SYLVANUS
arboricultural consultants ltd

John A Booth ***MBA, MSc, FICFor, CEnv, FArborA, MIEEM, MEWI, DipArb(RFS), CUEW, LCGI(Hort), NDArb.***
Director & Principal Consultant
Chartered Arboriculturist & Chartered Environmentalist

Arboricultural Survey Report

at

Whitehaven
Clay Lake
Endon

for and on behalf of

Dean Wainwright

April 2010

242 Highfields Park
Broadway
Derby
DE22 1JY

Tel (01332) 556307
Mobile: 07783 968714
Email: info@jabooth.co.uk
Web: www.jabooth.co.uk

Arboricultural Association REGISTERED CONSULTANT
SocEnv Society for the Environment
Institute of Chartered Foresters Registered Consultant
EWI MEWI

SUMMARY

This report is concerned with the arboricultural implications which may arise from the development of land comprising the gardens of Whitehaven, Clay Lake, Endon.

The report is produced in accordance with the guiding principles of British Standard 5837 (2005) *'Trees in Relation to Construction – Recommendations'.*

The Root Protection Areas (RPA's) of all trees surveyed are calculated and recorded in the Tree Survey Schedule where they are expressed both in linear and square metres; it is at this distance/around this area that tree protective barriers should be erected around any trees to be retained. Where construction is proposed within these areas special techniques must be employed and general guidance is contained herein.

Contents

1 Introduction

1.1 Author's Qualifications and Experience

1.2 Instructions & Brief

1.3 Documents and Information Provided

1.4 Limitations

2 Site Visit and Observations

2.1 Site Visit

2.2 Tree Survey Methodology

3 Tree Protection - General

3.1 Below Ground Constraints

3.2 Above Ground Constraints

4 Other Considerations

4.1 Trees Subject to Statutory Controls

4.2 Trees and Wildlife

4.3 Implementation of Tree Works

5 Recommendations

6 References

7 Tree Survey Schedule & Plan

9 Appendices

Appendix 1 Curriculum vitae

Appendix 2 Tree Survey Methodology

Appendix 3 'No-Dig' Construction Example Specification

Appendix 4: Successful Integration of Trees into New Development – A Guide to Process

Figures

1 Tree Protective Barrier

2 Barrier Notice

3 Adapted Barrier Incorporating Temporary Ground Protection

All rights in this report are reserved. Its content and format are for the exclusive use of the addressee and agents in dealing with the subject matter and only they may reproduce or transmit it, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise. It may not be sold, lent, hired out or divulged to any third party not directly involved in the matter concerned without written consent.

© Sylvanus Ltd & D Wainwright 2010

1 INTRODUCTION

1.1 ***Author's Qualifications and Experience*****:** John Booth is a Chartered Arboriculturist, a Chartered Environmentalist, a member of the Expert Witness Institute, a Fellow, Registered Consultant and past national Chairman of the Arboricultural Association, a Fellow of the Institute of Chartered Foresters and a member of the Institute of Ecology and Environmental Management. He has over twenty five years experience of arboriculture and amenity tree management and has written papers published in respected journals such as the International Journal of Urban Forestry. He is trained in the use of the Quantified Tree Risk Assessment (QTRA) methodology and is a Bond Solon/Cardiff University certificated Expert Witness. A full CV can be found at Appendix 1.

This report is based on his site observations and the information provided.

1.2 ***Instructions and Brief***: A fee proposal was issued to Paul Knifton of Matthew Montague Architects and accepted on behalf of Dean Wainwright (the client) on 7 April 2010. The brief was to undertake a tree survey compliant with the guiding principles of British Standard 5837 (2005) *'Trees in Relation to Construction: Recommendations'* which would be used to inform the development of gardens of Whitehaven, Clay Lake, Endon (the site). All tree survey data is recorded in the Tree Survey Schedule.

Adherence to the recommendations of BS 5837 will ensure trees are successfully retained, adding maturity and value to a development. The necessary process is outlined at Appendix 2 and this report is a 'Stage One' survey report as defined in that Appendix.

1.3 ***Documents & Information Provided***: A site survey plan was provided illustrating the existing layout; this was annotated so as to illustrate the tree survey No's; it supplements the Tree Survey Schedule.

It is understood that a Tree Preservation Order (TPO) is in force on part of the site.

1.4 Limitations:

1.4.1 This report has been prepared for the sole use of the client. Any third party referring to this report or relying on the information contained herein does so entirely at his or her own risk.

1.4.2 Whilst every effort has been made to detect defects within the subject trees, no guarantee can be given as to the absolute safety or otherwise of any individual tree. The recommendations given are intended to reduce the likelihood of tree collapse but absolute safety is not a realistic goal; even apparently sound trees can fail. All recommendations are given in the context of the site's current usage; any change will dictate a further survey.

1.4.3 The findings and recommendations contained within this report are, assuming its recommendations are observed, valid for a period of twelve months from the date of survey. Trees are living organisms subject to change – best practice dictates they are inspected on a regular basis for reasons of safety.

1.4.4 This report represents a survey and should not be construed to be a detailed tree inspection report. All recommendations are made in the context of the site's current usage; any change will dictate a further inspection.

Where trees were clad with ivy (*Hedera helix*) or where dense twig growth obscured the tree trunk, this was recorded in the Tree Survey Schedule. The inspection of such trees is impeded; ivy and twig growth should be removed and a further inspection carried out. The Retention Categories awarded to such trees can only be considered provisional.

1.4.5 Tree rooting characteristics and soils are both enormously variable as are their interactions. This makes attempts to quantify subsidence risk assessment impossible. No effort has been made to assess subsidence risk potential nor should any be construed.

2 SITE VISIT AND OBSERVATIONS

2.1 ***Site Visit*****:** An unaccompanied site visit was carried out on 8 April 2010 by John Booth. The trees were surveyed visually from the ground. No drilling or excavation was carried out on this occasion. The weather at the time of the visit was dry and visibility was adequate for the purposes of the visits.

