

TREE SURVEY, ARBORICULTURAL IMPACT ASSESSMENT AND TREE PROTECTION PLAN

Report in support of a planning application for the installation of a double garage and new driveway in front of 1 Woodbury Avenue, Havant, Hampshire, PO9 1RH



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Report prepared for Mr Ted Brooks

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MDA Ref: E80

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1. Introduction

- 1.1 Martin Dobson Associates Ltd was instructed by Mr Ted Brooks, owner of 1 Woodbury Avenue, Havant, Hants PO9 1RH, to carry out a tree survey and to prepare an arboricultural report in support of a planning application to install a double garage at the rear of the property, and a driveway leading from the road to it.
- 1.2 The aim of the survey was to identify how trees on the property might potentially be affected by the construction of the new garage and driveway, and thus what were the best architectural solutions to minimise or avoid potential risk of damage to them.
- 1.3 The British Standard 5837: 2012 *Trees in relation to design, demolition and construction – Recommendations* provides guidance on how to decide which trees are appropriate for retention within a development, the means of protecting trees to be retained during the development (which may include both demolition and construction work), and the means of incorporating trees into the developed landscape. This report complies with the recommendations of the British Standard.
- 1.4 Six individual trees adjacent to the proposed development were surveyed. Two trees were considered to be moderate quality category B trees, and four were identified as low value category C trees.
- 1.5 All the trees will be retained, and will be protected during development. Details of tree protection are contained in this report.

2. Tree survey

- 2.1 Martin Dobson Associates Ltd carried out a survey of the trees on the site on 27th June 2016. The survey was carried out in line with British Standard 5837: 2012 *Trees in relation to design, demolition and construction - Recommendations*. Appended at **MD1** is a copy of the tree survey schedule which lists the six individual trees adjacent to the proposed development. 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 **MD2** 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 **MD2** and are tabulated at **MD3**.
- 2.5 The pre-existing layout of the site is shown in **MD2**. 1 Woodbury Avenue is situated at the corner of Langstone Road and Woodbury Avenue. The house is situated to the rear of the site, with a large front garden leading down to the road. There is an existing driveway leading up to the house, and a number of temporary buildings within the garden area.
- 2.6 The western boundary of the property is demarcated by a wooden fence and a series of mature trees which provide important screening. Two smaller trees occur along the western area of the garden, beneath the canopy of the larger trees.

