

Arboricultural Impact Assessment
&
BS5837 Tree Survey
at
Oak View Residential Care Home, Hayling Island, PO11 0JB
for
English Oak Care Homes



Ben Abbatt
Dip. Arb. (RFS), BA (Hons), MICFor, MRICS, CEnv
Arboricultural Association Registered Consultant

Holbache, Mount Pleasant Road, Alton, Hants,
GU34 2RS

t: 01420 550160
e: enquiries@saplingarboriculture.com
w: www.saplingarboriculture.com

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1 Instruction

To inspect the trees on and adjacent to the site in relation to British Standard 5837:2012 Trees in relation to design, demolition and construction - Recommendations. To give recommendations to reduce the impact of such development where feasible.

I have been instructed due to my qualifications and experience in Arboriculture. I am a qualified member of the Institute of Chartered Foresters, Royal Institute of Chartered Surveyors, a Chartered Environmentalist and have a Professional Diploma in Arboriculture awarded by the Royal Forestry Society, Technicians' Certificate awarded by the Arboricultural Association, HNC in Forestry and a member of the Arboricultural Association, International Society of Arboriculture and the Royal Forestry Society. I started in the industry as a forestry contractor in 1995, progressing to the surveying and management of arboricultural contracts for a national forestry company, the running of the arboricultural part of a horticultural business overseas. From 2000 I worked in Local Government, initially at a Borough Council and subsequently at Hampshire County Council. Since August 2006 I have been practicing as an independent Arboricultural Association Registered Consultant; providing arboricultural advice to private individuals, companies, developers, architects, structural engineers, landscape architects and local authorities.

2 Site survey

The survey of the trees was of a preliminary nature carried out from ground level. Detailed investigations were not carried out and no tree climbed. The conclusions are based on my own observations, qualifications and experience in arboriculture. All dimensions recorded are estimated. No soil assessments have been undertaken. Positions of the trees identified in the survey were measured from known points within the site and indicated on the Tree Protection Plan.

3 Site details

The site is on the east side of Beach Road. The site is effectively flat with Hayling Park to the west. There is a slight embankment on the north side of the rear garden up to the boundary over approximately 2m.

4 Proposals

The proposals are to construct a single storey rear extension to form two new bedrooms and to reposition an existing bedroom.

5 Drawings

Drawings were produced by PMG Limited and received on the 7th March 2018. The drawings have been provided by the client for the purposes of this assessment and they are:

Proposed plan, 003 revision A
Proposed elevations, 004 revision A
Proposed details, 006 revision A

6 Tree Preservation Orders and Conservation Areas

No details have been sought from the Local Planning Authority (LPA) on whether the trees

on or adjacent to the site are protected by Tree Preservation Order (TPO) or within a Conservation Area. TPO 1270 is shown to relate to the site (http://maps.havant.gov.uk/havant.aspx?MapSource=HBC/AllMaps&StartEasting=471426.950000&StartNorthing=99312.800000&StartZoom=250&o=1&Layers=tpo_points accessed 4th April 2018). The online mapping service does not show the site as being within a Conservation Area. This impact assessment has been carried out to assess which trees are worthy of retention and how the proposed scheme may affect them.

7 **Summary**

The main arboricultural feature of the site are the TPO trees to the south of the site (distant from the proposals) and those outside the site around the perimeter on adjacent land. These trees are to be retained and industry standard construction methods and tree protection methods (tree protection barriers, special surface construction, site monitoring) should be used to reduce the impact of the works upon them.

Provided the trees to be retained are protected throughout the development in accordance with this Arboricultural Impact Assessment and Appendix 1: Method Statement the impact upon the retained trees is likely to be insignificant. As the impact upon the trees is likely to be insignificant there is unlikely to be any arboricultural impact upon the character of the local area.

8 **Findings**

Please see Appendix 2: BS5837 Tree Survey Sheet for specific details.

8.1 Proposed single storey extension

The proposed extension is outside the root protection area (RPA) and canopy spread of the retained trees and therefore there is unlikely to be any impact upon them.

8.2 Proposed access path

The proposed path is within the RPA of T6B outside the site to the north. Normal pedestrian access construction techniques would damage the tree roots by excavations severing roots, compacting soil (which would then restrict air flow) and possibly contaminating the soil within the RPA of the trees. As the proposed pedestrian access is to be within the RPA of a retained tree then a no-dig (following removal of the leaf litter and herbaceous layer) cellular confinement system (CCS) as part of an industry standard special surface construction could be installed. See Appendix 4: Special surface construction for additional details. The entire final wearing course within the RPA must be load bearing and porous to allow the free exchange of air and water, for instance:

- large particle resin bonded surfaces
www.green-tech.co.uk/store/product_info.php?products_id=476
- gravel surfacing
www.ced.ltd.uk/documents/4.pdf
www.geosyn.co.uk/brochures/DuoBlock_02.pdf
www.netlon.co.uk/turfsystems/prod-netpave50.htm
- block paving
www.geosyn.co.uk/brochures/Formpave_01.pdf

- 8.3 Other suppliers and materials may be used as long as they do not cause contamination, excessive compaction and maintain the free exchange of air and water.
- 8.4 The thickness of the CCS structures may vary due to their different uses. Therefore, as the access is for pedestrian use, the thickness of the CCS must be >75mm with the final porous wearing course on top (>75mm) for a full depth of >150mm. Guidance from the manufacturer in this matter is essential to ensure that the correct thickness of CCS is used for the specified use. It is important that the depth of the CCS material is specified by the manufacturer with data provided from the site manager on the soils identified on site beneath the structure. This will allow the manufacturer to identify the extent of deformation of the CCS and to demonstrate that the ground beneath the CCS will remain available for tree root colonisation through looking at the specific soil bulk density and the California Bearing Ratio (CBR) before and after the installation of the CCS.
- 8.5 Prior to the CCS construction the area must be protected by tree protective fencing to prevent damage to retained tree roots. Immediately prior to construction of the CCS a site meeting between the Site Manager and the appointed Arboricultural Consultant is necessary to agree the removal of the tree protective fencing to allow construction of the CCS.
- 8.6 As the final wearing course is unlikely to be installed until the end of the construction works, the CCS may suffer damage and not perform to its full design potential until the full 200mm depth of construction is achieved. Therefore, there must be an additional load spreading surface installed to support construction traffic until the full depth of construction is achieved. This can be created by either laying an additional 75mm layer of CCS, or use of overlapping 20mm steel plate held in place with road pins, or TuffTrak <http://www.tuffmat.eu/products.html> (or similar) or other appropriate method. Until the area to be subject to CCS construction is built the area must be protected with ground protection to ensure that the potential for harm does not occur to the tree roots beneath.
- 8.7 The thickness of the construction will have a bearing upon the relationship to areas of the pedestrian access not made from a CCS structure, for instance the link to the existing hard surface of the car parking area. Excavation will be required at this point, outside the RPA, to taper the above ground construction down to the existing surface. The excavation for this link to the existing hard standing will need to be carried out using an appropriate system to reduce the impact upon the trees. The excavation must be carried out in accordance with Appendix 1: Method Statement.
- 8.8 BS5837: 2012 discusses hard surfacing within the root protection area (RPA) of trees in section 7.4 page 25. It has a number of design recommendations. The above design specification complies with these design recommendations. In 7.4.2.3 it states 'New permanent hard surfacing should not exceed 20% of any existing unsurfaced ground within the RPA'. The impact upon T6B of the encroachment by c5.3sqm / c13% of an above ground porous construction is unlikely to be significant. It is appreciated that it is normal that development is kept outside the RPA and canopy spread of retained trees. However, this needs to be balanced between the impact of the development and the best design and layout solution that can be created. On this occasion it is reasonable to allow the encroachment within the RPA as the anticipated impact upon the tree is not significant.
- 8.9 No levels data has been provided. From the site visit it is clear the ground gently rises to the boundary. The above ground construction will need to be constructed on top of the existing ground levels. This may require a 'stepped' damp proof course or other engineering solution to avoid the adjacent soil levels affecting the proposed extension.

