Technical Arboriculture

Arboricultural Impact Appraisal and Method Statement

Land to rear of 31 North Crescent, Hayling Island, Hampshire

HAVANT BOROUGH COUNCIL
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Land to rear of 31 North Crescent, Hayling Island, Hampshire

Prepared by

Kevin Cloud BSc Hons, Tech Cert Arbor A, M Arbor A

Report reference number: AIA/AMS-KC/31north/001

Report date: 3rd February 2011

1.0 Summary

The development proposal is to construct a new dwelling and associated access on land owned by our client

The trees that could be affected by the development have been surveyed. The details of the tree survey and root protection area calculations are shown at appendix one of this report. Information has been supplied to the client on the constraints that trees impose upon the use of the site. The site layout has evolved, following consultation and taking full account of these constraints.

Mature trees on the site can be retained and protected. Tree loss is predominantly restricted to poor grade trees. Some minor pruning may be required to improve access and facilitate the installation of the drive within root protection areas.

Some construction activity will be necessitated within the root protection areas of the retained trees. However, the use of appropriate engineering solutions to construct the drive and cycle storage will ensure that these areas will not be subjected to significant ground disturbance.

If adequate precautions to protect the retained trees are specified and implemented through the arboricultural method statement included in this report, the development proposal will have no significant adverse impact on the contribution of trees to amenity or character in the wider setting.

If the local planning authority is anxious about tree protection during development, direct reference to this document in planning conditions would make effective enforcement easier.

Kevin Cloud BSc Hons, Tech Cert Arbor A, M Arbor A

2.0 Introduction

2.1 Our client is seeking planning consent for development at Land to rear of 31 North Crescent, Hayling Island, Hampshire.

2.2 Our advice has been sought on the arboricultural issues relating to this project in order to conform to the requirements of British Standard 5837:2005 *trees in relation to construction – recommendations.*

3.0 Client's brief and scope of report

3.1 Our instructions have come from Mark Bray, Bramley Property Developments, Straightpoint Building, Clovelly Road, Southborne, West Sussex, PO10 8PE.

3.2 We have been instructed to assess the significant trees that could be affected by the development proposal and to prepare the following information to accompany the planning submission:-

- a schedule of relevant trees including basic data and a condition assessment based on assessment criteria within BS5837:2005;
- an appraisal of the impact of the proposal on trees and any resulting impact that the proposal will have on local amenity;
- an arboricultural method statement setting out appropriate protective measures and management for trees to be retained.

3.3 This report provides an analysis of the implications of the development proposal on trees and local amenity. It also provides additional guidance on protective measures, appropriate tree management and any special engineering, or other such techniques or methods, required to minimise impact to trees.

3.4 The primary purpose of this report is for the local planning authority to review the tree related information in support of the planning submission and utilise it as the basis for issuing a planning consent, formulating tree related planning conditions or engaging in further discussions towards that end. Any use outside the planning application context is not intended or authorised.

3.5 Although this document is not meant to be a full and detailed report on tree health and safety, any significant visible structural defects or physiological conditions identified, together with preliminary tree works, are noted in the appropriate columns in the tree schedule. However, a full post development tree inspection is recommended to establish that the trees retained during construction present acceptable levels of risk once the development has been completed.

3.6 Any plans, tables, figures or attachments whether within this document, appendices or supplied as associated drawings are illustrative, and based on layout drawings, topographical surveys or other information provided. Therefore, all scaled measurements should be checked against the original design documents.

3.7 Any plans, tables, figures or attachments whether within this document, appendices or supplied as associated drawings should only be used for dealing with the tree protection issues and all other uses are prohibited, unless authorised by Technical Arboriculture Limited.

4.0 Document disclosure

4.1 The following text and plans have been provided to me for the purpose of consideration of the development proposals:

- Existing site layout — OS Mastermap
- Proposed site layout — Mike Gillings Building Plans, Drawing No 1980.02

5.0 Location and brief site description

5.1 The site is located on land occupied by our client at Land to rear of 31 North Crescent, Hayling Island, Hampshire.

6.0 Land survey

6.1 We have been provided with CAD based and paper site plans which we assume to be based upon an accurate land survey. This includes plots of tree locations and other topographical information relevant for the preparation of this report and appendices. All

information in this report and appendices assumes accuracy of the land survey supplied and no responsibility for accuracy can be assumed or guaranteed by the author of this document.

7.0 Tree Survey – categorisation and assessment of tree stock

7.1 A tree survey exercise was conducted on 8th January 2011 in accordance with the guidelines contained at table one, section four of British Standard 5837:2005. The results of the survey may be viewed at appendix one.

7.2 Observations were made from ground level without detailed investigations. The survey involved a visual inspection of the trunk, together with the major branches and forks of the canopy. The examination was restricted to those views available within the survey site and the neighbouring area.

7.3 The position of the trees is shown on the submitted tree survey and protection plan drawing based on the site plan provided to us by our client or their representative. British Standard colour coding and root protection area information has been added. See appendix two.

7.4 The height measurements are approximations and have not been calculated using a clinometer. Where the canopy extends over an adjacent property, or where the under storey is very dense, the canopy spread has been estimated and stated as such with the tree schedule.

7.5 This report is based on the condition of the trees at the time of inspection. Trees are dynamic and their condition changes throughout their lives. No inspection has been made of the soil structure. No account has been taken of the effects of the tree/s or their removal directly or indirectly on any building/s or structure/s relating to the possibility of subsidence or heave. Regular inspections of the tree/s should be undertaken to monitor their health and determine appropriate management.

7.6 This report is to be used for the purposes for which it is prepared as specified in paragraphs 3.1 -3.4 of this document.

7.7 The trees identified in the tree survey are those upon which development of the land may have potential impact in line with paragraph 4.1.3 of the British Standard.

8.0 Tree constraints

Above and below ground constraints

8.1 Following our tree survey, the data gathered was used to provide constraints information to our client and their appointed architect, based on the locations of retained trees. Crown extension of the trees and root growth has been taken into consideration with both the client and architect agreeing to alterations to the location, design and construction methods to lessen potential impact trees to be retained.

Defining root protection areas (RPAs)

8.2 The root protection areas (RPAs) have been calculated (see appendix one) and plotted on the tree survey and protection plan in accordance with recommendations contained in Table 2 of BS5837 (please refer to appendix two). RPAs are shown as a circle around each of the category A, B and C graded trees. It should be noted that BS5837:2005 states (section 5.2.4) that the use of a circle at this juncture is for guidance purposes only *"as assessed by an arboriculturalist, which may change its shape but not its area whilst still providing adequate protection for the root system"*. No significant disturbance should occur within the RPA and a high level of care is needed during any activities that are authorised within it if important trees are to be successfully retained.

Legal constraints

8.3 The site of the proposed development is bordered by a variety of mature trees.

8.4 We have not been requested to ascertain the protection status of the trees. If the trees are subject to statutory protection any arboricultural work recommended by this report may only be carried out following the issue of formal planning consent, notwithstanding any restrictions placed by planning conditions contained therein. If tree work is to commence prior to the issue of consent we recommend that the client, or project arboricultural consultant, liaise with the local planning authority.

8.5 A licence from the Forestry Commission is normally required to fell growing trees (Forestry Act, 1967). However, an occupier may fell up to 5 cubic metres per calendar quarter without a licence provided that no more than 2 cubic metres are sold. A felling

licence is not required if the work is undertaken in accordance with an approved planning permission or the trees are dead, dying or dangerous.