2.2 ***Tree Survey Methodology:*** The survey was undertaken in accordance with the guiding principles of British Standard 5837 (2005) *'Trees in Relation to Construction: Recommendations'* and the trees were assessed objectively and without reference or influence being given to any proposed site layout. Using 'Visual Tree Assessment' (VTA) techniques the trees were surveyed from the ground. VTA is a methodology, undertaken by arboriculturists, to evaluate the structural integrity of a tree, relying on observation of a trees biomechanical and physiological features; this is the method generally adopted and is appropriate in this instance. Groups have been identified as such in instances as are defined in BS 5837 (2005) ie where, by virtue of the fact that trees are in such close proximity they function as a unit, in visual terms, aerodynamically or culturally. The trees surveyed are listed in the Tree Survey Schedule which is accompanied with an excerpt of the plan provided upon which the trees are numbered. Shrubs and hedges have been omitted from the survey.

Further explanatory details regarding the survey methodology can be found at Appendix 3.

3 TREE PROTECTION – GENERAL

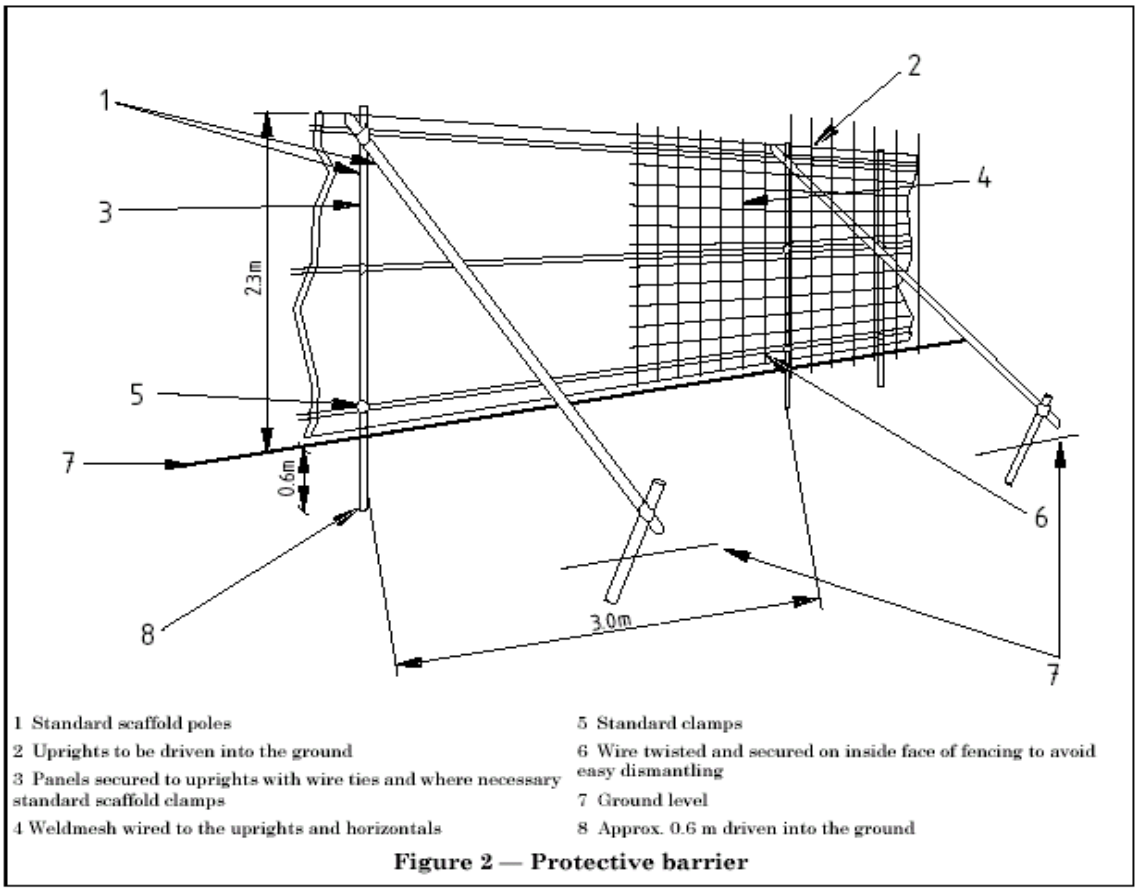
3.1 ***Below Ground Constraints:*** to achieve any development various construction activities are required and great care and consideration needs to be given as to how such activity can proceed whilst avoiding damage to retained trees.

"Damage can occur as a result of direct impact between construction machinery and parts of a tree. Often greater damage and even destruction occurs quite invisibly due to the deformation of the soils in which the trees root. Soil stripping, trenching and compaction all have serious effects on trees and if such trees are to be successfully retained in the long term it is necessary to protect the soil during construction."

British Standard 5837, (2005), Para 3.1.2, '*Trees in Relation to Construction:– Recommendations*', Page 2

3.1.1 There is a direct proportional relationship between a tree's roots and its aerial parts and since the majority of tree roots occur in the upper 600m of the soil horizon this balance can easily be upset by even shallow excavation. Root damage can result in instability or premature decline which may not manifest for a number of years, often long after development has ceased. British Standard 3998(1989) '*Recommendations for Tree Work*' Paragraph 14, Note 3, states '*Older or larger trees are more vulnerable than younger or smaller ones, but in all cases the effects of root severance are detrimental*.'

3.1.2 In order to avoid damage to their roots, trees should be protected using protective barriers as are detailed in British Standard 5837 (2005) and as illustrated in Figures 1 and 3. Such barriers should be erected around the RPA prior to the commencement of any demolition/construction activity; they must remain in situ and intact until completion. The area within these barriers should be considered sacrosanct, and no work should ordinarily be permitted within them. In an effort to ensure any tree protective barriers remain during construction, it is further advised that they carry signage as per Figure 2 and that the Site Agent is briefed accordingly. On sites which are particularly 'tree sensitive' the Local Planning Authority (LPA) may apply conditions to a planning permission requiring arboricultural supervision.



1 Standard scaffold poles
2 Uprights to be driven into the ground
3 Panels secured to uprights with wire ties and where necessary standard scaffold clamps
4 Weldmesh wired to the uprights and horizontals
5 Standard clamps
6 Wire twisted and secured on inside face of fencing to avoid easy dismantling
7 Ground level
8 Approx. 0.6 m driven into the ground

Figure 2 — Protective barrier

Figure 1 - Tree Protection Barrier

BS5837, (2005), '*Trees in Relation to Construction: Recommendations*, Page 13.

