TREE SURVEY, ARBORICULTURAL IMPLICATION ASSESSMENT & METHOD STATEMENT

Proj. No 1655 **3 & 4 Hooley Drive, Rayleigh, Essex** **06/02/09**

HAYDEN'S

ARBORICULTURAL CONSULTANTS

TREE SURVEY, ARBORICULTURAL IMPLICATION ASSESSMENT & METHOD STATEMENT

PROJECT NO: 1655

3 & 4 Hooley Drive
Rayleigh
Essex
SS6 9RA

6 February 2009

For
Mr Martin Blackwell
3 Hooley Drive
Rayleigh
Essex
SS6 9RA

5 MOSELEY'S FARM BUSINESS CENTRE
FORNHAM ALL SAINTS
BURY ST EDMUNDS
SUFFOLK IP28 6JY
TELEPHONE: 01284 765391
FAX: 01284 765181

Email: INFO@TREESURVEYS.CO.UK

3 & 4 Hooley Drive
Rayleigh
Essex
SS6 9RA

SUMMARY

The purpose of this report is to consider the arboricultural implications of proposed development. In accordance with BS5837:2005, trees deemed to be within the influencing distance of the projected construction have been evaluated for quality, longevity, and initial maintenance requirements. Where trees do not have to be removed for health and safety reasons, a detailed and objective assessment has been made of the consequences of the intended layout.

In this circumstance it is intended to demolish the existing two semi detached dwellings at the centre of the site and construct two new detached properties on a slightly different footprint. As a result fifteen individual trees, four groups of trees, and one hedge were inspected. The arboricultural related implications of the proposal are as follows:

1 **Implications on Construction** – Minimal. No specialist construction techniques are required. Protective fencing must be erected prior to the commencement of demolition.

2 **Cultural Implications** – None. No retained trees or landscape features require intervention for the sole purpose of achieving the proposed layout.

3 **Landscape Implications** – Minimal. One tree features requires felling for the sole purpose of achieving the proposed layout. Additionally, two individual trees and one landscape feature require felling irrespective of any development proposals. The removal of one of these items coincides with the needs of the proposed layout.

4 **Post Development Implications** – None perceived. The orientation of the site, together with the relationship and scale of the retained trees to the proposed structures is such that undue shading or excessive dominance are not considered to be significant issues.

Given the above, there are no overt or overwhelming arboricultural constraints that can be reasonably cited to preclude the proposed construction.

CONTACT DETAILS

CLIENT – **Mr Martin Blackwell**			
ADDRESS 3 Hooley Drive Rayleigh Essex SS6 9RA	CONTACT Mr Blackwell	TEL: FAX: E-MAIL:	01702 461050 01702 301444

LOCAL PLANNING AUTHORITY – **Rochford District Council**			
ADDRESS Council Offices South Street Rochford SS4 1BW	TREES OFFICER Mr J Choat	TEL: FAX: E-MAIL:	01702 546366 01702 545737 James.choat@rochford.gov.uk

ARBORICULTURAL CONSULTANT – **Hayden's Arboricultural Consultants**			
ADDRESS 5 Moseley's Farm Business Centre Fornham All Saints Bury St Edmunds Suffolk IP28 6JY	PRINCIPAL Stephen Hayden	TEL FAX: E-MAIL:	01284 765391 01284 765181 info@treesurveys.co.uk

TREE SURVEY, ARBORICULTURAL IMPLICATION ASSESSMENT & METHOD STATEMENT

INDEX

1.0 INTRODUCTION

1.1 Terms of Reference

1.1.1 Hayden's Arboricultural Consultants has been commissioned by Mr Martin Blackwell to prepare a Tree Survey, Arboricultural Implication Study and Method Statement for the existing trees at 3 & 4 Hooley Drive, Rayleigh, Essex.

1.1.2 The site survey was carried out by David Carmichael on 6th February 2009. The relevant qualitative tree data was recorded in order to assess the condition of the existing trees, their constraints upon the prospective development and the necessary protection and construction specifications required to allow their retention as a sustainable and integral part of the completed development.

1.1.3 Information is given on condition, age, size and indicative positioning of all the trees both on and affecting the site, in line with British Standard 5837:2005 Trees in Relation to Construction.

1.2 Scope of Works

1.2.1 The survey of the trees, soils and any other factor is of a preliminary nature. The trees were inspected on the basis of the Visual Tree Assessment (VTA) method as developed by Mattheck and Breloer (1994). The trees were inspected from ground level with no climbing inspections undertaken. No samples have been removed from the site for analysis. Information on the soils has been obtained from Cranfield University, National Soil Resources Unit.

1.2.2 Whilst this is an arboricultural report, comments relating to non arboricultural matters are given, such as built structures and soil data. Any opinion thus expressed should be viewed as provisional and confirmation from an appropriately qualified professional sought. Such points are clearly identified within the body of the report.

1.2.3 An intrinsic part of tree inspection in relation to development is the assessment of risk associated with trees in close proximity to persons and property. Most human activities involve a degree of risk with such risks being commonly accepted, if the associated benefits are perceived to be commensurate. In general, risk relating to trees tends to increase with the age of the trees concerned, as do the benefits. It will be deemed to be accepted by the client that the formulation of the recommendations for all the management of the trees will be guided by the cost-benefit analysis (in terms of amenity), of the tree work that would remove all the risk of tree related damage.

2.0 THE SITE

2.1 Site Description

2.1.1. The site is 3 & 4 Hooley Drive, Rayleigh, Essex. This is a significant area of land which contains two bungalow structures at the centre. It is understood that these are the properties known as 3 & 4 Hooley Drive. Beyond these (to the north of the site) is a newer bungalow located beyond a substantial pond. This structure has a double garage and two single garages attached to its western flank.

2.1.2 The site is generally devoid of significant vegetation although a number of large trees are present along the western periphery. There are some poorer quality specimens along the southern periphery and some individually spaced trees dispersed amongst a hedge along the western boundary. The remainder of the internal area of the site is primarily laid to lawn. The garden also contains a prefabricated garage towards the south western entrance and the remnants of a dividing fence between the front gardens of Nos. 3 and 4. Wet ditches run along the western and eastern boundaries of the site. At the time of inspection these were flowing freely with a significant volume of water.

2.1.3 The site is predominantly level with only minor undulations.

2.2 Soils

2.2.1 The soils type commonly associated with this site are slowly permeable and seasonally wet, slightly acid but base-rich loams and clays. They are of moderate fertility and mainly support seasonally wet pastures and woodlands type habitats. This soil type constitutes approximately 19.9% the total English land mass.

3.0 THE TREES

3.1 As part of this survey fifteen individual trees, four groups of trees and one hedge have been identified and these have been numbered T001 – T015, G001 – G004, and H001 respectively.

3.2 An accurate topographical survey was not available at the time of inspection. Therefore, the position of the trees shown on the attached drawing No. 1655.D has been fixed by use of a hand-held GPS surveying unit. Given this, the position of the trees must be considered indicative, although drawing no. 1655.D provides a fair representation of the relationship of the trees as distributed across the site.

3.3 There is one BS 5837:2005 Category "A" (features where retention is most desirable) specimens or landscape features within the confines of the survey – T013.

3.4 One tree (T003) has been classified as a BS 5837:2005 Category "A/B" specimen. This designation identifies fine specimens, but with minor defects or faults as detailed in the Schedule of Trees which differentiate them from the very best (Category "A") items.

3.5 There are six BS 5837:2005 Category "B" (features where retention is desirable) trees and landscape features on or associated with the site – T002, T004, T005, T006, T007, and T012.

3.6 The total of higher quality items inspected (BS 5837:2005 Category "A", "A/B", "B" and above) represents approximately 53% of the surveyed trees and landscape features.

3.7 One item (T001) has been classified as a BS 5837:2005 Category "B/C" specimen. The reason for this designation is that whilst these features may contain attractive or unusual qualities or characteristics, they are of poor form, poorly sited, or have a predicted life span of less than 20 years due to inherent weaknesses or faults as detailed in the Schedule of Trees.

3.8 There are six BS 5837:2005 Category "C" (features which could be retained for short term benefit only) individual specimens and landscape features on site – G002, G003, H001, T011, T014, and T015. These items are generally evenly dispersed throughout the site. They may include young trees, trees or landscape features of poor form, or specimens with no significant individual long term landscape or amenity value, but which in certain circumstances visually coalesce to provide pleasing softening, screening and habitat benefits.

3.9 BS 5837:2005 Category "B" and Category "C" specimens represent the joint most populated designations within this survey. Of the total individual trees and landscape specimens inspected, approximately 30% were items which should be retained if possible, and a further 30% were items identified as being of only short term benefit.

3.10 G001 and T010 are a specimen and a landscape feature assessed as BS 5837:2005 Category "C/R". These items are either of such poor form that they will require removal in the near future, or their removal, whilst not essential for health and safety reasons, would be beneficial in other ways (e.g. aesthetically, for quality of life reasons, or for the cultural benefit of remaining specimens).

3.11 The remaining trees and landscape features; G004, T008, and T009 are BS 5837:2005 Category "R" specimens (features for removal). These items require felling for health and safety, cultural, or structural reasons, irrespective of the future use of the site.

3.12 The total of lower quality items inspected (BS 5837:2005 Category "B/C", C, C/R, and R) represents approximately 47% of the surveyed trees and landscape features.

3.13 Allied to the trees that require felling as detailed at item 3.11 above, several items would benefit from tree surgery, be it for health and safety, cultural, aesthetic, or structural reasons as detailed in the attached Schedule of Trees. Including the trees recommended for felling, the items requiring the **most urgent** intervention are as follows:

As soon as possible:

T001	Remove lodged branch

Within six months:

G004	Fell 2 no Willow
T003	Undertake Picus examination
T007	Clear path of power cables
T008	Fell (dead tree)

3.14 Over and above the general and prudent recommendation that all trees are inspected on an annual basis, the following items have been identified as requiring enhanced monitoring to assess any changes in faults and weaknesses etc as detailed in the Schedule of Works:

T001	Tight limb unions

3.15 As noted in the table at item 3.13 above, it is recommended that T003 be subject to a Picus examination (Appendix 7). This is ostensibly a sturdy and impressive specimen, but closer examination shows the presence of an Artists Fungus Fugal bracket, (please see item 18.3). Testing of the stem with a rubber mallet appeared to indicate some hollowing around the buttress roots on the western aspect. Given the location of the tree and its visual prominence, it is recommended that a Picus ultrasound scan be undertaken to provide more detailed information as to the structural integrity of the base of this tree. The Picus uses a series of sensors positioned at equidistance around the tree to both send and receive sound waves generated by the tapping of the sensors with a hammer. Once all the sensors have been tapped the software generates a tomograph depicting the condition of the wood as a series of colours dependant on the speed of the sound waves between the sensors. As sound travels more quickly through healthy wood and more slowly through degenerate/dead wood the tomograph generated should, if correctly interpreted, give an accurate depiction of the levels of decay within the tree. Gathering information in this way will also act as a datum point should future ultrasound scans be undertaken.

3.16 The site is not subject to a Tree Preservation Order, or within a Conservation Area, although this should be confirmed by the Local Planning Authority, Rochford District Council, prior to any tree works being undertaken on site.

3.17 Details of all proposed tree works are given on the attached Schedule of Trees.

4.0 Implications of Proposed Development

4.1 Implications on Construction

4.1.1 The proposal is to demolish the existing two semi detached dwellings at the centre of the site and construct two new detached properties on a slightly different footprint.

4.1.2 Site access is unencumbered by the Root Protection Areas (RPA's) of any trees to be retained. Therefore, and from a purely arboricultural perspective, it will not be necessary to install a proprietary temporary load bearing road to protect tree roots.

4.1.3 In order to impart a more realistic assessment of the Root Protection Area (RPA) of T013, this has been offset by 20% in accordance with item 5.2.4 (a) of BS 5837:2005. This is appropriate in this circumstance due to the open grown nature of the tree and the proximity of a wet ditch immediately to the east of the stem which has almost certainly reduced the volume of root incursion within the site.

4.1.4 Construction of the new dwellings does not encroach within the RPA's of any trees to be retained. Therefore no specialized construction or foundation techniques will be required.

4.1.5 No specific information on the location of access drives has been provided. However, provided that any route of access is located outside the fenced (see item 4.1.6, below) RPA's of retained trees, or utilizes the existing concrete access at the eastern aspect of the site, no specialist "on top" construction in accordance with Appendix 4 will be required.

4.1.6 Prior to the commencement of construction and immediately after the completion of the necessary tree surgery and felling work, protective fencing must be erected on site. This must be in full accordance with item 5.0 below and positioned as shown on drawing no. 1655.D.

4.1.7 The site provides adequate internal space to locate a construction compound outside the RPA's of any trees and landscape features that are to be retained.

4.2 Cultural Implications

4.2.1 There are no cultural implications for any retained landscape features associated with this proposal.

4.3 Landscape Implications

4.3.1 From the proposed layout it is clear that the construction of the proposed new dwellings will not have a significant impact on the important trees and landscape features associated with the site. Within the confines of the survey, there is one BS 5837:2005 Category "A" tree, one Category "A/B" specimen, and six Category "B" items. All of these high quality features will be retained within the proposed layout.

4.3.2 In addition to trees and landscape features already indentified for removal irrespective of any development proposals, the item listed in the table below requires felling to permit the proposed development:-

FEATURE NO	REASON FOR REMOVAL	BS CATEGORY	VISUAL AMENITY ASSESSMENT
T010	Necessary to fell to permit construction of westernmost dwelling.	C2/R	Low. Loss will not be significant from within or beyond the site.

4.3.3 One landscape feature (G008), and two trees (T008 and T009) are also scheduled for removal. These are poor quality items whose work requirements are appropriate on safety, cultural or structural grounds irrespective of any projected layout and whose loss will not be significant from either within or beyond the site. In this particular circumstance the recommendations to fell T008 and T009 coincide with the requirements necessary to achieve the layout as detailed at item 4.1.1 above.

4.4 Post Development Implications

4.4.1 The orientation of the site, together with the relationship and scale of the retained trees to the proposed structures is such that undue shading or excessive dominance are not considered to be significant issues

5.0 Tree Protection

5.1 The trees to be retained will be protected by the use of stout fencing erected along the lines indicated on the attached Arboricultural Implication assessment drawing No.1655 D. This fencing will be constructed with weld mesh panels on a framework of scaffolding, or similarly sturdy material, driven into the ground to a suitable depth to ensure its stability and in line with BS 5837:2005, figure 2 (Appendix No 1).

5.2 Where construction adjacent to trees is within the Root Protection Area (RPA) (BS 5837:2005, Table 2), specific detail will be paid to the type of surface treatment used in these areas, details of which are given in para' 12.0 below. This proposed development (footpaths) will be constructed as a final phase of the development, thereby protecting the roots of the tree throughout the major construction phase of the proposed development.

5.3 All fencing with regards to the protection of trees will be erected prior to any development on the site, therefore ensuring the maximum protection. This fencing will be regarded as sacrosanct and, once erected, will not be removed or altered without the prior consent of the Local Planning Authority Arboricultural Officer.

6.0 Location of Site Office/Compound

6.1 The position of the office/compound will be agreed in writing with the Local Planning Authority prior to commencement of any permitted development works. Any re-siting of the office/compound through the various phases of development will be agreed prior to re-siting with the Arboricultural Officer.

7.0 On Site Storage of Spoil and Building Materials

7.1 Prior to and during all construction works on site, no spoil or construction materials will be stored within the RPA of any tree on, or adjacent to the site, even if the proposed development is to be within the RPA. This is to reduce to a minimum the compaction of the roots of the trees. Details of the RPA for each tree where no spoil or building materials will be stored are indicated on the attached drawing No. 1655 D. Any encroachment within this protected area will only be with the prior agreement of the Local Planning Authority Arboricultural Officer.

7.2 Any facilities for the storage of oils, fuels or chemicals shall be sited on impervious bases and surrounded by impervious bund walls. The volume of the bund compound shall be at least equivalent to the capacity of the tank plus 10%. If there is a multiple tankage, the compound shall be at least equivalent to the capacity of the largest tank, or the combined capacity of interconnected tanks, plus 10%. All filling points, vents, gauges and sight glasses shall be located within the bund. The drainage system of the bund shall be sealed with no discharge to any watercourse, land or underground strata. Associated pipe-work shall be located above ground and protected from accidental damage. All filling points and tank overflow pipe outlets shall be detailed to discharge downwards into the bund.