8.6 The Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way Act 2000, provides statutory protection to birds, bats and other species that inhabit trees. In addition European Protected Species legislation places a duty upon landowners to ensure that best practice is followed or an appropriate license issued prior to any work commencing which may affect bats, reptiles or dormice. These could impose constraints on the use and timing of access to the site in addition to any of the tree matters considered in this report. These issues are not the subject of this report. However our client is advised to seek ecological advice and this may be provided by Technical Arboriculture Limited.

Arboricultural Implications Assessment

Summary of impact on trees:

9.1 **Table 1:** Summary of trees that may be affected by development.

Impact	Reason	Tree no	Category
Actual tree loss	**Trees not viable for retention or poor grade trees.** Trees which should not be considered a constraint to development	T2 T3	R R
	Trees lost to development footprint Main building.	nil	
	Trees lost to development footprint Car park and access requirements.	nil	
Potential damage through disturbance to RPA	**Demolition** Some existing site features will require careful demolition to prevent damage to root protection areas and above ground parts of trees to be retained.	nil	
	Access and car parking Installation of some elements of parking bays and access will need to be carried out using suitable no dig solution to prevent tree root damage e.g. Geoweb cellular confinement system or similar.	T1 T6	B2 B2
	Foundation design Where elements of some buildings encroach into the plotted RPA of retained trees a suitable low impact foundation design will be required.	nil	
	Construction activity – working space requirements Areas of RPA requiring suitable ground protection or scaffolding precaution in accordance with BS5837:2005.	G1 T4 T5 T6	C2 B2 B2 B2
	Construction activity – encroachment into RPA Minor encroachment into plotted RPA to install site features	nil	
	Construction – low impact development Areas where small, low impact structures (e.g. bin or cycle store) are to be located within plotted RPA.	G1	C2
	RPA correction Area where pre-existing site conditions (e.g. levels, services, compaction, slope, etc) do not favour rooting. RPA adjusted to reflect arborist's professional opinion of prevailing root spread. Adjustment noted on tree survey and protection plan.	nil	

Pruning	**Access pruning** Minor crown lifting or pruning may required to facilitate and/or improve access to the development or to install site features. **Recommended pre development arboricultural work.** Refer to tree survey schedule and appendix four.	T1 T4 T5	B2 B2 B2

Detailed impact appraisal

9.2 Trees to be retained and protected

9.2.1 Access and car parking – The plans provided to us show some sections of the car parking and access in close proximity to retained trees. Where this will have an unacceptable degree of impact to the root protection areas of these trees, a low impact solution to form these elements will be required e.g. Cellweb cellular confinement system (sample product specification at appendix). Such areas are indicated on the tree survey and protection plan. A performance specification for low impact surfacing is included within the arboricultural method statement. Refer to operational guidance on installation of low impact surfacing contained within the arboricultural method statement supplied with this report.

9.2.2 Some site operations (e.g. installation of scaffolding), or restricted working space, require encroachment into the root protection areas of retained trees. Where such access is required this shall only occur following the installation of adequate ground protection as detailed in figure 3, BS5837:2005 (shown on tree survey and protection plan). Where such areas are not required for erection of scaffolding, basic ground protection, as detailed within the arboricultural method statement may be installed.

9.2.3 Low impact construction – Some minor construction .e.g. bin stores, cycle storage, is proposed with the root protection area of retained trees. Such elements will require a low impact construction methodology to prevent significant disturbance to root protection areas. A stepwise methodology for low impact construction such as cycle and bin stores is included within the arboricultural method statement. Refer to operational guidance on installation contained within the arboricultural method statement supplied with this report.

9.2.4 All other trees located within the development site will be located away from intense activity.

9.2.5 We have considered the situation carefully and it is our opinion that these trees may be successfully retained without any adverse effects provided that appropriate protective measures are specified.

9.3 Tree losses

9.3.1 A total of 2 trees are recommended for removal.

9.3.2 The trees were surveyed and categorised in accordance with the guidelines contained at table one, section four of British Standard 5837:2005. Accordingly **2** trees are of such condition and status that they should not be considered a constraint to development. Both trees of such condition that their removal would be justified **on** the grounds of sound arboricultural management (cat R). Details of these trees may be found at appendix one.

9.4 Future Growth

9.4.1 The proximity of trees offers sufficient clearance to the proposed dwelling. In general the trees on the site will compliment the development and aid its integration into the local area. No containment pruning is required or expected.

9.5 Shading, windows and orientation

9.5.1 The site location offers good opportunity for solar gain at various parts of the day. No issues from excessive shade or proximity of trees are envisaged.

9.6 Conclusion

9.6.1 I have considered the impact to trees and the effect of tree loss, pruning and other site operations on local tree cover, amenity and character.

9.6.2 Provided that the recommendations of this report are followed and that construction methods, as detailed within the arboricultural method statement, are followed when working near retained trees, I consider impact to be minimal and acceptable.



10.0 Arboricultural Method Statement

Terms of reference

10.1 This Arboricultural Method Statement has been compiled to aid the safe and healthy retention of all trees to be retained on the development site at Land to rear of 31 North Crescent, Hayling Island, Hampshire. Implementation of the protection methods, and other details, within this report are integral to achieving this aim.

10.2 For details of trees to be retained and locations and types of protection, reference should be made to the latest revision of the Tree Protection Plan which should be displayed prominently on site for all staff to see.

10.3 The information contained within this Arboricultural Method Statement conforms to BS5837:2005 Trees in relation to construction – recommendations.

10.4 The controlling authority is Havant Borough Council, who should be consulted on any matters relating to existing trees at Planning Department, Civic Offices , Havant, PO9 2AX.

10.5 Any questions relating to the content of this method statement or associated tree protection plan should be directed to Kevin Cloud at Technical Arboriculture Limited, 87 Provene Gardens, Waltham Chase, Hampshire, SO32 2RW, 01489 896655 or info@techarb.co.uk

Phasing and monitoring of development

10.6 The following phasing is governed by operational constraints and may be subject to change or amendment. The project arborist must be notified of any proposed changes to this schedule:

- Phase one - Pre Development
    - Pre commencement site meeting between local planning authority tree officer, client and project arboricultural consultant.
    - Tree removals, pruning and remedial work.
    - Tree protection measures installed.
    - Site inspection by project arboricultural consultant.



- Phase two – Development
- NOTE NO VEHICLE, PLANT OR DELIVERY ACCESS UNTIL LOW IMPACT CONSTRUCTION OF DRIVE COMPLETED.
    - Phase 2 is subject to monthly site monitoring visits by project arboricultural consultant.
    - Low impact surfacing installed (subject to supervision by project arboricultural consultant).
    - Site accessible to construction traffic
    - Site compound/WC/materials
    - Groundworks and services
    - Development
    - Completion of development

- Phase three – Post development
    - Removal of protective fencing
    - Low impact construction e.g. bins stores, car ports (subject to supervision by project arboricultural consultant).
    - Landscape operatives briefed by project arboricultural consultant.
    - Hard and soft landscaping
    - Boundary treatments

10.7 Arboricultural monitoring involves a site visit and completion of a standard form which is signed by the site manager (or representative) and the project arboricultural consultant, and copied to both client and local planning authority tree officer.

10.8 The monitoring visit is held to ensure that the approved tree protection measures are continually adhered to. If remedial work or alterations are required to protective measures these can be agreed by all parties and actioned promptly.

10.9 Arboricultural supervision is to be carried out at all crucial stages of the development process to ensure that detailed tasks are carried out to the approved methodology. Such supervision shall occur during:



- Any demolition of existing buildings, surfaces or structures near to trees or within root protection areas (RPAs).
- Hand excavations for boundary treatment posts.
- Any incursion into protection areas or exclusion zones for whatever reason.