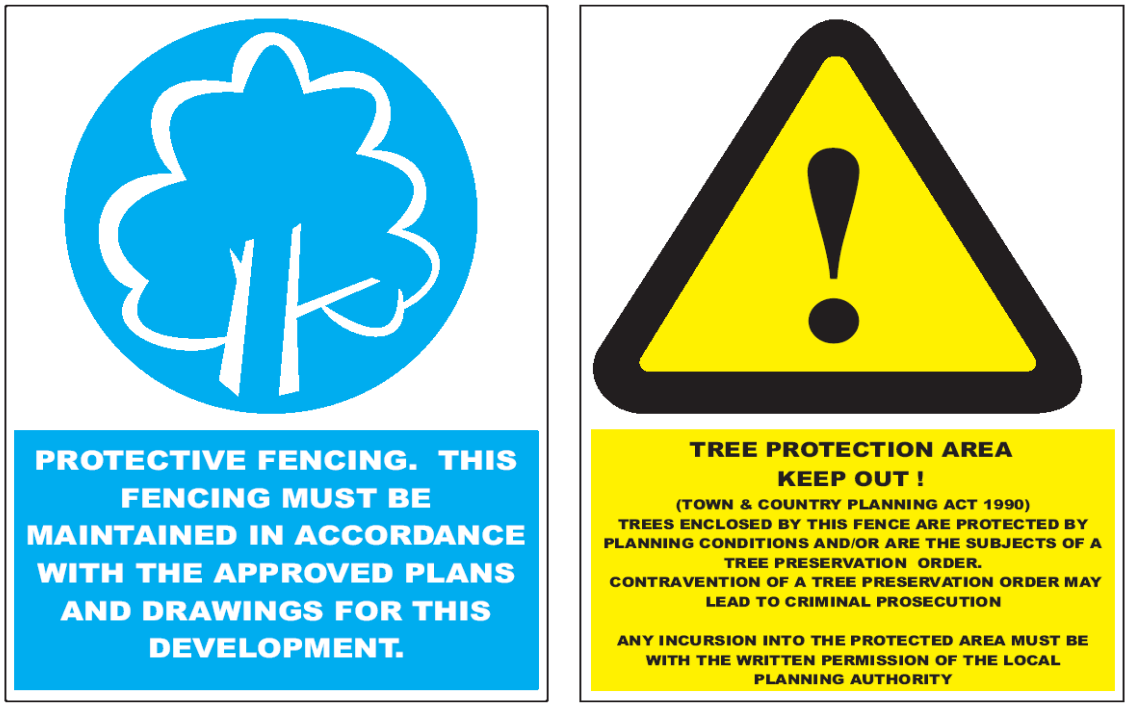


Figure 2 - Barrier Notice

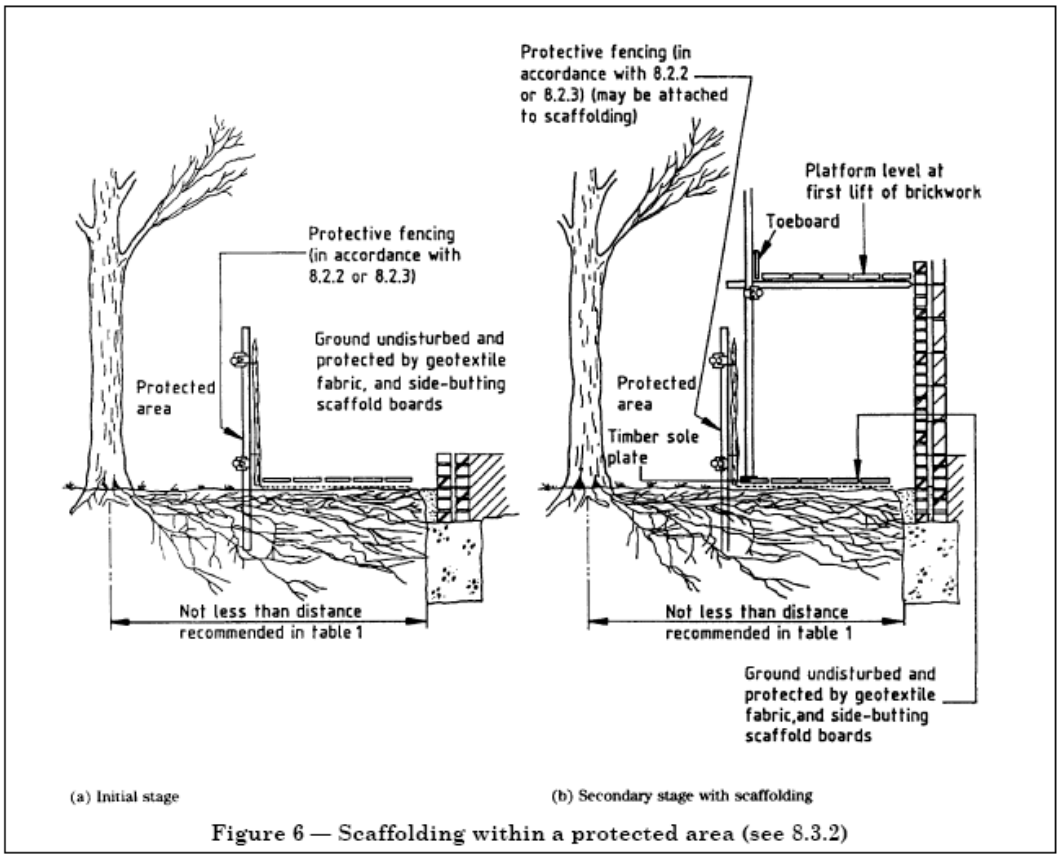


Figure 3
Adapted Barrier Incorporating Temporary Ground Protection
British Standard 5837, (2005), '*Trees in Relation to Construction: Recommendations*', *Page 14.*

3.1.3 Where space is required within the RPA to facilitate construction, for example, for the erection of scaffold, this can be satisfactorily achieved by employing the technique illustrated in Figure 3 above.

3.1.4 In some instances it is possible to offset the RPA by up to 20% and this may afford more room to manouvre should such be necessary. Further arboricultural advice should be sought regarding the off-setting of RPA's.