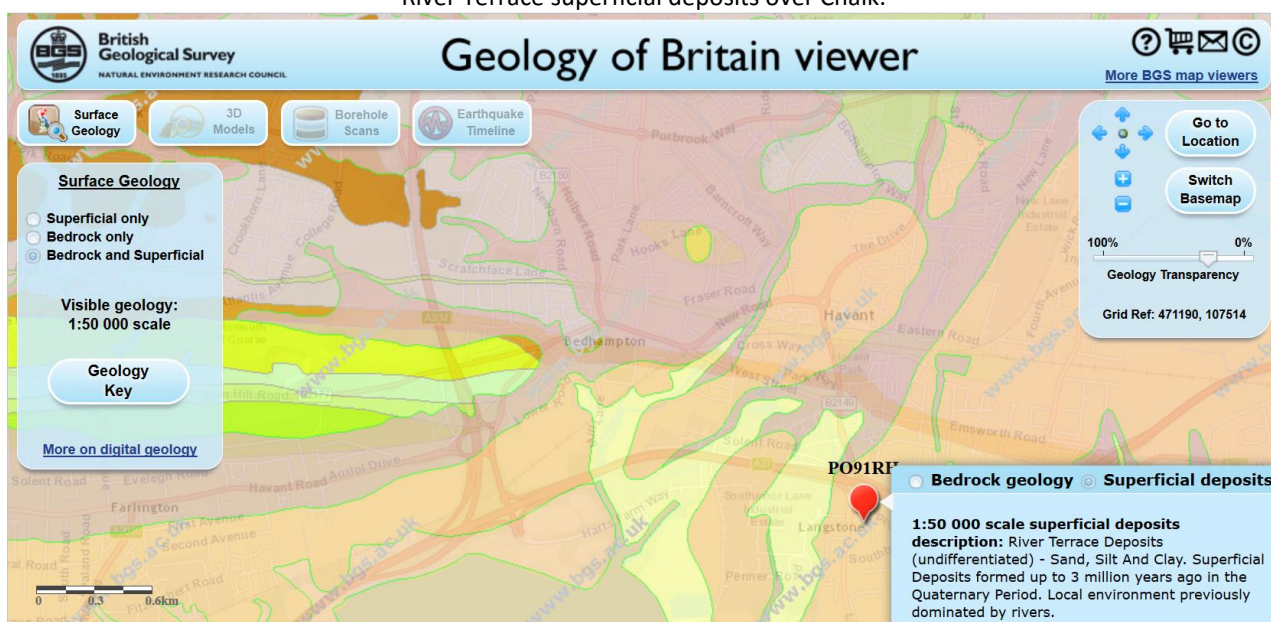
Tree population

- 2.7 In more detail, tree T1, an ash of low quality (C category) is located at the south-western corner of the property, close to the current site entrance and driveway. Further north, T2, a Pittosporum of relatively small stature (category C) occurs between T1 and T3, another ash of moderate value (category B). T4 is another ash, considered of low value (category C). T5 is an Irish Yew, of small stature and low value (category C) which is overshadowed by T4 and T6, a large beech of moderate value (category B).

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 below-ground structures 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 superficial River Terrace deposits over Chalk (Figure 1). These deposits are variably composed of sands, silts and clay materials and the map does not attempt to identify which occur on the site. Hence, it is recommended that investigations be conducted to identify if clay materials occur on site in order that the possible effect of trees on the shrink-swell behaviour of the soil be further understood. If shrinkable soil is detected foundations should be designed with reference to the National House Building Council's Guidance Chapter 4.2 *Building near trees*

Figure 1. Extract from British Geological Survey 1: 50,000 scale geological map indicating that the site is underlain by River Terrace superficial deposits over Chalk.



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 does not require the removal of any trees.

Tree pruning

- 4.4 The proposed development does not conflict with the branches of existing trees and therefore no pruning is required.

Tree protection

- 4.5 The retained trees 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.
- 4.6 The proposed location for the new garage lies outside the root protection areas of the trees in the front garden of the property. In contrast, the driveway is within the RPAs of many of the trees. The driveway will therefore be constructed above existing ground level using a cellular confinement system as recommended by BS5837 which will minimise ground disturbance through excavation and will prevent compaction of the underlying soil. The driveway will form an essential component of tree protection measures as it will serve as a ground protection layer. It is therefore crucial that the drive should be installed before any activities associated with garage construction take place in order to ensure that the ground is protected throughout operations.

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.
- 5.3 BS5837:2012 recognises that construction may need to take place within tree root protection zones, and gives guidance on how this might proceed, provided that root loss is minimised. The basic requirement is that existing hard structures are removed with little or no disturbance to the underlying soil containing tree roots and that new subterranean construction is minimised through selection of appropriate engineering solutions. The Tree Protection Plan (**MD4**) has been produced according to the principles in BS5837:2012.
- 5.4 It is proposed that parts of the driveway will be constructed using no-dig principles (see section 5.8) before construction of the garage, as this will ensure that important RPAs are protected during construction.

Protective fencing and overhead tree protection

- 5.5 Tree and soil protection will comprise of 2 m tall fencing installed in the positions shown as a red dashed line at **MD4** 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.
- 5.6 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.
- 5.7 Fencing will not be taken down under any circumstances during construction unless with the express approval of the local authority.