- 8.10 Gradient of the pedestrian access will need to conform with current guidance. Therefore, the remainder of the pedestrian access will need to be considered in relation to the above ground construction of the footpath within the RPA.
- 8.11 Where there is existing hard standing or foundations within the RPA of the retained trees then these surfaces will need to be removed in accordance with Appendix 1 Method Statement and Tree Protection Plan (Method statement for the removal of existing hard surfaces).
- 8.12 In the long term minor tree pruning may be required to maintain a similar relationship between the proposals and the trees. The impact of these tree works is unlikely to have any significant impact upon the condition of the trees or the visual amenity that they provide.
- 8.13 Services
New services should avoid the RPAs of retained trees, for instance T6B outside the site. If this is not possible then the services must be designed by an Engineer in consultation with the Arboricultural Consultant (NQF level 4 or higher in Arboriculture). Further advice is available in Appendix 1: Method Statement and NJUG Volume 4 "Guidance for the planning, installation and maintenance of utility services in proximity of trees".
- 8.14 Site monitoring and tree protection measures
BS5837:2012 Trees in relation to design, demolition and construction - Recommendations states in paragraph 6.3:

Wherever trees on or adjacent to a site have been identified within the tree protection plan for protective measures, there should be an auditable system of arboricultural site monitoring. This should extend to arboricultural supervision whenever construction and development activity is to take place within or adjacent to any RPA.
- 8.15 Therefore, it is necessary for site monitoring by an Arboricultural Consultant (qualified in Arboriculture to NQF Level 4 or higher) to occur for the proposed works. Details of the occasions and frequency of site monitoring will be given in Appendix 1: Method Statement, Arboricultural Method Statement Summary table: Timing of operations.
- 8.16 Tree protection measures are necessary to aid the retention of the trees. The details of these tree protection measures are specified in Appendix 1: Method Statement and Tree Protection Plan.
- 8.17 Site compound
The site compound can be located within the site and distant (>1m) from tree protection measures. If there is insufficient space within the site for storage materials will need to be delivered to site on an 'as required basis' and the use of an offsite storage compound may be necessary.
- 8.18 Soft landscaping
Within the RPA of retained trees there must be no changes of grade (up or down) and the

amount of new planting limited to reduce the impact upon the retained trees through severance or damage to tree roots.

8.19 Post development

Due to the design of the site layout, there is no significant adverse post development pressures anticipated.

8.20 Falling branch debris is a regular maintenance issue and should be treated as such. A routine of tree survey and inspection will identify foreseeable failures allowing them to be resolved prior to them becoming an issue.

8.21 Falling leaves, seed and needles debris is a regular maintenance issue and should be treated as such. If desired, then www.suraflo.co.uk (which prevents debris falling in the gutter through the coanda effect), mesh (www.guttergrid.co.uk or similar) or 'hedgehog' (www.hedgehoggutterbrush.com or similar) inserts can be used to filter out tree debris. Down pipes can also be installed with traps that are easily cleaned or chains used as the down pipe (which requires no cleaning).

8.22 Soils

In the event of shrinkable soils being found on the site, it will be for an engineer to design the foundations in accordance with the current industry guidance to reduce any potential risk of tree related subsidence to an acceptable level.

8.23 Other trees

This report considers the trees that may significantly be affected by the proposed development. Any trees not mentioned or not surveyed are sufficiently distant that the proposed works are unlikely to have an influence upon them.

9 **Conclusion**

The main arboricultural features of the site are to be retained and tree protective measures must be utilised to minimise the impact of the proposals upon the trees.

The principles and details of the Arboricultural Impact Assessment and Appendix 1: Method Statement and Tree Protection Plan should be followed to reduce the impact upon the retained trees.

10 **Recommendations**

That, following any permission from the Local Planning Authority, the principles and details of the Arboricultural Impact Assessment and Appendix 1: Method Statement and Tree Protection Plan are followed to reduce the potential for harm to the retained trees during development.

Ben Abbatt

Dip. Arb. (RFS), BA (Hons), MICFor, MRICS, CEnv.
Arboricultural Association Registered Consultant

Appendix 1: Method Statement (for protection of trees during development) and Tree Protection Plan

Appendix 1: Method Statement

1. A pre-commencement meeting prior to the start of any works between the Local Planning Authority (LPA) Arboricultural Officer, appointed Arboricultural Consultant and Site Manager must take place to clarify any additional protection measures required.

The purpose of the pre-commencement site meeting is to:

- confirm the position of the tree protective fencing and / or ground protection on site;
- discuss any potential conflict with the tree protection measures and identify acceptable solutions;
- understand the timeframe for the demolition and construction phases;
- identify and agree the frequency of Arboricultural site monitoring, recording process and reporting procedure to the Local Planning Authority to aid discharge of relevant planning conditions (appointed Arboricultural Consultant to issue written report to Site Manager and Local Planning Authority discussing findings from site monitoring).

To aid the demolition and construction phase for the development of the site an Arboricultural Consultant (NQF Level 4 or higher in Arboriculture) must be appointed to inspect and monitor the site at the start of the works and on an as required basis throughout the construction works to ensure that the protection procedures are adhered to and to assist with addressing further arboricultural issues that may arise.

2. Tree works may be required in the interest of good arboricultural practice and to facilitate the use of the site once development is complete. These works are listed in the recommendations of Appendix 2: BS 5837 Tree Survey. All tree works should be carried out according to BS3998: 2010 'Recommendations for tree works' and carried out by an appropriately competent, experienced, qualified and insured arboricultural contractor and preferably under the supervision of the Arboricultural Consultant.

3. The protective measures, as shown on the drawing "Tree protection plan" must be erected after the tree works and prior to any demolition or construction works. Once erected, barriers and ground protection must be considered sacrosanct, and must not be removed or altered without prior recommendation by the appointed Arboricultural Consultant and written approval by the LPA.

The protective barriers and ground protection must be erected according to drawings "Tree protection plan" and Appendix 2: BS5837 survey sheet which is based upon the guidelines in BS5837: 2012 'Trees in relation to construction'. Barriers should be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place around the retained trees. On all sites, special attention should be paid to ensure that the barriers remain rigid and complete. Barriers must consist of a 1.8 high scaffold framework comprising a vertical and horizontal framework, well braced to resist impacts, with vertical tubes spaced at a maximum interval of 3m. Onto this 1.8m high weldmesh panels should be securely fixed with wire or scaffold dampers. Weldmesh panels on rubber or concrete feet are not resistant to impact and must not be used. If an alternative specification is preferred then it must be agreed in writing with the Local Planning Authority prior to installation.