10.10 Supervision will require the project arboricultural consultant to be present throughout the task, to ensure all arboricultural objectives are met.

10.11 If the task is to take a long time period, the project arboricultural consultant may, at their discretion, reduce supervision to telephone contact between the site foreman and the project arboricultural consultant.

10.12 The local authority tree officer will have free access to the site and pass any recommendations directly to the project arboricultural consultant.

10.13 Remedial tree works and any site clearance will be carried out prior to the erection of any tree protection fencing; however it may be expedient to mark out the extent of root protection areas and protective measures to aid any site clearance or pruning work.

10.14 Temporary site access across any areas designated for low impact (no dig) measures may be achieved by the use of trakway. Any temporary surface must be capable of supporting the expected loads and avoiding compaction, rutting or disturbance to soil within root protection areas. This approach is subject to approval by the project arboricultural consultant

10.15 The tree protection fencing may require initial adjustment to facilitate the removal of existing had surfacing. All hard surface removal must be carried out in accordance with the relevant section of this method statement. Any alterations to the fence line must be approved by the project arboricultural consultant.

10.16 Installation of any low impact (no dig) surfaces will ideally be carried out between May and October when the ground is driest and least prone to compaction. In all circumstances installation shall occur in dry weather conditions.

Root Protection Areas (RPAs)

10.17 Based on tree survey data, root protection areas (RPAs) have been calculated and determined for every retained tree. The RPA is designed to protect a functional minimum of tree root mass in order to ensure that trees survive the construction process.

10.18 Some trees on the site may be subject to statutory protection by tree preservation order or location within a conservation area. Damaging such trees is a criminal offence and contrary to any tree related planning condition imposed with planning consent. Breach of planning consent could lead to the issue of a stop notice; breach of statutory protection could result in heavy fines.

10.19 It is the responsibility of everyone engaged in the construction process to respect tree protection measures and observe necessary precautions within and adjacent to them. If in any doubt when working close to trees – consult the site foreman who will contact the project arboricultural consultant.

Restrictions within tree protection areas

10.20 Inside the area of protective fencing, the following shall apply:

- **No** mechanical excavation whatsoever
- **No** excavation by any other means without arboricultural site supervision
- **No** hand digging without a written method statement having first been approved by the project arboricultural consultant.
- **No** lowering of levels for any purpose (except removal of grass sward with hand tools)
- **No** storage of plant, equipment or materials
- **No** vehicular or plant access
- **No** fire lighting
- **No** handling, discharge or spillage of any chemical substance including cement washings
- **No** action likely to cause localised water logging

10.21 In addition to the above, further precautions are necessary adjacent to trees:

- A 10 metre separation distance shall be observed between any tree and substances injurious to tree health, including fuels, oil and bitumen, cement (including cement washings), builders sand, concrete mixing and other noxious chemicals
- No fire shall be lit such that flames come within five metres of tree foliage; this should be taken to mean a fire separation distance of 20 metres from any tree's canopy

Tree protection barriers

10.22 The Tree Protection Plan shows the alignment of tree protection fencing (TPF). This fencing comprises of 2 types as detailed on the tree protection plan (TPP). All TPF shall be installed prior to any of the following taking place:

- Plant and material delivery
- Demolition
- Soil stripping
- Construction works
- Utility installation
- Landscaping

10.23 It is advised that, in order to ensure accuracy and avoid future fencing adjustments which should be carried out under supervision), the TPF is set out by a surveyor will all node points being marked clearly on site for fencing contractor to work to.

10.24 Once erected, all TPF will regarded as sacrosanct and will not be removed or altered without prior consultation with the project arboricultural consultant and approval of the local planning authority.

10.25 **Type 1 TPF** is suitable for areas of high intensity development activity and shall comprise of interlocking weld mesh panels, well braced to resist impact by attachment to a scaffold framework that is set firmly into the ground. A detailed specification can be found on the TPP.

10.26 Should any other type of barrier construction be proposed, consultation with the project arboricultural consultant will be undertaken to clarify the efficacy of the revised design prior to informing the local planning authority and obtaining their consent.

10.27 **Type 2 TPF** is erected as a temporary barrier to protect areas designated for later construction within RPAs and shall consist of weld mesh panels mounted on rubber/concrete boots and clamped to the adjacent type 1 TPF. Type 2 TPF may be removed to facilitate approved construction methods within the RPA; any such construction shall be carried out in strict accordance with this method statement.

10.28 Once the exclusion zone has been protected by barriers and/or ground protection, construction activity may commence. All weather notices should be attached to the barriers. A template of an appropriate notice in provided at appendix seven of this report.

Ground protection

10.29 RPAs must be covered with ground protection based on the recommendations of BS5837 until there is no further risk of damage from demolition and/or construction activity. This shall consist of plywood or board ground protection secured in position to spread localised loading. Under the boards woodchip mulch shall be laid to make up levels for the ground protection to rest on. Gaps in the ground protection should be left in locations where it is expected to install foundation piles or scaffolding.
In order to minimise the impact to the rooting soil in terms of compaction, foundations (within the RPA) should be constructed using machinery which has low ground impact and does not present a risk to the above ground parts of the tree e.g. mini piling rig.

Avoiding damage to trees

10.30 Care shall be taken when planning site operations in proximity to retained trees to ensure that wide or tall loads, or plant with booms, jibs and counterweights and static or mobile cranes can operate without coming into contact with retained trees. Such contact could result in serious injury which may make a tree's safe retention impossible.

10.31 Consequently, any transit or traverse of plant, in proximity of trees, shall be conducted under the supervision of a banksman to ensure that adequate clearance from trees is maintained at all times.

10.32 In some circumstances it may not be possible to achieve this without access facilitation pruning. Such pruning shall be kept to the utmost minimum required to facilitate development and shall be carried out in strict accordance with the guidance set out in section 10.7 Tree Surgery. **Under no circumstances shall construction personnel undertake tree pruning operations.**

Tree Surgery

10.33 Tree work proposals based on preliminary inspection are set out the schedule of pre development tree works at appendix six.

10.34 All permitted or approved tree work must be carried out in accordance with British Standard 3998:1989 *Recommendations for tree work.*

10.35 Work should be carried out by suitably qualified and experienced professional tree surgeons. For safety and insurance reasons under no circumstances should site personnel undertake any tree pruning operations.

10.36 The statutory protection afforded by the Wildlife and Countryside Act and Countryside and Rights of Way Act will be adhered to. If further advice is required, particularly if bats are discovered during tree work, contact should be made immediately with the project arboricultural consultant.

10.37 The contractor shall seek consent from the project arboricultural consultant for the chosen tree surgeon to be used. Proof of experience and appropriate levels of insurance provision will be required, prior to approval to commence tree works. All work shall be undertaken at the appropriate time and with the consent of the site agent who shall approve a programme of work.

10.38 The stumps of any trees removed from within the construction exclusion zone or RPAs of retained trees will be either cut flush to ground level and left in situ or ground out using a stump grinder. At no time shall tree roots be removed by winch or any other mechanical means.

10.39 All operations shall be carried out to avoid damage to the trees undergoing tree surgery or neighbouring trees which are to be retained. No trees to be retained shall be used for anchorage or winching purposes.

10.40 The tree surgeon shall report to the project arboricultural consultant, any defects or biological disorders which may compromise the health and future safety of the tree which are not noted on the tree survey schedule supplied to the tree surgeon at the time of commencement of tree works.

10.41 All arisings shall be removed from site, unless other provisions have been made for their disposal, and the site shall be left clean and tidy.