Figure 2. Diagram to illustrate design of protective fencing

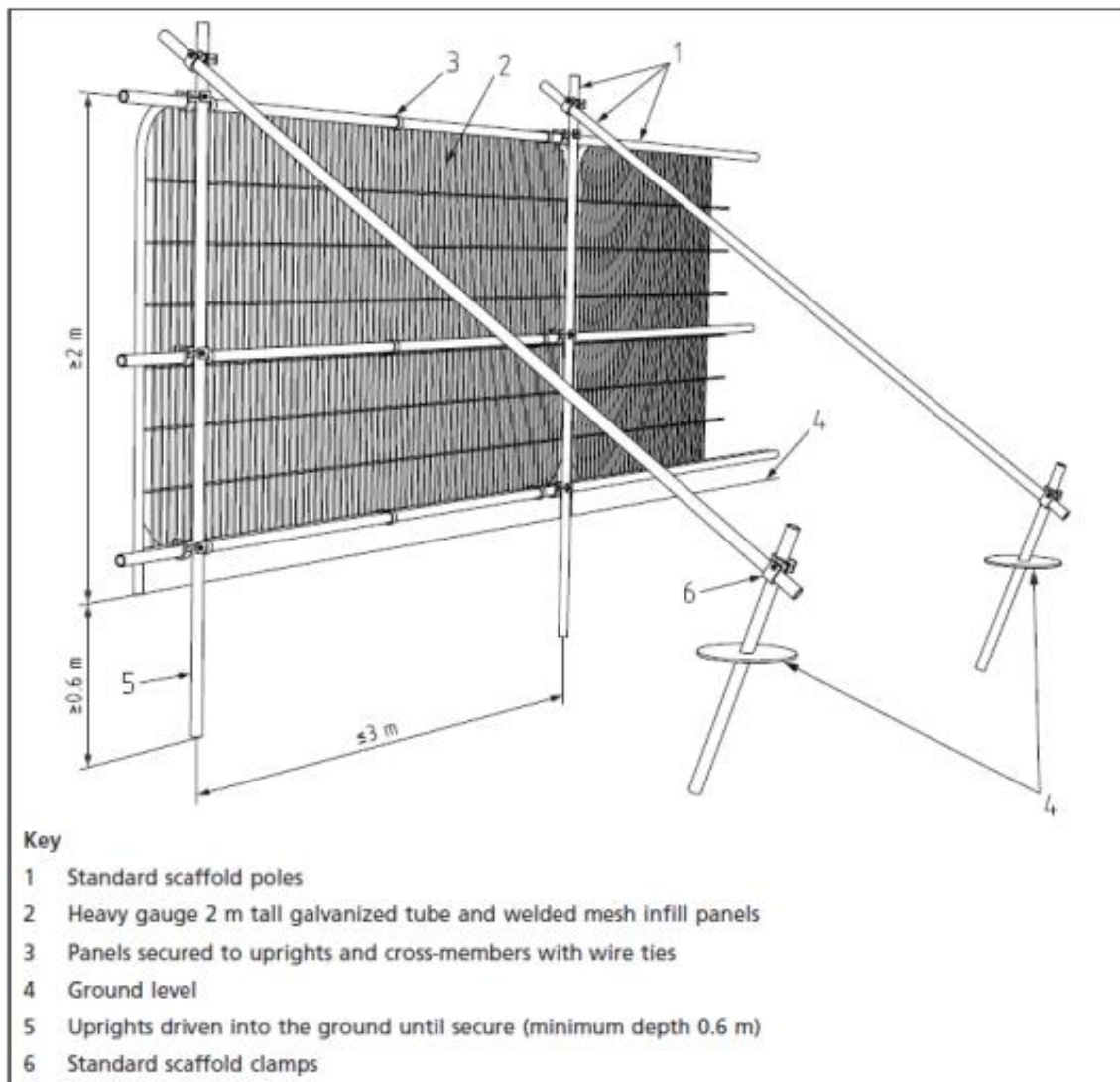


Figure 3. Wording to be included in high visibility all-weather sign attached to protective fencing.



Installation of above ground no dig driveway

5.8 The sequence of events to be followed for installation of the above-ground no-dig driveway (hatched in purple at **MD4**) is as detailed below, and given in greater detail in **MD5**. Copies

of **MD5** will be distributed to operatives involved in installation before operations commence by the site manager or project arboriculturist.

- 5.9 Stones, bricks and no more than 100 mm of topsoil will be removed from within the driveway area using hand tools and the area will be approximately levelled using hand tools only. These operations will take place progressively, starting with areas furthest away from the entrance to the highway in order to minimise trafficking of soil. Tracked or wheeled vehicles will not be used on unprotected ground.
- 5.10 Once soil has been levelled, a layer of Treetex geotextile will be laid over the ground in the area marked in mauve on **MD4**, overlapping as necessary (see **MD5**), working progressively from the entrance into the property.
- 5.11 A cellular confinement system (e.g. Geosynthetics Cellweb TRP¹) 100 mm thick will be laid out over the geotextile and pegged in place (Figure 4), again working progressively from the property entrance. Care will be taken to ensure that cells are stretched to the recommended extent.
- 5.12 Wooden treated timber board edging laid above ground will be used and will be anchored by the use of wooden or metal pegs driven into the ground.
- 5.13 The cellular confinement system will be filled with no-fines clean angular roadstone to BS EN 13242 or BS EN 12620 standard. Filling will take place working from the road inwards so that any machinery required works on filled rather than empty cells. Banked soil will be used outside the construction to mask retaining boards.
- 5.14 Figures 4 and 6 give cross sections/details indicating the proposed finished ground levels, surface materials including sub-base and depth of construction and method/materials used for edging within protected zone around retained trees.

