MARTIN DOBSON ASSOCIATES
ARBORICULTURAL CONSULTANCY

● Ivy House, 49 Liphook Road, Whitehill, Bordon, Hants, GU35 9DA
● Telephone: 01420 488342 ● Mobile: 07787 530983
● Email: info@martindobson.org.uk
● www.martindobson.org.uk

TREE SURVEY, ARBORICULTURAL IMPACT ASSESSMENT AND TREE PROTECTION PLAN

Report to accompany a planning application for rebuilding the boundary wall, extension to existing lower ground floor level, installation of air handling units at lower ground floor level at 6 Albert Terrace, London, NW1 7SU

Report by

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

On the instructions of Humphrey Kelsey Architecture

15th May 2018

MDA reference J21

Contents

1. Introduction

1.1 Martin Dobson Associates Ltd (MDA) were instructed by Humphrey Kelsey Architecture on 3rd March 2018 to prepare an arboricultural impact assessment and method statement report in relation to proposed development at 6 Albert Terrace, London, NW1 7SU. The trees on the site were surveyed by MDA for a previous application on 10th February 2017. The purpose of this report is to provide advice on tree protection during proposed rebuilding of the boundary wall, extension to the existing lower ground floor level and installation of air handling units at lower ground floor level.

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 Primrose Hill 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 and out of these six are limes of which five are considered to be Category B and of moderate value (T4 – T6 and T8 – T9) and one is category C and of low value (T7). Three recently planted trees in the front driveway/garden (T1 magnolia and T2 – T3 cherry) are Category C and are of low value. In general category C trees should not be considered a material constraint to development.

1.5 The proposed development requires the removal and replacement of the three Category C trees (T1 – T3) in the front paved garden.

1.6 The retained trees 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 Martin Dobson on 10th February 2017.

2.2 Appended at **MD1** is the tree survey schedule which provides details of the nine trees within the boundaries of the property (Figures 1 and 2).

Figure 1. Photograph of trees T1 – T3 at the front of 6 Albert Terrace

Figure 2. Photographs of lime trees T5 – T9 in the rear garden adjacent to the boundary wall looking towards mews house (left) and main house (right).

2.3 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 tabulated at **MD2** and are shown as circular polygons around the trees on the Tree Constraints Plans (TCP) at **MD3**/**MD4**.

2.4 The TCPs appended at **MD3**/**MD4** show the positions of the surveyed trees and give a reasonable indication of their comparative branch spreads. The drawing has been colour coded as follows:

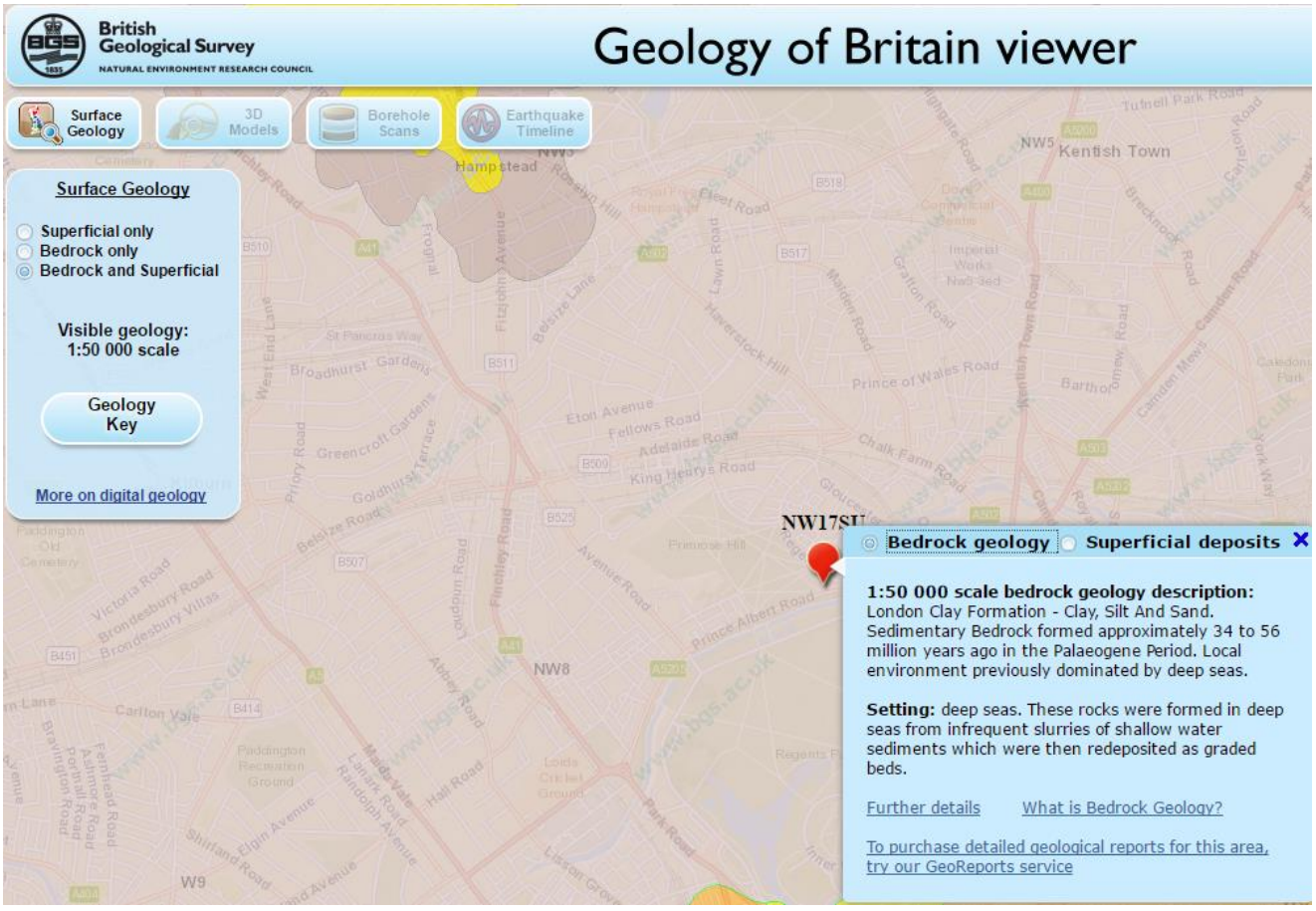
A trees (high quality and value, minimum 40 years useful life)	LIGHT GREEN
B trees (moderate quality and value, minimum 20 years useful life)	MID BLUE
C trees (low quality and value, minimum 10 years useful life)	GREY
U trees (unsuitable or dead/dying/dangerous, less than10 years useful life)	RED