Ground protection for pedestrian movements (and scaffolding activities) within the root protection area (RPA) must be a single thickness of scaffold boards on top of a compressible layer (for instance bark mulch) laid onto a geotextile membrane, or supported by scaffold (see drawing on Tree Protection Plan). If an alternative specification is preferred then it must be agreed in writing with the Local Planning Authority prior to installation.

Ground protection for wheeled or tracked construction traffic movements within the root protection area (RPA) must be designed by an engineer and Arboricultural Consultant to accommodate the likely loading and may involve the use of proprietary systems (for instance www.evertakway.co.uk) or reinforced concrete slabs or a series of railway sleepers pinned together or other suitable system to ensure that the bulk density of the soil remains lower than 1.5g/cm³. If an alternative specification is preferred then it must be agreed in writing with the Local Planning Authority prior to installation.

These tree protective measures shall be identified and marked on the 'Tree protection plan' and all the approved engineering drawings to be used on site.

Any encroachment within the RPA or breaches of the tree protection measures must be reported to the appointed Arboricultural Consultant to enable them to provide recommendations to mitigate the encroachment / breach and to allow the issue and mitigation to be reported to the Local Planning Authority for their written approval.

4. All site personnel must be briefed by the Site Manager or the Arboriculturalist on the importance of the trees to be retained and the protective measures implemented to aid their retention into the future. The Site Manager is responsible for the implementation of all tree protection measures.

5. Once the construction exclusion zone has been protected by barriers then construction work can commence. All weather notices should be erected on the barriers with words such as 'Construction exclusion zone - keep out' (see recommended sign on the Tree Protection Plan).

6. Care should be taken when planning site operations to ensure that wide or tall loads or plant with booms, jibs and counterweights can operate without coming into contact with retained trees. Such contact can result in serious damage to the equipment and retained trees, and might make the safe retention of the retained trees impossible. Consequently, any transit or transverse of plant in close proximity to trees should be conducted under the supervision of a banksman to ensure that adequate clearance from trees is maintained at all times. In some circumstances it may be impossible to maintain adequate clearance thus requiring tree works to clear the necessary access.

Material which will contaminate the soil, e.g. concrete (dry or mixed), diesel, oil, vehicle washings, etc. must not be discharged within the root protection area. It is essential that an allowance should be made for the slope of the ground so that damaging materials such as concrete washings, mortar, diesel or oil cannot run towards the trees.

There must be no fires on the site.

Notices boards, telephone cables or other services must not be attached to any part of the tree.

7. The advice of the appointed Arboricultural Consultant must be sought where underground structures present within the RPA are / will become redundant. In general it is preferable to seal these off as this avoids the need for significant excavation.

8. Any excavations in proximity of retained trees will require certain precautions to avoid unnecessary damage to trees to be retained, and should be undertaken as follows:

- All excavations should avoid damage to the protective bark covering larger roots. Roots, whilst exposed, should be wrapped in dry, clean hessian sacking to prevent desiccation (drying) and to protect from temperature changes.
- Roots smaller than 25mm diameter may be pruned back, preferably to a side branch, using a proprietary clean cutting tool such as bypass secateurs or handsaw.
- Roots larger than 25mm diameter should only be severed following consultation with the appointed Arboricultural Consultant, as the roots may be essential to the tree's health and stability.
- Prior to backfilling, any hessian wrapping should be removed and retained roots should be surrounded by sharp sand (builder's sand should not be used because of its high salt content which is toxic to tree roots), or other loose granular fill, before soil or other material is replaced. This material, e.g. general purpose grade topsoil to BS3882, should be free of contaminants and other foreign objects potentially injurious to tree roots.
- Further details are available in NJUG Volume 4 "Guidance for the planning, installation and maintenance of utility services in proximity of trees".
- Any excavation within the RPA of retained trees must be subject to Arboricultural Consultant supervision.

9. There are no services to be installed within the RPA of the retained trees, other than as described in the Arboricultural Impact Assessment.

10. There should be no changes in grade within the RPA without prior recommendation by the appointed Arboricultural Consultant and approval of the LPA.

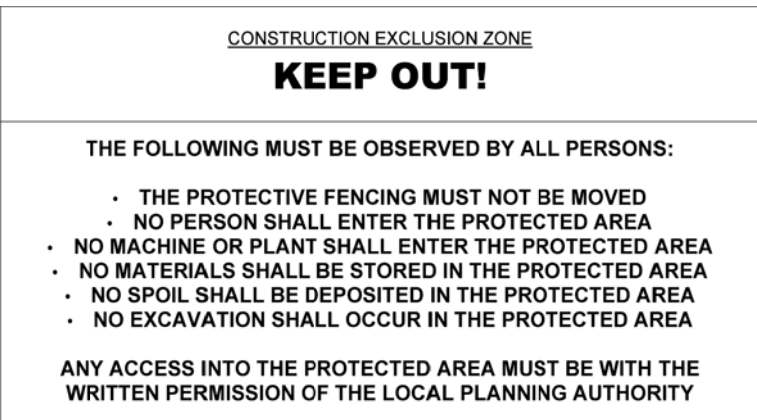
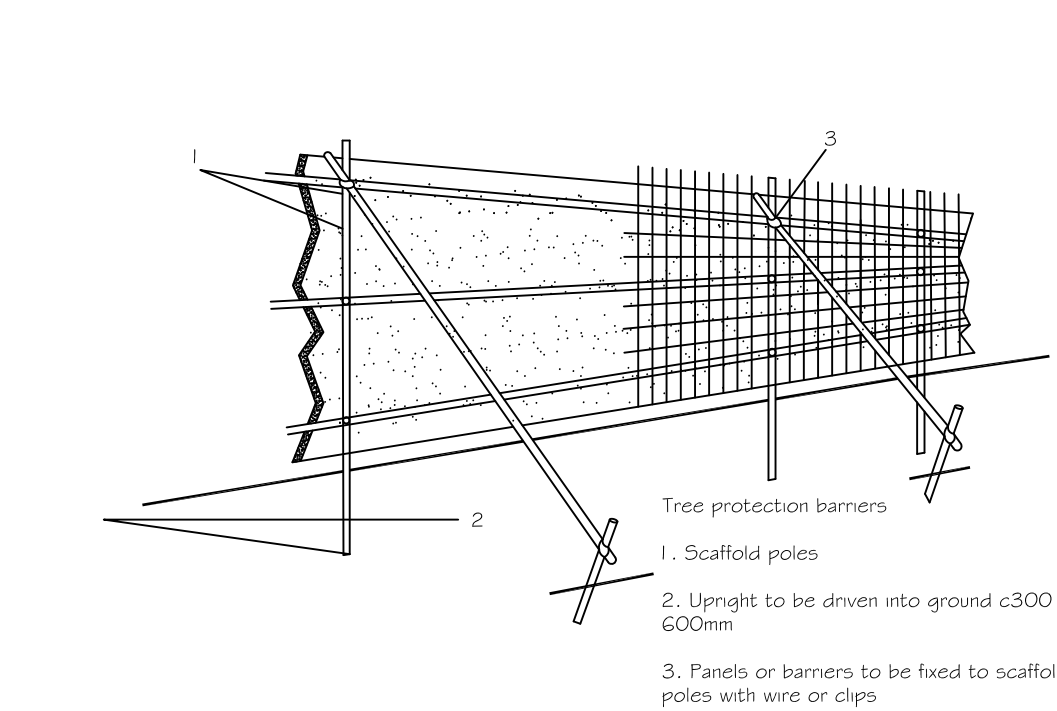
11. Following completion of the construction and hard landscaping works a site meeting between the Local Planning Authority Arboricultural Officer, appointed Arboricultural Consultant and Site Manager must take place to assess whether the protective barriers and ground protection can be removed to allow soft landscaping works.