Figure 4. Photographs illustrating cellular confinement system used to form an above-ground no-dig driveway.



¹ <http://www.geosyn.co.uk/product/cellweb-tree-root-protection>

INDICATIVE CROSS SECTION OF THE RAMP WITH CELLWEB REINFORCED SUBBASE

Treated timber Edging or similar. Specified by others.

Final surface & thickness to be confirmed as per client detail

25mm Overfill of clean angular stone

25mm Overfill of Subbase Type 1

Cellweb TRP with clean angular stone Type 4/20

Cellweb TRP infill with Concrete or Subbase Type 1

Treetex Geotextile for Separation

200 mm

Note: 3 or 4 cells filled with Concrete or Subbase Type 1

 Geosynthetics Trading from: 100-102 Hargrave Road Wetherill Park NSW 2150 Australia Tel: (02) 9555 0770 Fax: (02) 9555 0774 www.geosyn.com.au	Project: Standard Ramp Cross Section	Description: Standard Ramp Cross Section	Drawn By: P/B R/R	Scale: NTS Version: V1	Date: 15/05/2015 Drawn Cross Section	Checked By: PG
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Standard Mot type 1 material

Cellweb with Mot type 1 infill extending 1m beyond R.P.Z.

Cellweb TRP 75-200mm with Clean angular stone Type 4/20 or 20/40 mm.

Treetex T300 Geotextile for separation

 Geosynthetic Ltd Harlow Road, Harlow, Essex, UK Harlow, Essex, UK Tel: 02045 817188 Fax: 02045 817189 www.geosyn.co.uk	Project: Cellweb 75-200mm TRP std. construction transition detail	Description: Std. Construction Transition Detail	Drawn By: PVB Ref: —	Scale: NTS Version: V1	Date: 18/07/2014 Sheet: Cellweb transition detail	Checked By:
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5.15 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.

5.16 All machinery required on site will operate outside of root protection areas or from the ground protection.

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.

- 5.18 Landscaping will not involve any changes in soil levels, digging of any trenches or construction of masonry or retaining walls within root protection areas.

Communication and supervision

- 5.19 It is recommended that this Tree Protection Plan should be made available to and be read by all professionals involved with tendering for and implementing any planning consent obtained before any construction activities commence at the property.
- 5.20 A pre-start meeting will be held on site between 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.
- 5.21 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.
- 5.22 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.

6. Conclusions

- 6.1 A survey of trees has been carried out in accordance with the British Standard 5837: 2012 *Trees in relation to design, demolition and construction - recommendations*. Six individual trees were surveyed. Two trees are considered to be moderate quality category B and four are low value category C trees.
- 6.2 All trees will be retained and protected during development. Methods for ensuring their protection have been described.
- 6.3. It is considered that the proposed development will pose no threat to trees to be retained.

APPENDIX MD1
Tree survey schedule (BS5837: 2012) for 1 Woodbury Avenue, Havant

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 (yrs)	BS5867 Grade	Comments
T1	Ash	14.5	380	3	4.5	4	6.5	3	MA	Moderate	Good	40+	C	ivy clad trunk; some dieback of lower branches
T2	Pittosporum*	4	150	0.5	1	0.5	1	1.5	Y	Good	Good	<20	C	ivy clad
T3	Ash	15	370	4	3	4	6.5	3	MA	Good	Good	40+	B	some dieback of lower branches; some pruning of lower branches into garden
T4	Ash	17	430	4.5	5.5	4	5.5	3	MA	Good	Good	40+	C	pruning and dieback of lower branches
T5	Irish yew	6	130	2	1.5	2.5	1.5	0	Y	Good	Good	<20	C	overshadowed by trees T4 and T6
T6	Beech	21	640	4.5	8	5.5	5.5	3	M	Good	Good	40+	B	Slight dieback (<5%) of some twigs

* multiple stems

N, S, E, W are maximum dimensions of tree crown from centre

Y - young (up to one third life expectancy)

