



barnes & associates
independent arboricultural consultants

ARBORICULTURAL IMPLICATION ASSESSMENT
RELATING TO PROPOSED DEVELOPMENT AT
BURTON ROAD, MONK BRETTON, BARNSELY

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On behalf of:

YORKSHIRE HOUSING
c/o WSM ACANTHUS ARCHITECTS

Contents:

Title	Implication Assessment	DATE COMPLETED	3rd August 2011
AUTHOR	Ian Barnes	OUR REF.	BA3310AIA
SIGNED		PRINTED DATE	12/08/2011

1. **Summary.** This report relates to the trees located throughout the site at Burton Road, Monk Bretton. The trees are in poor overall condition having suffered from historical rootzone compaction and the effects of livestock, and in some cases poor management. The few more valuable trees have become swamped which has led to the formation of some poor quality trees.
 - 1.1. A total of 15 trees are not sustainable in the medium to long term with many requiring early removal or remedial works to establish good arboricultural / Silvicultural management, regardless of intentions to develop the site.
 - 1.2. To enable the proposed development an additional 12 trees, associated scrub, and seedling trees will need to be removed, however these combined losses are countered with an extensive re-landscaping scheme, which proposes 22 new trees in addition to a range of soft landscaping / shrubs to help establish an understory.
 - 1.3. Retained trees require management to enable them to be protected and so avoid the potential negative effects of the development processes. This can be achieved with appropriate fencing, ground protection and the adoption of specialist construction methods if developing close to, or within the trees root protection areas.
 - 1.4. The improvement in management and the addition of new planting will help improve the immediate condition of the trees and help secure their long-term condition.
 - 1.5. The proposed construction of hard landscaping surfacing and services needs to account fully for the presence of the retained trees. This will enable the safe retention of trees throughout the development phase and enable the trees to develop naturally following the site development.
 - 1.6. The development can be undertaken with limited risk to retained trees, providing appropriate protective measures, management and planning are incorporated into the design and management of the site.
 - 1.7. Providing that the points suggested within this report and the guidance outlined within BS5837:2005 'Trees in Relation to Construction', are incorporated within the design and the site is regularly assessed by an independent arboriculturalist; as part of the site management strategy. I would suggest that a development should be achievable from an arboricultural perspective.
2. **Objective:** To assess the potential impact of a proposed housing development and to provide sufficient information to enable a decision on the planning aspects of the site and its potential development in relation to trees.
 - 2.1. It is proposed to construct 30 units with a new internal access roads which is to be softened by an extensive landscaping scheme.

3. **Surveyor:** My name is Ian Barnes; I am an Arboricultural Association Registered Consultant, a Chartered Environmentalist, and Fellow of the Arboricultural Association and an International Society of Arboriculture Certified Arborist and Professional member of the Consulting Arborist Society.
4. **Qualifications and experience:** I have based this report on my site observations and the provided information; I have come to conclusions in the light of my experience. I have experience and qualifications in arboriculture and list the details in Appendix 1.
5. **Scope of this report:** This report relates to the retention of trees in relation to redevelopment of the site. The trees have been assessed in line with the guidelines outlined in British Standard BS5837:2005 'Trees in Relation to Construction'. This provides information for the retention and protection of trees upon development sites.
 - 5.1. The statements made in this Report do not take account of the effects of extremes of climate, vandalism or accident, whether physical, chemical or fire. Barnes & Associates cannot therefore accept any liability in connection with these factors, nor where prescribed work is not carried out in a correct and professional manner in accordance with current good practice. The authority of this report ceases at any stated time limit within it, or if none stated after two years from the date of the survey or when any site conditions change, or pruning or other works unspecified in the Report are carried out to, or affecting, the Subject Tree(s), whichever is the sooner.
6. **Limitations of use and copyright:** This assessment has been prepared for Yorkshire Housing for the proposal at Burton Road. All rights in this report are reserved. No part of it may be reproduced or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, or stored in any retrieval system of any nature, without our written permission.
7. **Site Overview:** The site benefits from trees close to the western, eastern and southern boundaries. The site has a reasonable range of species and age ranges.
8. **Visual Assessment of Trees:** The trees have been assessed from ground level only in line with the guidelines outlined in British Standard BS5837:2005 'Trees in Relation to Construction'. This provides information for the retention and protection of trees upon development sites. Information upon the trees is located in our Tree Survey BA3310 undertaken in July 2011.