12. Following the completion of the soft landscaping works a tree survey must be undertaken to identify whether additional tree works are required for the safe use of the site and adjacent land users.

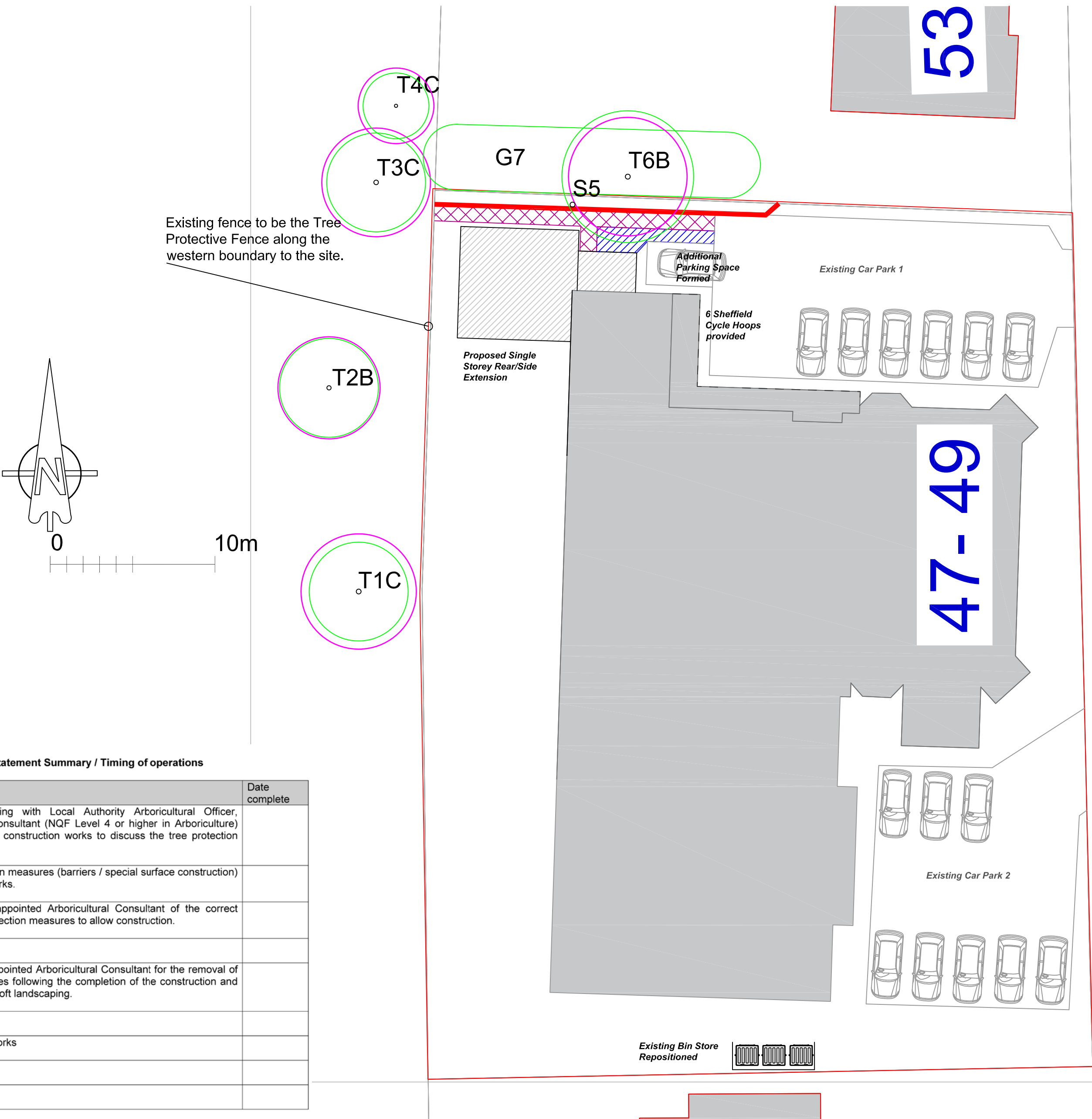
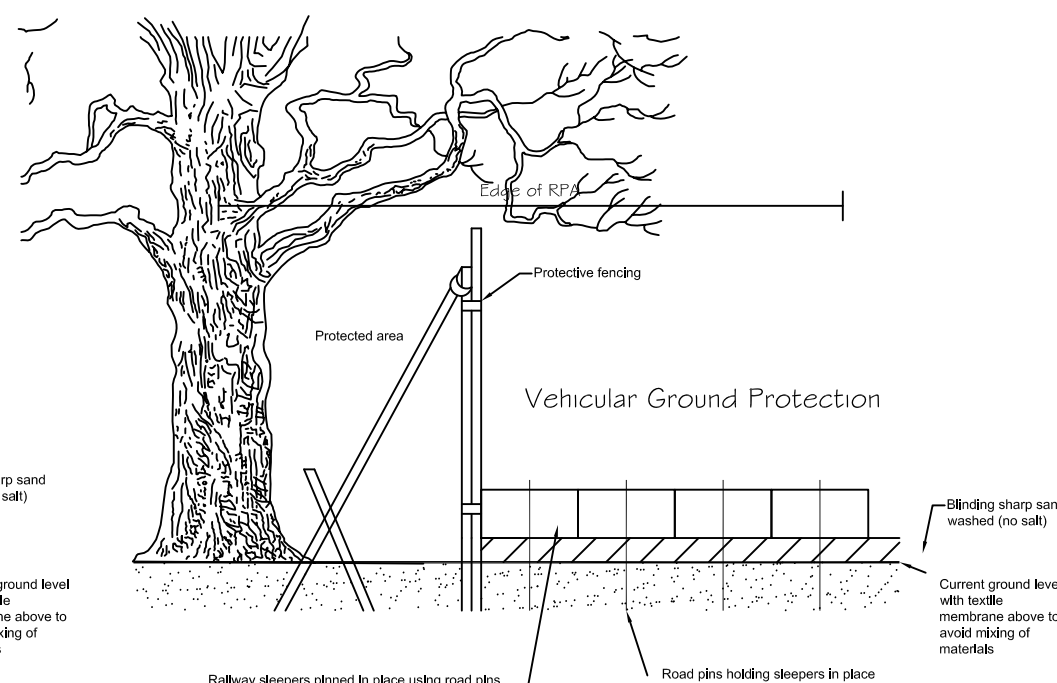
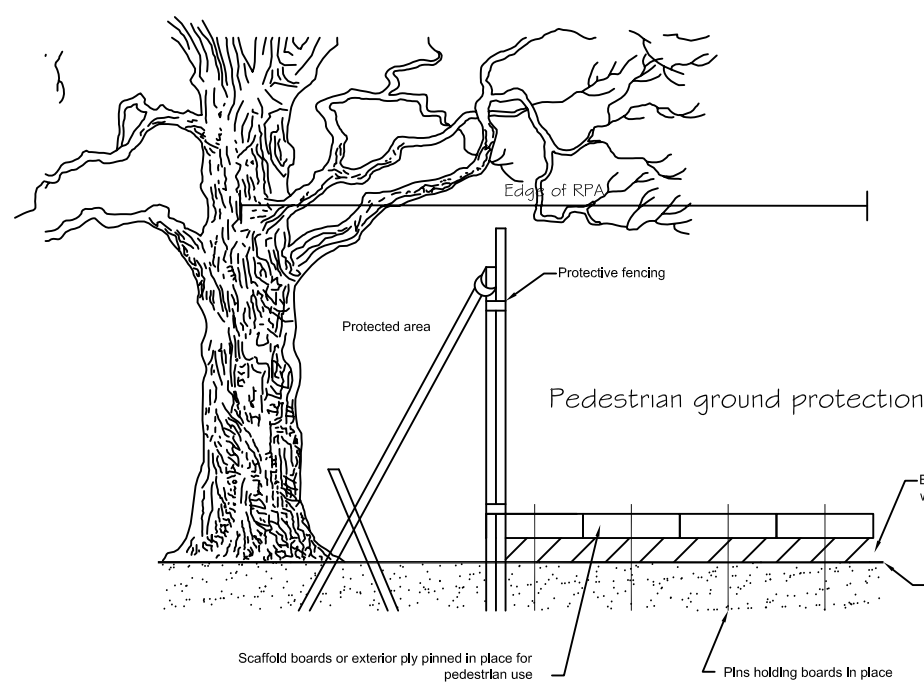
Method statement for the removal of the existing hard surfaces.