8.0 Programme of Works

8.1 All tree surgery works, once approved by the Local Planning Authority, will be carried out prior to any other site works. Once completed, the proposed protective fencing will be erected along the lines indicated above. All of this will be carried out prior to commencement of any development works on the site. Outline details of the proposed programme are given in the Flow chart attached (Appendix 3). A detailed schedule of the proposed tree surgery works to be completed prior to construction work is in the attached Tree Survey.

8.2 During the construction works on site, the protective fencing will be maintained and every effort will be made to prevent unnecessary damage to the trees. The Arboricultural Officer will be notified immediately of any unforeseen damage. The necessary remedial tree surgery will be carried out at the earliest opportunity to the approval of Arboricultural Officer. The site will be inspected on a regular basis by a competent and qualified arboriculturalist.

8.3 On completion of the development works on site, it would be advisable to carry out a further tree survey to identify any remedial tree surgery necessary as a result of the development works, and to suggest details for the future management of the trees.

9.0 Remedial Tree Surgery

9.1 All necessary remedial tree work will be agreed with the Local Planning Authority and will be carried out in line with BS 3998:1989 (Recommendations for Tree Works). An arboricultural contractor approved by the Local Planning Authority will carry out the work. Any alterations to the proposed schedule of works will be agreed with the Arboricultural Officer prior to commencement of works.

10.0 Levels

10.1 To allow the proposed development, there may have to be some alterations in the site levels. Appropriate measures will be taken to minimise the detrimental effects on the tree(s) that are to be retained in these areas. If excavations have to be so close to the tree(s) that roots greater than 50mm diameter are likely to be encountered, particular care will be taken to avoid damage. Excavation in these areas will be undertaken by hand, avoiding any damage to the bark. The roots will be surrounded with sharp sand prior to the replacing of any soil or other material in the vicinity.

10.2 With regards to raising levels, it is necessary to maintain adequate supplies of water and oxygen through the soil to the trees' roots. Therefore, where necessary, a granular material will be used which will not inhibit gaseous diffusion e.g.; no-fines gravel or cobbles, Type 2 road-stone, and all hard surfaces will be of suitable specification to allow such gaseous diffusion, such as brick pavers.

11.0 Services

11.1 It is proposed that all service runs will be placed outside the RPA of the trees on or adjacent to the site. Where it is not possible to do this, then the proposed length infringing on the RPA will be hand dug 'broken trenches' (NJUG 10 Para 4.6.1) to ensure the maximum protection of the trees' roots. Alternatively the trenches could be excavated using an 'Air spade' allowing services to pass below and through the roots without the need for excavation. All roots that need to be cut should be cut in such a way to ensure that the final wound is as small as possible and free from ragged torn ends, (see BS 3998:1989 Para 14.3). All routes for overhead services will aim to avoid the trees. Where this is unavoidable, any tree work will be agreed prior to commencement with the Arboricultural Officer.

11.2 All service providers (Statutory Authorities) will be consulted prior to commencement of works with the aim of minimising the number of service runs on the site.

11.3 All service runs/trenches will be agreed with the Local Planning Authority / Arboricultural Officer prior to commencement of works.

12.0 Hard Surface Types and Construction Beneath the Crown Spread

12.1 It may be necessary to construct footpaths may be within the RPA's of retained trees as calculated in BS 5837:2005, Table 2. If footpaths are required, specific detail will be paid to the design and specifications of any hard surfaces. In these areas, it is proposed that the construction of footpath will be along the lines of the Arboricultural Advisory Information Services (AAIS) Practice Note 1 "Driveways Close to Trees", the only difference being that in conjunction with the 'geo-web, the road stone will be incorporated in and retained by 'Terram' geo-web, cellular confinement system' or similar (see Appendix 4). Where it is necessary to remove the existing hard surface or lower the ground level exposing roots within the BS 5837:2005 RPA, this will be excavated by hand and the roots surrounded by sharp sand, with the greatest of care being taken to cause the minimum of damage to the root.

12.2 Where it is shown that the construction of a boundary wall or dwelling encroaches within the Root Protection Area of a tree, the foundations of the wall or dwelling will be constructed in such a manner as to minimise the detrimental affect of the construction on the tree's roots. In this case any excavations within the Root Protection Area of the tree will only be undertaken following exploration of the existing root system with an Air-spade and the necessary root pruning undertaken to allow excavation without unnecessary pulling and tearing of the roots to be retained. This will ensure minimal damage to tree roots. Obviously, should a piling rig be required to create piles, any tree work required to allow access must be undertaken prior to the commencement of works and only with prior consent of the Local Planning Authority.

12.3 Where it is proposed that boundary fencing is to be erected within the RPA, it is proposed that the fence posts will be secured by the use of 'Met-Posts' in order to keep the disturbance and damage of the roots of the trees to a minimum.

13.0 Reporting Procedures

13.1 The site and associated development should be monitored/inspected regularly by a competent arboriculturalist to ensure that the arboricultural aspects of the planning permission are enforced and to deal with and advise on any problems that may arise during the development process. Should any problems arise during the development; the Arboriculturalist will contact the Local Planning Authority and appropriate action taken only with the prior permission of Mr Martin Blackwell and the Local Planning Authority.

14.0 Conclusions

14.1 The site is the domestic gardens associated with 3 and 4 Hooley Drive, Rayleigh, Essex. Within what is considered to be the influencing area of the site (i.e. the gardens of the properties and immediately adjacent land) a total of fifteen individual trees, four groups of trees, and one hedge have been surveyed. These were found to be of mixed condition and age providing a variety of amenity benefits. It is proposed to demolish the two semi ditched properties and construct a two detached dwellings within the curtilage of this plot.

14.2 It is my conclusion that the proposed development will not have a significant impact on the important trees associated with the site. There is one BS 5837:2005 Category "A" specimen, one BS 5837:2005 Category "A/B" item, and six BS 5837:2005 Category "B" trees on or immediately adjacent to the site. All these features will remain as an integral part of the proposed layout.

14.3 It is necessary to fell three low quality/poor longevity trees in order to achieve the proposed layout.

14.4 One group of trees and two individual trees have been identified for removal irrespective of any development proposals. The removal of one of these items coincides with the requirements of the proposed layout.

14.5 The footprints of the new dwellings do not conflict with the Root Protection Areas of any retained trees. As such, no specialist construction techniques will be required for either of the houses.

14.6 The location of the access drives have not been determined, but provided they are located beyond the Root Protection Areas of any retained trees, no specialist "no dig" construction techniques will be required.

14.7 Irrespective of any development proposal, it is recommended that one tree (T003) be subject to a Picus examination to assess the progression of fungal activity.

14.8 All trees and landscape features that are to remain as part of the development should suffer no structural damage provided that protective fencing is erected as detailed at items 4.1.6 and 5.0 of this report, and that the work is scheduled as listed in items 4.1.6 and in the attached Schedule of Trees.

15.0 RECOMMENDATIONS

15.1 It is recommended that in view of the siting and design of the layout which has been planned to incorporate the important trees on and associated with the site, together with the detailed tree protection measures listed in this report, the trees should not be considered a constraint on the proposed development.

15.2 Tree surgery should be completed as detailed in the Schedule of Trees. Where this has been identified for reasons other than to permit development, this work should be completed within the advised timescales irrespective of any development proposals.

15.3 The tree surgery works proposed as part of this Survey are recommended to mitigate any identified problems that may be caused by trees in close proximity to the proposed development. To this end, should these recommendations be overruled, this Survey stands as the opinion of Hayden's Arboricultural Consultants, and therefore any damage or injury caused by trees recommended by this practice for felling or tree surgery works, to which the proposed schedule of works has been altered or the tree has been requested to be retained by the Local Planning Authority, cannot be the responsibility of this practice.

16.0 REFERENCES

British Standards Institute. (1989). Recommendations for tree work *BS 3998:1989* HMSO, London.

British Standards Institute. (2005). *Trees in relation to Construction BS5837:2005* HMSO, London.

DETR. (2000). *Tree Preservation Orders, A Guide to Good Practice*. Department of the Environment, Transport and the Regions

17.0 Explanatory Notes

17.1 **Categories**

17.2 Below is an explanation of the categories used in the attached Tree Survey.

No Identifies the tree on the plan.

Species Common names are given to aid understanding for the wider audience.

BS 5837 Category On the basis of this assessment, trees can be divided into one of the following simplified categories, and are differentiated by cross-hatching and by colour: A-trees where retention is most desirable, high category (colour green); B-trees where retention is desirable, moderate category (colour blue); C-trees which could be retained, low category (colour grey); R-trees for removal, fell category (dark red). These categories are based on health, form, safety, screening value, historical value and rarity. (Table 1, BS 5837:2005).

***DBH* (mm)** Diameter of main stem in millimetres at 1.5m from ground level. Where the tree is a multi-stem, the diameter is given at the narrowest point immediately above the root flare..

Age Recorded as one of seven categories:

Y Young. Recently planted or establishing tree that could be transplanted without specialist equipment, ie up to 12-14 cms stem girth.

S/M Semi-mature. An established tree but one which has not reached its potential ultimate height and has significant growth potential.

E/M Early-mature. A tree reaching its ultimate potential height, whose growth rate is slowing down but will still increase in stem diameter and crown spread and has a safe useful life expectancy.

M Mature. A mature specimen with limited potential for any significant increase in size but with a reasonable safe useful life expectancy.

O/M Over-mature. A senescent or moribund specimen with a limited safe useful life expectancy. Possibly also containing sufficient structural defects with attendant safety and/or duty of care implications.

V Veteran. An over-mature specimen of high value due to either its age, size and/or ecological significance

D Dead.

Height Recorded in metres, measured from the base of the tree.

Life Expectancy	Relates to the prospective life expectancy of the tree and is given as 4 categories: 1 = 40 years+; 2 = 20-40 years; 3 = 10-20 years; 4 = less than 10 years.
Crown spread	Indicates the spread of the crown from the base of the tree.
Minimum distance	This is a distance equal to 12 times the diameter of the tree at 1.5 metres for single stemmed trees and 10 times the diameter of the base of the tree for multi stemmed specimens. (BS 5837:2005).
RPA	Root Protection Area, defined in BS5837:2005 as 'a layout design tool indicating the area surrounding a tree that contains sufficient rooting volume to ensure the survival of the tree, shown in plan form in square metres. Ideally this is an area around the tree that must be kept clear of construction, level changes of construction operations. Some methods of construction can be carried out within the RPA of a retained tree but only if approved by the Local Planning Authority's tree officer.
Water Demand	This gives the water demand of the species of tree when mature, as given in the NHBC Standards Chapter 4.2 'Building Near Trees'.
Visual	Concerns the planning and landscape contribution to the development site made by the tree, hedge or tree group, in terms of its amenity value and prominence on the skyline along with functional criteria such as the screening value, shelter provision and wildlife significance.
Problems/comments	May include general comments about growth characteristic, how it is affected by other trees and any previous surgery work; also, specific problems such as deadwood, pests, diseases, broken limbs, etc.
Work required	Identifies the necessary tree work to mitigate anticipated problems and deal with existing problems identified in the previous category.
Priority	This gives a priority rating to each tree allowing the client to prioritise necessary tree works identified within the Tree Survey. **1** Urgent – works required immediately; **2** Works required within 6 months; **3** Works required within 1 year; **4** Re-inspect in 12 months, **0** Remedial works as part of implementation of planning consent.

18.0 Tree Problems

18.1 This gives a brief description of the problems identified in the attached Tree Survey.

18.2 **Artist's Fungus (*Ganoderma applanatum & adspersum*)**
This is a common and widespread fungi commonly associated with Beech trees. It causes heart rot in the infected tree, turning the wood white and ultimately soft and spongy as the rot consumes the lignin. This rot obviously causes the weakening of the tree and may eventually causes the tree to fall / snap or branches to break off. It is therefore recommend that any tree infected be removed, not only to make it safe, but also to remove the danger of infection of adjacent trees.

18.3 **Deadwood:**
This relates to dead branches in the crown of the tree. In the majority of cases this is just caused by the natural ageing of the tree or its close proximity to neighbouring trees. However in some cases it may be related to fungal, bacterial or viral infection and for that reason a close eye should be kept on those trees showing signs of excessive deadwood.

18.4 **Epicormic / Adventitious growth / Basal Suckers**
This is the production of numerous shoots on the main stem and branches or at the base of the tree. They are produced by the bursting into life of otherwise dormant buds. It is commonly associated with stress caused by factors such as canker and dieback.

18.5 **Ivy (Hedera helix)**

This is generally only harmful on already unhealthy trees which may be constricted by large ivy stems around the trunk or may have their top growth suppressed by a mass of flowering shoots in the crown. Ivy should only be removed if absolutely necessary because of the abundant cover it gives to wildlife and then by severing twice close to the ground and removing a length of stem.

19.0 LIMITATIONS AND QUALIFICATIONS

Tree inspection reports are subject to the following limitations and qualifications.

General exclusions

Unless specifically mentioned, the report will only be concerned with above ground inspections. No below ground inspections will be carried out without the prior confirmation from the client that such works should be undertaken.

The validity, accuracy and findings of this report will be directly related to the accuracy of the information made available prior to and during the inspection process. No checking of independent third party data will be undertaken. Hayden's Arboricultural Consultants will not be responsible for the recommendations within this report where essential data are not made available, or are inaccurate.

This report will remain valid for one year from the date of inspection, but will become invalid if any building works are carried out upon the property, soil levels altered in any way close to the property, or tree work undertaken.

If alterations to the property or soil levels are carried out, or tree work undertaken, it is strongly recommended that a new tree inspection be carried out.

It will be appreciated, and deemed to be accepted by the client and their insurers, that the formulation of the recommendations for the management of trees will be guided by the following:-

1. The need to avoid reasonable foreseeable damage.
2. The arboricultural considerations - Tree safety, Good Arboricultural practice (tree work) and Aesthetics.

The client and their insurers are deemed to have accepted the limitation placed on the recommendations by the sources quoted in the attached report. Where sources are limited by time constraints, or the client, this may lead to an incomplete quantification of the risk.

David M Carmichael
Arboricultural Consultant
Hayden's Arboricultural Consultants

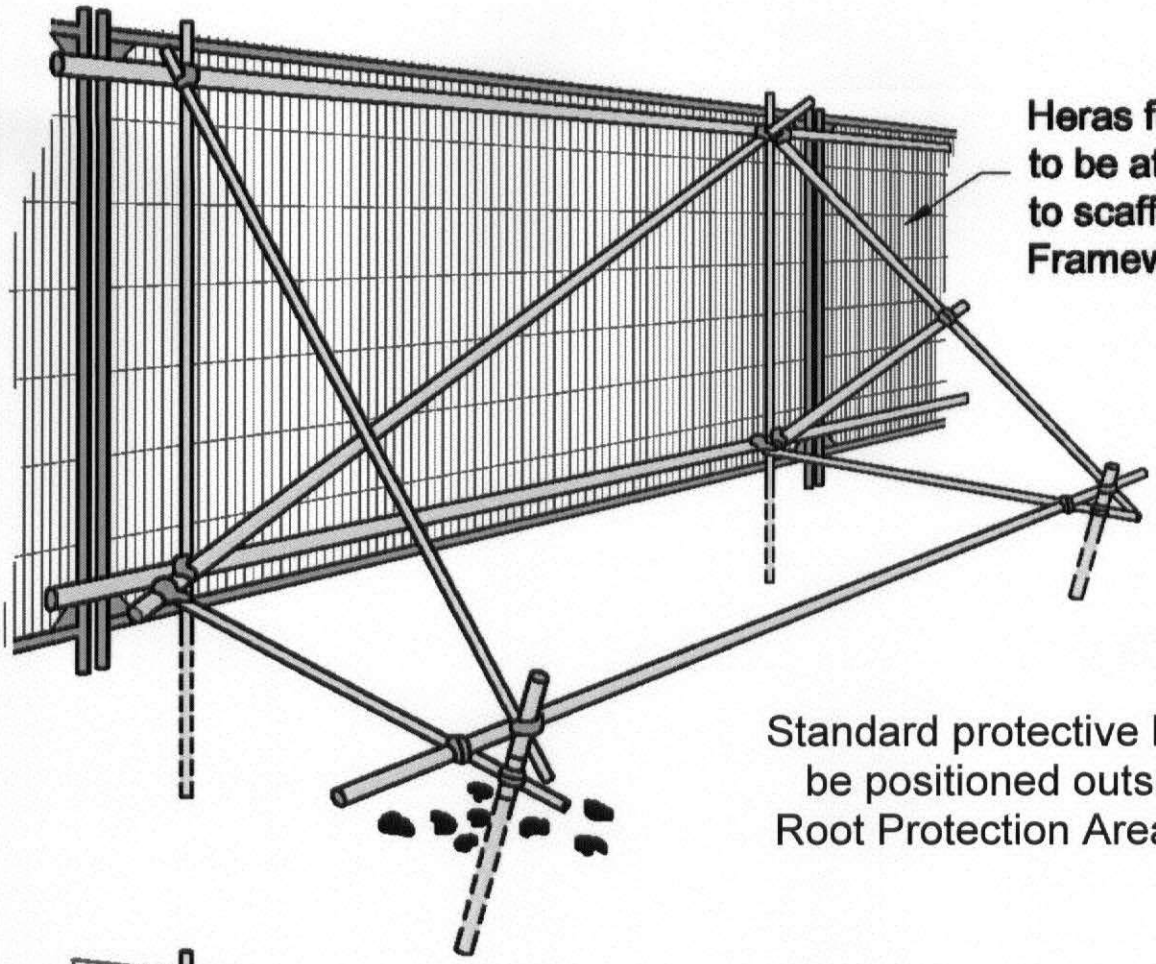
February 2009.....