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 shrinkable London Clay Formation – Clay, Silt and Sand (Figure 3). Thus, foundation design will need to take account of trees. The National House Building Council's Standards Chapter 4.2 *Building near trees* provides advice and recommendations. Lime is a moderate water demand species.

Figure 3. British Geological Survey 1: 50,000 scale map showing that the site is underlain by London Clay Formation.



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 three young Category C trees (T1 magnolia and T2 – T3 cherry) in order to extend the existing lower ground floor. The trees are about 4 m tall and are eight years old, having been planted in 2009 (Figure 4). It is therefore considered that they can be replaced by similar sized trees which can easily be obtained from a specialist nursery and it is proposed to replace them on a like-for-like basis. There will therefore be no net loss of trees.

Figure 4. Photograph of the front garden of 6 Albert Terrace taken in October 2009 showing newly planted trees T1 – T3 (Google StreetView). Current size of trees is shown in Figure 1.

Tree pruning

4.4 No pruning work is required to facilitate the proposed development as there is sufficient space between the proposed building works and retained trees that there are considered to be no conflicts. The lime trees (T4 – T9) have all been pollarded from time to time (last in 2015) and

therefore their crowns are much smaller than they would otherwise be. The trees will continue to be managed under a regular crown reduction/pollarding cycle as is common for trees of this kind in this area.

Tree protection

4.5 Trees T4 – T9 will be protected from mechanical damage to their trunks, 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 protective fencing.

4.6 The RPAs of T4 and T5 overlap with the existing lower ground floor, but it is considered that there will be no significant rooting under the building as foundations will extend beyond the principal rooting depth of the trees (about 1m).

4.7 In order to allow access for site workers, welfare facilities and scaffolding it is proposed that protective fencing will be stepped back from the edge of the building. The soil between fencing and the edge of the proposed new structure will be protected from spillages and compaction by means of ground protection installed above existing ground level and designed as a physical barrier.

4.8 Installation of the protection described in the Method Statement below and illustrated in the Tree Protection Plans (**MD5** – **MD6**) will ensure that no harm is caused to retained trees by the proposed development.

Re-building boundary wall

4.9 The existing boundary wall is located very close to the trunks of the lime trees T4 – T9 and therefore demolition and rebuilding of the wall could potentially damage them. In order to prevent damage the wall will be taken down using hand tools from the pavement side. The ground inside the RPA will benefit from temporary ground protection using plywood sheets. The existing foundations will carefully be removed and replaced with a pile and beam system that will be designed to minimise any damage to roots.