RPA refers to the Root Protection Area as detailed in Appendix 2: BS5837 Tree Survey.

- The existing hard surface should be broken up, lifted and removed from the RPA from outside the RPA where feasible, or from exiting hard surfaces within the RPA.
- The excavation of the hard surface must not extend into the soil underneath unless specifically determined by the Arboricultural Consultant. In reality this would mean that the teeth of an excavator bucket should be kept horizontal so that any disturbance to the soil is kept to a minimum. When the hard surface is thin or close to the soil level, the works must be carried out by hand to prevent avoidable unnecessary damage to the tree roots.
- All material, once lifted, must be transported to outside the RPA to prevent compaction or contamination of the tree roots. No material should be stored within the RPA.
- Due care and attention must be undertaken to ensure that machinery or other operations do not cause damage to the above ground parts of the tree.
- Where an existing hard surface is removed and replaced with soil the infill material must be a good quality, weed free aerobic natural topsoil with good crumb structure. Man made soils are not acceptable. Soil samples must be issued to the Arboricultural Consultant for written approval prior to delivery on site where the soil is to be installed within the RPA of retained trees.



A3 sign on laminated all weather material at 1.8m on the protective fencing every 10m.



Method Statement Summary / Timing of operations		
Activity		Date complete
01	Pre-commencement meeting with Local Authority Arboricultural Officer, appointed Arboricultural Consultant (NQF Level 4 or higher in Arboriculture) and Site Manager prior to construction works to discuss the tree protection measures.	
02	Installation of tree protection measures (barriers / special surface construction) to facilitate construction works.	
03	Written approval by the appointed Arboricultural Consultant of the correct installation of the Tree Protection measures to allow construction.	
04	Construction works	
05	Written approval by the appointed Arboricultural Consultant for the removal of the tree protection measures following the completion of the construction and hard landscaping to allow soft landscaping.	
06	Soft landscaping works	
07	Tree survey for remedial works	
08	Remedial tree works	
09	Occupancy	

General / Key:

- Root protection area
- Indicative canopy
- Barrier fencing
- Ground protection
- Special surface

Site: Oak View Residential Care Home, Hayling Island.

Data: Site layout and survey data provided by Client. Ordnance survey is subject to Crown copyright. All rights reserved.

This drawing is produced in colour. Please ensure that you use a colour printing to ensure that the drawing is correctly interpreted.

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Item reference (T/G/H/W)
Item number (1, 2, etc.)
BS5837 category (A/B/C/U)
For instance: T1C

Drawing title: Tree protection plan

Drawing reference: J1103

Revision: -

Date: April 2018

Scale: 1 to 200 on A1 (site layout only)

Sheet: 1 of 1

Tree positions measured from the existing building and are approximate only.

sapling
arboriculture limited
registered in england: 5414238

T: 01420 550 160
E: enquires@saplingarboriculture.com
W: www.saplingarboriculture.com

Ben Abbott
Dip. Arch. (RPS), BA (Hons), MCFor, MRCS, CEnv
Arboricultural Association Registered Consultant

Appendix 2: BS5837 tree survey

BS5837 Tree Survey Data Collection Form
Site Oak View Nursing Home Hayling Island
Date 20th March 2018
Job reference J1103
Surveyor Ben Abbatt

Designation	Reference number	BS 5837 Category	Species	Height (m)	Single stem diameter (mm at	N Canopy spread (m)	E Canopy spread (m)	S Canopy spread (m)	W Canopy spread (m)	Canopy height (m)	Canopy height cardinal point	Age class	Canopy context	Physiological condition	Structural condition	Condition notes	Condition related tree works	Anticipated remaining life	Root Protection Area - Radius (m)	Root Protection Area - Area (sqm)	Development related tree works	Development related mitigation
T	1	C1	Norway Maple <i>Acer platanoides</i>	9	293	3	3	3	3	3	~	Middle aged	Dominant	Fair	Fair	Outside site. Slightly sparse canopy. Mechanical damage at base.	No works required at the time of the survey.	10+	3.5	38.9	None required.	Utilise existing perimeter fence as tree protective fence.
T	2	B1	Field Maple <i>Acer campestre</i>	9	257	3	3	3	3	3	~	Middle aged	Dominant	Good	Fair	Outside site. Mechanical damage at base.	No works required at the time of the survey.	20+	3.1	29.9	None required.	Utilise existing perimeter fence as tree protective fence.
T	3	C1	Hornbeam <i>Carpinus betulinus</i>	10	278	3	3	3	3	3	~	Middle aged	Intermediate	Good	Fair	Outside site. Mechanical damage at base. Stem diameter measured at 0.3m.	No works required at the time of the survey.	10+	3.3	35.0	None required.	Utilise existing perimeter fence as tree protective fence.
T	4	C1	Ash <i>Fraxinus excelsior</i>	10	193	2	2	2	2	3	~	Middle aged	Intermediate	Good	Fair	Outside site. Mechanical damage at base.	No works required at the time of the survey.	10+	2.3	16.9	None required.	Utilise existing perimeter fence as tree protective fence.
S	5	U	Stump								~					Stump.	No works required at the time of the survey.		0.0	0.0	Grind stump to 200mm below ground level.	None required.
T	6	B1	Unidentified	13	300	3	3	3	3	3	~	Middle aged	Dominant	Good	Good	Outside site. Inaccessible.	No works required at the time of the survey.	20+	3.6	40.7	None required.	Install tree protective fencing and ground protection.
H	7	C1	<i>Eleagnus</i> and other boundary hedge plants.	8	200	2	2	2	2	0	~	Middle aged				Outside site. Inaccessible.	No works required at the time of the survey.	40+	2.4	18.1	Cut back to the boundary and maintain as boundary hedge.	Install tree protective fencing and ground protection.