20.0 APPENDICES

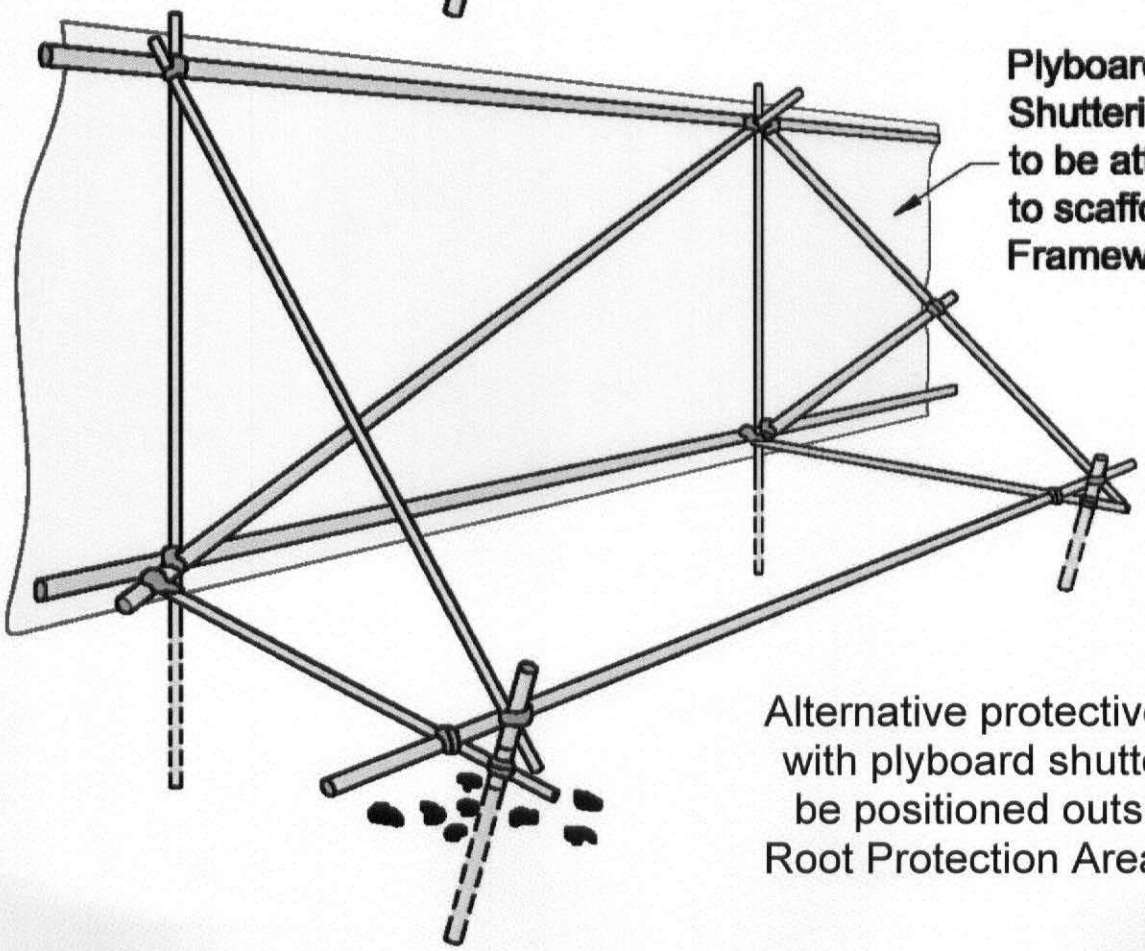
Appendix No.	**1**	BS 5837:2005 Figure 2 Protective Barrier
Appendix No.	**2**	BS 5837:2005 Figure 3 Detail of protective barrier where construction encroaches within BS5837:2005 Root Protection Area
Appendix No.	**3**	BS 5837:2005 Figure 1 Flow Chart – Summarising Planning for Trees on Development Sites
Appendix No.	**4**	Method Statement for 'No Dig' Construction in line with Arboricultural Practice Note 1 'Driveways Close to Trees and Terram Cellular Confinement System'
Appendix No.	**5**	European Protected Species and woodland operations Decision tree to aid planning of woodland operations and protecting EPS (v.1)
Appendix No.	**6**	Air Spade/Air Excavation Specification
Appendix No.	**7**	Picus Sonic Tomograph
Appendix	**A**	Species List
Appendix	**B**	Schedule of Trees
Appendix	**C**	Schedule of Work required to allow the proposed development
Appendix	**D**	Drawing No 1655 D

APPENDIX NO 1

BS 5837:2005 Figure 2 Protective Barrier



Standard protective barrier to be positioned outside the Root Protection Area (RPA).

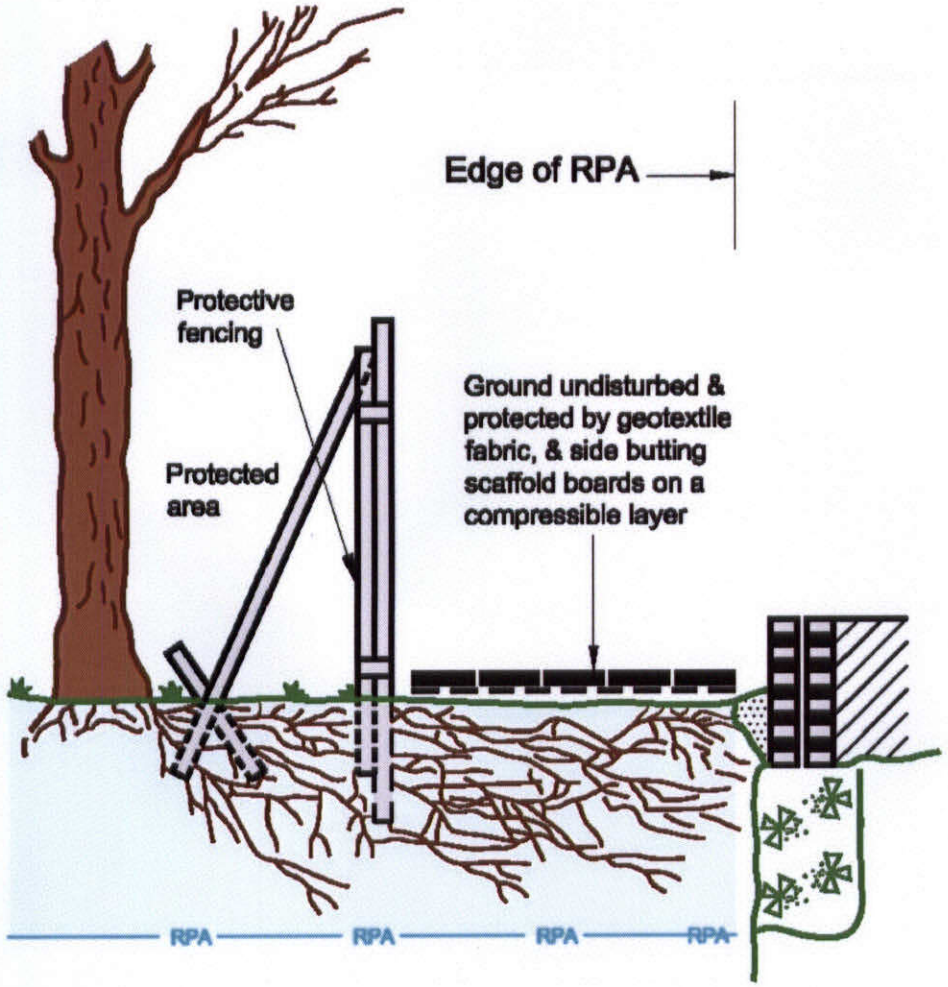


Alternative protective barrier with plyboard shuttering to be positioned outside the Root Protection Area (RPA).

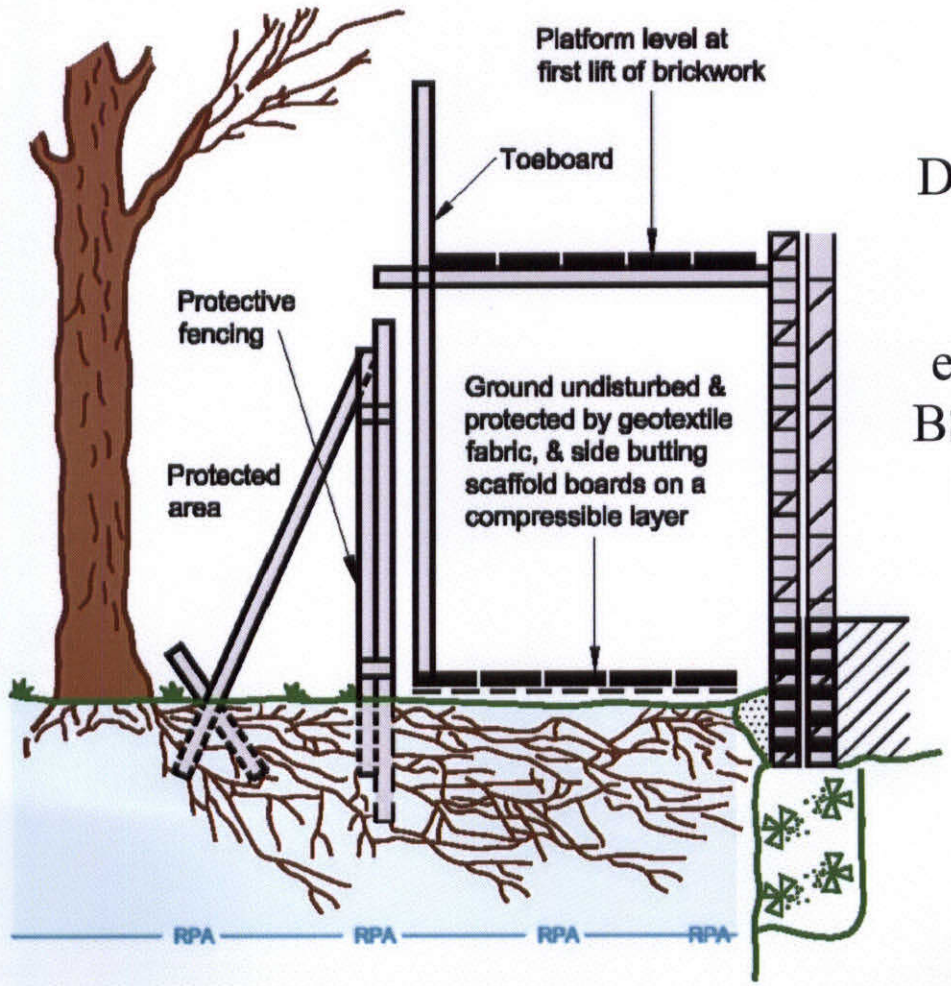
Appendix No 1 - BS 5837:2005,
Figure 2 - Protective barrier

Appendix No 2

BS 5837:2005 Figure 3
Detail of protective barrier where construction encroaches within BS 5837:2005 Root Protection Area



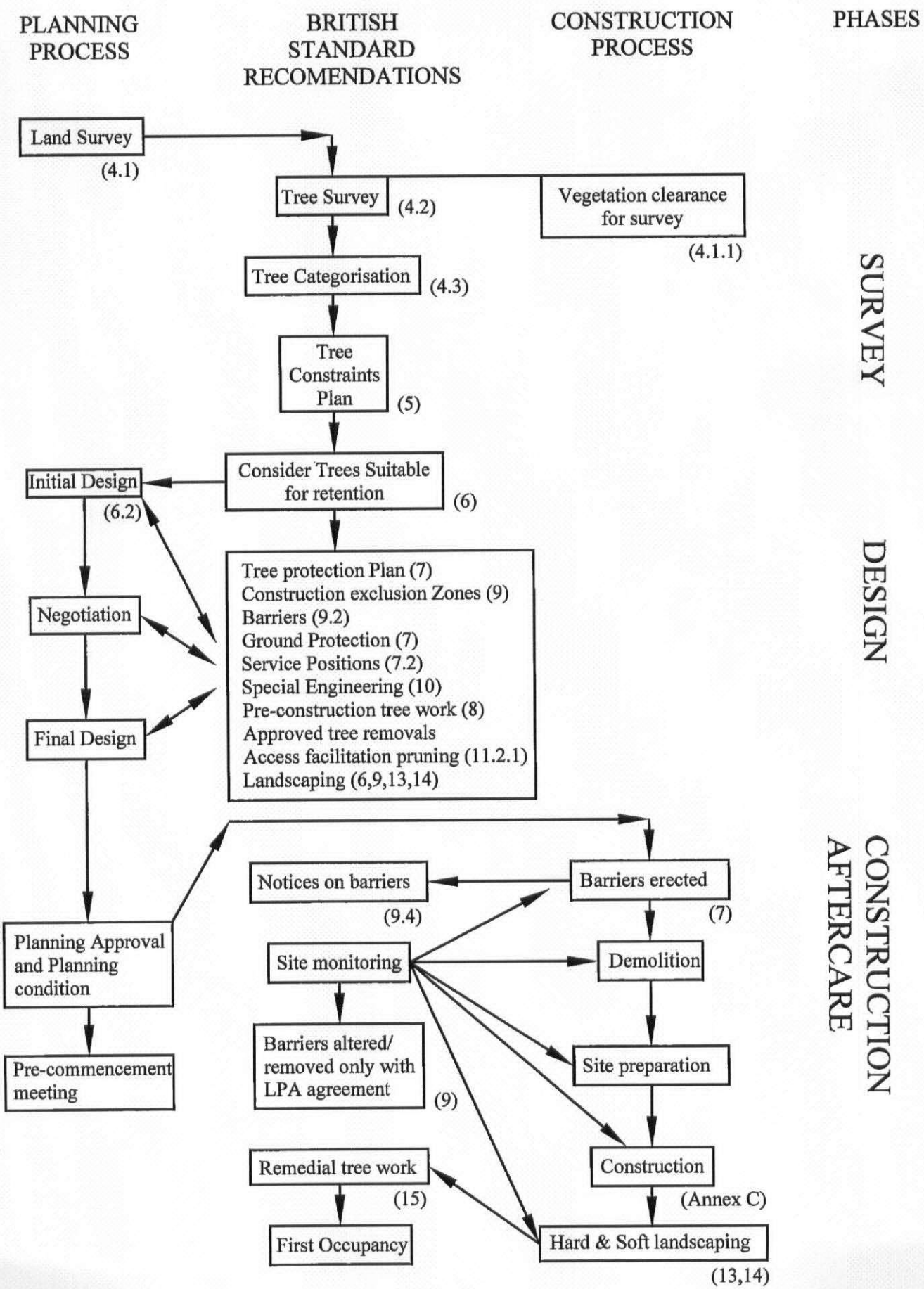
Appendix No 2
BS 5837:2005,
Figure 3 –



Detail of protective barrier where construction encroaches within BS 5837:2005 Root Protection Area (RPA)