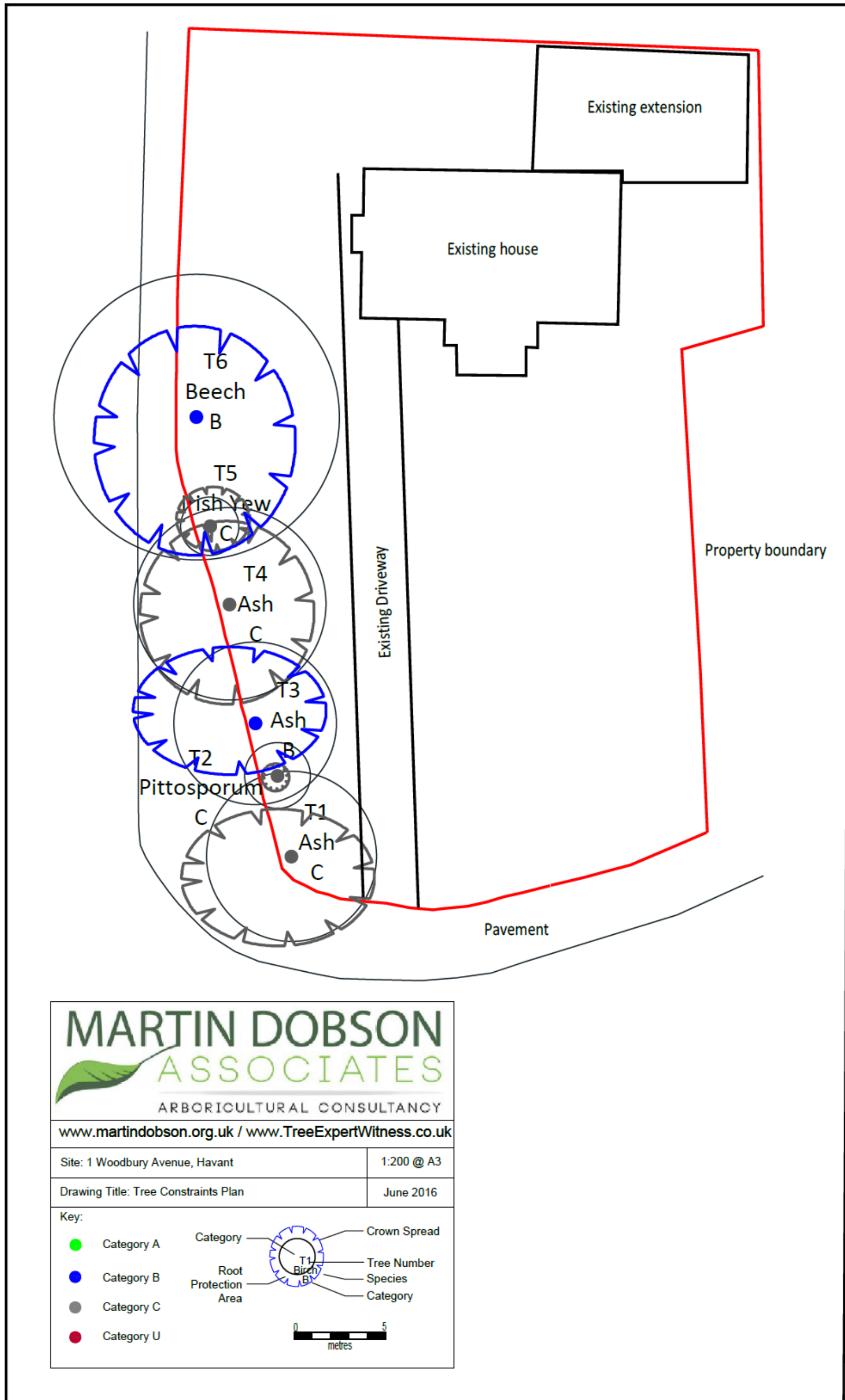
MA - mid aged (one third to two thirds life expectancy)

M - mature (more than two thirds of life expectancy)