9. **Potential Risks.** In several locations, the proposals enter the Root Protection Area (RPA) of retained trees and as such offers a foreseeable risk to these trees. These areas are highlighted with magenta crossed hatching on the Arboricultural Implication Assessment Plan BA3310AIA attached to this report in Appendix 7. In particular, these risks relate to the construction of new boundary walls, the formation of new drives, proposed parking areas and hard landscaping associated with new footpaths.
10. **Poor condition Tree Removals.** To improve safety and help simplify site management 15 poor condition trees within the development area are proposed to be removed (Those located in the woodland areas are to be retained to improve habitat potential). The poorer condition trees to be removed are classified R within the trees survey and are highlighted red hatching on the Implication Assessment Plan BA3310AIA attached to this report in Appendix 7, these removals are required regardless of the site development and should ideally be viewed in isolation.
11. **Development Tree Removals.** To provide sufficient space in which to undertake the proposal the central section of the site needs to be cleared of the existing overgrown shrubberies and seedling trees in addition to 12 trees which will need to be removed; these trees are highlighted in yellow hatching on the Implication Assessment Plan BA3310AIA attached to this report in Appendix 7.
12. **Proposed Tree pruning.** No specific pruning of trees is expected in relation to the installation of the dwellings. Limited crown lifting is expected to provide sufficient clearance for the passage of vehicles, which will be limited to minor pruning to achieve 2.5 metres above the footpaths and gardens.
13. **Retained Trees.** All proposed site alterations can be undertaken using methods that will enable the continued viability of the retained trees. The proposal aims to protect the retained trees by adopting methods, which will lessen the impact of the proposed changes.
14. **Construction Activity.** Traditional construction has the potential to damage trees irreparably I have therefore included a guide in Appendix 6 which outlines the threats to trees.
15. **Site Protection.** Protection will revolve around the need to prevent compaction or excavation within the soil profile or significant changes to the existing soil levels close to retained trees. To this end '**Prevention is better than Cure**', to avoid the soil changes simply requires appropriate site organisation and management where as the cure can

be costly and comes with few guarantees.

16. **Protective Fencing/Barrier.** The area within the **Root Protection Area (RPA)** requires barriers/fencing and management to avoid potentially damaging alterations to the soils within the root zone.

17. Before commencement of any site works or construction the primary tree protective barrier which is shown as the Red line with 'o' intersects () should be installed which is shown the Tree Protection Plan BA3310PRO attached to this report in Appendix 8. This fencing will need to remain in place for the duration of the active development. An example of the fencing is included in Appendix 3. The minimum distance of the fencing refers to the protective distances which are outlined within BS5837:2005 Table 1 Section 7.0. These distances are detailed within the Tree Schedule Appendix 2 of our Tree Survey BA3310TS and included on the site plans BA3310AIA & BA3310PRO. This primary tree protective barrier needs to replace the initial tree protective barrier and remain in position until other tree protection measures have been installed on site.

17.1. When temporary access is required, a secondary protective barrier should be used. An example of the secondary tree protective barrier /temporary fencing is included in Appendix 3. An example of the fencing location is included as an orange line with square intersects () shown on the Tree Protection Plan BA3310PRO attached to this report in Appendix 8. This needs to be installed after the initial tree works as construction commences and remain in position until the primary tree protective barrier is installed only in areas where temporary access is required, subject to appropriate ground protection and other tree protection measures; which have been installed to allow works.

17.2. The fencing on site should only be removed during the landscaping phase, where final detailed level changes should be undertaken by hand.

18. **Changes in ground surface.** The proposal indicates that drives, footpaths and parking areas are located within the RPA of trees. Where these hard surfaces are proposed below the retained trees, measures need to be included to both control access into the RPA and to counter the potential negative effects of excavation and soil compaction. The proposed hard surface within the RPA needs to avoid significant soil level changes. Where changes are required these should remain distinct and should not be graduated across the RPA.

18.1. Where services changes are proposed within the RPA, the construction materials need to be porous and should be constructed above the existing grade using No Dig methods, adopting a cellular confinement geo-textile (3D geotextile) with a porous wearing surface such as bonded gravel or porous tarmac. This avoids excavation, whilst enabling continued air and water ingress into the soil below. I have included an example of this in Appendix 4. The locations of these areas are highlighted with blue hatching on the attached Tree Protection Plan BA3310PRO attached to this report in Appendix 8.