5. Arboricultural method statement and tree protection plan

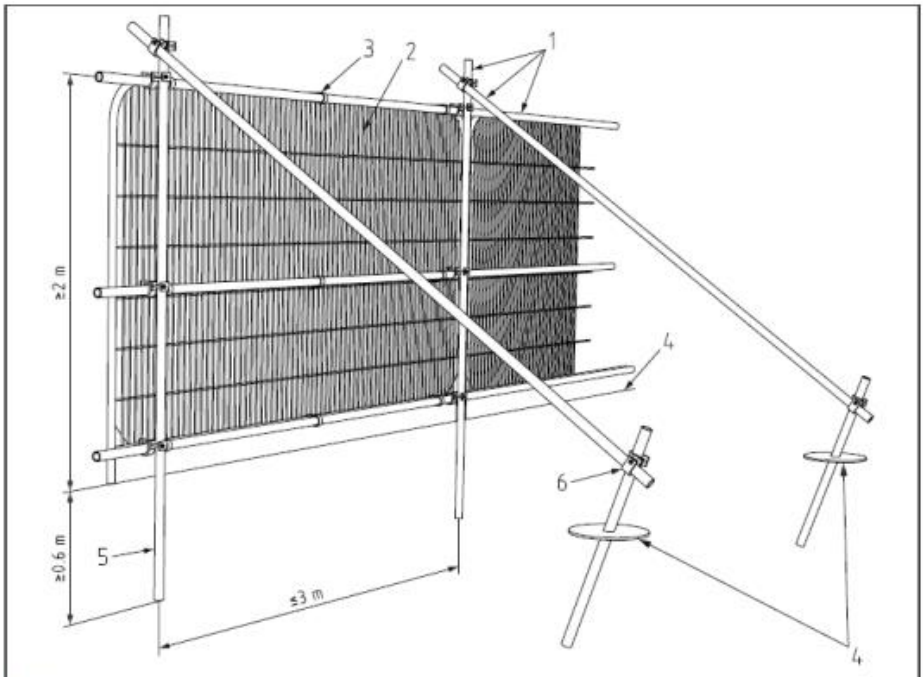
5.1 Trees can very easily be damaged during construction activities through their branches being broken by construction traffic passing close to the canopy or by root severance during the digging of foundation or service trenches. The majority of roots are to be found in the upper 600 mm of soil and 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 25 mm 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 **MD5** – **MD6** before the building is stripped out or demolition takes place or materials are delivered to site. 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. Weld mesh panels on unsecured rubber or concrete feet should 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

Figure 6. Diagram to illustrate alternative design of protective fencing with stabilizer struts.

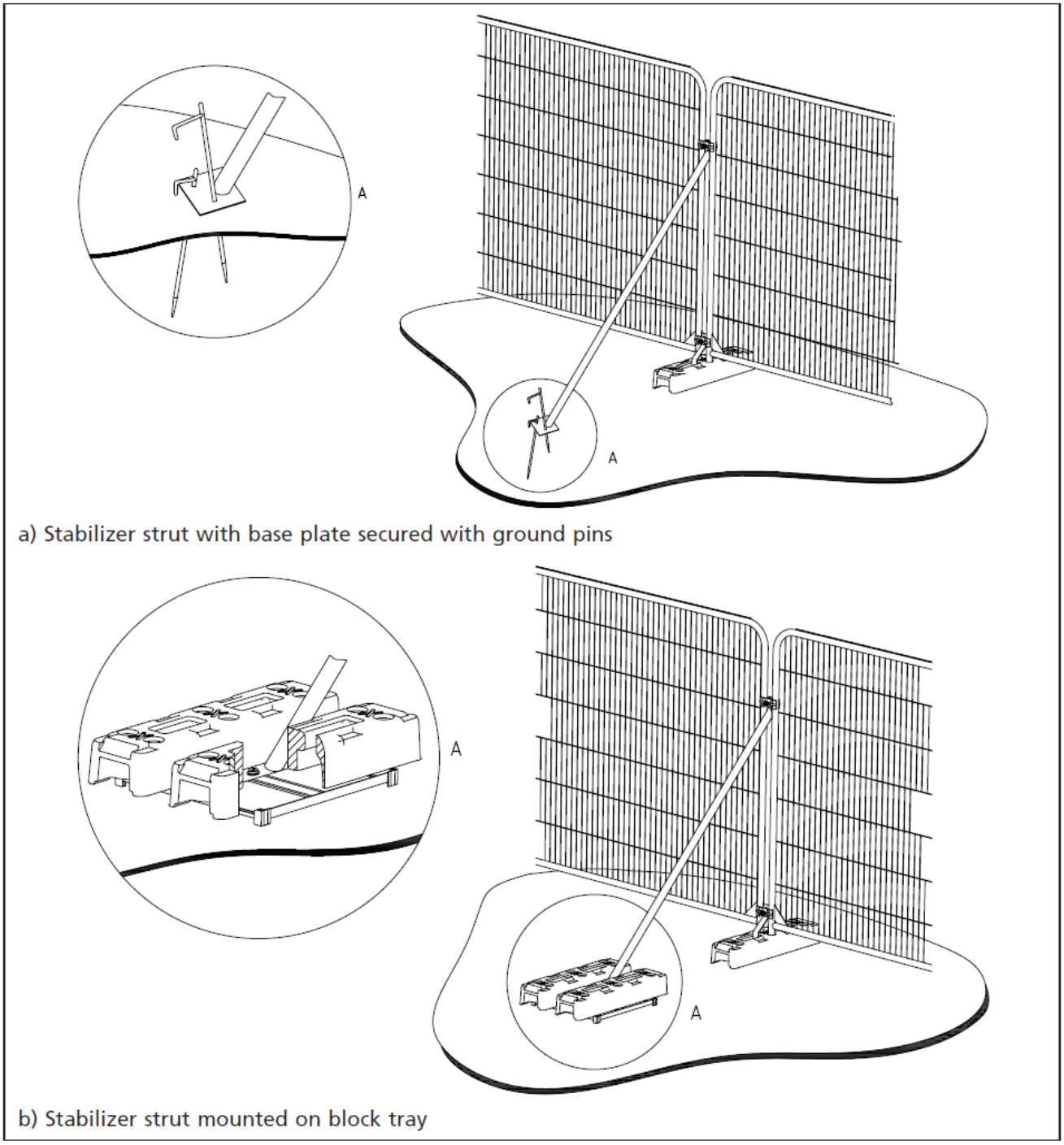


Figure 7. Photograph to illustrate installed protective fencing and ground protection

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 8.