OM - overmature

APPENDIX MD2

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

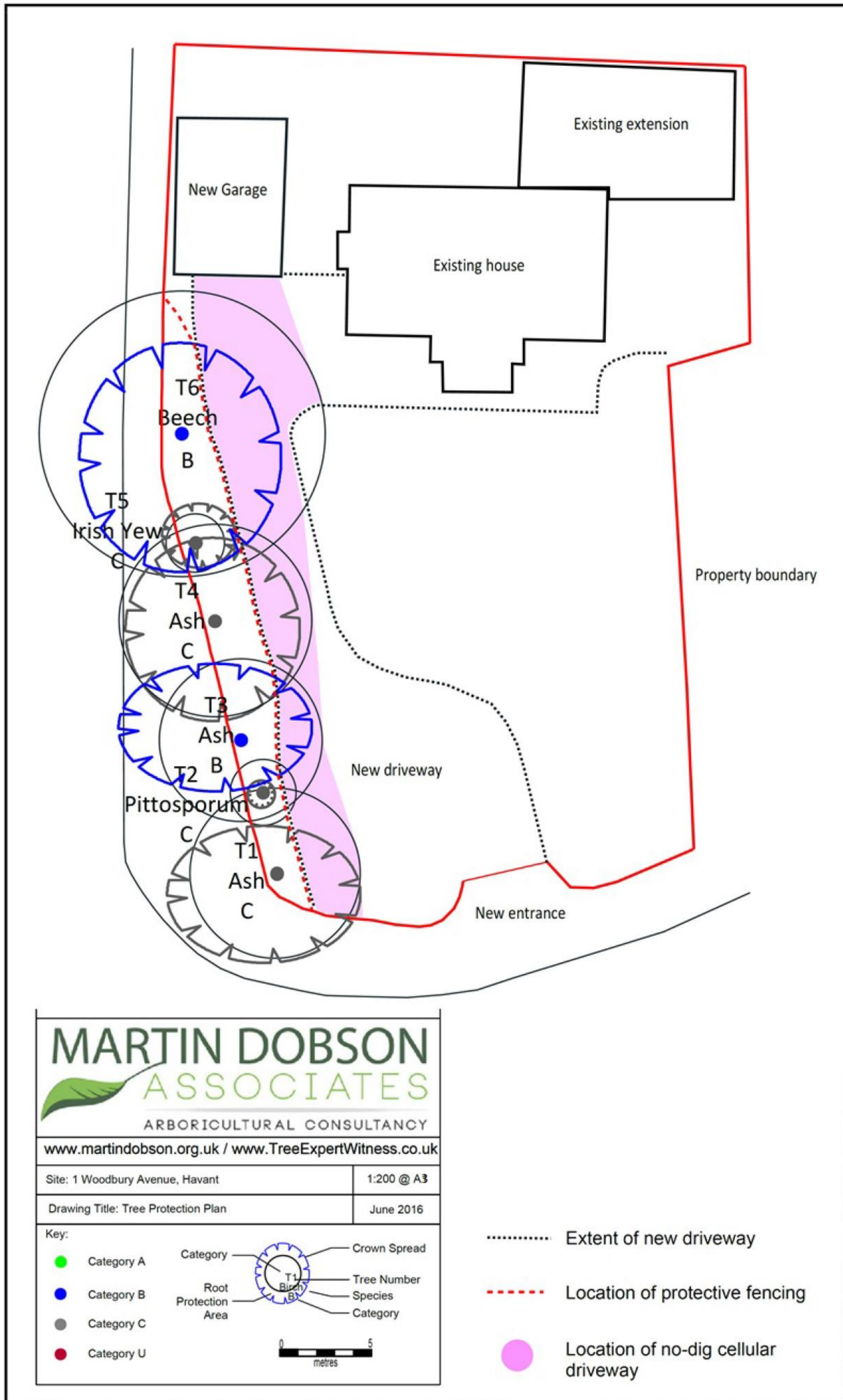


APPENDIX MD3
BS5837: 2012 schedule of root protection areas

Tree number	Species	Trunk diameter (mm)	BS5837: 2012 Root protection Area (RPA) (m ²)	BS5837: 2012 Radial Protection Distance (m)	BS5837 Grade
T1	Ash	380	65.3	4.6	C
T2	Pittosporum*	150	10.2	1.8	C
T3	Ash	370	61.9	4.4	B
T4	Ash	430	83.7	5.2	C
T5	Irish yew	130	7.6	1.6	C
T6	Beech	640	185.3	7.7	B

APPENDIX MD4

Tree Protection Plan showing location of no-dig cellular driveway construction (mauve shading) and position of protective fencing (dashed red line)