3.1.5 In addition and in order to maximise a sites' development potential, it may be possible to employ special foundation design such as mini/micro pile and suspended beam or a cantilevered foundation; these enable construction within the RPA as they limit excavation to a minimum. Any such structure will need to carry the weight of the building without transferring the load to the soil thereby

creating compaction. The location of any mini piles would need to be flexible so as to avoid damage to major roots and the necessary excavation for the piles may need to be carried out by hand. In these circumstances a suspended floor slab will need to be incorporated and the void beneath should be externally vented so as not to inhibit gaseous exchange, in some instances there may need to be provision for the redistribution of rainwater beneath the slab, further advice from a chartered arboriculturist should be sought. Where pile foundations are to be employed, consideration needs to be given to the selection of the type of piling rig so as to avoid conflict with low, overhanging tree branches. Further advice from a structural engineer should be sought on this matter with a chartered arboriculturalist advising upon the final design. Where it is proposed to construct within the RPA, careful consideration must be given to the avoidance of above ground conflicts (See Para 3.2).

3.1.6 Hard Surfacing:

***New*:** It is permissible to construct hard surfacing for drives and paths within the RPA, however, it can have implications for tree roots. These implications can be overcome by employing 'no-dig' construction techniques (see Appendix 4). These construction types are load bearing, negate the need for deep excavation, and unlike some materials eg hoggin, can allow for gaseous exchange and moisture percolation. Further advice of a structural engineer must be sought to design the final specification in accordance with these parameters, with the final design being agreed with a chartered arboriculturalist.

Existing: Where hard surfacing exists within the area defined as the RPA, it is acceptable to erect protective barriers at the extent of that hard surface, since the surface itself will afford protection to tree roots. However, care must be taken to avoid collision between overhanging tree branches and passing construction traffic. Where is proposed to remove/regrade existing hard surfacing it is advised that an arboricultural method statement should be sought.

3.1.7 Services – Details regarding the siting of underground services have not been made available, the following is given as general advice: Careful consideration must be given to the siting of underground services eg drains, electricity, gas etc. They should ideally not be sited within the RPA; where such is unavoidable; the trench must be hand dug and all roots greater than 25mm diameter must be carefully dug around and left intact. Any roots below this size, where they cannot be retained, must be cut cleanly with pruning tools. If the trench is to remain open for prolonged periods, especially in hot, dry weather, roots must be wrapped in damp hessian sacking to prevent desiccation. In order that they can assess any impact upon trees it is likely that the LPA will require the submission of details regarding service location and installation methodology prior to the granting of any planning consent.

3.2 ***Above Ground Constraints*****:** Consideration must also be given to the aerial parts of the tree in relation to any construction; particularly residential buildings. Conflict frequently arises where dwellings are placed close to trees giving rise to concerns relating to shade, falling debris such as leaves and twigs and from apprehension arising from a perceived threat of tree failure. These concerns can often be overcome, in part at least, by carefully ensuring adequate useable garden space is provided and is not dominated by trees and that principal windows face away from trees; in some instances it may be appropriate to locate glazed panels into the roof structure. The LPA are likely to resist any proposal that results in built structures close to trees or that makes inadequate provision for their future growth. Usually, and particularly in the case of immature trees, the distances required to avoid conflict will be greater than those expressed as the RPA.

4 OTHER CONSIDERATIONS

4.1 ***Trees Subject to Statutory Controls:*** No attempt has been made to establish the existence of either Tree Preservation Orders (TPO) or Conservation Areas. The following is given as general advice.

Trees and hedgerows can be subject to statutory control and severe penalties can result from unauthorised works or damage. It is recommended that prior to commencement of any tree works the LPA are contacted. When proposing to do works to trees within a Conservation Area, with some exceptions, six weeks written notice must be given to the LPA. This notice is often referred to as a Section 211 Notice. Having received such a notice the LPA has essentially only one of two options at its disposal ie:

- **Impose a TPO** in respect of those trees/some of those trees subject to the notice. This prevents any works being carried out without the express, written consent of the LPA,

  Or

- **Do nothing** It is considered best practice for an LPA to acknowledge receipt of the notice but there is no obligation for it to do so. After six weeks of serving the notice the tree owner may proceed with the works detailed in the Section 211 Notice.

The LPA cannot, in response to a Section 211 Notice, issue a conditional consent.

TPO's are made in the interests of preserving amenity, usually taken to mean public visual amenity. Trees largely removed from public view and which have little visual impact are not usually made the subject of a TPO. Subject to certain exemptions eg trees which are dead, dying or dangerous, the written consent of the LPA must be obtained prior to undertaking works to trees subject to TPO.

Where trees are protected Sylvanus is happy to act as the clients agent, liaising as necessary with the LPA and producing the written submissions/application required.

4.2 ***Trees and Wildlife*****:** Trees play host to nesting birds many of which are protected by law. All British bat species are also protected and can be found in

trees. Great care needs to be taken to avoid disturbance and consideration should be given to the timing of tree works in order to avoid disturbance. Where the presence of protected species is suspected, Natural England should be contacted for advice.

4.3 ***Implementation of Tree Works*****:** Guidance on hiring an Arborist is available from Sylvanus Ltd. Also, the Arboricultural Association's Register of Contractors is available free from Ullenwood Court, Ullenwood, Cheltenham, Gloucestershire, GL53 9QS (Telephone 01242 522152 , www.trees.org.uk). Any appointed contractor should carry out all tree works to BS 3998 (1991) '*Recommendations for Tree Work'* as modified by research that is more recent. Sylvanus Ltd can assist with both the appointment of a tree surgery contractor and provide on-site supervision.

5 RECOMMENDATIONS

5.1 This report provides guidance for the design team and sets out the constraints relating to the trees on site. Tree survey and RPA detail can be found in the Tree Survey Schedule.

5.2 It is recommended that a site visit is undertaken with the Local Authority's Planning Case Officer and Tree Officer to ensure that the approach for development and tree retention is suitable; therefore ensuring any issues are resolved from the outset. Sylvanus Ltd would be happy to make representation at such a meeting.