Figure 8. Wording to be included in high visibility all-weather sign attached to protective fencing

5.5 In order to allow access for construction workers at the side and rear of the house it is proposed that part of the RPA will be protected by ground protection. This area, shaded blue on the Tree Protection Plans (**MD5** – **MD6**), 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 9 and 10). The plywood may need to be coated with a non-slip paint.

Figure 9. Specification for ground protection

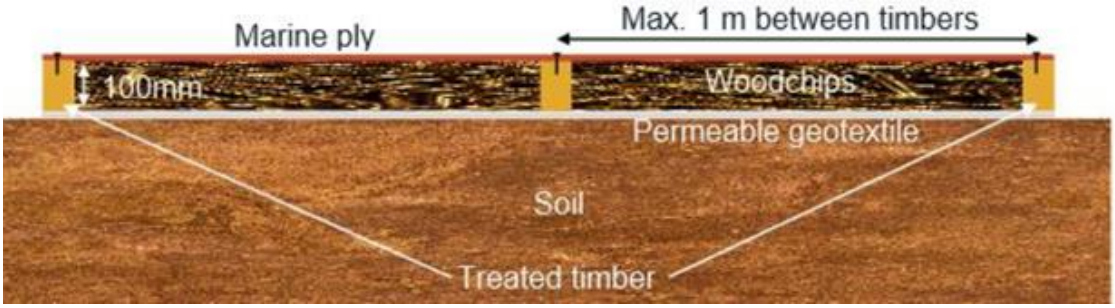


Figure 10. Plywood sheeting used as ground protection.

5.6 As an alternative, the ground protection may be formed of a 100 mm thick concrete plinth similar to that shown in Figure 6. The concrete must be laid over an impermeable membrane to prevent toxic alkaline leachate from the concrete affecting tree roots.

Re-building boundary wall

5.7 The existing boundary wall is located very close to the trunks of the lime trees T4 – T9. In order to prevent damage to roots or trunk the wall will be taken down using hand tools from the pavement side. The ground inside the RPA will benefit from temporary ground protection using plywood sheets. The existing foundations will carefully be removed and replaced with a pile and beam system that will be designed to minimise any damage to roots (**MD7**). Piles will be installed between tree trunks and will be linked by a reinforced concrete beam laid at a depth which is no more than existing foundations. Pile locations will be hand dug for the first 300 mm to confirm that no significant roots are present. If they are, the position of the pile will be moved accordingly.

Arboricultural supervision

5.8 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 (e.g. site manager) should take on the responsibility of overseeing tree protection. If appointed, the 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 provide induction and 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 (fencing and ground protection) but prior to any works commencing on site to confirm that it is fit for purpose;
- During excavation of existing boundary wall foundations and during piling to ensure roots are not damaged;
- At any time that there are potential conflicts with tree protection and/or at monthly intervals during lower ground works and at two-monthly intervals during above ground works;
- At the completion of construction works to confirm that tree protection may be removed to enable final landscaping;

5.9 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 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 (**MD8**) will be provided to and be signed by the site manager in recognition of acceptance of their role in enforcing day to day tree protection.

5.10 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 and be required to sign an Induction Sheet confirming they have understood the protection

measures. Signed sheets will be kept on site for inspection.

5.11 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.

5.12 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.

Burning of waste

5.13 No fires will be lit on site at all 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

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

5.15 Delivery vehicles will park on the road and materials will be offloaded into the area created by the demolition of the side extension. This is well away from protected trees.

Services

5.16 The proposed layout of incoming (water, gas and electricity) and outgoing (foul sewer) services is not yet established although it is understood that existing service runs will be used. 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

5.17 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

5.18 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 be prepared by others and will not involve any changes in soil levels, digging of any trenches or construction of masonry or retaining walls within root protection areas.

5.19 Three replacement trees, one magnolia and two cherries, will be planted in the front garden. New soil will be imported to create a suitable planting environment. Soil will be of a loam consistency and care will be taken to ensure that it is placed in such a way as not to cause compaction – which would inhibit tree establishment. The area outside the perimeter of the proposed lower ground floor is adequate to provide an equivalent area to the trees' existing RPAs. Additionally, there will be a minimum of 1 m of soil above the lower ground floor in order to provide a sustainable rooting environment into the future as set out in *Camden Planning Guidance: Basements and Lightwells* paragraph 2.