Appendix No 3

BS 5837:2005 Figure 1
Flow Chart – Summarising Planning for Trees on Development Sites



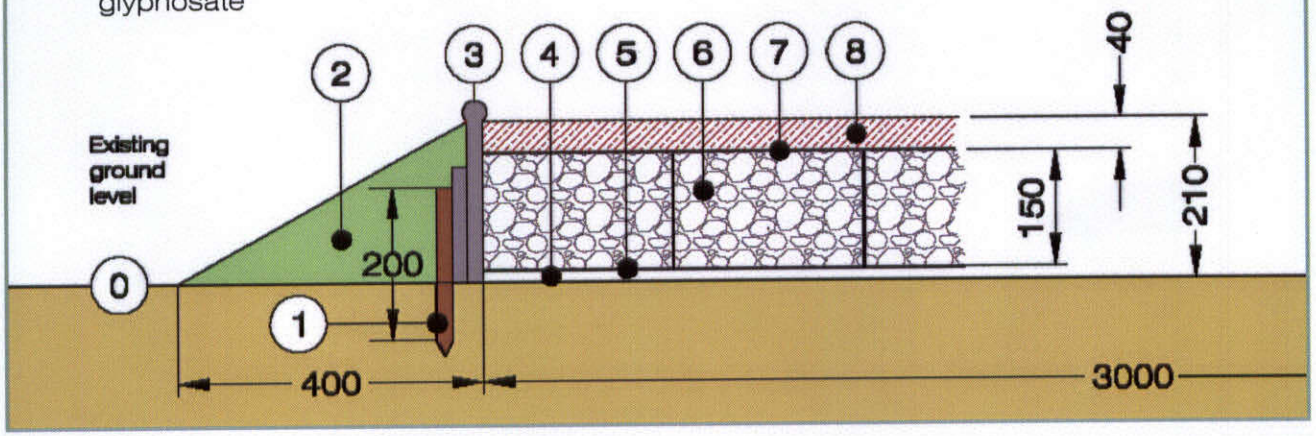
Figures in brackets refer to Clause numbers

Appendix 3 BS 5837:2005, Figure 1 - Flow diagram, summarising planning for trees on development sites

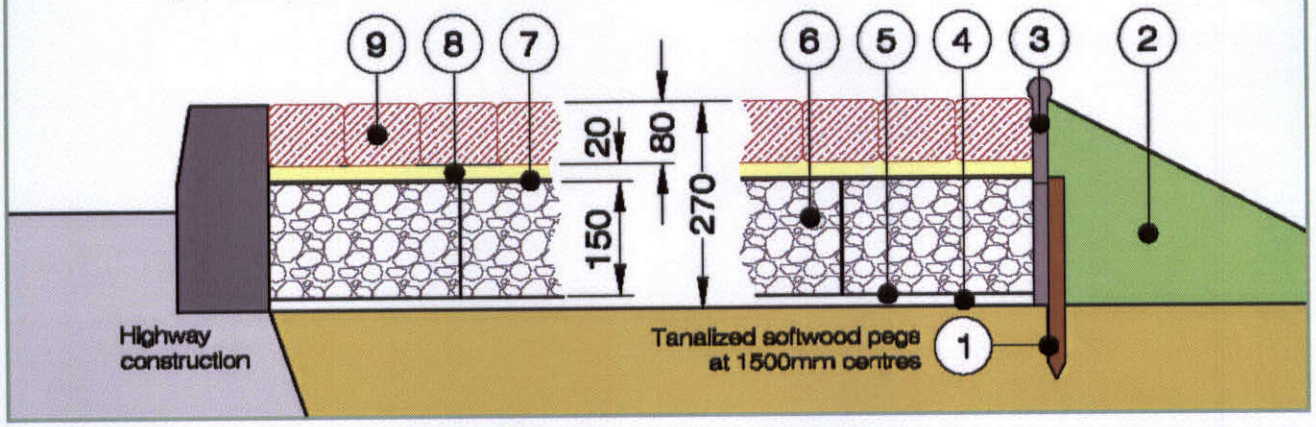
APPENDIX NO 4

Method Statement For" No Dig" Construction In Line With Arboricultural Practice Note 1. 'Driveways Close To Trees & Terram Cellular Confinement System'.

1) Tanalized softwood pegs at 1500mm centres
2) Top soil banked up to edging
3) Softwood boards / Concrete edging 'tiles'
4) Existing surface to be cleared of ground vegetation using a translocated herbicide such as glyphosate
5) Geo-textile matting "Terram" laid on top of footpath
6) "Geocell" Cellular Confinement System (150mm deep) with gravel chippings
7) Geo-textile matting "Terram" laid on top of cellular confinement system
8) Gravel or paving laid on top of permeable sub-base



2) Top soil banked up to edging
3) Softwood boards / Concrete edging 'tiles'
4) Existing surface to be cleared of ground vegetation using a translocated herbicide such as "glyphosate"
5) Geo-textile matting "Terram" laid on top of footpath
6) "Geocell" Cellular Confinement System (150mm deep) with gravel chippings
7) Geo-textile matting "Terram" laid on top of cellular confinement system
8) 'No fines' sand laid on top of geo-textile matting
9) Aquaflow permeable paving laid on top of no fines sharp sand and permeable sub-base

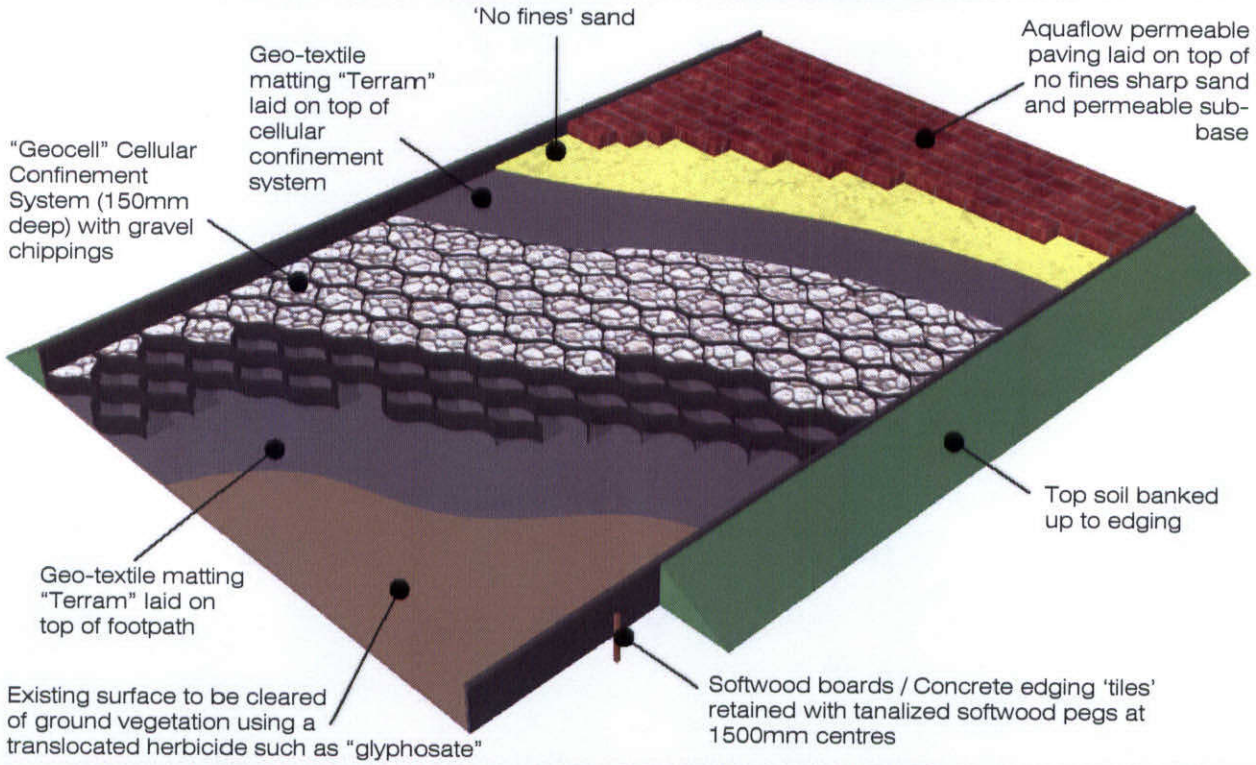


HAYDEN'S
ARBORICULTURAL CONSULTANTS

5 Moseley' Farm
Business Centre
Fornham All Saints
Bury St Edmunds
Suffolk IP28 6JY

Tel: 01284 765391
Fax: 01284 765181
Mob: 07850167400
info@treesurveys.co.uk
www.treesurveys.co.uk

Client: Mr Martin Blackwell	Scale: 1:10 (A4)
Site: 3 & 4 Hooley Drive, Rayleigh	Date: 06/02/09
'No Dig' Driveway & Parking Specification	Drg No. 1655.ND



The 3D drawing above may not accurately depict the construction to be carried out and should be taken as indicative only. Use the section drawings on the previous page for full details on the required construction method

'No Dig' system during construction (right)

"Geocell" Cellular Confinement System (100mm deep) with gravel chippings (below)

HAYDEN'S
ARBORICULTURAL CONSULTANTS

5 Moseley' Farm
Business Centre
Fornham All Saints
Bury St Edmunds
Suffolk IP28 6JY

Tel: 01284 765391
Fax: 01284 765181
Mob: 07850167400
info@treesurveys.co.uk
www.treesurveys.co.uk

The Aquaflow® range of permeable paving

Aquaslab®

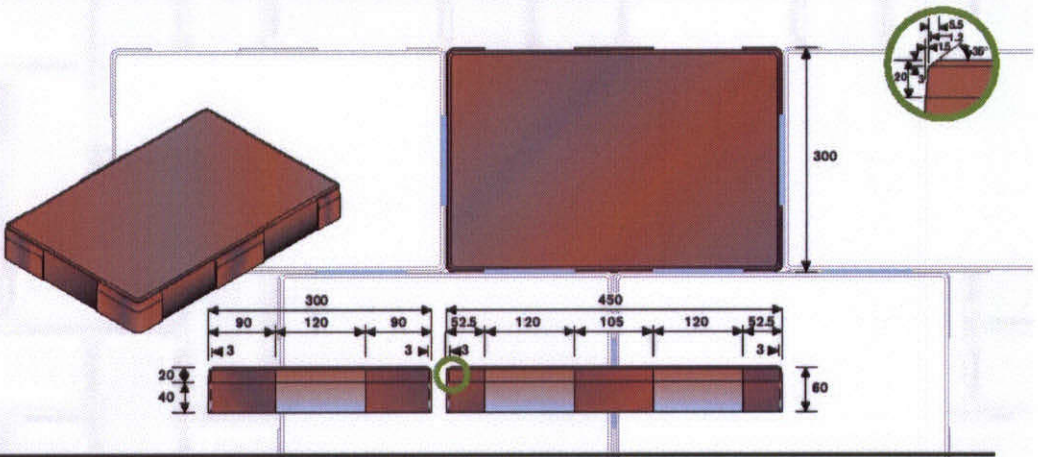
For use on Pedestrian areas

Size
300 x 450 x 60mm

Laying pattern
Staggered stretcher bond

Colours*
Natural, Burnt Red, Red brindle, Golden brindle and Charcoal

Finish
Standard
Bush hammered to special order



Aquasett®

For use on footpaths, domestic drives and roads (80mm)

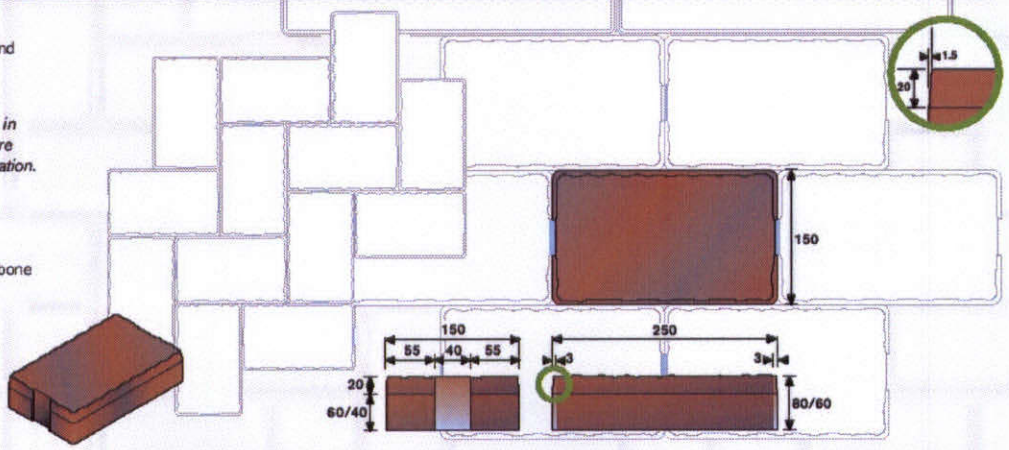
Range of colours and the Olden finish make the Aquasett appropriate for use in conservation areas or on projects where architectural heritage is a major consideration.

Sizes
150 x 250 x 60/80mm

Laying pattern
Staggered stretcher bond or 90° herringbone for trafficked areas.

Colours*
Traditional, Red Brindle, Vendage and Pennant.

Finish
Olden
Bush hammered to special order



Aquasett combined®

For use on footpaths and domestic drives

Range of colours and the Olden finish make the Aquasett combined appropriate for use in conservation areas or on projects where architectural heritage is a major consideration

Sizes
Large 150 x 250 x 60/80mm
Medium 150 x 150 x 60/80mm
Small 100 x 150 x 60/80mm

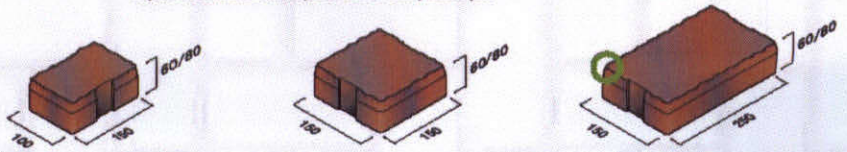
Ratio of blocks in 0.8 square metre manufactured format: 10 large, 14 medium and 7 small.

Laying pattern
Staggered stretcher bond

Colours*
Traditional, Red Brindle, Vendage and Pennant.

Finish
Olden
Bush hammered to special order

Aquasett combined (0.8 square metres-one pallet layer)



Formpave have designed a range of Aquaflow paving blocks to be used in conjunction with either tanked or infiltration systems.

The range consists of six blocks manufactured from concrete with a tensile splitting strength in accordance with BS EN 1338:2003.

Included within the range is the Aquaslab which has been designed for use on non-trafficked pedestrian areas.

All of the blocks and slabs provide drainage through vertical channels and will allow water through the surface at a rate of approximately 9000mm per hour (9000 litres per m^2 per hour). The Inbitex geotextile beneath the laying course will allow approximately 4500 litres per m^2 per hour through and this figure should be used for design purposes.

The Aquaflow ML block system consists of an interlocking block with specialist top, bottom and edge blocks and has been specifically designed for heavy duty applications.

The ML blocks can be laid by hand or by machine. Where the blocks are machine laid modules of .65m^2 are laid in one pass. Laying rates of over 600m^2 per day have been readily achieved with a three man crew.

* Other colours and finishes such as EcoGranite are available to special order.

