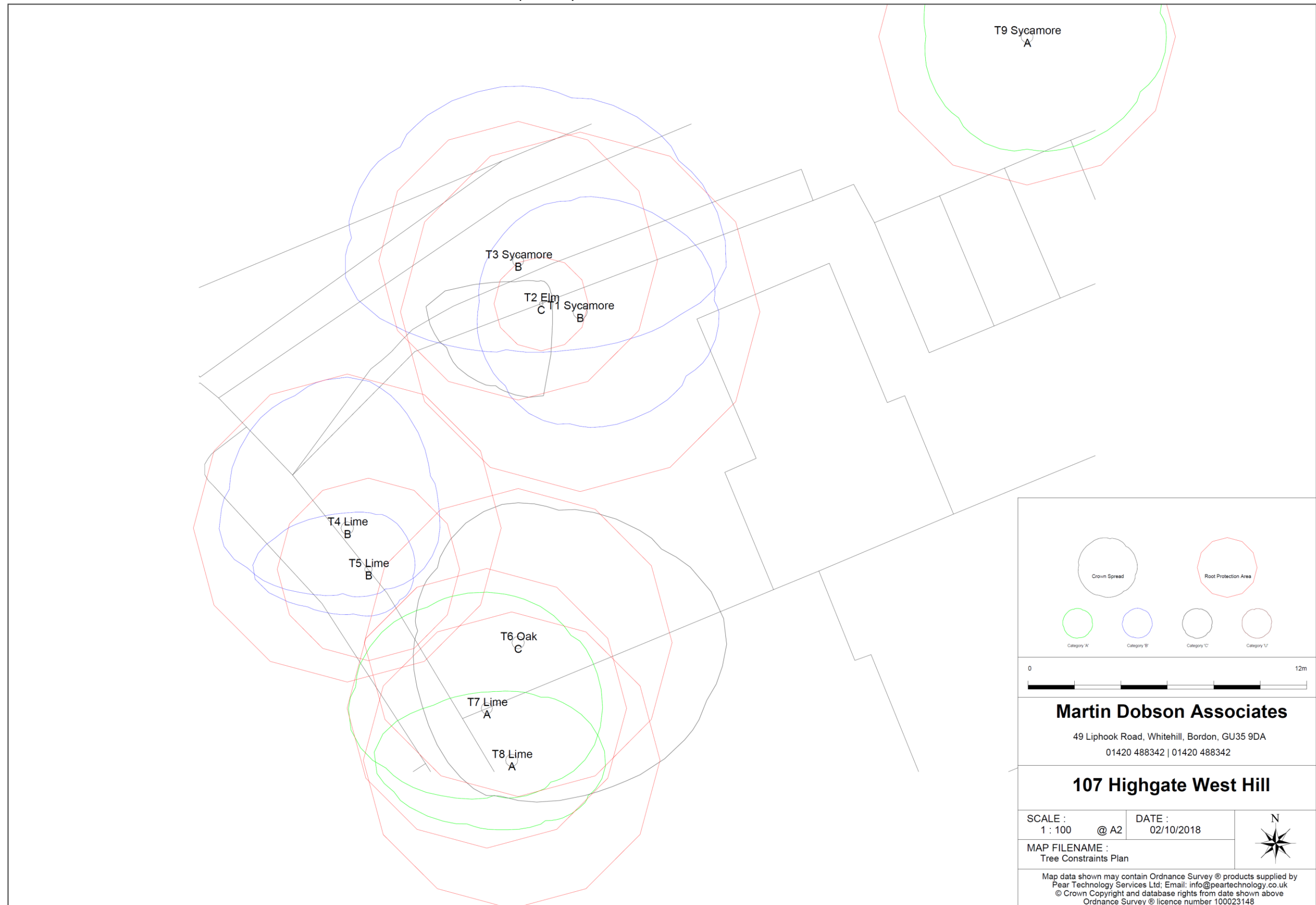


**APPENDIX MD1**  
Tree survey schedule (BS5837: 2012)

| 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       | Sycamore | 16         | 630                 | 5     | 5     | 6     | 4.5   | 5                             | Mature      | Good                    | Good                 | 20 to 40 yrs | B            | Ivy covered stem to 12m. Pollarded within the last 7-12 years   |
| T2       | Elm      | 10         | 165                 | 1     | 4     | 0.5   | 5     | 4                             | Young       | Good                    | Good                 | <10 yrs      | C            | Suppressed, growth biased SW  |
| T3       | Sycamore | 17         | 420/250             | 7.5   | 4     | 9     | 7.5   | 3                             | Semi-mature | Good                    | Good                 | 20 to 40 yrs | B            | Twin stemmed from ground level. Ivy covered to 15m. Smaller stem heavily biased E   |
| T4       | Lime     | 18         | 540                 | 6.5   | 3     | 4     | 5.5   | 4                             | Mature      | Good                    | Good                 | 20 to 40 yrs | B            | Pollard. Ivy covered to 12m. Cavity at 4m, ivy preventing inspection.   |
| T5       | Lime     | 18         | 320                 | 2.5   | 2     | 2     | 5     | 6                             | Semi-mature | Good                    | Good                 | 10 to 20 yrs | B            | Pollard. Growing against boundary wall, Small cavity at 4m pollard knuckle. Dead tree stem and basal growth preventing base inspection. |
| T6       | Holm Oak | 16         | 540                 | 6     | 7     | 9     | 4.5   | 0                             | Semi-mature | Poor                    | Fair                 | <10 yrs      | C            | Heavy lean E. Large cavity at base SW, signs of internal decay  |
| T7       | Lime     | 19         | 490                 | 5     | 4     | 5     | 6     | 6                             | Mature      | Good                    | Good                 | 20 to 40 yrs | A            | Neighbouring garden   |