6 REFERENCES

- Arboricultural Advisory & Information Service, (1996) '*Driveways Close to Trees'*
- Arboricultural Advisory & Information Service, (2007) '*Through the Trees*

to Development'

- British Standard 5837:2005 '*Trees in Relation to Construction: Recommendations.'* BSI
- British Standard 3998:1989 '*Recommendations for Tree Work*'. BSI
- DCLG (2000) '*Tree Preservation Orders – A Guide to the Law and Good Practice'.*
- Mattheck, C. Breloer H., (1994) *The Body Language of Trees*, Forestry Commission.
- Mattheck, C. (2007), *Updated Field Guide for Visual Tree Assessment*
- Strouts R. G., Winter T. G. (1994), *Diagnosis of Ill Health in Trees*, 2nd Ed., DETR
- Lonsdale D., (1999), *Principles of Tree Hazard Assessment and Management*, DETR

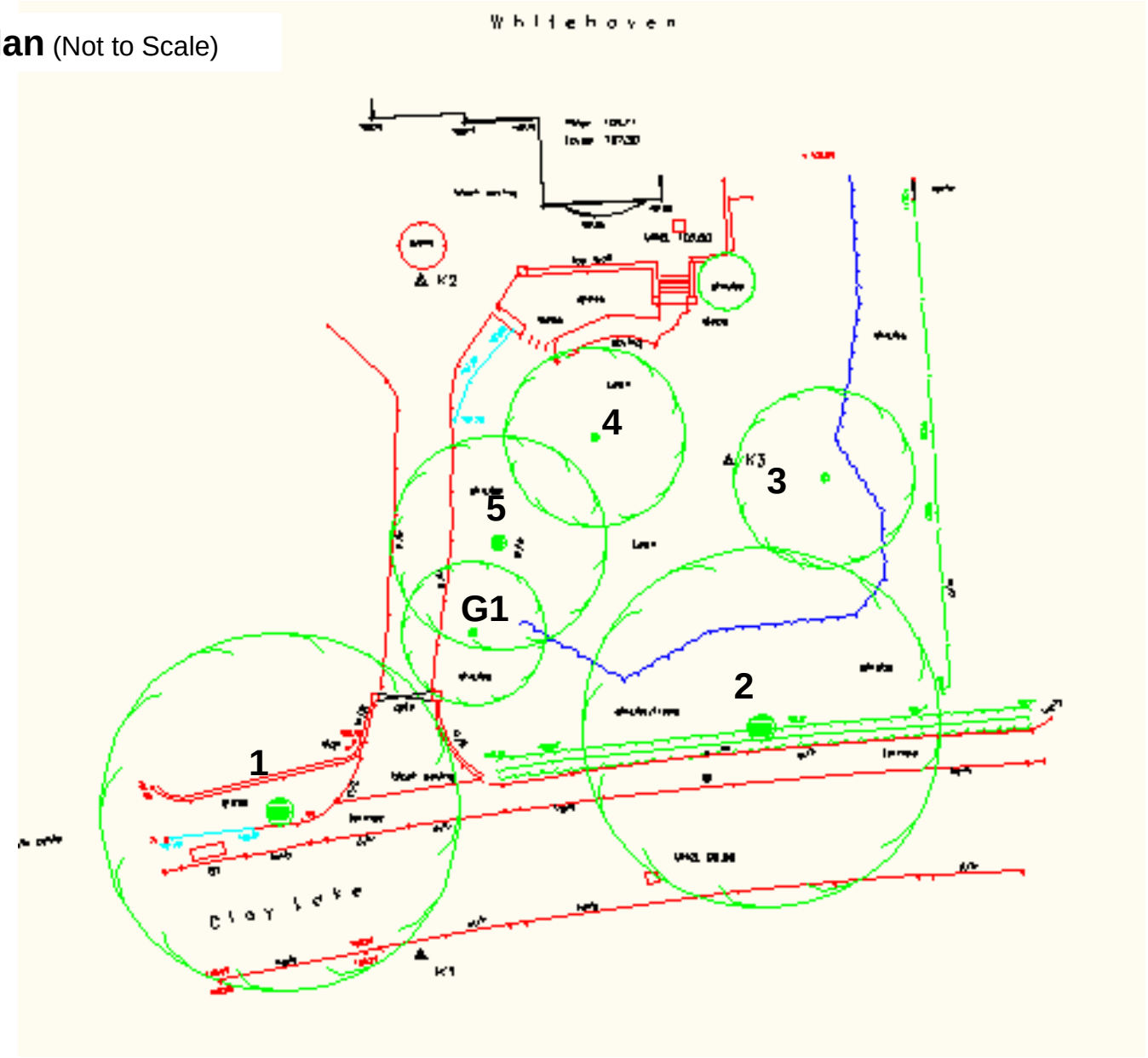
John A Booth ***MBA, MSc, FICFor, CEnv, FArborA, MIEEM,*** MEWI, DipArb(RFS), CUEW, LCGI(Hort), NDArb.
Director & Principal Consultant
Chartered Arboriculturist, Chartered Environmentalist & Arboricultural Association Registered Consultant

7 Tree Survey Schedule

Tree No	Species	Ht (m)	Stem Dia (mm)	Branch Spread (m)				Crown Ht. (m)	Age Class	Cond.	Preliminary Recs.	Life Exp (yrs)	Ret Cat	RPA* (Lin M)	RPA** (M^2)
				N	E	S	W								
1	Sycamore (*Acer pseudoplatanus*)	21 (25)	950	6	7	8	7	5	Mat	B	Remove deadwood >25mm diameter	>40	B1	11.4	408
2	Sycamore (*Acer pseudoplatanus*)	20 (25)	780	7	7	6	8	2	Mat	B	None at this moment in time	>40	B1	9.4	275
3	Stump	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Stump	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Cherry (*Prunus* sp)	7 (10)	m/s 570	5	6	5	5	2	Mat	B	None at this moment in time	10-20	C1	5.7	102
G1	Cherry (*Prunus* sp)	8 (10)	200	2	2	2	2	2	Mid	B	None at this moment in time	20-40	C1	2.4	18

* RPA = The minimum distance, measured from the trees trunk, at which tree protective barriers should usually be erected.
** RPA = The minimum area in M^2 around which tree protective barriers should usually be erected

Tree Survey Plan (Not to Scale)



8 APPENDICES

Appendix 1: Curriculum Vitae

John Booth **MBA, MSc, FICFor, CEnv, FArborA, MEWI, MIEEM, DipArb(RFS), CUEW, LCGI(Hort), NDArb**