Soft landscaping within root protection areas

10.42 Ground preparation will be carried out sensitively to ensure root damage is mitigated as much as is practicable. At no time is any heavy plant to be used within the RPA. Removal of existing vegetation will be carried out by hand, turf may be removed using a mechanical turf stripper or by hand.

10.43 At no time shall a rotorvator be used within any RPA to prepare the soil. Any levelling will be done by hand with the use of hand tools.

10.44 Should the soil be compacted or have a poor structure which may hinder the development of any new planting, soil decompaction techniques may be used upon consultation with the project arboricultural consultant.

10.45 New plants will be planted individually to minimise root disturbance (eg 'no trench' planting).

10.46 No works will be carried out within any RPAs if the soil moisture is of a level likely to allow compaction to occur.

Hard surface removal within root protection areas

10.47 Tree protection measures will remain in place until work commences. When removed, all personnel to be working within the RPA are to be made aware of the extent and nature of the area.

10.48 The initial 'breaking up' of any surface may be carried out by low impact pneumatic tools (not breakers attached to diggers or JCBs, unless required due to the nature of the surface and if so, only when agreed with the supervising project arboricultural consultant), or by hand if possible.

10.49 Removal of the surface will occur in 2m strips working from undisturbed surface. This will enable any roots exposed to be covered with a good quality top soil to avoid desiccation and the ground to be 'made good' as the operation progresses, avoiding the need for excessive travel on exposed ground.

10.50 Where practicable subsequent removal of debris will be carried out by hand. Should mechanical means be required due to the size of the debris, then a small (1.5 ton) digger may be used providing that, when picking up debris, no tines/teeth from the bucket cause any damage to the underlying soil surface. Once left with manageable sized pieces, hand removal will be used. Where the digger is employed, it will only travel on the undisturbed hard surface (within RPA), clearing debris as it progresses out of the RPA.

10.51 No reduction in levels of the underlying soil surface will occur.

10.52 The underlying soil may be levelled by the addition of up to 100mm of good quality top soil to BS3882:1984. Hand tools only will be used for any levelling works; this work will not disturb the underlying soil.

10.53 Should any roots over 25mm diameter have grown above the final soil level and be a hindrance to the final installation, their removal will only be carried out under arboricultural supervision and with the approval of the local planning authority.

10.54 If the area around the retained trees is to be left following the removal of the existing hard surface, before a new hard surface is laid or soft landscaping implemented, then the line of protective fencing MUST be correctly re-established immediately the hard surface removal work has been completed.

10.55 If, for whatever reason there is a delay before the area is left exposed prior to awaiting a new surface, then a temporary surface must be implemented or the area fenced off.

Installation of underground services

10.56 Although every effort has been made to ensure the routing of services does not encroach into RPAs, if installation within RPAs is required the project arboricultural consultant and local authority must be notified prior to any tree protection barrier removal and the following details adhered to.

10.57 Trenching for the installation of underground services severs any roots present and may change the local soil hydrology in a way that adversely affects the health of trees. For this reason, particular care will be taken in the routing and methods of installing underground services. Wherever possible, they should be kept together and tree and root sensitive methods of excavation used. At all times where services are to pass within the RPA, detailed plans showing the proposed routing will be drawn up in conjunction with the project arboricultural consultant. Such plans will also show the levels and access space needed for installing the services.

10.58 The preferred method for trenching within RPAs is excavation using an 'air-spade' or similar. This tool utilises compressed air to remove soil from around tree roots causing minimal damage. This approach will be utilised whenever possible.

10.59 Trenchless technology, such as thrust boring can be used in some instances and is particularly effective as it can pass directly under the tree. As no access/thrust pits will be located within the RPAs of the subject trees, the need for arboricultural supervision is limited.

10.60 Reference can be made to National Joint Utilities Group publication10 Volume 4 (NJUG 10 Vol 4) for guidance, but any approach must be approved by the project arboricultural consultant and brought to the attention of the local authority tree officer.

Bin store construction within root protection areas

10.61 **Structure to be installed as per engineers approved specification**. This specification must be designed to meet the following performance criteria:

- Construction will be above current ground (removal of grass sward/leaf litter by hand only).



- It will provide adequate resistance to applied loads, avoiding compaction of the soil.
- Provision will also be made for resistance to or tolerance of deformation by tree roots.
- Allowance will be made for oxygen diffusion according to seasonal demand.
- Water throughput to meet seasonal demand will also be possible (can be achieved by redirection of captured rainwater into hand dug land drains).
- Any supports (such as a pile and beam construction may require) will be sited around any significant root masses. Sensitive air excavation prior to design will identify ideal locations.

10.62 Such techniques, for example: pile and beam foundations must be designed to cause minimal impact to the trees root system. This will include building above the current soil grade and using floating or cantilevered floors within the structure.

10.63 Stages for construction:

Stage 1: type two TPF to be taken down only when commencement of work is imminent.
Stage 2: grass sward to be removed as necessary using hand toold or low ground pressure plant (eg bobcat or similar)
Stage 3: excavation to establish root free sites for piles or pads. To be carried out by hand or with an air excavation tool.
Stage 4: piles installed (screw pile preferred, these negate the need for exploratory excavation).
Stage 5: void form material installed.
Stage 6: slab based cast onto void form material.
Stage 7: void form material removed to create void under slab.
Stage 8: remaining construction built on slab with no further excavation.

10.64 No plant or machinery can be sited within the RPA. The use of back-acters or diggers to deposit construction materials within the area is acceptable provided this can be achieved without causing damage to the trees canopy and only under arboricultural supervision. The exception to this rule is when the use of piling rigs is required. In most

cases it will not be possible to site a normal sized rig under the trees' canopy, and a mini rig will be required. To facilitate use of such a rig within the RPA without causing soil compaction, ground protection must be used. This can be in the form of large metal plates or trackway placed on a substantial compressible layer (e.g. woodchips).

10.65 Arboricultural supervision will be employed during all work within the RPA.

10.66 Contamination of the soil by fuel and lubricant leaks must be avoided. If such a situation arises the project arboricultural consultant must be notified to assess the situation and to prescribe remedial measures.

Demolition within root protection areas

10.67 All types of TPF to be installed as per approved tree protection plan prior to any plant arriving on site.

10.68 Sensitive demolition will occur to structures within RPAs as indicated on TPP.

10.69 Demolition will be by folding buildings in on themselves, and where it is likely that tree roots have exploited the soil under the building footprint (i.e. lightweight structures with slab floors and no foundations) then the removal of the debris and floor must be carried out sensitively as described below.

10.70 If slab floor can be lifted and removed by mechanical means in one action then this is to be done. Care must be taken to avoid contact between any plant booms and retained trees during this operation.

10.71 Should this not be possible, the initial breaking up of any surface may be carried out by low impact pneumatic tools (mot breakers attached to diggers or JCBs) or preferably by hand.

10.72 Where practicable, subsequent removal of debris will be carried out by hand. Should mechanical means be required due to the size of the debris, then a small (1.5 ton) digger may be used providing that, when picking up debris, no tines/teeth from the bucket cause any damage to the underlying soil surface. Once left with manageable sized pieces, hand removal will be used. Where the digger is employed, it will only travel on the undisturbed hard surface (within RPA), clearing debris as it progresses out of the RPA.

10.73 If a larger digger is required for whatever reason to clear the area it must follow the guidance above and work only outside the RPA.

10.74 No reduction in levels of the underlying soil surface will occur.

10.75 At no point are any heavy machinery permitted within the RPA.

10.76 The underlying soil may be levelled by the addition of up to 100mm of good quality top soil to BS3882:1984. Hand tools only will be used for any levelling works; this work will not disturb the underlying soil.