Aquaflow block®

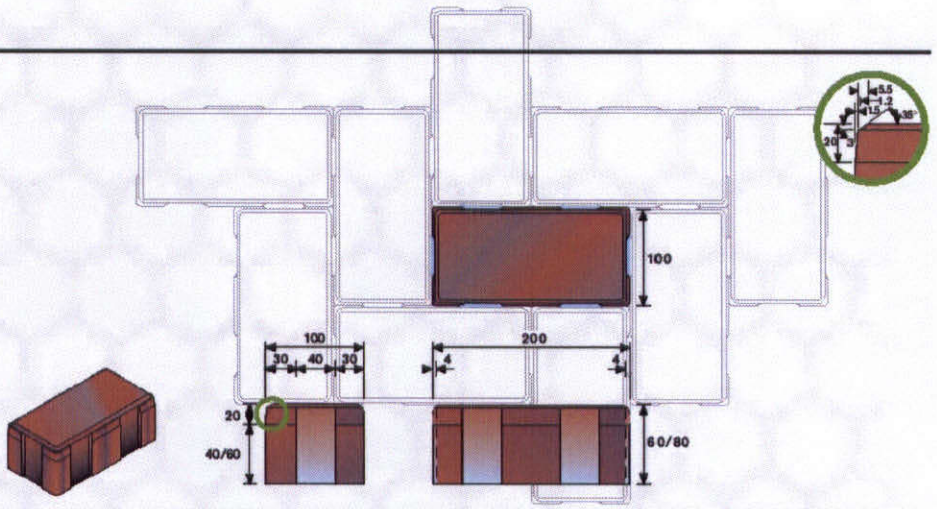
For use on car parks, drives and moderately trafficked areas

Sizes
100 x 200 x 60/80mm

Laying pattern
Must be laid in 90° herringbone

Colours*
Natural, Burnt Red, Red brindle, Golden brindle and Charcoal.

Finish
Standard
Bush hammered to special order



Aquaflow ML block®

For Roads and heavy duty use

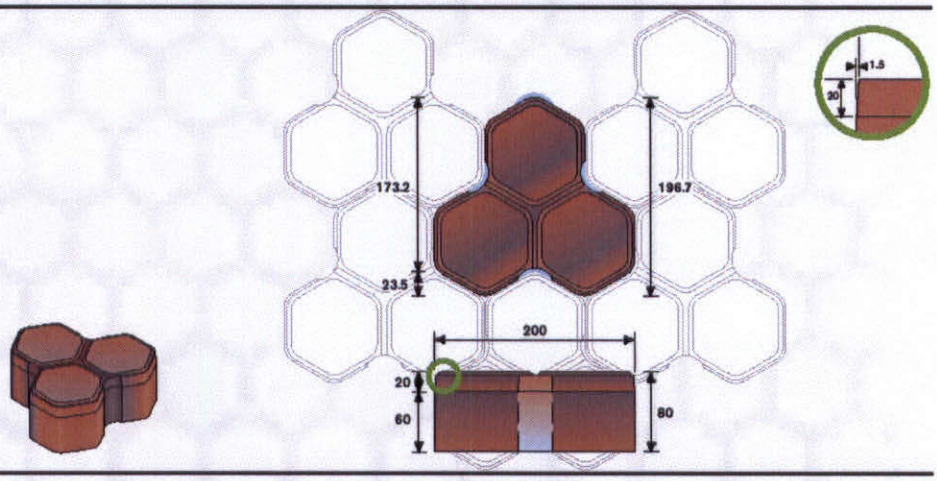
Size
80mm

Laying pattern
Include stretcher course around edge in conjunction with MLE and MLTB

Colours*
Natural, Burnt Red, Red brindle, Golden brindle and Charcoal.

Finish
Standard

Not available in EcoGranite



Aquaflow MLE® *top drawing*

End block
For use with Aquaflow ML blocks

Aquaflow MLTB® *bottom drawing*

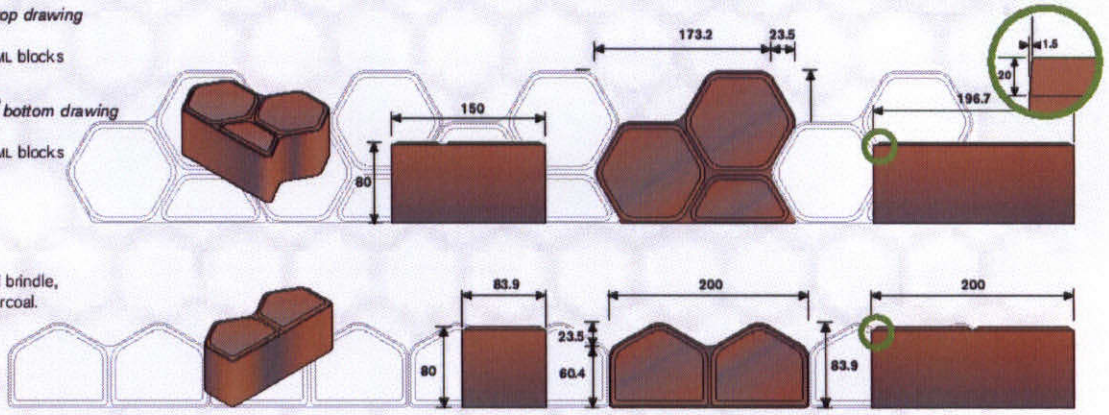
Top and bottom block
For use with Aquaflow ML blocks

Size
80mm

Colours*
Natural, Burnt Red, Red brindle, Golden brindle and Charcoal.

Finish
Standard

Not available in EcoGranite



METHOD STATEMENT FOR "NO-DIG" CONSTRUCTION IN LINE WITH ARBORICULTURAL PRACTICE NOTE 1

"DRIVEWAYS CLOSE TO TREES"

Prior to commencing any construction on site, erect protective fencing around trees to form an exclusion zone (see attached plan).

This will ensure that roots will not be severed during the construction work and the soil in the area of the exclusion zone will not be compacted, enabling oxygen to continue to diffuse into the soil beneath.

Construction of the path should be undertaken in dry weather between May and October when the ground is driest and least prone to compaction.

1 Kill ground vegetation using a translocated herbicide (glyphosate), ensuring that the selected herbicide doesn't damage the root of the tree(s) below the surface of the path.

2 Remove the dead or organic material from the site and ensure that large stones and shrub stumps are removed from the proposed route.

3 Any stumps should be ground rather than excavated to minimize soil disturbance.

4 The resulting hollows and any other holes in the path should be filled with sharp sand.

5 Lay terram geotextile matting across the full width of the access. This will prevent the intrusion of roots into the sub-base whilst still allowing nutrients and gaseous exchange.

6 Lay Terram 100 Geocell (cellular confinement system). (This is available from the Terram Ltd, tel 01495 757722, fax 01495 762393, and can be cut with a Stanley knife on site to the length, width and profile of the path required).

7 The path is to be supported against 150 x 20mm tantalized softwood boarding and 200mm long tantalized soft wood pegs driven into the ground at 1500mm centres.

8 Using hand shovels, carefully push 20mm – 40mm gravel chippings (no fines) into the Geo 100 Geocell matting to form an aggregate sub-base.

9 The chippings should be placed at one end of the matting and pushed/spread across the matt to prevent compacting the soil, working on either side of the path.

10 Compact the sub base to ensure binding with the geogrid and to minimise future rutting.

11 Lay second layer of terram geotextile matting across the full width of the path. This will prevent the intrusion of fines into the gravel chippings.

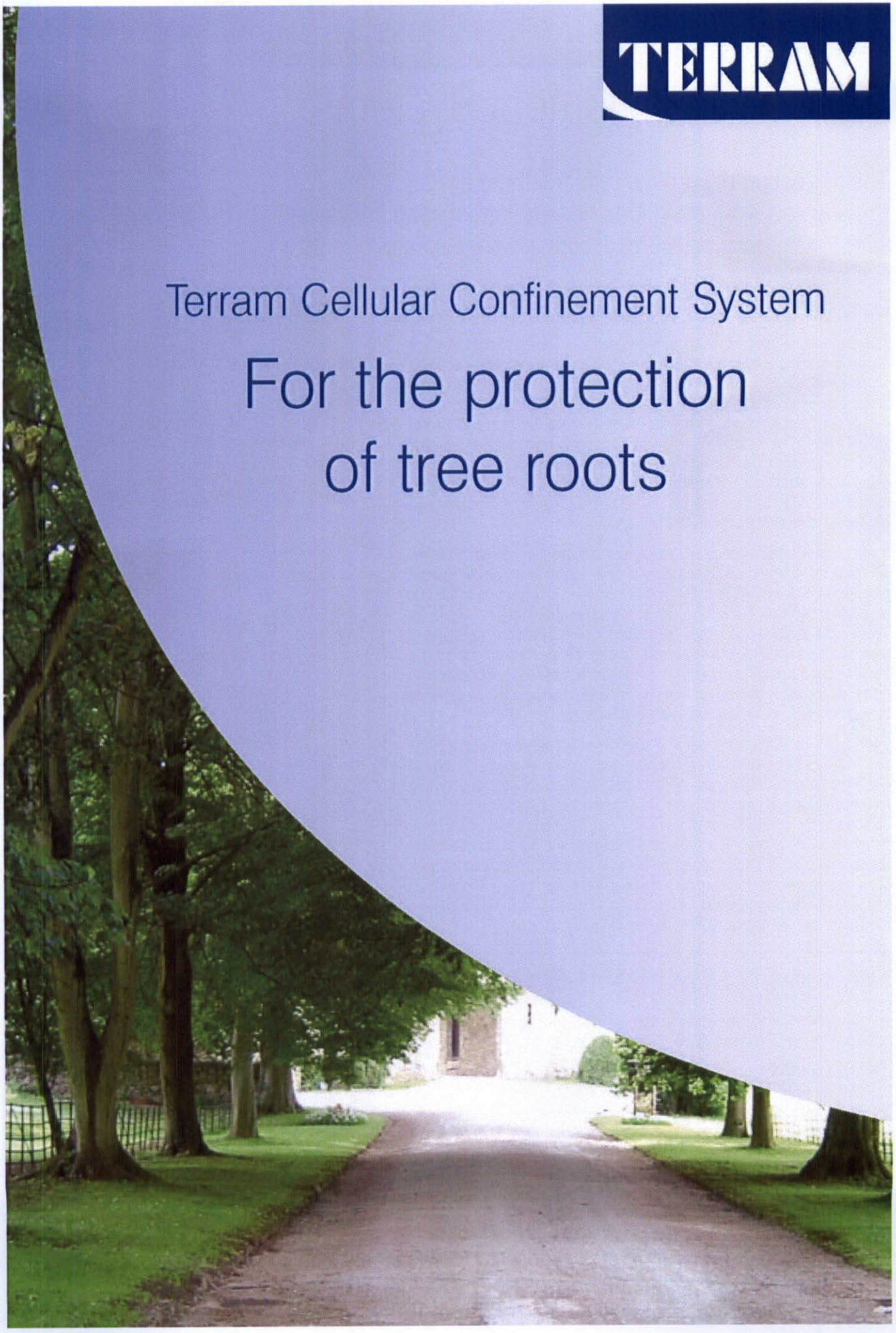
12 Add layer of 'no fines, sharp sand and compact if using pavers as surface treatment.

13 Place proposed surface treatment (Pavers) on top of the compacted sub-base to form the finished surface to the path and bank up the edging with topsoil, which is to be grass seeded in spring/autumn. This will form a gentle slope from the edging back onto the existing ground level.

TERRAM

Terram Cellular Confinement System

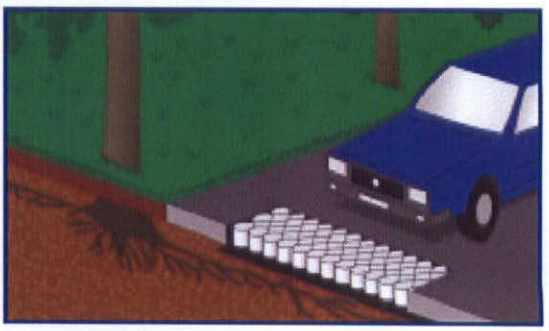
For the protection of tree roots



Cellular Confinement Systems

The perfect no-dig ground reinforcement system. Provides above-ground load bearing for paths and driveways whilst preventing soil compaction and protecting tree roots.

Damage to tree roots during driveway construction



The conventional method for constructing paths, drives and roads involves excavating soil to enable the installation of a sub-base that will adequately support traffic loads. Unfortunately this method of construction can badly damage trees since a by-product of the excavation is root severance. Most people don't realise that trees are very sensitive to disturbances in the soil around them. The reason for this is that, contrary to popular belief, trees do not have massive roots that go deep down into the soil but rather have lots of relatively small roots (frequently only a few centimetres in diameter) which spread out from the tree very close to the soil surface for quite large distances (often equal to the height of the tree).

If you imagine a tree system as a wine glass standing on a dinner plate you will have a roughly accurate idea of the above and below ground proportions of a tree (Figure 1). It may come as a surprise to learn that about 80-90% of all tree's roots are in the upper metre of soil (Figure 2). These roots serve two purposes: anchorage and absorption of moisture. If even relatively small roots are severed, for example by digging a trench, the tree can begin to suffer symptoms of drought stress as it is no longer able to obtain all its water needs. In addition the tree may become unstable as cutting the roots is a bit like cutting the guy roots on a tent.

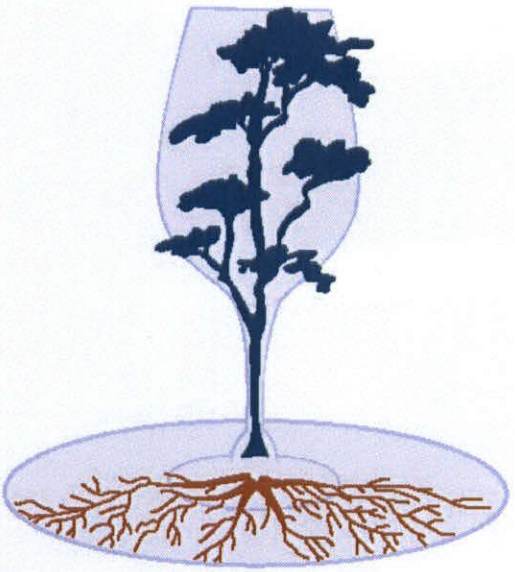


Figure 1

It is not only root severance that may harm trees but also compaction of the soil. If the root zone of a tree is not protected during development then the soil may become compacted by vehicles or heavy machinery moving repeatedly over the ground (Figure 3). The effect of compaction is to close up pores in the soil which contain air and water. The tree's roots then suffer from both a lack of oxygen and a lack of moisture, and, as the soil becomes denser, roots find it hard to penetrate the soil. All this can lead to a dieback of the root system and frequently dieback of the tree. Raising of soil levels has a similar damaging effect as it deprives roots of oxygen and creates a build up of harmful carbon dioxide around the roots.

So, How Do Tree Roots Grow?

People often wrongly assume that tree roots are thick and grow down into the soil for many metres (Figure A). In reality tree roots:

- Are usually only large near to the trunk and get thinner the deeper and further from the tree they go. At a distance of just 3-4 metres from the trunk most roots are no bigger than a few centimetres in diameter.
- Spread outwards from the trunk, more or less parallel with the soil rather than growing downwards (Figure B).
- Can spread horizontally in any direction for a distance equivalent to at least the tree's height.
- Are usually relatively shallow; 80-90% of a tree's roots are in the Upper metre of soil. Few roots reach depths of more than about 2-3 metres and at this depth they are only a few millimetres in diameter.

Figure A: Incorrect *Figure B: Correct*

Figure 2

British standard for trees in relation to construction and APN1

In recognition of the fact that trees are sensitive to disturbance the British Standards Institution has published recommendations on how to protect trees during development. In line with the earlier British Standard (BS 5837: 1991) the most recent guide, published in September 2005 (see further reading), recommends that there should be a 'root protection area' in which development should not be permitted.

In most case this are has a radius equal to twelve times the trunk diameter and forms a exclusive zone around the tree protected by means of robust fencing. This guidance had the effect of prohibiting the installation of roads, driveways and parking areas near to trees. But in 1996 the Arboricultural Advisory and Information Service published Arboricultural Practice Note 1 Driveways Close to Trees (APN1) which suggested that driveways could be installed within the root protection area provided roots and soil were not damaged.

The conditions set out for a suitable system were as follows:

- Roots must not be severed
- Soil should not be compacted
- Free movement of oxygen and carbon dioxide into and out of the soil should be maintained
- Water infiltration into the soil should not be impeded

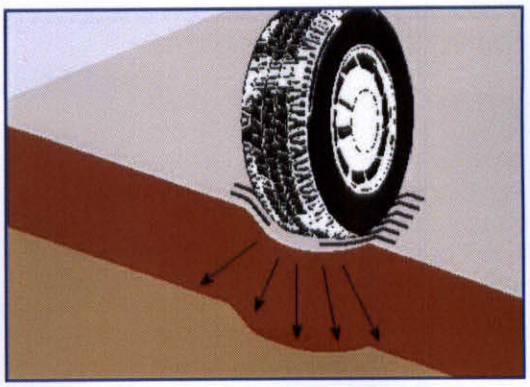
The, APN1 advised that driveways could be installed within the root protection zone provided that an above-ground, no-dig construction was used. This advice was incorporated into the recent British Standard which recommended that the most effective means of achieving this was through the use of a three-dimensional cellular confinement system.