General notes

We have not checked whether the site is within a Conservation Area or whether the trees are under Tree Preservation Order (TPO). Prior to any tree works confirmation of whether these legal restrictions apply to the site or trees ought to be sought from the Local Planning Authority (LPA). If the trees stand within a Conservation Area designated under the Town and Country Planning Act the LPA will normally require 6 weeks notice of intention to carry out any tree works as detailed in the survey. If the trees are under TPO then the LPA will normally require an application for any tree works. Some tree works are exempt, for instance if the trees are dead or dangerous, and certain works can be carried out without application. It is necessary to give the LPA at least five days notice prior to carrying out any of these tree works under these exemptions. This survey, with recommendations, can be used to support any such notice or application. If this document is used to support a planning application, then the tree works required for development may be permitted under any subsequent planning application.

Wildlife issues are of significant concern to the general public. A balance has to be found between the protection of wildlife and the need for safety when managing trees. The Wildlife and Countryside Act (1980) and Countryside Rights of Way Act (2000) give statutory protection to wild birds, bats, mammals, some invertebrates and plants. It is important to ensure that this legislation is properly considered when carrying out any works to trees.

Bird nests were not identified whilst on site. However, any Arborist carrying out the tree works should ensure that there is no disturbance to nesting birds prior to the works being carried out. Further guidance upon the appropriate timing of the works can be sought from DEFRA, if necessary. Where nesting birds are found, further information should be sought from DEFRA 08459 33 55 77 or helpline@defra.gsi.gov.uk. Prior to any works being implemented the tree contractor must identify whether there are any bats or birds using the tree as roost or nest. If such habitation is identified then the tree contractor must obtain the necessary licence from Natural England (0845 601 4523 www.naturalengland.org.uk) to carry out the works.

In this instance, considering the size of the trees, their location and features I believe that there is a medium potential of bats using the mature trees as a roost site. A bat survey prior to tree works is not recommended as it would be difficult to determine the location of any exit point from the roost within the tree by a bat survey and also confusion may also arise from bats travelling from other roosts. Any such exit could more easily identified by a competent tree worker. During the tree works the contractor should carry out the tree works with bats as an active consideration and follow the current industry best practice, e.g. Arboricultural Association Guidance Note 1 Bats in the context of tree work operations 2011, which a competent tree contractor should be familiar with.

Typical significant defects that are to be identified can be referred to in "Hazards from Trees, a general guide", "Principles of tree hazard assessment and management" both by David Lonsdale and "The body language of trees" by Claus Mattheck published by the Forestry Commission and the Department of the Environment respectively.

Trees are dynamic structures and as such their condition and health may change in a short period of time, particularly in relation to changes in their immediate environment and circumstances, as such the survey relates to the visible condition found on the day of the survey.

All tree works to be carried out to BS3998: Recommendations for Tree Works (including the biosecurity measures). Biosecurity measures: To minimise to potential for contamination of the tree from other tree works it is appropriate to sterilise tools to be used before and after the works are implemented. Appropriate disinfectant includes Propellar or Cleankill Sanitizing spray. Loose debris is to be brushed off prior to treating with disinfectant to ensure appropriate application. See [http://www.forestry.gov.uk/pdf/FCMS028-guidance.pdf/\\$file/FCMS028-guidance.pdf](http://www.forestry.gov.uk/pdf/FCMS028-guidance.pdf/$file/FCMS028-guidance.pdf) for further information on Biosecurity and <http://www.forestry.gov.uk/forestry/infod-9fjd2d> for disinfectant information.

Appendix 3: Key to BS5837 tree survey

No	Tree number.	
Species	Species of tree.	
Height	Height measured in metres and rounded to the nearest metre.	
Stem Ø	Stem diameter at 1.5metres following normal Forestry conventions or immediately above the root flare for multiple stemmed trees, in millimetres.	
abf	Above basal or root flare.	
Canopy spread and context	Canopy spread in metres is taken at the four cardinal points to derive an accurate representation of the crown.	
	Canopy context relates to the form and context of the canopy in relation to adjacent trees and how this relates to the development and form of the tree and potential issues that may arise as a result.	
Height of crown	Height in metres of crown clearance above adjacent ground level.	
Life stage (Age)	Young	A tree considered to be less than approximately 20 years old.
	Middle aged (Early Mature)	A tree in approximately the first 1/5th of its normal life span with apical dominance (rapidly growing with a clear main leader) and not yet fully at its environmental potential full height.
	Mature (Semi mature and Mature)	A tree in its 2/5ths to 5/5ths of its normal life span with apical dominance lost and at its environmental potential full height.
	Over mature	A tree beyond the normal life span for the location with apical dominance lost and with symptoms of canopy decline.
	Veteran	A tree of interest biologically, aesthetically or culturally because of its age and is old relative to others of the same species.
Condition (Physiological and Structural)	Good	A tree of typical physiological and structural condition that requires only general tree works to facilitate its retention in the landscape.
	Fair	A tree of impaired physiological and / or structural condition that may require remedial and general tree works to facilitate its retention in the landscape.
	Poor	A tree of significantly impaired physiological and / or structural condition that will require remedial and general tree works to facilitate its retention in the landscape if feasible.
Preliminary management recommendations	As per BS3998: 2010 Recommendations for Tree Works.	
Category grading	See below: Table 1.	
Estimated remaining contribution (years)	Estimated remaining contribution in years (e.g. < 10, 10-20, >20).	
Root protection area	See below: Extract from BS5837:2012.	
OI INAC LS c	Over ivy	
	Inaccessible	
	Land survey, i.e. data provided by the land survey.	
	circa / about	
All measurements in metres are approximate and rounded to the nearest metre.		

Table 1 - Cascade chart for tree quality assessment, BS5837: 2012 Trees in relation to construction - Recommendations

TREES UNSUITABLE FOR RETENTION			
CATEGORY AND DEFINITIONS	CRITERIA		
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	• Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning). • Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline. • Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality. <i>NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5 of BS5837:2012</i>		
TREES TO BE CONSIDERED FOR RETENTION			
CATEGORY AND DEFINITIONS	CRITERIA - SUBCATEGORIES		
	1 Mainly arboricultural values	2 Mainly landscape values	3 Mainly cultural values, including conservation
Category A Trees of high quality with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue).	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features.	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation.	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality.	Trees with material conservation or other cultural value
Category C Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories.	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits.	Trees with no material conservation or other cultural value.