PROFESSIONAL QUALIFICATIONS
Sheffield/Hallam University, MSc in Environmental Management (Distinction), 2005-2006
Nottingham Trent/Derby Universities, Masters in Business Administration (MBA) 2002-2005
Merrist Wood College, RFS Professional Diploma in Arboriculture, 1992-1993
Merrist Wood College, National Diploma in Arboriculture (Distinction) (B Tec), 1987-1990
Cardiff University/Bond Solon, Expert Witness Certificate, 2007
Lantra Certificate – Professional Tree Inspection, 2007

CAREER
2007 - Director of Sylvanus Arboricultural Consultants Ltd. (www.jabooth.co.uk)
1994 – 2007 - Arboricultural Manager for Derby City Council.
1990 – 1994 – Tree & Landscape Officer for Wycombe DC
1988 – 1989 – Assistant Arboricultural Officer for Bolton MBC
1981 – 1987 – Arborist for Bolton MBC

CONTINUING PROFESSIONAL DEVELOPMENT (CPD)
The maintenance of an active CPD record is a strict membership requirement of the following professional organisations to which I subscribe –

- The Arboricultural Association
- The Institute of Chartered Foresters
- The Institute of Expert Witness's
- The Institute of Ecology and Environmental Management

MEMBERSHIP OF PROFESSIONAL BODIES
Fellow of the Institute of Chartered Foresters
Chartered Environmentalist
Chartered Arboriculturist
Fellow, past National Chair, Trustee and Registered Consultant of the Arboricultural Association
Member of Institute of Ecology and Environmental Management
Licentiate of City & Guilds Institute
Assessor for the Professional Diploma in Arboriculture & Institute of Chartered Foresters Professional Membership applications.

PUBLICATIONS
Numerous articles and papers in academic journals and trade literature.

Appendix 2: Successful Integration of Trees into New Development – A Guide to Process (as per BS 5837(2005) Trees in Relation to Construction').

Arboricultural Stage 1
Tree survey and preliminary constraints advice obtained from Arboriculturalist

Usually **'Required'** by LPA's prior to them accepting/registering receipt of a planning application which might have arboricultural impacts. Includes:

- Survey & schedule
- and in some instances, a Tree Constraints Plan (TCP), graphically presenting Root Protection Areas (RPA's) and tree Retention Categories ie:
    - R = Remove
    - A = Retain unless planning considerations over-ride
    - B = Consider retention
    - C = Retain if not restraining proposal

Arboricultural Stage 2
Design review (Referred to as an Arboricultural Impact Assessment)

A means by which an applicant can demonstrate to the LPA that arboricultural constraints have been considered and that designs have been put in place to minimise any impact.

- evaluation of arboricultural implications of emerging site layout
- design tested against tree protection requirements in relation to the following:
    - Root Protection Area (RPA) (barriers/ground protection and special engineering)
    - space necessary to accommodate anticipated growth of retained trees (setback distances and shading considerations)
    - Protection/remediation in areas identified for new planting
- Arboriculturalist works within design team to develop 'best fit' scheme
- Object is to establish optimal development potential whilst appropriately retaining trees of greatest value.

Arboricultural Stage 3
Preparation of supporting documentation

- Arboricultural Impact Assessment (AIA) is produced by an Arboriculturalist. This will demonstrate that trees have been properly considered by:
    - an analysis of the tree retention/removal balance
    - information on how retained trees will be protected

- Typical appendices include:
    - Tree survey plan
    - Tree schedule
    - Tree retention/removal plan
    - Tree Protection Plan
    - Arboricultural Method Statement
    - and sometimes Shading analysis

Arboricultural Stage 4
Securing discharge of planning conditions

- Arboriculturalist works with design team to resolve any outstanding details
- Tree friendly solutions and ongoing design review relating to the build process:
    - drainage, services, site infrastructure, construction management
- often includes preparation of detailed Arboricultural Method Statements

(Stage 4 frequently overlaps with Stage 5)

Arboricultural Stage 5
Implementation

- Local Planning Authorities (LPA's) typically employ planning conditions to ensure tree protective barriers remain in place throughout the construction process.
- Arboricultural site monitoring can be offered to LPA (and in some instances is required by them) to demonstrate trees continue to be considered during the construction phase of a project. It includes:
    - checking correct alignment and construction of tree protection
    - ensuring compliance with Arboricultural Method Statements
    - responding to emerging questions from Site Agent etc.

Appendix 3: Tree Survey Methodology

The survey was undertaken in accordance with the guiding principles of British Standard 5837 (2005) *'Trees in Relation to Construction: Recommendations'.*

Information recorded in the survey includes:

Species – the species identification is based on visual observations and the common English name of what the tree appeared to be is listed first, with the botanical name after in brackets. In the case of groups only the principal species are recorded, other minor species may be omitted.

Tree Heights – are estimated in metres. Estimated mature heights are given in brackets. In the case of groups the mean current height is recorded.

Crown Height – the height to the lowest branch is estimated in metres. In the case of groups of trees minimum crown height was recorded.

Trunk Diameters – measured at 1.5 metres above ground and recorded in millimetres to the nearest 10mm. However, where the trunk of any tree breaks below 1.5 metres it is considered a multi-stemmed tree and, in accordance with British Standard 5837 (2005), '*Trees in Relation to Construction: Recommendations'* it is measured immediately above the root flare. In the case of groups of trees the maximum diameter was recorded.

Crown Radius – was recorded in metres along each of the cardinal points. In the case of groups of trees the maximum peripheral spread was recorded.

The ***Condition*** of the trees is based upon a preliminary assessment categorised thus:

A - Good

B - Fair

C - Poor

D - Very Poor/Dead

In the case of groups the category awarded is that typical of the group.

Life Expectancy – estimated; ie less than 10 years, 10-20 years, 20-40 years, more than 40 years.

Preliminary Recommendations – works required regardless of development proposals.

A ***Retention Category*** is given as follows which corresponds with Table 1 (See Appendix 2) of British Standard 5837, (2005), '*Trees in Relation to Construction: Recommendations* ie:

- **A** - Trees of a high quality and value, including visual amenity value (Sub categories 1, 2, 3). It is usual for such trees to be retained unless the planning merits of a particular scheme or layout over-ride.

- **B** - Trees of moderate quality and value, including visual amenity value (Sub categories 1, 2, 3). Such trees should be considered for retention.