10.77 Arboricultural supervision must be employed during all work within the RPA.

10.78 Contamination of the soil by fuel and lubricant leaks must be avoided. If such a situation arises the project arboricultural consultant must be notified to assess the situation and to prescribe remedial measures.

Installation of low invasive (no dig) surfacing using a cellular confinement system within root protection areas.

10.79 The following design criteria for low-invasive surfaces (LIS) will need to be considered when installing new hard surfacing within the RPAs of retained trees:

- Maintain oxygen diffusion through new surface to rooting area (5-12% by volume)
- Maintain sufficient passage of water to the rooting area (12-40% by volume)
- Maintain existing ground levels to avoid root damage (severance and/or asphyxiation)
- Avoid compaction my maintaining a soil structure sufficient to sustain root growth (soil bulk density below 1.4g/cc)

The above criteria will provide the conditions for continued tree survival and growth.

10.80 Site analysis of the soil type and its structural characteristics will be required prior to determining the specific depth of products to be adopted for the LIS. For example, footpaths normally require a depth of 100mm and 150-200mm depths are used for residential driveways, whilst greater depths may be required for the passage of the heavier vehicles such as construction traffic.

10.81 The use if a three dimensional cellular confinement system within an LIS is an acceptable approach which aims to fulfil the above design criteria. This system maintains the passage of oxygen and water to root systems; avoids root loss through severance or asphyxiation and minimises the potential for soil compaction. It is achieved by using geotextile membranes and the introduction of the three dimensional cellular confinement system (CCS). The CCS is laid directly onto the unchanged soil levels within the RPA of retained trees.

10.82 Retained trees must first be protected during all stages of the development, including demolition, by the erection of fencing as specified on the TPP. Installing the LIS may require the repositioning of the tree protection fencing to a secondary location in line with the TPP and associated method statement. This follows the recommendations set out in section 9 and 11 of BS5837:2005.

10.83 If ground level s are to be raised more than 150mm within the RPA this should be achieved by the use of a granular material which does not inhibit vertical gaseous diffusion e.g. no fines gravel, washed aggregate, structural soil (min 20% sand content) or cobbles.

10.84 Ideally the LIS should be installed between May and October when the ground is driest and least prone to compaction. The approved wearing course s to be laid over the CCS. Where the LIS covers in excess of 20% of the RPA or is wider than 3m within the RPA the new surface should be constructed in a manner to permit infiltration of moisture and gaseous diffusion (pervious). Where the wearing course is in excess of 20% of the RPA or wider than 3m, a specially engineered LIS will need to be designed to meet the above criteria.

10.85 The effect of the CCS produces a composite mattress, with high flexural stiffness and load support capabilities. The angular infill material engages with the CCS in such a manner as to prevent significant soil compaction and rutting.

10.86 The use of a non-woven geotextile beneath the cellular mattress acts as a separation/filtration layer. The CCS should be filled with no-fines stone in the 20-40mm range. This operation will be carried out avoiding the use of heavy machinery within the exposed RPA of retained trees. Once filled, the perforated cellular wall structure

provides mechanical interlock for infill materials, increasing the sheer strength while allowing lateral and vertical draining and gaseous exchange.

10.87 The system will be used as a permanent base for a wearing course and/or a temporary site access for root protection. The minimum thickness available for CCS material is 75mm and is available up to 300mm thickness; the material required is dependent on the load bearing capacity of the final surface. A structural engineer should design all engineering solutions to surfaces.

10.88 A pre commencement site meeting with the appointed demolition and/or ground works contractor, site manager, project arboricultural consultant, tree officer and appointed engineering consultant, will agree the stages and specification for the installation of the LIS. The project arboricultural consultant will supervise any works within the RPAs of retained trees.

10.89 Stages for installation of LIS;

Stage 1: erection of tree protection fencing (see TPP)

Stage 2: remove existing vegetation by using a specific herbicide (as advised by a specialist) or manual removal with hand tools only. Agreed removal of shrubs, saplings or trees within the RPAs of retained trees are to be cut to or just below ground level, rather than grubbed or ground out which can damage roots of retained trees.

Stage 3: remove existing hard surfaces. Machinery operating on existing surfaces or outside the RPAs and tree canopies could, under arboricultural supervision, be used to carefully remove existing wearing surfaces, however hand tools and preferable and should be used is possible. The sub base of existing surfaces or foundations should be left in situ where possible to avoid unnecessary root disturbance and provide a base for a new LIS

Stage 4: install the non woven geotextile directly over soil grade level (levelled where necessary by the infill of no fines gravel, washed aggregate or structural soil) and fix in place.

Stage 5: lay the CCS over the geotextile which is secured open under tension during the infill process with steel staples or wooden pegs

Stage 6: install curbs and edgings directly on top of existing soil grade level. For light



structures a treated peg and board may be acceptable. For more substantial structures, railway sleepers, haunched concrete with road pins, drilled curb stones, gabions or cast in situ curbs will be appropriate.

Stage 7: fill the CCS ensuring any machinery works only on already filled areas. Typical infill consists of no fines angular granular material 20-40mm which will remain un-compacted

Stage 8: install surfacing options

Small block paving

- Lay a second layer of geotextile separation fabric over the infill CCS
- Lay a sharp sand bedding layer to recommended depth
- Place block paviers as per manufacturers' instructions

Washed gravel

- Lay a second layer of geotextile separation fabric over the infill CCS
- Place pea shingle/gravel to required depth

10.90 Further details, specifications and typical cross sections for CCS are contained in appendix seven of this report (courtesy of Cellweb).

Appendix one - Tree survey schedule in accordance with table one of BS5837

These tree survey notes have been prepared in accordance with the recommendations of British Standard 5837:2005 and define the criteria for pre development tree surveys.

- **No/Tag No.** Each tree / group has been allocated a unique number. Where specifically instructed small durable numbered metal tags have been applied to each tree / group surveyed.
- **Species** Species of tree.
- **Height** Height assessments are estimated and dimensions are provided in **m**etres. This will be adequate for the majority of cases, however where accurate heights become a critical issue it will be necessary to return to site, as a separately commissioned exercise, to collect accurate measurements with the aid of optical instruments.
- **Trunk Diam.** Trunk / stem diameters are measured in metres (**m**) at 1.5metres above ground level
- **No of Stems** denoted as **S** where trees are single stemmed and **MS** where trees are multi stemmed. In the case of multi stemmed trees the measurement of diameter is measured immediately above the root flare.
- **Branch Spread** Radial crown spread assessments are estimated in **m**etres from the centre of the trunk / group to each of the four primary points of the compass (**N**orth, **E**ast, **S**outh, **W**est) in order to achieve a representation of the crown shape which will be recorded on the accompanying tree survey plan. These provide a general guide to the main bulk outline of a tree / group crown but **do not constitute** tape measured dimensions. These would only be undertaken as part of a separately commissioned exercise where precise dimensions are critical to the project.
- **Cr Cl** Height in **m**etres of crown clearance above adjacent ground level.
- **Age** An assessment of a tree / group's age class is made in terms of its site specific maturity as part of the surrounding landscape, taking into account its overall shape and form in that setting and is recorded thus:

Young tree / group
Middle aged tree / group
Mature tree / group
Over mature tree / group
Veteran tree / group

- **Phys Cond** An assessment of a tree / group's overall physiological condition is recorded as:
  Good
  Fair
  Poor
  Dead

- **Struct Cond** An assessment of a tree / group's overall structural condition is recorded as:
  Good
  Fair
  Poor