6. Conclusions

6.1 A BS5837: 2012 survey of nine trees has been carried out at 6 Albert Terrace, London, NW1 7SU.

6.2 Five trees are considered to be Category B and of moderate value (lime T4 – T6 and T8 – T9) and four are Category C and are of low value (T1 magnolia, T2 – T3 cherry and T7 lime). The three Category C trees in the front paved area (T1 – T3) will be removed and replaced.

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 character of the Conservation Area.

APPENDIX MD1
Tree survey schedule (BS5837: 2012)

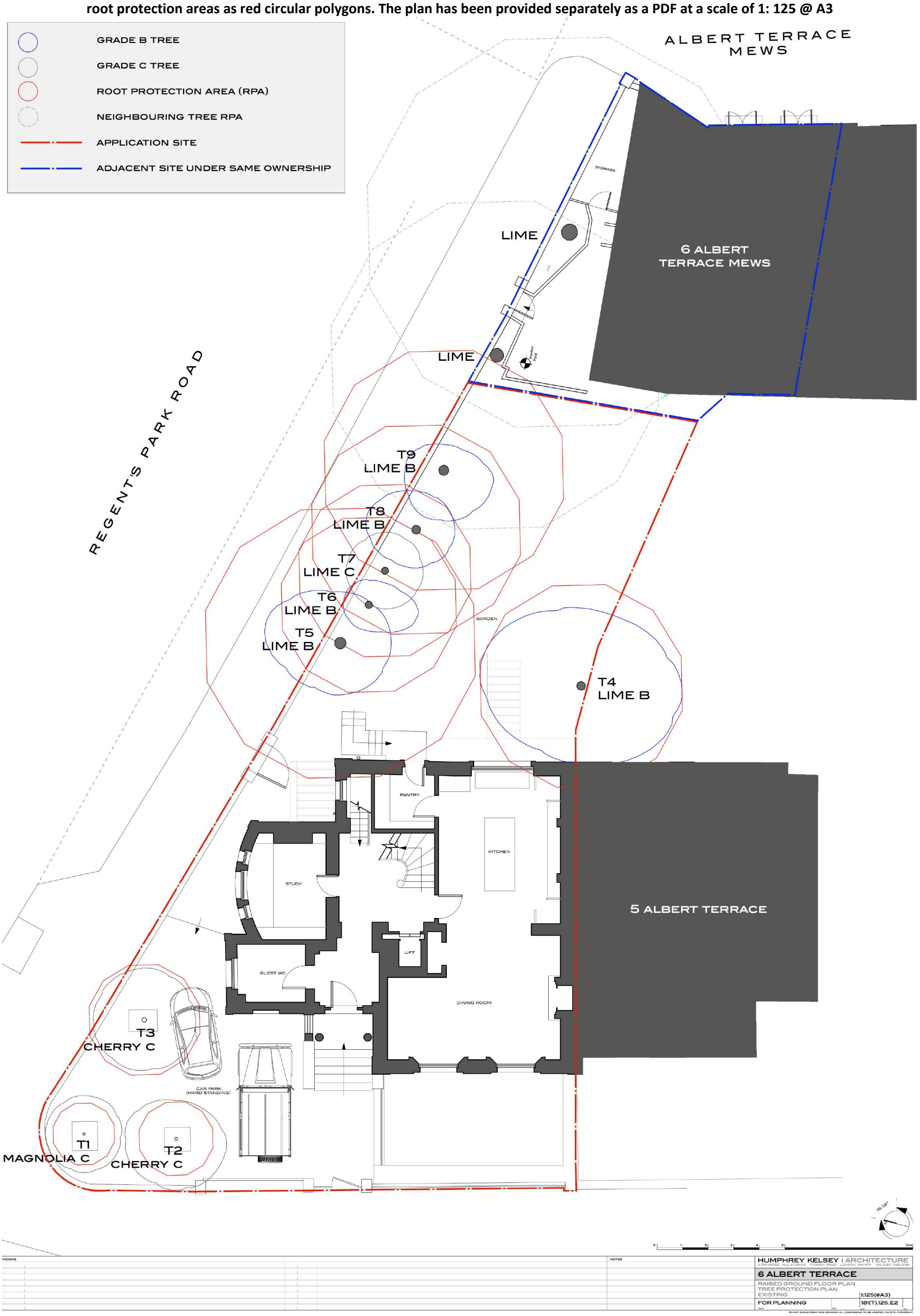
Tree No.	Species	Height (m)	Trunk diameter (mm)	N (m)	E (m)	S (m)	W (m)	Height of crown clearance (m)	Age class	Physiological condition	Structural condition	Useful Life (y)	BS5867 Grade	Comments
T1	Magnolia	4.5	100	1.5	1.5	1.5	1.5	1	Young	Good	Good	10-20	C	Small ornamental
T2	Cherry	4.5	120	2	1.5	2	2	2	Young	Good	Good	10-20	C	Small ornamental
T3	Cherry	4.5	180	2	2	2	2	2	Young	Good	Good	10-20	C	Small ornamental
T4	Lime	12	330	4	3	4	3	3	Semi-mature	Good	Good	20-40	B	Pollarded
T5	Lime	12	440	3	2	2	2	W3	Semi-mature	Good	Good	20-40	B	Pollarded
T6	Lime	11	285	1	1	2	1	8	Semi-mature	Good	Good	20-40	B	Pollarded
T7	Lime	10	280	1.5	1.5	1.5	1.5	8	Semi-mature	Good	Good	20-40	C	Pollarded
T8	Lime	12	340	2	1.5	1.5	1.5	8	Semi-mature	Good	Good	20-40	B	Pollarded
T9	Lime	12	390	1.5	1	2	2	8	Semi-mature	Good	Good	20-40	B	Pollarded