| T8       | Lime     | 19         | 520                 | 3     | 3     | 4     | 6     | 6                             | Mature      | Good                    | Good                 | 20 to 40 yrs | A            | Neighbouring garden   |
| T9       | Sycamore | 14         | 520                 | 7     | 5     | 6     | 4.5   | 4.5                           | Semi-mature | Good                    | Good                 | 20 to 40 yrs | A            | Cavity at base SE   |

## APPENDIX MD2

Tree constraints plan (TCP) showing existing plot layout with tree numbers, BS5837: 2012 colour codes (A – Green, B – Blue, C – Grey) and root protection areas (Red Circles). The plan has been provided separately as a PDF at a scale of 1: 100 @ A2.



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

| Tree No. | Species  | Trunk diameter (mm) | BS5837: 2012<br>Root protection area, RPA, (m <sup>2</sup> ) | BS5837: 2012<br>Radial protection distance (m) |
|----------|----------|---------------------|--|--|
| T1       | Sycamore | 630                 | 179.6  | 7.6  |
| T2       | Elm      | 165                 | 12.3   | 2.0  |
| T3       | Sycamore | 489                 | 108.2  | 5.9  |
| T4       | Lime     | 540                 | 131.9  | 6.5  |
| T5       | Lime     | 320                 | 46.3   | 3.8  |
| T6       | Holm Oak | 540                 | 131.9  | 6.5  |
| T7       | Lime     | 490                 | 108.6  | 5.9  |
| T8       | Lime     | 520                 | 122.3  | 6.2  |
| T9       | Sycamore | 520                 | 122.3  | 6.2  |

APPENDIX MD4

Tree protection plan (TPP) showing retained trees, tree numbers and root protection areas (red circles). The location of protective fencing is shown as purple lines, ground protection as blue areas. The plan has been provided separately as a PDF at a scale of 1: 100 @ A2





## APPENDIX MD5

# TREE AWARENESS – SITE INDUCTION SHEET

SITE NAME: 107 Highgate West Hill, London, N6 6AP

**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 be 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

## APPENDIX MD6

### 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.