Terram Geocell ground protection

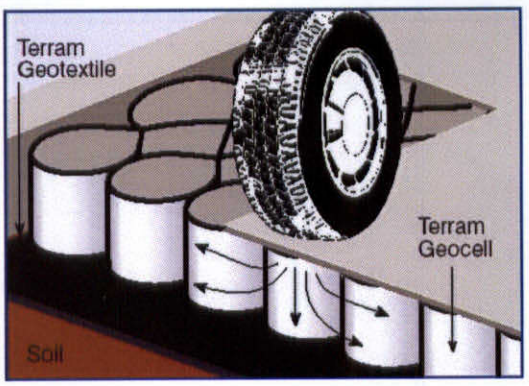
Terram Geocell is an ideal solution for providing ground reinforcement with tree protection areas. It confines fill material within its strong flexible cell structure in order to provide a stable base for traffic and an even load distribution (Figure 3 and 4). A big advantage of Terram Geocell over other products is that the geotextile material is permeable and allows lateral movement of air and water.

Terram Geocell is suitable for permanent woodland trails, paths, driveways, roads and parking areas.

It may also be used as temporary ground reinforcement where access to a site is limited by the presence of trees. Once operations on site are completed the temporary surface can easily be removed and the ground left undamaged.



No ground reinforcement: Unreinforced soil becomes compacted and rutted by vehicle loads



Geocell ground reinforcement: Forces are spread Laterally reducing loads on the underlying soil

Figure 3. The Geocell Distributes loads evenly In order to prevent rutting

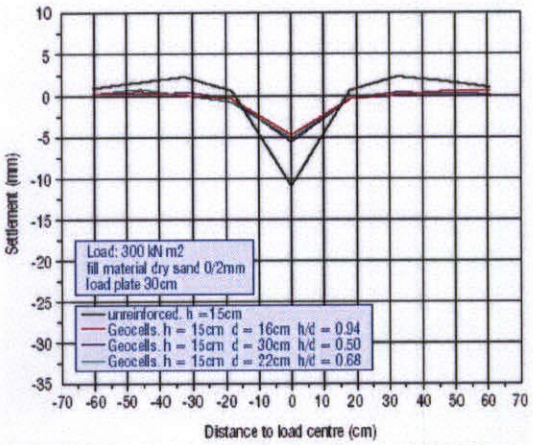


Figure 4. Static loading tests of up to 300kN/m2 revealed only minimal deflection (<5mm) of the surface of filled Geocell

Getting the design right

Every application will be slightly different so it is important to have the input of an engineer and arboriculturist together in order to design the right solution for an installation near to trees. The Arboriculurist will be able to advise on tree protection issues and the engineer will be able to specify details such as cell depth, fill type (Figure 5) and load bearing capacity.

For example, the design of a pedestrian footpath may be less rigorous than that of an access road that may have to withstand the load of a heavy crane or lorry.

But there are some principles that should be considered in every application (see Figure 6):

- The ground must be protected at all stages during installation – there is no point in installing a ground protection system where soil or roots have already been damaged by other site activities
- Terram Geotextile should be used underneath the Geocell to prevent fill materials penetrating the soil
- The fill material should be granular and should permit water and air flow
- Any edgings should be carefully designed to avoid excavation and root severance
- A permeable and gas-porous wearing course should be installed above the Geocell
- In most case the driveway or parking area should not exceed 20% of the root protection area.

If correctly designed and installed the Geocell cellular confinement system should allow paths, drives and parking areas to be located within a tree's protection zone, thus enabling development that might not otherwise be permitted by local authorities.

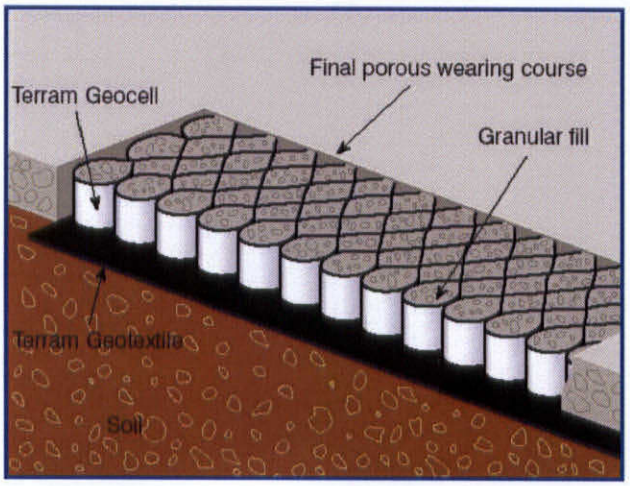


Figure 6. Components of an above-ground load bearing platform suitable for vehicles

Example installation
Driveway construction

1. Remove grass and other vegetation and the upper organic layer Of soil by hand digging. Arisings should be wheel-barrowed out of the tree protection area. Machinery (even low ground pressure tracked vehicles) should not be used due to the danger of soil compaction
2. Small depressions may be filled with sharp sand
3. Lay out Terram Geotextile over the driveway area
4. Lay out Terram Geocell and carefully peg in place
5. Fill the cells working from the area furthest from the trees first. Further filling should be carried out using the filled Geocell as a platform
6. Install a permeable wearing course, e.g. porous tarmac, block paviours on a sharp sand base (a further layer of Terram above the filled Geocell will be needed in this case to prevent the sand mixing with the granular fill below).

Conclusion

BS5837 Trees in Relation to Construction and APN1 allow the careful development of paths, drives and roads within the root protection area of trees provided an above-ground, no-dig construction is used.

The use of Terram Geocell as a ground reinforcement Platform is Therefore and Ideal solution that can facilitate such development near to tree which might not otherwise be permitted due to fears of damage to soil structure and tree roots.

Further reading

BS 583: 2005 Trees in relation to construction – Recommendations. British Standards Institution.

Dobson, M. (1995): Tree Root Systems. Arboriculture Research and Information Note 130/ARB/95. Arboricultural Advisory and information Service, Farnham.

Patch, D. and Dobson, M. (1996). Driveways Close to Trees. Arboricultural Practice Note 1. Arboricultural Advisory and Information Service, Farnham.

Nicholson, R. (2001). APN1, BS5837 & PPG 3, Guidance for Trees: Conflict or Complement? Arboricultural Journal 25, 361-376.

Products Available	Panel size	Depth	Cell Diameter
Erocell 22/20	5.0m x 10.1m	200mm	220mm
Erocell 25/15	7.0m x 10.0m	150mm	250mm
Erocell 25/10	7.0m x 10.0m	100mm	250mm

The cell depth and diameter is dependent upon specific site conditions

Cellular Confinement Systems 1 June 2006

Terram Ltd, Mamhilad, Pontypool, Gwent NP4 0YR, United Kingdom
Tel: +44 (0) 1495 757 722 Fax: +44 (0) 1495 762393
Email: info@terram.co.uk Web: www.terram.com

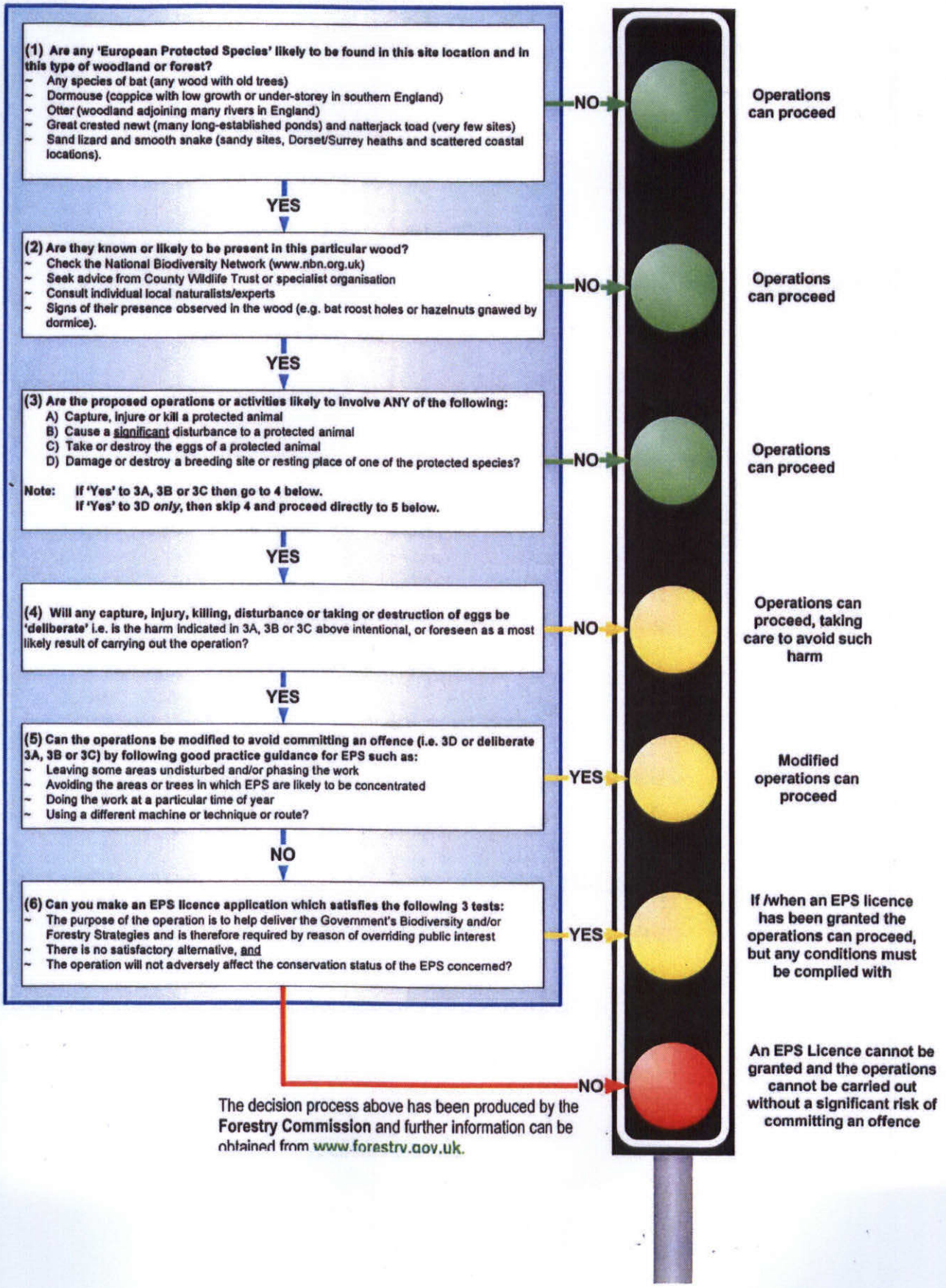
Recommendations for use are a guide and purchasers must determine the suitability of the product for their intended use. Terram Ltd assumes no liability for claims beyond the replacement value of the product.

Appendix No 5

European Protected Species and woodland operations
Decision tree to aid planning of woodland operations and protecting EPS (v.1)

European Protected Species and woodland operations
Decision tree to aid planning of woodland operations and protecting EPS (v.1)

The diagram below illustrates the questions that woodland managers and operators should consider when deciding whether they need to apply for an EPS licence. It should be noted that the diagram presents a simplified overview of the decision-making process.



The decision process above has been produced by the **Forestry Commission** and further information can be obtained from www.forestry.gov.uk.

APPENDIX NO 6

Air Spade/Air Excavation Specification

trees unlimited.co.uk

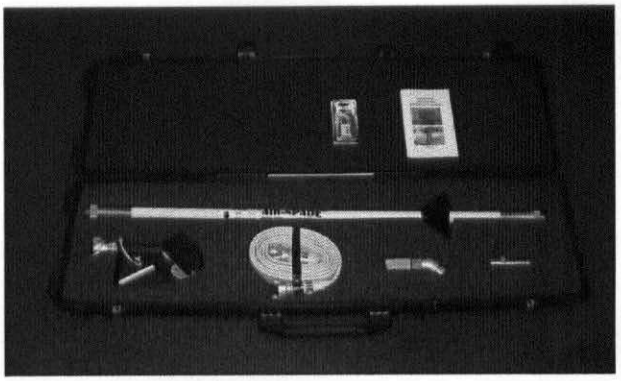
The largest specialist Arboricultural suppliers in the North of England.

UK Distributors to the Tree Care Industry of the

AIR-SPADE®

AIR EXCAVATION TOOL

Industrial / Construction Applications



Industrial / Construction Applications

AIR-SPADE® is the ideal tool for contractors, utility companies and everyone practicing safe excavation. Common uses include:

Pot holing

Utility line Locating

Crack Cleaning

Valve box cleaning

Utility Installation

Line spotting for backhoe

Vacuum excavation

Trench rescue

Meter locating

Full Range of Parts Available

AIR-SPADE® Series 2000 tool *

2 ft. 3 ft, 4 ft or 5 ft. extensions

Custom length barrel
Extra 15, 25, or 60 scfm nozzle
Extra 105 or 150 scfm nozzle
Extra 225 scfm nozzle
45o Angled Adapter
Arboricultural
Applications Benefits
AIR-SPADE® Handle

10 Ft. Lightweight Hose
25 Ft. Lightweight Hose
50 Ft. Lightweight Hose

Scratch Proof Face Shield

Spare Parts Kit
Storage Case with lock
* includes handle, 150 cfm / 90 psi nozzle, and 4 foot barrel.

Why does the AIR-SPADE® out perform other air tools?

In head to head tests, the AIR-SPADE® dislodged harder clay soil and dug faster than other air digging tools. Soil fractures from compressive stress, tons per square foot (tsf), exerted on its surface. As shown above for the same pressure and flow, compressed air exiting from a pipe nipple, orifice, or improperly designed nozzle expands outward rapidly to 3 to 4 times the area versus the jet from the patented supersonic nozzle in the AIR-SPADE®. The flow from these competitors can even go sub-sonic as indicated by the presence of a "Mach Disk," which can be seen in the flow if the light is right

Arboricultural Applications

AIR-SPADE® is used by arborists and landscape professionals worldwide for:

Root Collar Excavation

Plant Aeration

Vertical Mulching

Soil Compaction Relief

Disease diagnosis and treatment

Transplanting

Bare rooting

Damage analysis

Locating Roots in New Construction

Root Pruning and Structure Analysis

Running utilities through the root zone

Radial trenching

Benefits

- Digs faster and harder soils than competitive or home made wands
- Less worker fatigue/injuries than a pick or shovel
- Faster and safer than hand digging
- Saves expensive hourly labour costs
- Non-damaging to all kinds of buried utilities or plant roots
- Digs without making mud and does not create "contaminated" spoil like water
- Excavated soil is ideal for recompaction
- Modular design with parts that screw together without tools
- Interchangeable nozzles sized to match air compressors from 15 to 250 scfm
- Interchangeable extensions to 8ft and reducers to 2 ft
- Ergonomic handle with thermal shield and pressure gauge
- Safety "dead Man" trigger with guard
- Electrically insulating barrel
- Hardened wear resistant stainless steel nozzle
- 45 deg adaptor

How should I dig with the AIR-SPADE® ?

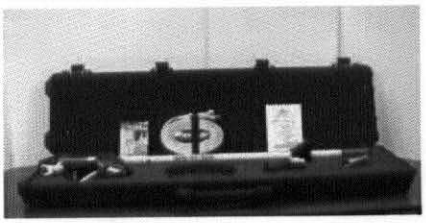
The **AIR-SPADE®** will dislodge up to several inches deep in a medium to stiff soil. High-speed movies show that an air-jet penetrates and dislodges the soil in a fraction of a second. Unless the soil is highly compacted, dwelling on the same spot is unnecessary and tends to increase spray. The **AIR-SPADE®** can be moved over the soil surface at a rate of about 1 to 2 feet per second. When several inches of soil have been loosened, the soil should be removed to expose a fresh working face for the air jet. Vacuum suction, as provided by our AIR-VAC and SAFEX® units, is an excellent companion to the **AIR-SPADE®** since it is likewise non-damaging.