- **C** - Trees with a stem diameter of less than 150mm or which are of low quality and value, including visual amenity value (Sub categories 1, 2, 3). ***The retention of Category C trees should not be allowed to impose a constraint on development.*** Trees with a stem diameter of less than 150mm should be considered for transplanting.

- **R** - Trees in such a condition that they should be removed.

Sub-categories are also awarded and reflect where the value of a particular tree lies ie:

- **Sub-category 1** – awarded in recognition of arboricultural value,
- **Sub-category 2** – awarded in recognition of landscape value,
- **Sub-category 3** – awarded in recognition of cultural value, including historic value.

All sub-categories carry equal weighting and some trees may qualify in more than one category, although they will not accrue additional value if they do.

It must be noted that Retention Categories are awarded purely on arboricultural/amenity grounds and that in some instances the planning merits of a particular scheme may well over-ride the retention of even those trees qualifying for Retention Category 'A'.

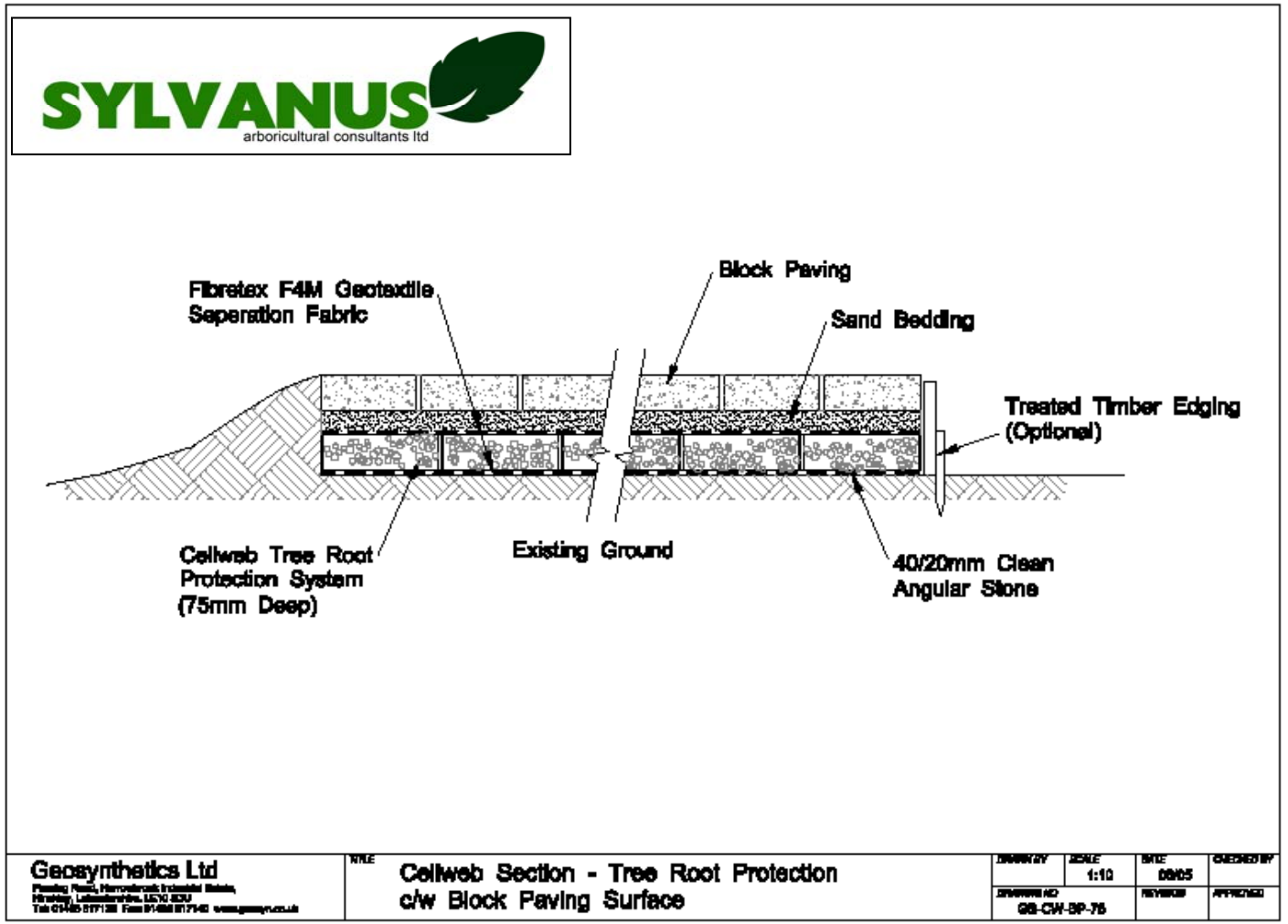
Root Protection Area (RPA) – In respect of all trees surveyed the RPA has been calculated and is given in the Tree Survey Schedule. The figures given represents both the radial distance, from the trees trunk, at which the barriers should be erected and the entire area which should be encompassed by the barriers.