APPENDIX MD2
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	Magnolia	100	4.5	1.2
T2	Cherry	120	6.5	1.4
T3	Cherry	180	14.7	2.2
T4	Lime	330	49.3	4.0
T5	Lime	440	87.6	5.3
T6	Lime	285	36.8	3.4
T7	Lime	280	35.5	3.4
T8	Lime	340	52.3	4.1
T9	Lime	390	68.8	4.7

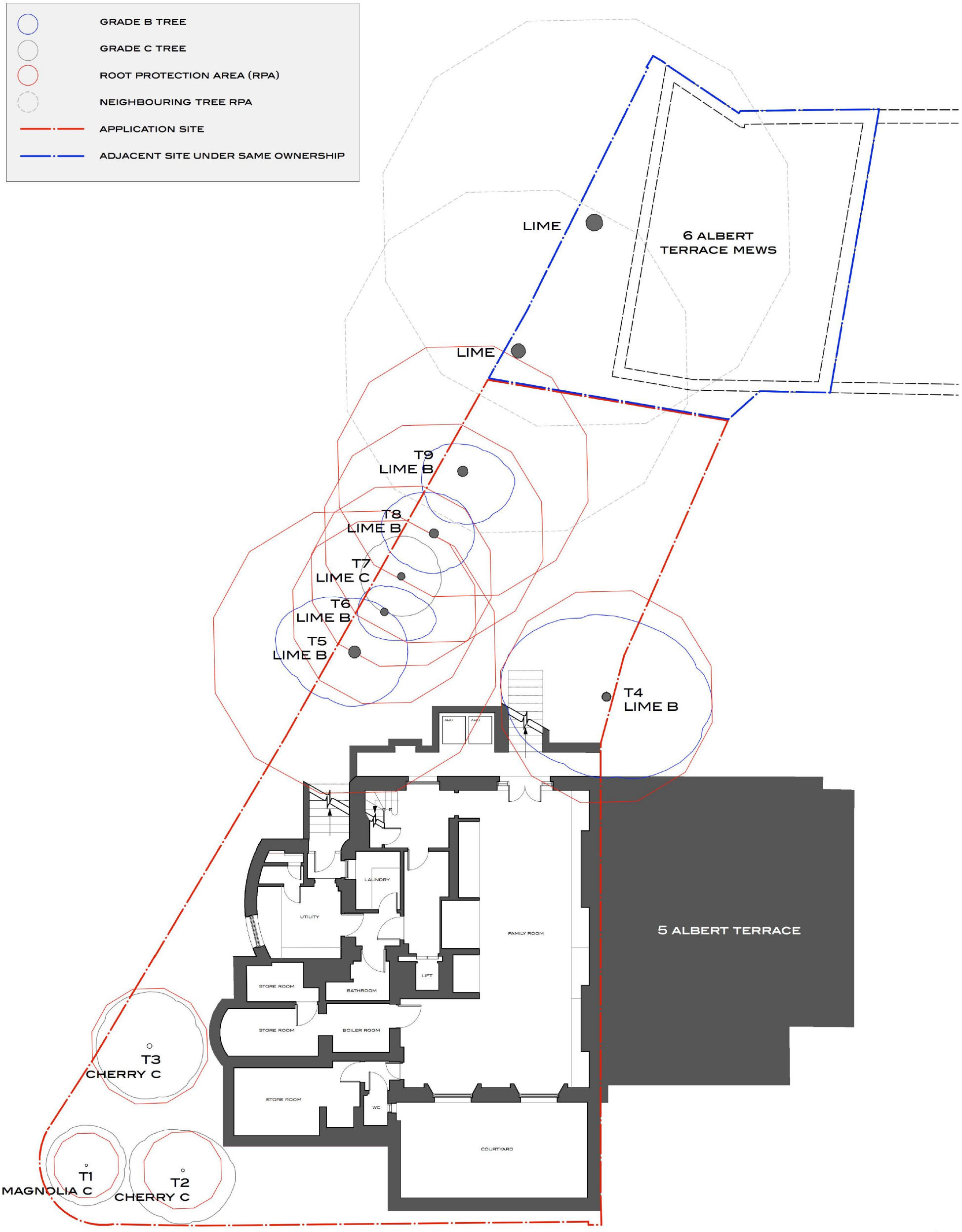
APPENDIX MD3

Tree constraints plan (TCP) showing existing ground floor and locations of trees (category B trees outlined in blue and Category C trees in grey) with root protection areas as red circular polygons. The plan has been provided separately as a PDF at a scale of 1: 125 @ A3