What size of air hose do I need to use the AIR-SPADE® properly?

Compressed air flowing through a hose experiences a drop in pressure from friction and constrictions. Friction loss is proportional to the length of the hose. The amount of air, its pressure, the hose inner diameter and its smoothness also determine the loss. The table below shows the pressure loss for 50 feet of common air hose with couplings as a function of size and nozzle flow, cfm, for air at a pressure of 90 psi. Generally, a 1-inch air hose is recommended for use with the AIR-SPADE®.

How much will it Cost?

Arbor Kit complete includes:



45deg Angled Adapter
10 Ft. Lightweight Hose
Storage Case with lock
Shipping/Carriage to Mainland UK
Excluding vat
£995.00 *

AIR-SPADE® Series 2000 tool

Shipping/Carriage to Mainland UK
Excluding vat
£775.00

AIR-SPADE® Series 2000 tool

*Prices are subject to exchange rate fluctuations

Who can supply me with it – and How long will it take to arrive?

You can be using this tool within 6 days of ordering it, it will be delivered to your door, carriage paid (Mainland UK).

trees unlimited.co.uk

The largest specialist Arboricultural suppliers in the North of England
Import the

AIR-SPADE®

Air Excavation Tool
&
Arbor Kit

CONTACT US NOW TO DISCUSS THIS INVALUABLE ADDITION TO YOUR WORKING TOOLS DO THE WORK FASTER - GET BETTER RESULTS !

TELEPHONE 0113 2296006:

EMAIL info@treesunlimited.co.uk

FAX 0113 2295171

APPENDIX NO 7

Picus© Sonic Tomograph

Picus© Sonic Tomograph

The Picus© Sonic Tomograph has been developed by a German company called Argus-Electronic-Gmbh. This advanced electronic equipment has been specifically designed for arboriculturalists and operates on hand-held computers. The great benefit of this apparatus is that it uses non invasive technology to allow the internal structure of trees to be assessed.

The Picus© uses a series of sensors positioned strategically around a tree to both send and receive sound waves that are generated by the tapping of the sensors with a hammer. Once all the sensors have been tapped, the software generates a tomograph image depicting the condition of the wood as a series of colours. The colours are dependant on the speed of the sound waves measured as they travel between the sensors. Sound travels more quickly through healthy wood and more slowly through degenerate/dead wood and therefore the tomograph generated should, if correctly interpreted, give an accurate depiction of the levels of decay within the tree.

Figure 1
Picus© sensors attached to a sample tree

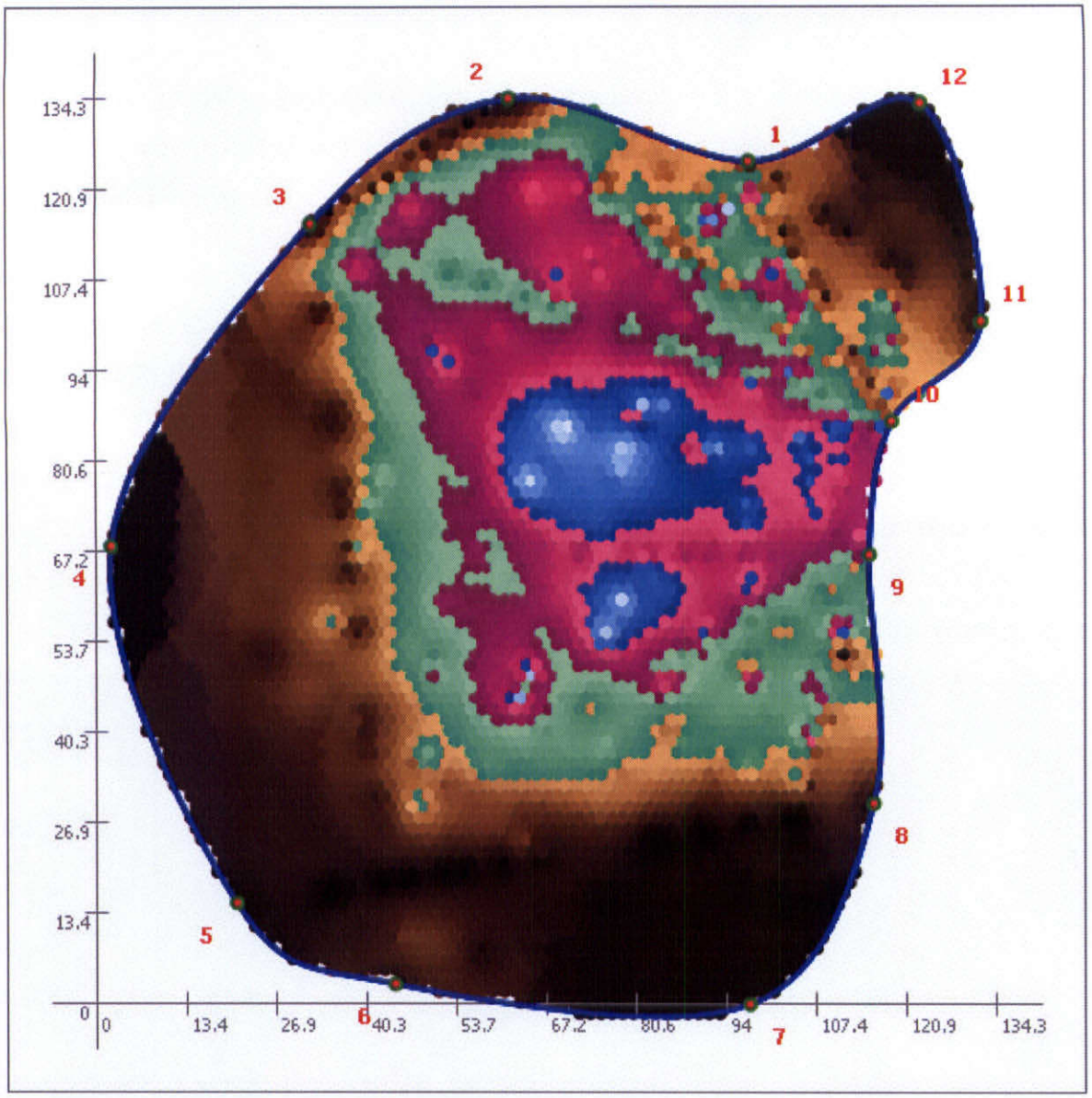


Figure 2
Sample Picus© Tomograph obtained from the tree tested in Figure 1

The differing colours depicted in Figure 2 represent the varying levels of decay. These can generally be interpreted as follows, depending on the type of decay present;

Colour	Condition of timber
	Sound timber
	Sound timber
	Incipient decay
	Incipient decay
	Decaying timber
	Badly decayed timber
	Badly decayed/hollow timber

Three Dimensional Picus© Sonic Tomograph

Below is an example of a series of Picus© Sonic Tomograph readings taken at different distances from ground level. These can be used to produce a three dimensional model.

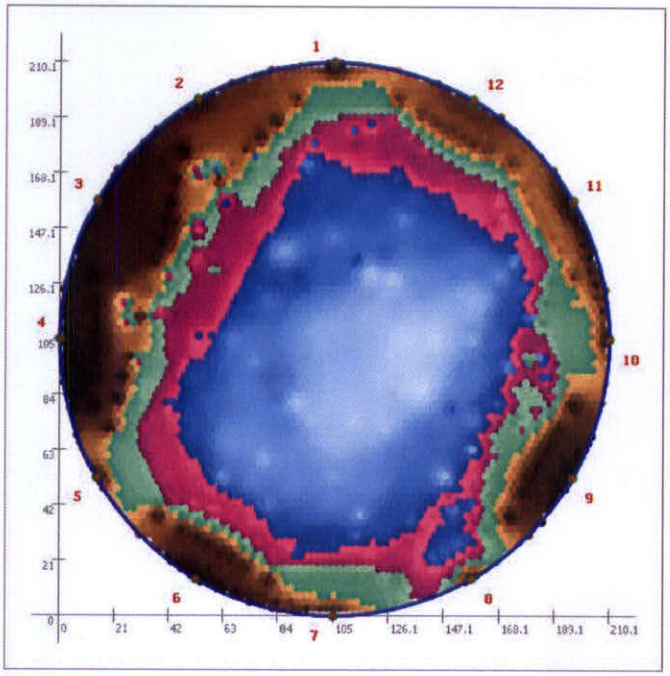


Figure 3. Tomograph of sample tree at 30cm from ground level

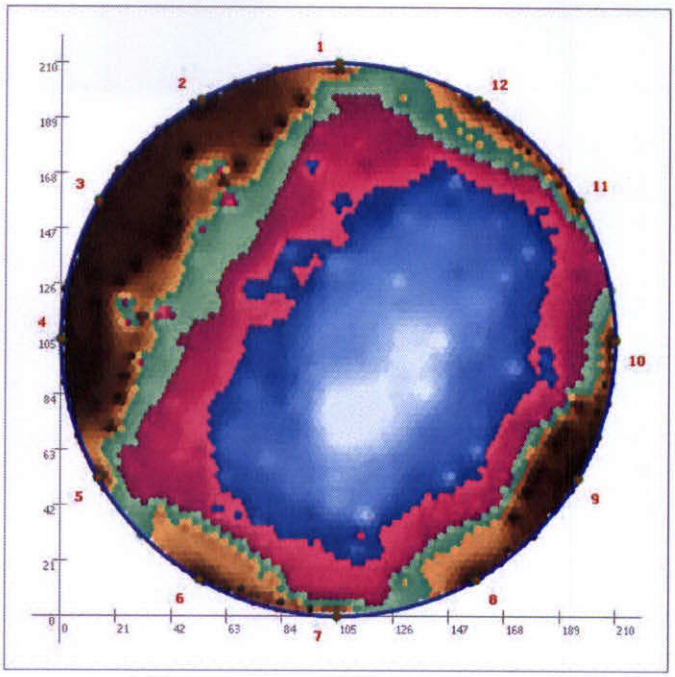


Figure 4. Tomograph of sample tree at 60cm from ground level

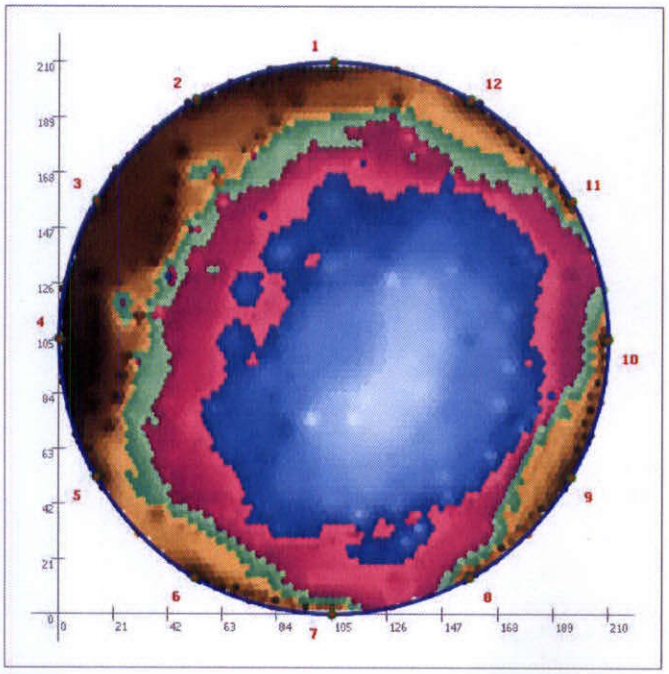


Figure 5. Tomograph of sample tree at 90cm from ground level

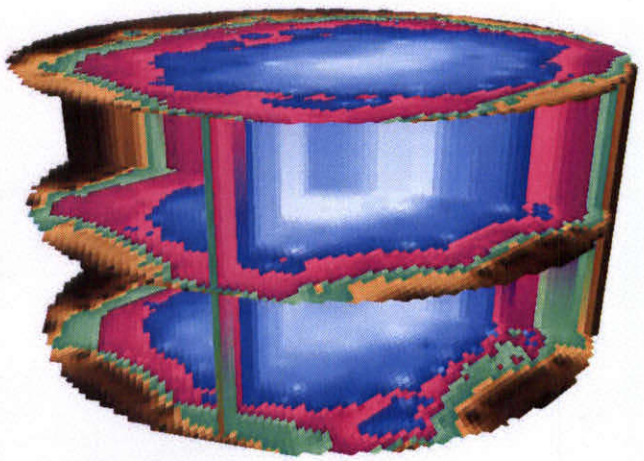
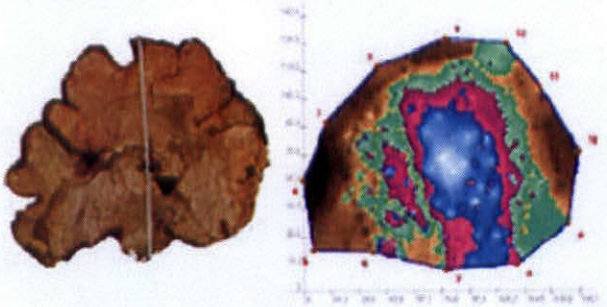
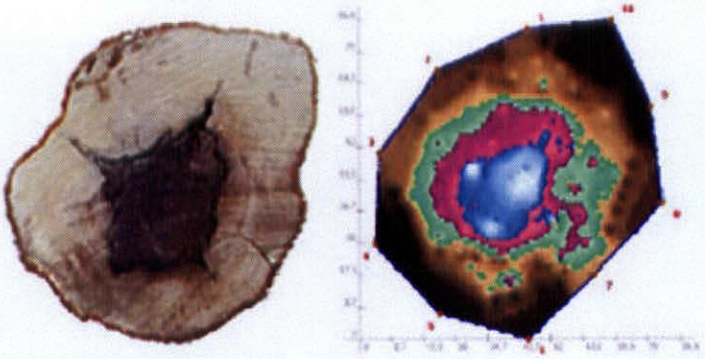


Figure 6. Three dimensional model of the sample tree

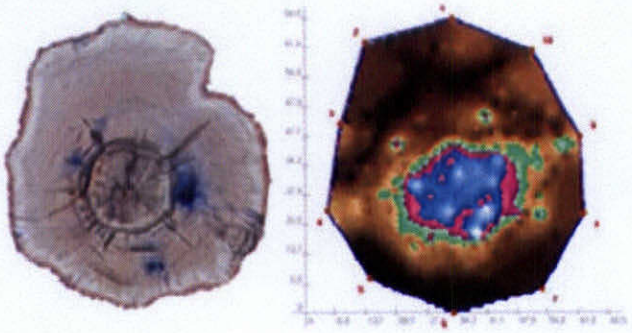
Examples of the Picus© Sonic Tomograph



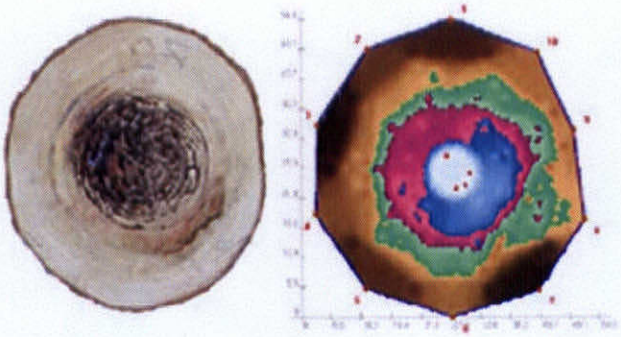
Linden tree with a severe *Ustulina deusta* infection (Germany)



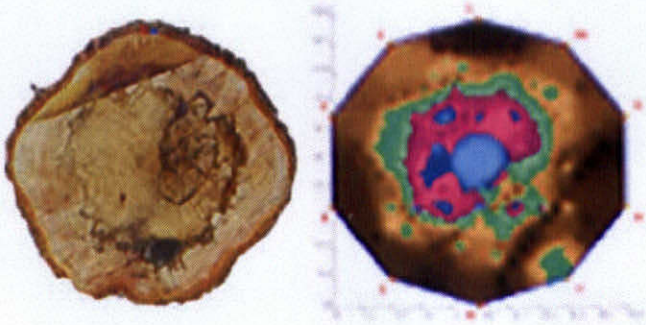
Linden tree with a large filled cavity (Germany)