Root protection area (RPA)

Extract from BS5837:2012.

4.6.1 For single stem trees, the RPA (see **3.7**) should be calculated as an area equivalent to a circle with a radius 12 times the stem diameter. For trees with more than one stem, one of the two calculation methods below should be used. In all cases, the stem diameter(s) should be measured in accordance with Annex C, and the RPA should be determined from Annex D. The calculated RPA for each tree should be capped to 707 m².

a) For trees with two to five stems, the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{stem diameter } 1)^2 + (\text{stem diameter } 2)^2 \dots + (\text{stem diameter } 5)^2}$$

b) For trees with more than five stems (not illustrated in Annex C), the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{mean stem diameter})^2 \times \text{number of stems}}$$

4.6.2 The RPA for each tree should initially be plotted as a circle centred on the base of the stem. Where pre-existing site conditions or other factors indicate that rooting has occurred asymmetrically, a polygon of equivalent area should be produced. Modifications to the shape of the RPA should reflect a soundly based arboricultural assessment of likely root distribution.

4.6.3 Any deviation in the RPA from the original circular plot should take account of the following factors whilst still providing adequate protection for the root system:

- a) the morphology and disposition of the roots, when influenced by past or existing site conditions (e.g. the presence of roads, structures and underground apparatus);
- b) topography and drainage;
- c) the soil type and structure;
- d) the likely tolerance of the tree to root disturbance or damage.

Appendix 4: Special surface construction

Greenfix Bulk Density Tree Root Protections Solutions

Established trees that experience sudden compaction of the soil frequently suffer root death and crown dieback. This often occurs because of the inability of the tree to adapt quickly to the rapid change in soil conditions. Also, oxygen supply to roots is governed by soil structure and texture; in loose or coarse textured soils the air gaps between the soil particles are relatively large and so atmospheric oxygen diffuses readily into the soil, and the waste product of respiration, carbon dioxide, can diffuse away. Sudden compaction of existing tree root areas can result in the death and decay of a large proportion of the existing root system.

Locations can differ greatly, even in close proximity. Trees in various locations will adapt very differently to meet the conditions of its environment. For this reason, should sudden changes to the bulk density or porosity be required, generic protections cannot hope to cover all eventualities. Only calculated, site specific control measures can ensure the reduction of changes to the established trees environment.

TECHNICAL SUPPORT FOR YOUR PROJECT

Greenfix offer a full range of services for site specific solutions for your tree root protection and bulk density requirements. These services expand across all stages of the industry, and are completely free of charge. For full assistance please do not hesitate to contact Greenfix on 01608666027

Greenfix technical team can attend both design and on-site support to offer recommendations for the project according to the British Standard 5837.

Our engineering team can calculate recommendations based on both CBR and bulk density values for true site specific tree root protection solutions. For any assistance completing the questionnaire please do not hesitate in contacting us.

Tree Root Protection solutions can be calculated on Bulk Density free of charge. Simply request a questionnaire by emailing james@greenfix.co.uk. This will be completed and returned to you within 7 working days. A PDF detail of the Geoweb build-up will also be provided for your use within your specification.

Once the tenders have been approved, Greenfix will continue to assist, and be available to attend site the date of installation. This support is to provide the contractor with recommendations of correct installation for tree root protection.



Examples of Geoweb solutions available to discuss on-site with the Greenfix technical team

Control measures within tree rooting areas can be challenging, especially where increasing levels are a concern. Greenfix offer the availability of pre-site meetings in order to recommend possible solutions to your clients requirements.

Example of solutions available.

Often on sites, construction traffic is required through tree rooting areas but the final access will only be for light vehicles, such as a driveway for cars. This can cause issues with the required 200mm level increase. A solution is to layer two 100mm Geoweb on-top of one another. This will provide the control measure for the construction access phase. On completion, the top 100mm layer of Geoweb can be removed, leaving the bottom layer in-situ to provide the permanent access for lighter traffic.

Piling rig and Heavy duty crane access

Laying of the Geoweb Tree Root Protection can be achieved for higher demand weight applications. The depth required can be calculated for site specific requirements via Greenfix should you require.



Geoweb Tree Root Protection Installation Guide

Installation Recommendation

1. **Preparation of the subgrade ready for Geoweb tree root protection no dig solution. Whilst inside the tree rooting area, all actions must ensure no detrimental effect on the ground condition. The tree rooting area is the surface which is being protected**
 - Removal of surface vegetation using prior agreed methods with local authority. No methods of removal which will cause compaction to the subgrade can be used. This includes the use of plant, vehicles and machinery. Examples of appropriate methods include hand tools or herbicide
 - When creating a level subgrade, do not grade off humps or level off through compaction, as these may contain tree roots. Rather infill hollows with a permeable material such as clean stone or sharp sand to create a level surface.
 - All external debris, such as rocks and waste, should be removed
 - When an existing hard surface is scheduled for removal, care should be taken not to disturb tree roots that may be present beneath. Hand held tools or appropriate machinery should be used to remove the existing surface, working backwards over the area so not trafficking the exposed area
2. **TRP4000 Non-woven Geotextile**
 - Lay out the TRP4000 over the prepared area, overlapping joins by a minimum of 300mm, dependent on soil conditions
 - When overlapping the TRP4000, ensure the overlap is in the same direction as the Geoweb will be extended. This will ensure the geotextile does not pull up when extending the Geoweb
 - If a site specific solution has been provided by Greenfix which includes a sub-base, this will require installation through non compaction methods
3. **Installation of the Geoweb panels**
 - Lay out the collapsed Geoweb on the TRP4000 and secure at one end in the middle of the width.
 - Extend the panel to 6.6m length, and secure its length at the other end
 - Extend the width of the Geoweb to 2.6m wide, and secure each corner
 - Ensure the panel is secured at 6.6m x 2.6m, as this will achieve the 259mm by 224mm cell diameter required.
4. **Connection of the panels to create one single mattress**
 - All panels must be adjoined to one another both side by side and end to end
 - Simply connect the Geoweb with the supplied ATRA® keys, through the aligned slots



1. Infill of the Geoweb for tree root application

- Compacted, non-porous material, such as M.O.T. Type 1 / crushed stone with fines should not be used for tree root protection
- Infill Geoweb panel with 4-20mm clean angular stone, ensuring Geoweb is not visible and is overfilled by a minimum 25mm. Plant and tracked vehicles should not drive on exposed Geoweb as this will lead to tearing and damage.
- Infill towards the tree, using the filled Geoweb cells as the working platform
- For a stone specification sheet please contact Greenfix Ltd go to www.greenfix.co.uk

2. Compaction of the infilled material

- Compaction of the Geoweb system is not required on generic site conditions, as the infill will secure its own level when trafficked over a short time
- If on poor / site specific conditions, complete 4 passes of a non-vibrating, smooth wheeled roller over the 25mm overfill. Refill and roller as necessary to ensure a 25mm surcharge remains

3. Edging options

- Where edging is required for light structures, such as footpaths, above ground peg and treated timber edging may be acceptable. Where areas of hard surface require edge support, the use of pinned sleepers, gabions or non-invasive haunch kerbing can provide appropriate solutions.
- For recommendations and details (CAD or PDF), please contact Greenfix for assistance

4. Surface options available

- Geoweb acts as a sub-base to all available surfaces on the market, including asphalt, block-paving, resin bound, grass vegetation or gravel etc.
- For tree rooting areas, the surface must be porous unless approved otherwise by local authority.
- For details of surface options please contact Greenfix for assistance

Additional Greenfix services available

For an on-site installation visit on the day of installation on any purchase of Geoweb TRP, please contact Greenfix for recommendations and support.