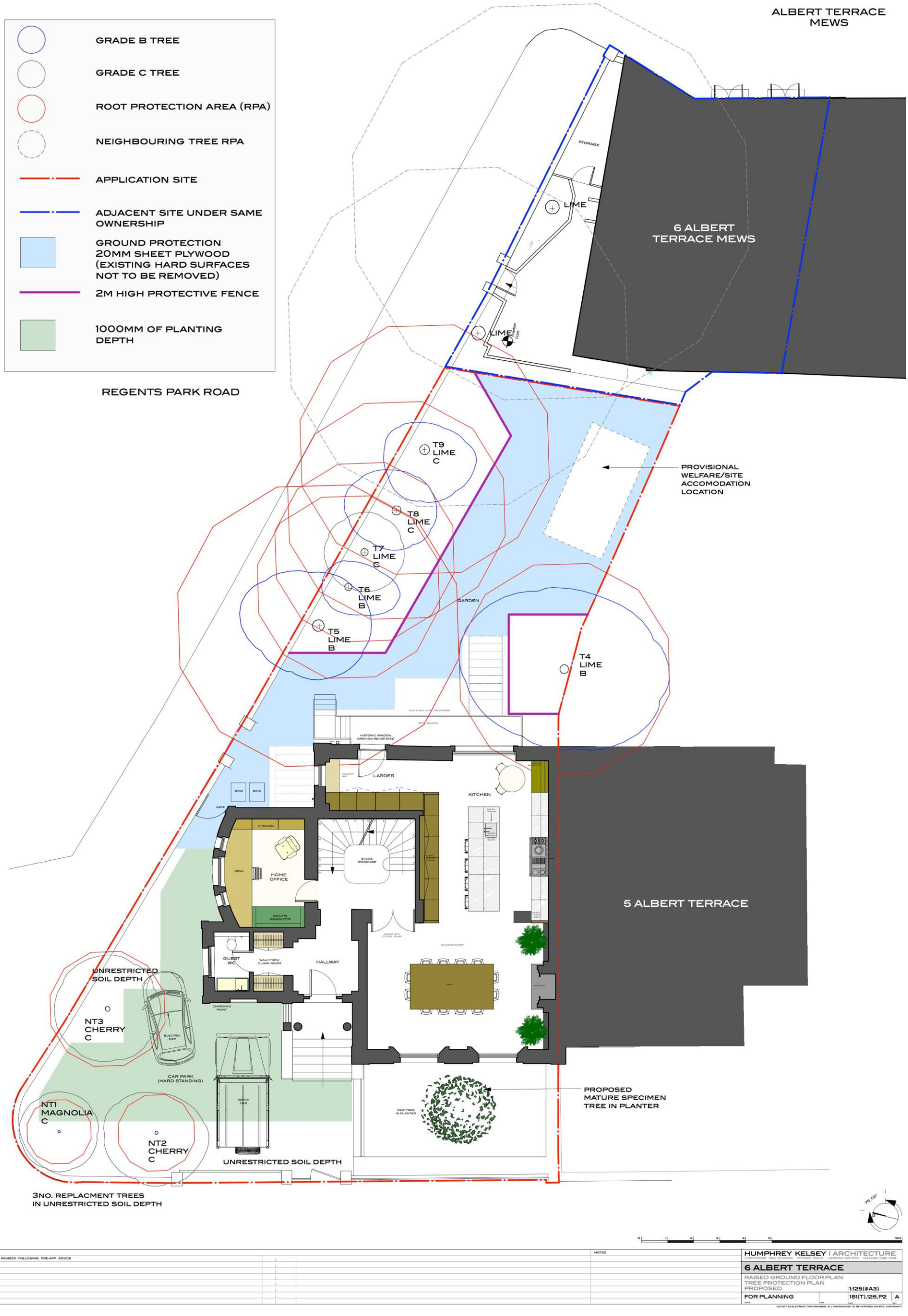
APPENDIX MD4

Tree constraints plan (TCP) showing existing lower ground floor and locations of trees (category B trees outlined in blue and Category C trees in grey) with root protection areas as red circular polygons. The plan has been provided separately as a PDF at a scale of 1: 125 @ A3