- **Rem Con** Estimated remaining contribution in years **(yrs)**
- **Cat** British Standard category grading - See extract from BS5837:2005 on following page.
- **RPA** Root protection area based on BS5837:2005 calculations and stated as **Radius** in metres (**m**) and **Area** in square metres (**m^2**).
- **Condition comments** Data on the structural condition of the tree / group is provided to give an indication of the visual appearance and any significant health and safety issues.
- **Management recommendations** as per *British Standard 3998:1989 Recommendations for tree work*



TREES FOR REMOVAL		
Category and definition	**Criteria**	**Identification on plan**
Category R Those in such a 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	• Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other R category trees (ie where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) • Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline • Trees infected with pathogens of significance to the health and / or safety of other trees nearby (eg Dutch Elm Disease), or very low quality trees suppressing adjacent trees of better quality Note: habitat reinstatement may be appropriate (eg R category tree used as a bat roost: installation of bat box in nearby tree)	**Red**

TREES TO BE CONSIDERED FOR RETENTION				
Category and definition	**Criteria – subcategories**			**Identification on Plan**
	1 Mainly arboricultural values	**2 Mainly landscape values**	**3 mainly cultural values, including conservation**	
Category A **Those of high quality and value:** in such a condition as to be able to make a substantial contribution (a minimum of 40 years is suggested)	Trees that are particularly good examples of their species, especially if rare or unusual, or essential components of groups, or of formal or semi formal arboricultural features (eg dominant and/or principal trees within an avenue)	Trees, groups or woodlands which provide a definite screening or softening effect to the locality in relation to views into or out of the site, or those of particular visual importance (eg avenues or other arboricultural features assessed as groups)	Trees, groups or woodlands of significant conservation, historical commemorative or other value (eg veteran trees or wood pasture)	**Light Green**
Category B **Those of moderate quality and value:** those in such a condition as to make a significant contribution (a minimum of 20 years is suggested)	Trees that might be included in the high category, but are down graded because of impaired condition (eg presence of remediable defects including un sympathetic past management and minor storm damage)	Trees present in numbers, usually in groups or woodlands, such that they form distinct landscape features, thereby attracting a higher elective rating than they might as individuals but which are not, individually, essential components of formal or semi formal arboricultural feature (eg trees of moderate quality within an avenue that includes better a category specimens), or trees situated mainly internally to the site, therefore individually having little visual impact on the wide locality	Trees with clearly identifiable conservation or other cultural benefits	**Mid Blue**
Category C **Those of low quality and value:** currently in adequate condition to remain until new planting could be established (min 10 years is suggested), or young trees with a stem diameter below 150mm	Trees not qualifying in other categories	Trees present in groups or woodlands, but without this conferring on them significantly greater landscape value, and / or trees offering low or only temporary screening benefit	Trees with very limited conservation or other cultural benefits	**Grey**
	Note: whilst C category trees will usually not be retained where they would impose a significant constraint on development, young trees with a stem diameter of less than 150mm should be considered for relocation			

Technical Arboriculture

Tree Survey Schedule

No	Species	Height m	Trunk Diam. m	No of Stems	Branch Spread m	Cr Cl m	Age	Phys Cond	Struct Cond	Rem con yrs	Cat	RPA Radius (m)	RPA Area (m^2)
G1	Cypress	4m	0.1m			1.5m	Young	Fair	Poor	10-20 Years	C2	1m	3.14m ^{2}
	Condition Comments Boundary hedge. Unmanaged on side of development.					**Management Recommendations** Prune to boundary.							
T1	Oak	14m	0.85m	MS	3N 7E 6S 5W	2m	Mature	Fair	Fair	20-40 Years	B2	8.5m	226.98 m^2
	Condition Comments Bifurcates at base.					**Management Recommendations** Crown lift to 3m over access.							
T2	Oak	12m	0.3m		3N 7E 4S 0.5W	2m	Mature	Poor	Poor	<10 Years	R	3.6m	40.72 m^2
	Condition Comments Remaining single stem. Dead wood. Decay and damage.					**Management Recommendations** Fell.							
T3	Hawthorn	10m	0.25m		3N 2E 0.5S 2W	3.5m	Mature	Fair	Poor	<10 Years	R	--	--
	Condition Comments Dead wood. Hangers.					**Management Recommendations** Fell.							
T4	Oak	16m	0.68m		6N 3E 3S 7W	1m	Mature	Good	Fair	20-40 Years	B2	6.8m	145.27 m^2
	Condition Comments Bifurcates at base. Previously pollarded. Dead wood.					**Management Recommendations** Crown lift to 3m over development site.							

No	Species	Height m	Trunk Diam. m	No of Stems	Branch Spread m	Cr Cl m	Age	Phys Cond	Struct Cond	Rem con yrs	Cat	RPA Radius (m)	RPA Area (m^2)
T5	Oak	16m	0.48m		3N 3E 4S 5W	1.5m	Mature	Good	Poor	20-40 Years	B2	5.76m	104.23 m^2
	Condition Comments					**Management Recommendations**							
	Previously pollarded. Previously pruned.					Crown lift to 3m over development site.							
T6	Oak	16m	0.63m		6N 5E 7S 4W	3m	Mature	Good	Fair	20-40 Years	B2	7.56m	179.55 m^2
	Condition Comments					**Management Recommendations**							
	Bark damage 1.5m. Dead wood. Previously pollarded. Garages in RPA.					No work required at time of survey.							

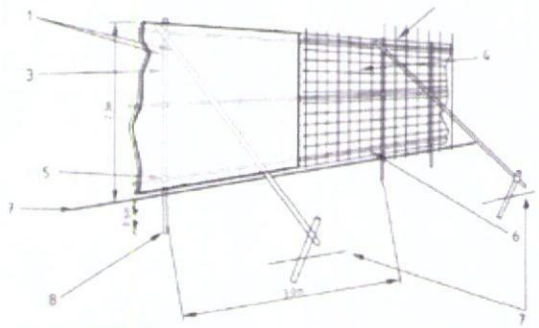
Appendix two - Tree survey and protection plan (TPP)

PDF version – see separate tree survey and protection plan PDF

Appendix three – protective barriers and ground protection

PROTECTIVE BARRIER TO RETAINED TREES

ADAPTED FROM FIG 2 BS 5837 (2005)



1 Scaffold pole framework
2 Uprights driven into the ground
3 Ply or corrugated sheet metal panels secured to uprights with standard clamps or wires, *or*
4 Weldmesh panels wired to uprights & horizontals
5 Standard clamps
6 Wire twisted and secured on inside of fencing to avoid easy dismantling
7 Existing ground levels maintained
8 Pole depth approximately 0.6m driven into the ground

Note: demountable block and mesh panel systems (e.g. 'Heras') are not acceptable)

SITE NOTICES ON FENCING

Pre-printed laminated waterproof signs A3 in size should be fixed securely to fencing panels on each enclosure at 9 metre minimum intervals. (These are avaialble in pdf form from the address below.)