APPENDIX MD5

Cellweb installation guide

PRODUCT DATA SHEET

Geosynthetics Limited Tel: 01455 617 139 Fax: 01455 617 140 Email: sales@geosyn.co.uk

Cellweb® TRP Installation Guide



Step 1: Prepare Surface



Step 2: Lay out Treetex™



Step 3: Lay out Cellweb® TRP

- Cellweb® TRP is a NO DIG tree root protection measure and it is recommended that no excavation be performed without prior approval and guidance from the Local Authority Arboricultural Officer.
- Soil compaction from vehicles, machinery and materials is to be strictly prohibited during construction within Root Protection Areas (RPAs).
- Approval must be obtained from the Local Authority that the design and the method of construction is acceptable.
- Further information is available from the following two documents;
 - British Standard BS5837: 'Trees in Relation to Design, Demolition and Construction' (2012).
 - Arboricultural Advisory and Information Service: Practice note 12 – 'Through the Trees to Development' (APN12).

Installation Method

1. Prepare the Surface

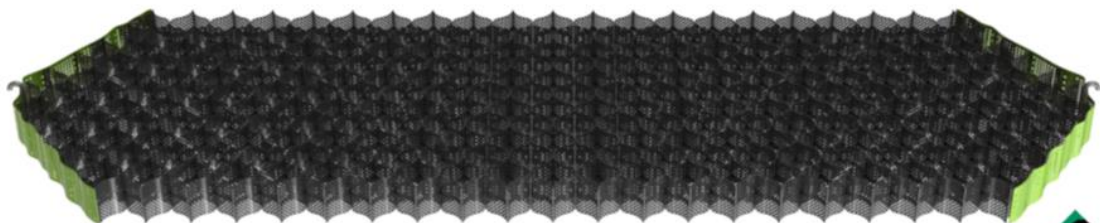
- Remove the surface vegetation using appropriate hand held tools or herbicide (see Note 1).
- Remove any surface rocks, debris and organic material.
- Create a level surface by filling any hollows with clean angular stone or sharp sand.
- Do not level off high spots or compact the soil through rolling.

2. Lay out the Treetex™ Non-Woven Geotextile

- Lay out the Treetex™ over the prepared area, overlaying the edges of the required area by 300mm.
- Overlap any joins by 300mm minimum or more, depending on soil structure (see Note 2).

3. Lay out the Cellweb® TRP Cellular Confinement System

- Lay out the collapsed Cellweb® TRP on-top of the Treetex™.
- Place one of the supplied J pins into the centre cell at the end of the panel and secure into the ground.



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Cellweb® TRP - Installation Guide

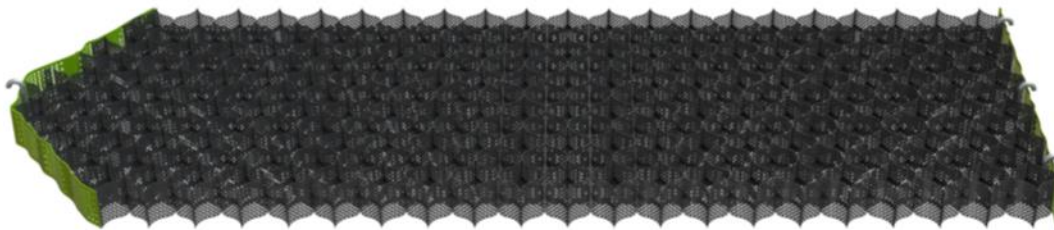


Step 3: Pinning Cellweb® TRP

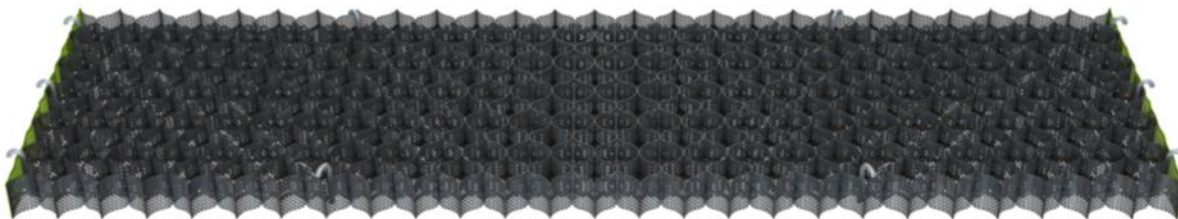


Step 3: Stapling Cellweb® TRP

- Pull out the Cellweb® TRP to its full 8.1m length and secure its length with another J pin.