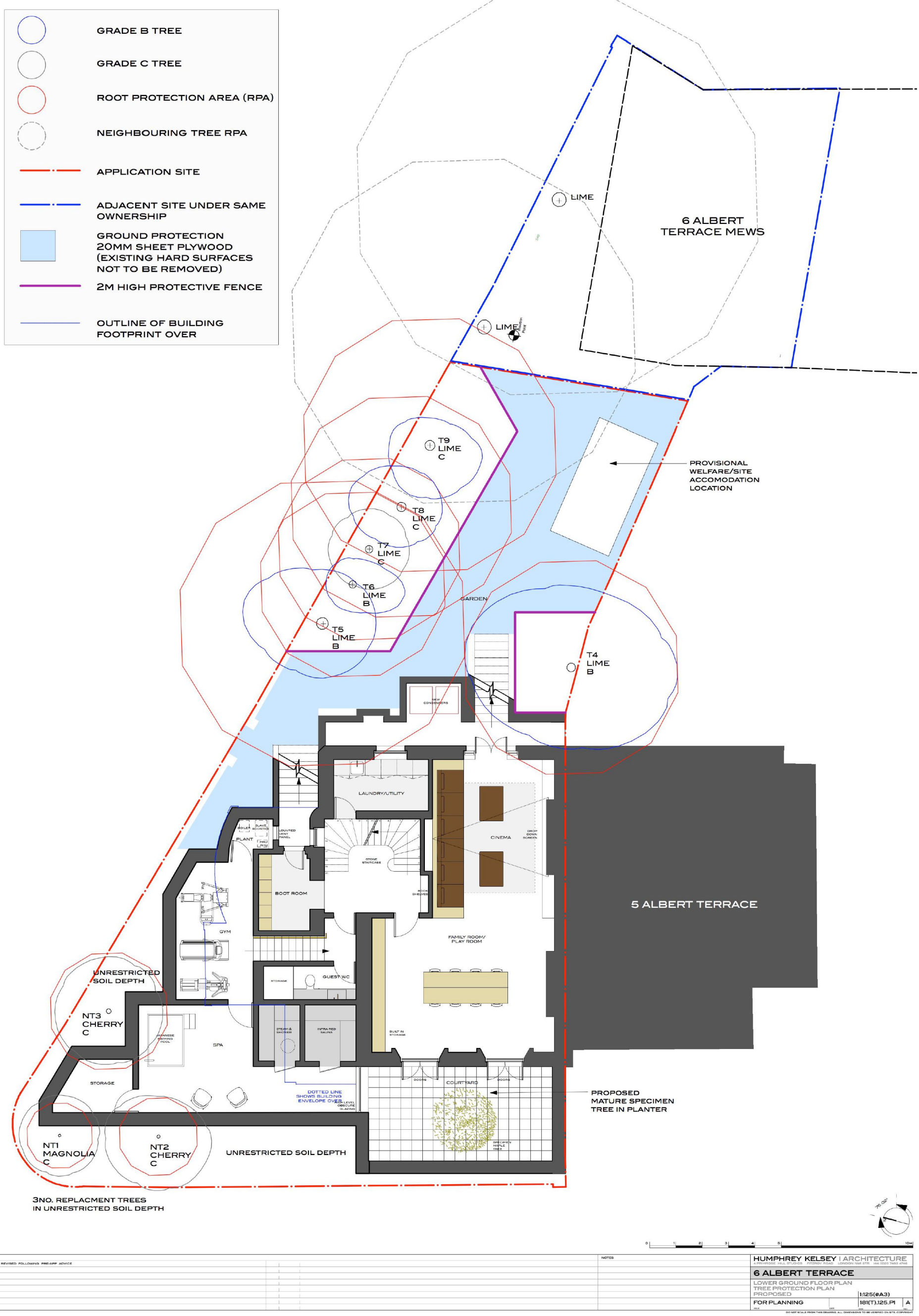
APPENDIX MD5

Tree protection plan (TPP) for proposed ground floor showing retained trees, tree numbers and root protection areas (red circular polygons). The location of protective fencing is shown as purple lines and ground protection as blue shading. The plan has been provided separately as a PDF at a scale of 1: 125 @ A3



APPENDIX MD6

Tree protection plan (TPP) for proposed lower ground floor showing retained trees, tree numbers and root protection areas (red circular polygons). The location of protective fencing is shown as purple lines and ground protection as blue shading. The plan has been provided separately as a PDF at a scale of 1: 125 @ A3



REVISIONS		NOTES	HUMPHREY KELSEY | ARCHITECTURE
A 22.01.18 REVISED FOLLOWING PRE-APP ADVICE			6 ALBERT TERRACE
			LOWER GROUND FLOOR PLAN TREE PROTECTION PLAN PROPOSED 1:125(@A3)
			FOR PLANNING 181(T).125.P1 A

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE VERIFIED ON SITE. COPYRIGHT

APPENDIX MD7

Schematic plan illustrating proposed re-construction of boundary wall on pile and beam foundations to ensure long-term stability and minimum root disturbance.

REVISIONS			NOTES
A	10.05.18	WALL PROFILE REVISED TO LPA COMMENTS	

HUMPHREY KELSEY | ARCHITECTURE
4 PRIMROSE HILL STUDIOS FITZROY ROAD LONDON NW1 8TR +44 (0)20 7483 4746

6 ALBERT TERRACE

BOUNDARY WALL ADJACENT TO LIME TREES
INDICATIVE FOUNDATION
PROPOSED

1:100(@A3)

FOR PLANNING | ISSUE | DATE | 181(T).100.BW | DWG | A | REV

APPENDIX MD8

TREE AWARENESS – SITE INDUCTION SHEET

SITE NAME: 6 Albert Terrace, London NW1 7SU

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

APPENDIX MD9

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.