PROTECTED TREE ZONE
NO STORAGE OR OPERATIONS
WITHIN FENCED OFF AREAS

GROUND PROTECTION

Where the need for ground protection is identified, the following ground protection measures should be installed:

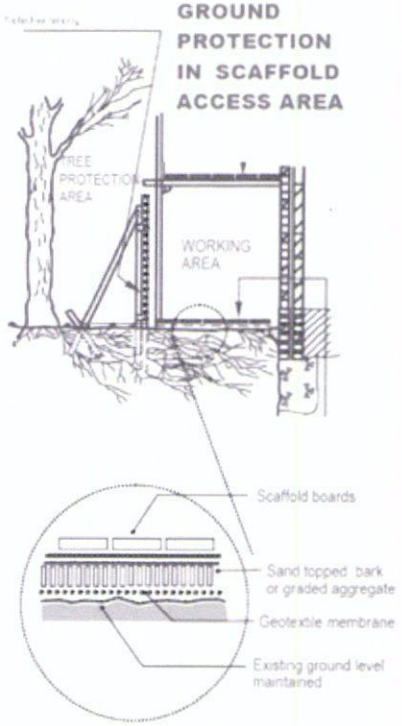
i for pedestrian access, ground protection with scaffold boards laid butt jointed on a 50mm cushioning layer of bark or single size gravel, spread on top of a porous geotextile membrane or

ii for access haul roads or close construction involving heavy loading, a reinforced concrete slab or a proprietory cellular confinement system, laid on a geotextile membrane over existing ground levels, designed by a civil/structural engineer for the specific purpose

iii both the above are to be removed and surface decompaction and rootzone enhancement measures undertaken such as spiking, aeration and / or injection of rhizobium innoculants

Failure to comply with these requirements could lead to enforcement action, including the issuing of a Stop Notice, until the matter has been remedied. Where damage has occurred to legally protected trees, you may be liable for prosecution.

GROUND PROTECTION IN SCAFFOLD ACCESS AREA



Appendix four - Site notices and additional information

Sample site notice – attach to protective fencing at regular intervals:

TREE PROTECTION AREA
!! KEEP OUT !!

NO DIGGING OR TRENCHING
NO STORAGE OF PLANT OR MATERIALS
NO VEHICLE ACCESS
NO FIRE LIGHTING
NO CHEMICAL HANDLING

AVOID PLANT CONTACT WITH TREE CANOPY

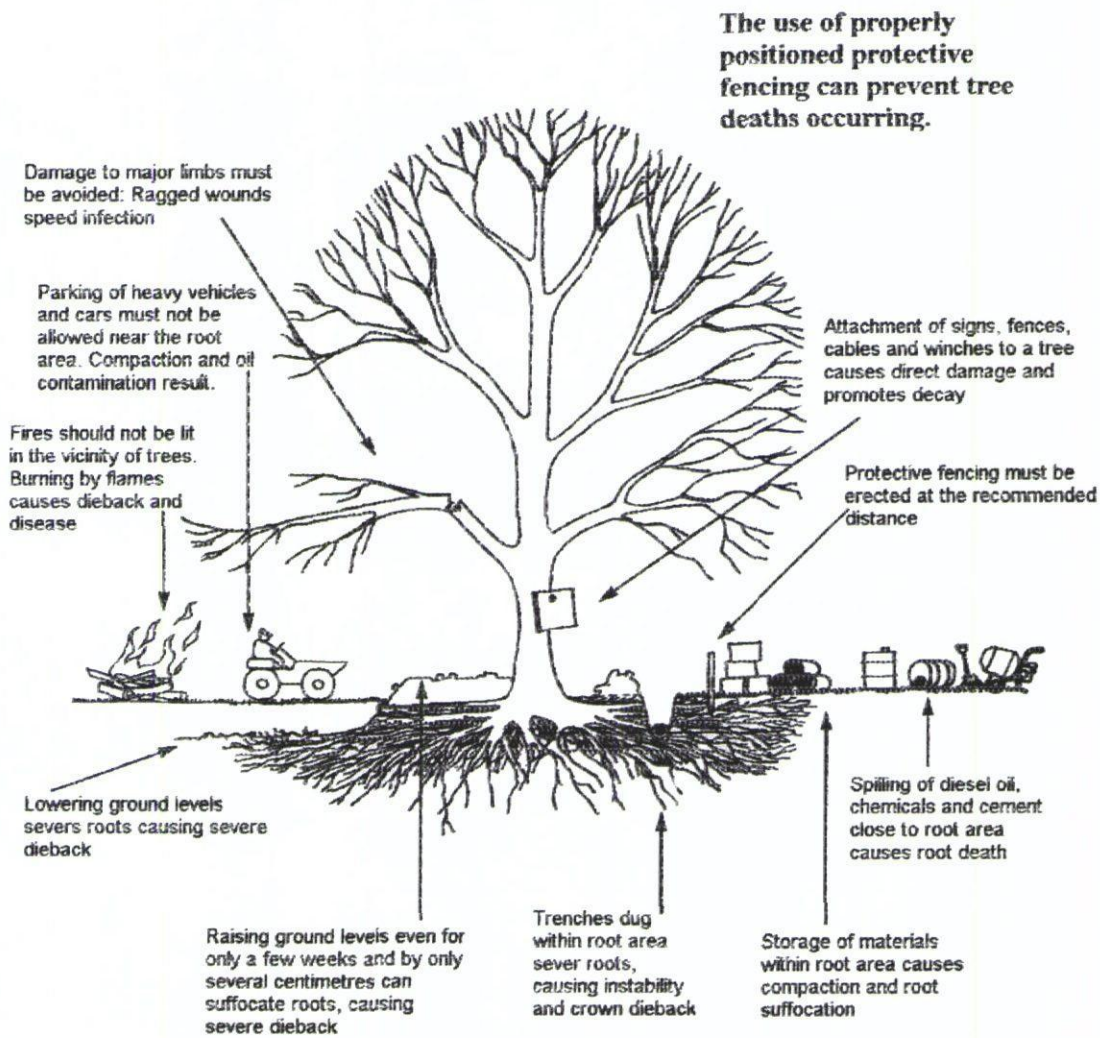
REPORT ANY DAMAGE TO TREES
OR PROTECTIVE FENCING IMMEDIATELY

Construction and Trees

Why is fencing erected around trees?

1. The major cause of damage to trees on construction sites is due to soil compaction.
2. Roots use the spaces between soil particles to obtain oxygen, water and nutrients.
3. Heavy plant and machinery compresses (compacts) the soil, squashing out the air spaces and preventing root function.
4. A compacted soil structure will stay compacted.
5. Consequently the tree suffers and will show signs of branch die-back.
6. Symptoms such as die-back may take several years to appear.
7. Soil compaction over roots can be prevented by maintaining a fenced exclusion zone over the tree roots.
8. The exclusion zone distance is calculated using British Standard 5837.
9. Protective fencing is installed at the calculated distance.
10. Protective fencing is a condition of planning approval, if it is removed or repositioned the construction firm is in breach of a condition and may be subjected to legal action.

Common causes of Tree Death



CellWeb™

Tree Root Protection System





The CellWeb™ TRP cellular confinement system protects tree roots from the damaging effects of compaction and desiccation, while creating a stable, load-bearing surface for vehicular traffic.



Potential loss of existing tree due to poor construction techniques.

CellWeb™ offers an alternative to the traditional methods of constructing roadways and building foundations that involve excavation, which can result in tree root severance and soil compaction from the passage of vehicles. Such damage can severely influence tree health, and in extreme cases leads to death. CellWeb™ can be sensitively installed close to and under the canopies of trees without negative effects.

Trees are valuable landscape features and a vital environmental resource. Increasingly, contractors are being required to ensure the health and survival of trees during and beyond the construction period. Although this is enshrined in BS 5837: Trees in Relation to Construction: Recommendations (2005) and Tree Preservation Order legislation, it presents several issues when implementing construction projects near to trees:

- **Root severance caused by excavation, leaving trees open to decay, less stable and with a diminished capacity to utilise soil water and nutrients.**
- **Destruction of soil structure and compaction due to the passage of heavy vehicles, restricting the flow of water and air to tree roots.**
- **Need for construction access, new roadways and hard surfaces that require engineering-standard load-bearing foundations that meet building regulations.**
- **Need for high-performance, cost-effective driveways and roadways in the vicinity of tree roots.**

The CellWeb™ system overcomes these issues and helps contractors to comply with tree health guidelines by creating a load-bearing base that is water-permeable, stable and durable.