Site specific calculations and technical recommendations are also available via Greenfix.

Greenfix can offer an on-site visit to recommend correct installation to the calculated recommendation if it has been complete via Greenfix

Geoweb infill material for Tree Root Protection Clean Angular Stone 4-20mm

Specification for open graded infill material for Geoweb cellular confinement within tree root protection applications. The no fines material is to ensure high ratio void space which corresponds with ideal soil void ratios for tree root health.

Material to BSEN1342 or BSEN12620. Crushed gravel is not permitted.

Properties of material	Test	Value
Grading of particle size	BSEN 13242	Grading 4-20mm
Fines Content	BSEN 13242	f ₄
Shape flakiness index	BSEN 13242	Fl ₂₀
Resistance to fragmentation	BSEN 13242	LA ₃₀
Resistance to wear	BSNE 13242	M _{DE} 20
Water absorption rate BSNE 1097-6:2000 clause 7	BSNE 13242	WA ₂₄₂
For typical WA>2% magnesium sulphate soundness	BSNE 13242	MS ₁₈
Acid soluble sulphate content air-cooled blast furnace slag	BSNE 13242	AS _{0.1}
Acid soluble sulphate content non air cooled blast furnace slag	BSNE 13242	AS _{0.2}
Total sulphur aggregates other than air cooled blast furnace slag	BSNE 13242	<1% by mass
Total sulphur air cooled blast furnace slag	BSNE 13242	<2% by mass

Sieve Size mm	Percentage of 4-20mm passing
40	100
31.5	98 - 100
20	90 - 99
10	25 - 70
4	0 - 15
2	0 - 5
1	-

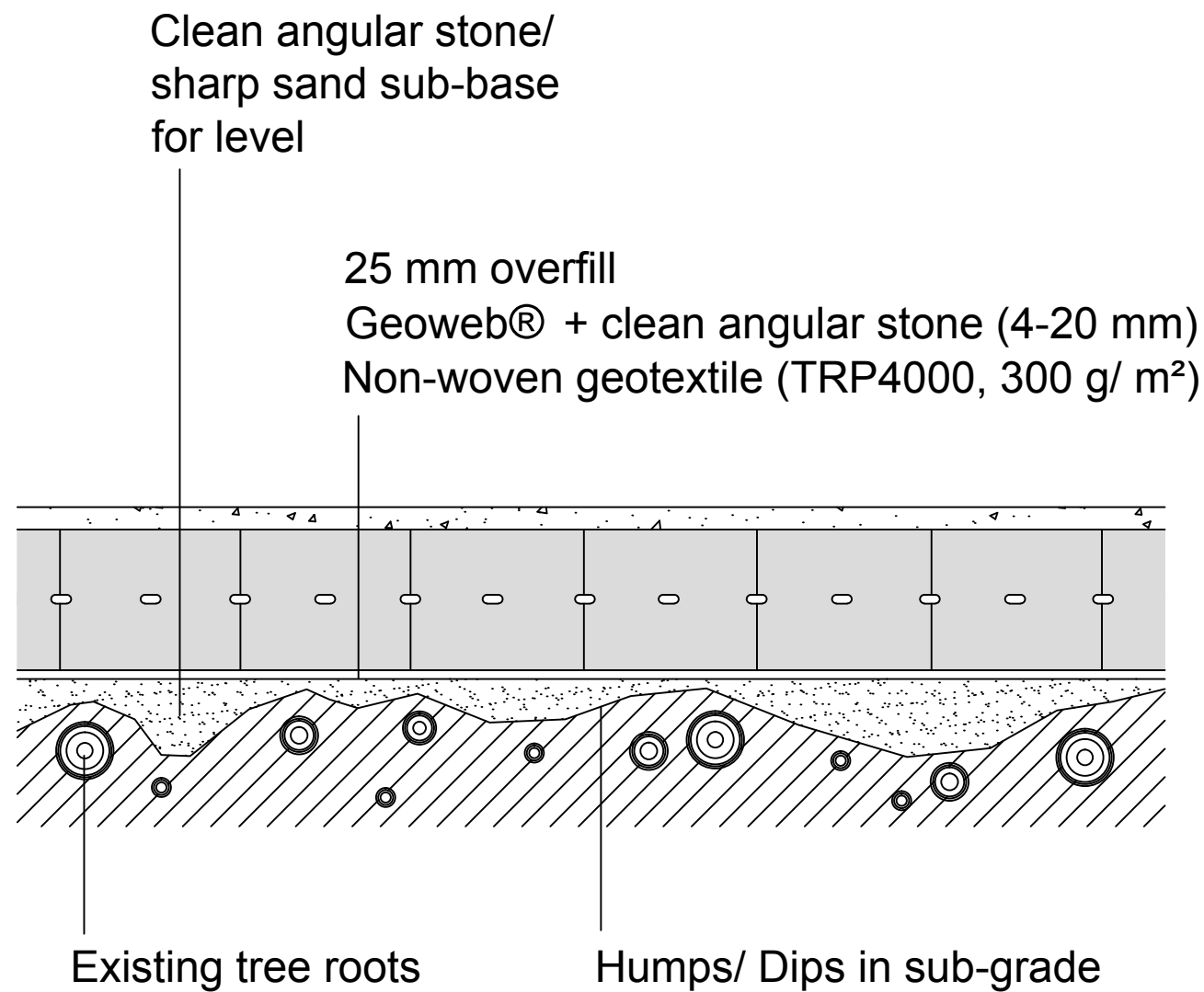


Air cooled blast furnace and steel slag should be free from Dicalcium silicate and iron disintegration in accordance with BSEN 13242:2002, 6.4.2.2 V5

Leaching of materials for blast furnace slag and other recycled materials should meet requirements of the Environmental waste acceptance criteria for inert waste when tested in accordance with BSEN 12457-3

On poor site conditions which require compaction, this should be minimum 4 passes of a smooth wheeled roller at max weight 1000kg/m width without vibration.

NO-DIG TREE PROTECTION SYSTEM



Adjacent Geoweb® units to be joined with Atra-keys.

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PRESTO PRODUCTS® CO.		SOILTEC GMBH
670 NORTH PERKINS STREET		NEUE FINIEN 7A
APPLETON, WI. 54914		28832 ACHIM
920-738-1342		04202-7670-0
WWW.PRESTOGEO.COM		WWW.SOILTEC-GEOSYSTEMS.DE
Project: Tree root protection		
Preliminary design		
Distributor: Greenfix soil stabilisation and erosion control		
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