- Now measure its width to 2.56m and secure in each of the corners with the J pins.
- Use 10 pins per panel to create a panel measuring 8.1m x 2.56m.



- This will produce a cell size of 259mm x 224mm which is the required cell diameter. Each cell must be fully extended and under tension.
- Staple adjacent panels together at each cell (see Note 3).
- If a curved path or shape is required, this should be cut when the Cellweb® TRP panel is pinned out to 8.1 x 2.56m, ensuring complete cells remain. Do not try to curve or bend the Cellweb® TRP panels into place.
- All cells must be fully opened to the required diameter.



Cellweb® TRP - Installation Guide



Step 4: Clean Angular Stone



Step 5: Edge Restraints



Step 6: Surface Options

4. Infill the Clean Angular Stone

- The infill material must be a clean angular stone, Type 4/20mm or Type 20/40mm (see Note 4).
- Do not use M.O.T type 1 or crushed stone with fines for tree root protection.
- Infill the Cellweb® TRP cells with the clean angular stone, working towards the tree and using the infilled panels as a platform.
- Minimum 25mm overfill of clean angular stone.
- No compaction is required of the infill. Do not use a whacker plate or other means of compaction.

5. Edge restraints

- Excavations for kerbs and edgings should be avoided within the RPAs.
- Where edging is required for footpath and light structures, a peg and treated timber board edging is acceptable
- Other options include wooden sleepers, kerb edging constructed on-top of the Cellweb® TRP system, plastic and metal edging etc.

6. Surface options

- Surfaces can include block paving, asphalt, loose gravel, grass and gravel retention systems (eg Golpla™), resin bound gravel, concrete etc.
- For Root Protection Areas this surface must be porous.

NOTES

1. **Herbicide:** According to BS5837:2012 "The use of herbicides in the vicinity of existing trees should be appropriate for the type of vegetation to be killed, and all instructions, warnings and other relevant information from the manufacturers should be strictly observed and followed. Care should be taken to avoid any damaging effects upon existing plants and trees to be retained, species to be introduced, and existing sensitive habitats, particularly those associated with aquatic or drainage features."
2. **Geotextile:** We recommend the installation of a Treetex™ under the Cellweb® TRP, or under the sub-base, if installed. The overlapping between adjacent rolls of Geotextile should be: CBR > 3%: 300mm minimum, CBR between 1% and 3%: 500mm minimum. CBR ≤ 1%: 750mm minimum.
3. **Staples:** Number of staples per join: 200mm: 5 staples. 150mm: 4 staples. 100mm: 3 staples. 75mm: 3 staples.
4. **Granular Fill:** Open graded sub-base, clean angular stone Type 4/20 or Type 20/40. Please refer to BS7533-13:2009 and to the Design Manual for Roads and Bridges (DMRB), Volume 4 Geotechnics and Drainage, Section 1 Earthworks, HA44/91, Volume 7 – IAN 73/06 Design Guidance for road pavement foundations and Manual of Contract Documents for Highway Works (MCHW), Volume 1 Specification for Highway Works for the construction and maintenance of the fill material.

This information corresponds to our current knowledge on the subject. It is offered solely to provide possible suggestions for your own experimentation. It is not intended, however, to substitute for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purposes. This information may be subject to revision as new knowledge becomes available. Since we cannot anticipate all variations in actual end use conditions, Geosynthetics Limited makes no warranties and assumes no liabilities in connection with this information. Nothing in this publication is to be considered as a licence to operate under or a recommendation to infringe any patent right.
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APPENDIX MD6

Tree awareness – Site Induction Sheet

SITE NAME: 1 Woodbury Avenue, Havant, PO9 1RH

Trees are an important part of this development and all trees noted on the Tree Protection Plan are protected by planning conditions. 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 MD7

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.

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 policy matters and is 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 focuses on issues relating to trees and buildings.

In 1997 he started an arboricultural consultancy practice specialising in subsidence and tree root claims, planning and development, tree safety issues and disease diagnosis. He has been 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.

He is an examiner for the Professional Diploma in Arboriculture for the Royal Forestry Society and has been a part-time lecturer for the Middlesex University Countryside Management MSc course. He has further significant experience lecturing at technical conferences and seminars.

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 a Member of the Expert Witness Institute.