With no need for excavation, the system is quick and easy to install, reducing construction time and saving costs and making it suitable for temporary and permanent solutions.



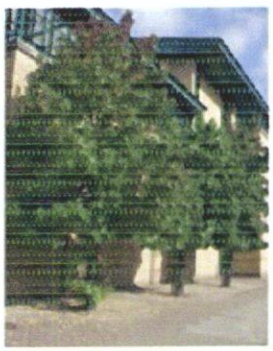
Glynebourne Wood.

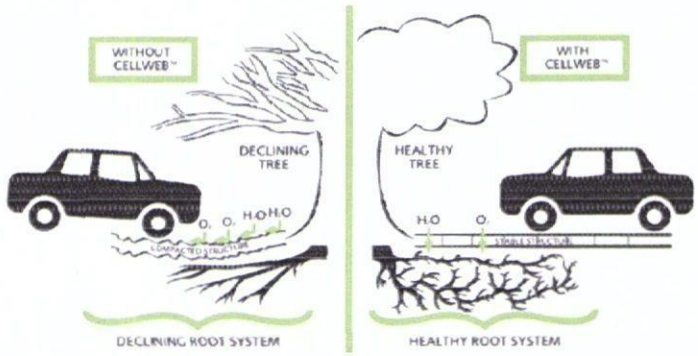
Pedestrian path to recreational woodland built using a CellWeb™ foundation which was covered with DuoBlock and then filled with woodchip to create a porous surface.

Hydrological benefits

Water is a shrinking resource in the urban environment. As the extent of the built environment increases, more and more ground is being covered by impermeable hard surfaces that repel rainwater runoff, preventing it from reaching the roots of vegetation, and in particular trees. Rapid water runoff stretches the capacity of stormwater drains and frequently results in drainage management issues that are rarely resolved in favour of adjacent trees.

Using CellWeb™ mitigates these issues by promoting both the vertical and the lateral movement of water, whether the system is installed above or below ground. The 'pores' that are created by the spaces between the infill stones and the cell perforations even allow water to flow to adjacent tree roots that are effectively 'trapped' under areas of impermeable hard standing. CellWeb™ therefore helps to promote root growth and allows roots to continue to grow within areas of hard surfacing.

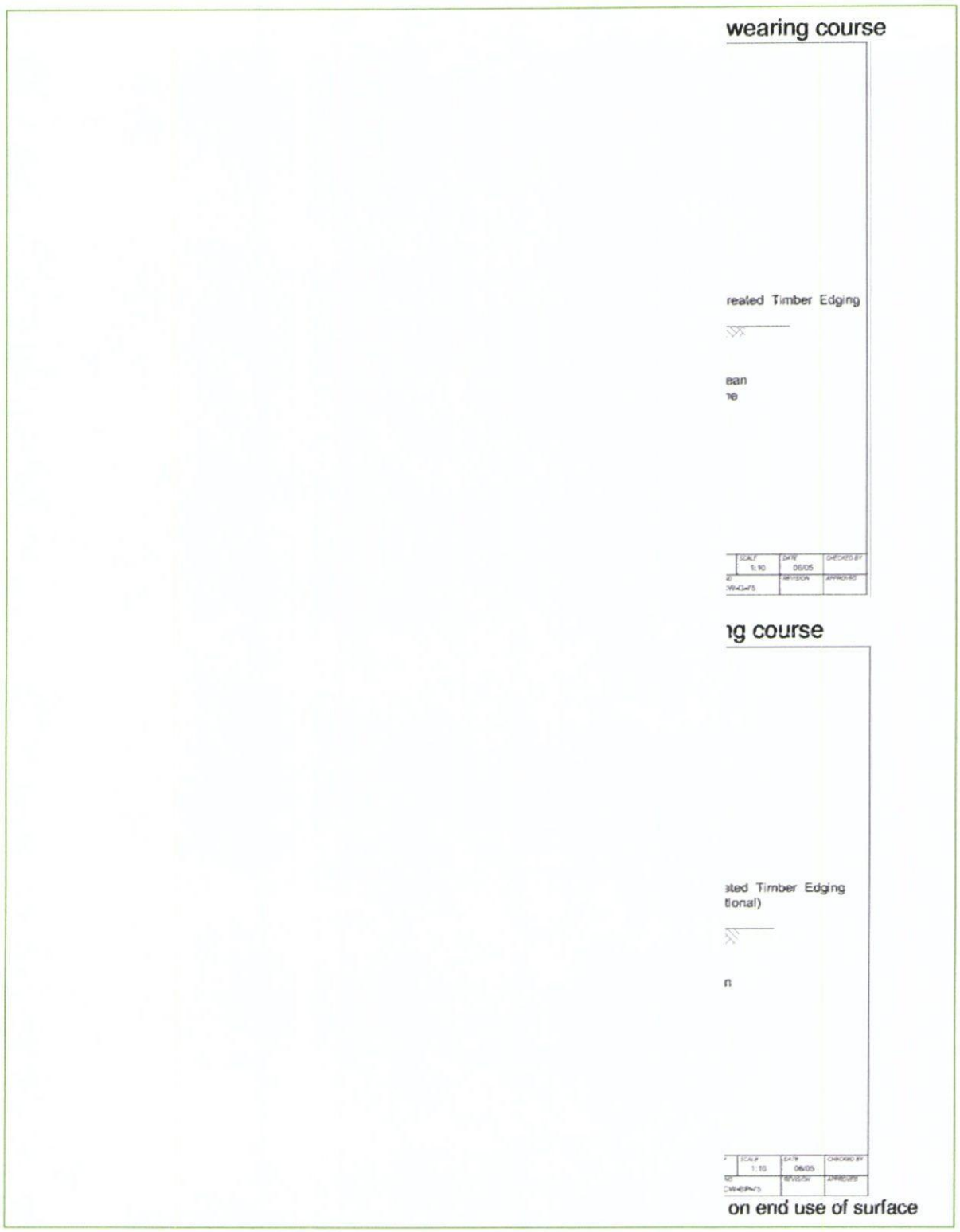




Design service

Onsite support

Geosynthetics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- Feasibility tree surveys
- Tree constraints reports and drawings
- Tree reports for planning
- Method statements to satisfy planning conditions
- Appeal statements and proofs
- Evidence at hearings and public enquiries
- Supervision and inspection of works
- Contract and project management
- Expert witness
- Tree risk assessment surveys
- TPO Review
- Local Government officer contracts
- Tree & woodland management programmes
- Protected species
- Habitat management plans



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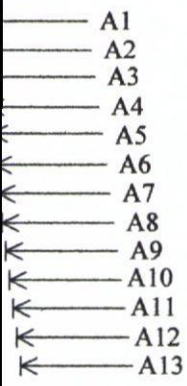
www.techarb.co.uk





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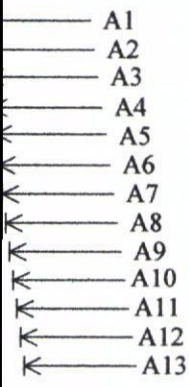



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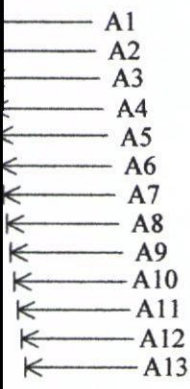
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D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 E1 E2 E3 E4 E5 E6 E7 E8 E9 E10 E11