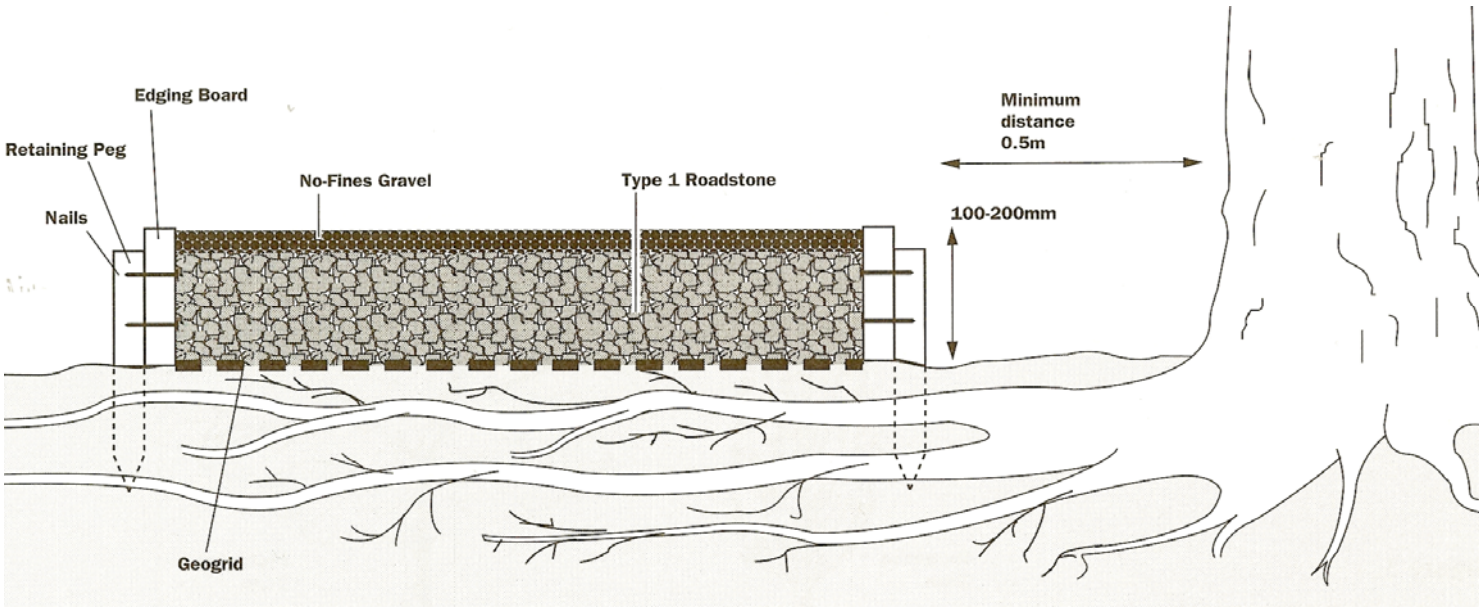
The RPA is calculated thus:

Number of Stems	**Calculation**	
Single Stem Tree	RPA (m^2) =	$\left(\frac{\text{stem diameter (mm) @ 1.5m x 12}}{1\,000}\right)^2 \times 3.142$
Tree with more than one stem arising below 1.5m above ground level	RPA (m^2) =	$\frac{(\text{Basal diameter (measured immediately above root flare (mm) x 10)}^2 \times 3.142}{1\,000}$

British Standard 5837, (2005), '*Trees in Relation to Construction: Recommendations'*, Page 8

Appendix 4: 'No-Dig' Cellular Confinement System
Example Specification





Cross Sectional Diagram Illustrating 'Geogrid No-Dig' Construction Specification.
APN12, Page4

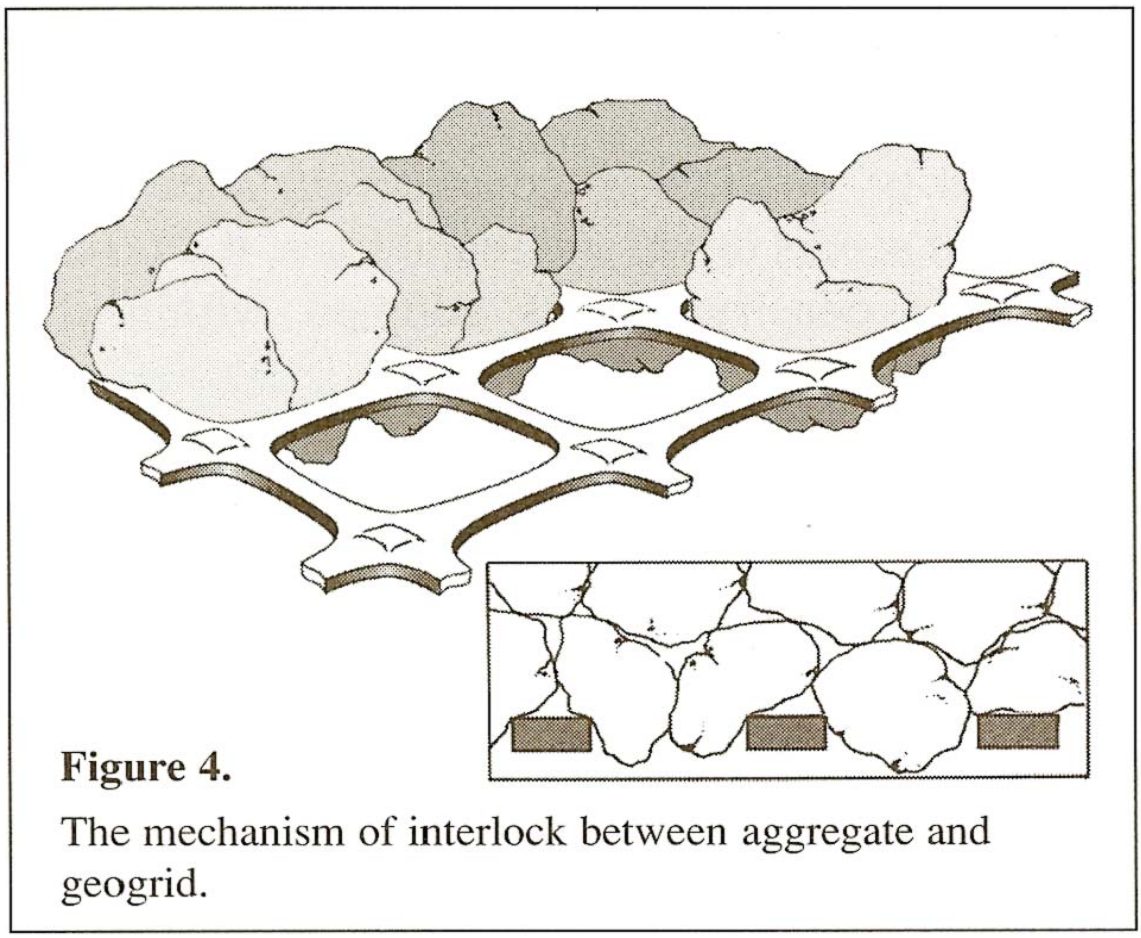


Figure 4.

The mechanism of interlock between aggregate and geogrid.

SYLVANUS
arboricultural consultants ltd



John A Booth ***MBA, MSc, FICFor, CEnv, FArborA, MIEEM,***
MEWI, DipArb(RFS), CUEW, LCGI(Hort), NDArb.
Director & Principal Consultant
Chartered Arboriculturist & Chartered Environmentalist

242 Highfields Park
Broadway
Derby
DE22 1JY
www.jabooth.co.uk