Red oak with shake (circular crack) (Germany)



Spruce with *Heterobasidion annosum* and ant damage (Germany)



Birch with rot (Germany)

APPENDIX A

Species List

Apple	*Malus sp.*
Blackthorn	*Prunus spinosa*
Hawthorn	*Crataegus monogyna*
Lawson Cypress	*Chamaecyparis lawsoniana*
Leyland Cypress	*x Cupressocyparis leylandii*
Oak	*Quercus sp.*
Prunus sp.	
Willow	*Salix sp.*

APPENDIX B

Schedule of Trees

SCHEDULE OF TREES (AIA)

3 & 4 Hooley Drive,
, Rayleigh , Essex

Surveyed By: David Carmichael
Survey Date: 06/02/2009

Tree No.	Species	DBH / Min Dist / RPA (m²)	Height / Base of Crown	Age / Life Expect.	Crown Spread / Water Demand / Ground Cover	Visual	Problems / Comments	BS Cat	Work Required (AIA)	Priority
G001	2 Hawthorn X 3 Prunus X 2, Oak X 1	150 1.5 7.1	7 3	S M 4	N3, E3, S3, W3 High Bare Earth	Low	Poor quality specimens clustered along edge of wet ditch, possibly remnant of former hedging. These items now distorted by competition and heavily enmeshed in ivy. Have some limited habitat value but have a short safe useful life expectancy due to their form. Would recommend that these trees are coppiced in the near future.	C2/R	Coppice	3
G002	Lawson Cypress X 3	180 2.16 14.7	8 0	S M 3	N2, E2, S2, W2 High Bare Earth	Low	Cluster of three Lawson Cypress trees forming a linear feature and providing hedge style screening. Not significant long term amenity specimens.	C2	No works required	4
G003	Lawson Cypress X 3, Leyland Cypress X 1	400 4.8 72.4	12 0	S M 3	N2, E2, S2, W2 High Bare Earth	Low	Cluster of three trees forming boundary screening immediately adjacent to Hooley Drive. Lawson Cypress only scaled to approximately 7 metres but the single Leyland Cypress is a more dominant specimen extending to approximately 12 metres above ground level. Despite the scale of this tree it is not really in keeping with the surrounding landscape and it could be argued that it should be removed on aesthetic grounds at some point in the near future.	C2	No works required	4

Tree No.	Species	DBH Min Dist RPA (m²)	Height Base of Crown	Age Life Expect.	Crown Spread Water Demand Ground Cover	Visual	Problems / Comments	BS Cat	Work Required (AIA)	Priority
G004	Willow X 2	600 7.2 162.9	10 0	E M 4	N4, E4, S4, W4 High Bare Earth	Low	Two early mature Willow trees growing on the southern embankment of the pond. The easterly specimen has been pollarded at approximately 5 metres above ground level and leans at an angle of 45 degrees towards the eastern aspect. There is a significant amount of epicormic growth developing along the length of the stem but the underside of the stem shows significant cracking and delamination. As such this tree has no significant long term structural integrity and should be felled. Immediately to the west of the leaning Willow is a more erect version of the same species. Pruning wounds and stubs indicate that this tree has been reduced in the past but the upper canopy is now entirely dead and brittle. There are also notable Woodpecker holes present. The whole structure appears brittle and liable to collapse. Therefore this tree should also be felled. It should be noted that there is a large pile of concrete stacked on the root plates of these two trees on their southern aspect.	R	Fell both specimens to ground level.	2
H001	Hawthorn, Blackthorn	100 1.2 4.5	4 0	S M 3	N1, E1, S1, W1 High Bare Earth	Low	Poor quality and intermittent feature which has been subject to very little management in recent years. Provides modicum of lower storey screening but not a significant long-term landscape asset.	C2	No works required	4
T001	Oak	550 5.5 95	15 5	S M 1	N4, E5, S4, W5 High Bare Earth	High	Multi stemmed specimen emanating immediately adjacent to eastern side of a wet ditch. Canopy supported on three major scaffold limbs which commence at potentially weak included bark unions at ground level. No sign of weakness at time of inspection. Some major deadwood in the lower canopy including one piece lodged in fulcrum of branch union and propped against adjacent tree. Also some minor ivy growth.	B2/C 2	Remove major deadwood and propped dead branch. Remove broken stubs and monitor potential weak included bark unions on an annual basis.	1

Tree No.	Species	DBH Min Dist RPA (m²)	Height Base of Crown	Age Life Expect.	Crown Spread Water Demand Ground Cover	Visual	Problems / Comments	BS Cat	Work Required (AIA)	Priority
T002	Oak	450 5.4 91.6	13 3	S M 1	N4.5, E6, S6, W3 High Bare Earth	High	Specimen located immediately adjacent to concrete access drive. Crown of slightly asymmetric form due to competition with neighbouring trees. The canopy contains a number of crossing and abrading limbs. Particularly notable example is present at the base of the crown on the southern aspect. It is recommended that the two abrading limbs at this location are removed to prevent the possibility of future limb collapse. Also occasional dead stubs and pieces of major deadwood present.	B2	Remove major deadwood and remove crossing and abrading branches, particularly attending to the situation at the base of the crown on the southern aspect.	3
T003	Oak	940 11.28 399.7	15 3	M 1	N8, E9, S9, W9 High Bare Earth	High	Sturdy and impressive mature Oak tree. Growth habit indicates that it has been previously pollarded at approximately 5 metres above ground level. This operation was last completed a long time ago and as a result the tree has regenerated a broad spreading and densely enmeshed canopy. The base of the crown shows evidence of crown lifting and limb shortening over the access drive. Works have not been completed to a high standard but could be easily rectified by appropriate surgery. There is also some major deadwood present. Of particular note is a Ganoderma bracket at ground level on the western aspect. This area was investigated by tapping with a rubber mallet which appeared to indicate some hollowing around the buttress roots on the western aspect. Given the size and scale of the tree combined with the presence of the Ganoderma bracket it is recommended that Picus examination be undertaken.	A2/B2	Initially undertake a Picus examination to determine structural integrity of the base of the stem. Assuming this is secure, remove major deadwood and undertake rectification surgery to the poorer pruning stubs at the base of the crown.	2
T004	Oak	390 4.68 68.8	17 3	E M 1	N6, E6, S1, W7 High Bare Earth	High	Early mature Oak which has developed an asymmetric crown due to competition from neighbouring trees. No overt signs of decay, instability or disease, but typical volumes of major deadwood in the lower crown. Also some poor previous surgery which could be rectified by appropriate pruning.	B2	Remove major deadwood and undertake rectification to poor previous tree surgery.	3

Tree No.	Species	DBH Min Dist RPA (m^2)	Height Base of Crown	Age Life Expect.	Crown Spread Water Demand Ground Cover	Visual	Problems / Comments	BS Cat	Work Required (AIA)	Priority
T005	Oak	430 5.16 83.6	17 5	E M 1	N4, E9, S3, W6 High Bare Earth	High	Tree of asymmetric form due to competition with neighbouring specimens. Notable heavy limb emanating from ground level overhanging ditch and developing to provide the majority of the western crown spread. Base of the crown over the access drive has been poorly pruned in the past resulting in stumped off limbs. Some major deadwood in the canopy typical for a tree of this age and species.	B2	Remove major deadwood and undertake rectification surgery to address poor previous pruning of the lower canopy.	3
T006	Oak	670 8.04 203.1	17 4	E M 1	N4, E6, S7, W5 High Bare Earth	High	Specimen of more balanced form than many of its neighbours, but with notable ivy scaling into the mid canopy. Also similar poor previous pruning to the neighbouring trees. Some major deadwood in the base of the crown.	B2	Remove ivy to ensure not masking major faults. Remove major deadwood. Attend to poor previous pruning by undertaking rectification surgery.	3
T007	Oak	950 11.4 408.3	14 2	M 1	N4, E6, S5, W5 High Bare Earth	High	Prominent specimen located at boundary of site with Hooley Drive. Substantial volumes of ivy scaling into the upper canopy to such an extent that the majority of the stem and a number of the limbs are obscured. Power cables pass through southern mid section of the crown. A number of limbs partially abrading on these cables. Evidence of poor quality stumping off tree surgery at base of canopy. Some major deadwood present at the base of the crown.	B2	Remove ivy to ensure not masking major faults. Remove major deadwood. Undertake rectification surgery to attend to poor previous pruning. Undertake sensitive surgery to create and maintain minimum clearance of at least one metre from power cables where possible.	2
T008	Blackthorn	180 2.16 14.7	4 0	E M 4	N2.5, E2.5, S2.5, W2.5 Low Grass	Low	Dead tree	R	Fell to ground level	2
T009	Apple	190 2.28 16.3	4 0	S M 4	N0.5, E0.5, S2, W4 Moderate Bare Earth	Low	Poor form, Leaning stem, Lack of vigour	R	Fell to ground level	3
T010	Apple	190 2.28 16.3	4 1	S M 4	N2.5, E3, S3, W2.5 Moderate Bare Earth	Low	Not significant landscape feature, Lack of vigour	C2/R	Fell to permit development	0

Tree No.	Species	DBH Min Dist RPA (m²)	Height Base of Crown	Age Life Expect.	Crown Spread Water Demand Ground Cover	Visual	Problems / Comments	BS Cat	Work Required (AIA)	Priority
T011	Oak	230 2.76 23.9	6 2	S M 3	N4, E4, S4, W4 High Bare Earth	Moderate	Semi mature specimen located on frontage with Hooley Drive and positioned directly below power cables. Growth habit of tree would indicate that the specimen has been effectively pollarded at approximately one metre above ground level and regenerated a new crown. It is assumed this work has been undertaken to prevent interference with the adjacent street light and power cables. Given this proximity it is considered unlikely that this tree can develop its full potential and will have to be subject to regular reductive surgery.	C2	Will have to be subject to regular reductive surgery.	4
T012	Oak	300 3.6 40.7	8 2	S M 1	N3.5, E4, S4, W4.5 High Bare Earth	Moderate	Semi mature specimen with potential to develop into a fine tree, despite its positioning in close proximity to power cables. The lower portion of the tree has been subject to poor quality surgery and this has resulted in a number of stubs emanating from the stem. On the southern aspect of the crown there are a number of branches which partially abrade the power cables, but the apex of the crown has now developed above these. Given this it should be possible to undertake sensitive pruning to clear the cables whilst retain the long-term form of the tree.	B2	Undertake rectification surgery to attend to pruning stubs etc. Also undertake careful reduction to provide clearance of power cables to a minimum of one metre where possible. This operation should be undertaken with a view to ensuring the long term form of the specimen. It would also be prudent to crown lift the tree to approximately 2 metres by removing the lowest limb on the western aspect.	3
T013	Oak	1000 12 452.4	18 4	M 1	N9, E9, S9, W9 High Bare Earth	High	Substantial specimen located on neighbouring property. Tree positioned immediately east of the wet ditch. Canopy densely shrouded in ivy which scales to the upper crown masking a number of limb unions. Typical volumes of major deadwood for a tree of this age and species. Overall an impressive specimen.	A1	Remove ivy to ensure not masking major faults. Remove major deadwood. For the portion of the tree that is not overhanging this site, these operations can only be completed with the agreement of the owner.	3
T014	Oak	170 2.04 13.1	6 4	S M 3	N3, E3, S1, W3 High Bare Earth	Moderate	Semi mature tree which has been high pruned creating a somewhat awkward visual effect. This is compounded by the asymmetric nature of the remaining crown which has resulted from direct competition from the neighbouring mature Oak. Given this relationship the longevity of this tree as an effective landscape feature must be questionable.	C2	No works required	4
T015	Oak	240 2.4 18.1	5 2	Young 3	N3, E3, S3, W3 High Bare Earth	Low	Young twin stemmed specimen of Oak located due south of the pond. A poor quality specimen of no significant landscape importance.	C2	No works required	4

APPENDIX C

Schedule of Work required to allow the proposed development

SCHEDULE OF WORKS (AIA)

3 & 4 Hooley Drive,
, Rayleigh , Essex

Surveyed By: David Carmichael
Surveyed: 06/02/2009

Tree No.	Species	Work required	Priority
G001	2 Hawthorn X 3 Prunus X 2, Oak X 1	Coppice	3
G002	Lawson Cypress X 3	No works required	4
G003	Lawson Cypress X 3, Leyland Cypress X 1	No works required	4
G004	Willow X 2	Fell both specimens to ground level.	2
H001	Hawthorn, Blackthorn	No works required	4
T001	Oak	Remove major deadwood and propped dead branch. Remove broken stubs and monitor potential weak included bark unions on an annual basis.	1
T002	Oak	Remove major deadwood and remove crossing and abrading branches, particularly attending to the situation at the base of the crown on the southern aspect.	3
T003	Oak	Initially undertake a Picus examination to determine structural integrity of the base of the stem. Assuming this is secure, remove major deadwood and undertake rectification surgery to the poorer pruning stubs at the base of the crown.	2
T004	Oak	Remove major deadwood and undertake rectification to poor previous tree surgery.	3
T005	Oak	Remove major deadwood and undertake rectification surgery to address poor previous pruning of the lower canopy.	3
T006	Oak	Remove ivy to ensure not masking major faults. Remove major deadwood. Attend to poor previous pruning by undertaking rectification surgery.	3
T007	Oak	Remove ivy to ensure not masking major faults. Remove major deadwood. Undertake rectification surgery to attend to poor previous pruning. Undertake sensitive surgery to create and maintain minimum clearance of at least one metre from power cables where possible.	2
T008	Blackthorn	Fell to ground level	2
T009	Apple	Fell to ground level	3
T010	Apple	Fell to permit development	0
T011	Oak	Will have to be subject to regular reductive surgery.	4
T012	Oak	Undertake rectification surgery to attend to pruning stubs etc. Also undertake careful reduction to provide clearance of power cables to a minimum of one metre where possible. This operation should be undertaken with a view to ensuring the long term form of the specimen. It would also be prudent to crown lift the tree to approximately 2 metres by removing the lowest limb on the western aspect.	3
T013	Oak	Remove ivy to ensure not masking major faults. Remove major deadwood. For the portion of the tree that is not overhanging this site, these operations can only be completed with the agreement of the owner.	3
T014	Oak	No works required	4
T015	Oak	No works required	4

APPENDIX D

Drawing No 1655 D

CATEGORY AND DEFINITION	
Category A	Those of high quality and Value: in such condition as to be able to make a substantial contribution (a minimum of 40 years is suggested)
Category B	Those of moderate quality and Value: those in such condition as to make a significant contribution (a minimum of 20 years is suggested)
Category C	Those of low quality and Value: currently in adequate condition to remain until new planting could be established (a minimum of 10 years is suggested), or young trees with a stem diameter below 150mm
Category R	Those in such condition that any existing value would be lost within 10 years and which should , in the current context, be removed for reasons of sound arboricultural management

North (Indicative)

LEGEND

- Existing Tree/Hedge BS 5837:2005 Category A
- Existing Tree/Hedge BS 5837:2005 Category B
- Existing Tree/Hedge BS 5837:2005 Category C
- Line of Root Protection Area (RPA) - calculated following guidelines set in BS 5837:2005
- Existing Tree/Hedge to be Removed BS 5837:2005 Category R
- Existing Tree/Hedge to be removed to allow for development BS 5837:2005 Category C
- Line of proposed temporary protective barrier (see appendix 1)

Scale 1:500

0m 5m 10m 15m 20m 25m

0m 2m 4m 6m 8m 10m

Scale 1:200

HAYDEN'S
ARBORICULTURAL CONSULTANTS

5 Moseleys Farm Business Centre,
Fornham All Saints,
Bury St Edmunds,
Suffolk, IP28 6JY.

Tel: 01284 765391
Fax: 01284 765181
Mobile: 07850 167400
Web Page: www.treesurveys.co.uk
Email: info@treesurveys.co.uk

Client:	Drawing Title:
Mr Martin Blackwell	TS & AIA
Site: 3 & 4 Hooley Drive, Rayleigh	
Date: 12/02/09 / Drawn By: AWG / Cad File Ref: C\\Pro\1655.D.TS .AIA.3&4HooleyDrive.dwg	
Scale: 1:500 @ A3 / Checked By: DC / Drawing No: 1655.D / Rev: -	