19. **Construction / Access:** To avoid changes in the soil condition within the RPA, general access precautions will be required during the demolition and construction phase. The construction works are located next to and in some cases within the RPA and special precautions for the access of operatives and or plant will be required. Details for temporary pedestrian access into the RPA are included in Appendix 4. This type of temporary above ground protection is highlighted in Yellow on the attached Protection Plan BA3310PRO attached to this report in Appendix 8.

19.1. As much of this work is located within the Root Protection Area it will need to be undertaken carefully and much of this is expected to be undertaken by hand.

20. **Location of Proposed Boundary Walls.** A number of the proposed boundary walls are located within the RPA of retained trees and pose a risk through root severance. The risk associated with these infringements can be kept to a minimum by either adopting low impact construction methods, to form the foundation of the wall above the existing ground level, or by substituting the walls for fencing which is less threatening to trees. Above ground areas are highlighted in yellow on the attached Site protection Plan BA3310PRO in Appendix 8 and an example of the construction methods are included in Appendix 5.

20.1. The foundations will need to adopt a pile / pad-stone / cantilever or other foundation with a ground beam (Subjects to engineers approval) which bridges the roots and avoids the need for wholesale excavation or soil level changes.

21. **Light Levels.** The site design and layout of dwellings has been informed by the existing shade offered by the trees. This is expected to avoid any significant shade problems and this is not expected to be a significant issue other than the southernmost plots 14 & 20, though with the internal arrangements this is not expected to be a significant issue within the high usage living space.

22. **Location of Services.** I have not seen any proposal for the drainage runs in relation to the site proposal. I assume due to the area available within the site, that services can be located well away from trees and outside the Root Protection Areas.

22.1. Where this is not possible, services will need to be installed in line with the guidance contained within the National Joint Utilities Guidelines (NJUG volume 4, issue 2, 19/11/2007) for the installation of services close to trees.

22.2. **Tree Planting.** A tree planting plan has been prepared by AWS Acanthus, which proposes the establishment of 18 Heavy Standard trees & 4 Semi Mature trees as part of a significant planting to provide continuity of tree cover for the site following the completion of the scheme.

22.3. The specific tree species can be amended to meet the requirements within the local landscape plan if required and typically can be a conditional item within the approval if required.

23. **Conclusion.** The development proposals does require tree losses, however these changes are generally restricted to the internal views as the centre of the site is cleared of trees to provide the development space.

23.1. The retained trees, subject to the changes highlighted above meet the guidelines outlined in British Standard BS5837:2005 Recommendations - Trees in Relation to Construction.

23.2. Subject to appropriate conditions, tree protection and site management and methods, I consider that the proposed site changes can be undertaken with limited risks to retained trees.

23.3. I can see no reason why this scheme should not proceed subject to appropriate conditions and providing that the points suggested within this report are incorporated within the planning approval and appropriately managed.

Yours Sincerely



Ian Barnes

HND Arb, F.Arbor.A, ND Ht/Arb Tech.Cert (Arbor.A), MI Hort, C.Env
Arboricultural Association Registered Consultant
Chartered Environmentalist
International Society of Arboriculture Certified Arborist

SUGGESTED CONDITIONS

Standard conditions relating to the creation and management of Tree Protection and its maintenance for 5 years.

Standard conditions relating to the site landscape, management maintenance can be formalised within a Landscape Management Plan.

APPENDIX 1 - BRIEF QUALIFICATIONS AND EXPERIENCE OF IAN BARNES

Qualifications:

Higher Diploma in Arboriculture (H.N.D Arb)
National Diploma in Horticulture & Arboriculture (N.D.Ht/Arb)
Arboricultural Association Technicians Certificate (Tech.Cert. (Arbor.A))
ISA Certified Arborist

Membership grades by peer review:

Chartered Environmentalist (CEnv)
Corporate Member Institute of Horticulture (MI Hort)
Fellow of the Arboricultural Association (F.Arbor.A)
Professional member Consulting Arborist Society UK.

Registration Schemes:

Arboricultural association Registered Consultant (49)

Practical experience:

I have worked in the Arboricultural Industry since 1987. Firstly as a climbing Arborist in both the public and private, sector, undertaking a wide range of practical operations on a variety of sites, before becoming a gang foreman. I set up and ran my own Arboricultural contracting business for 15 years, though this is now under new ownership. I have developed an arboricultural consultancy practice over the last 12 years, working throughout England for clients in both the public and private sector.

Continuing professional development:

As part of my ongoing education, I am a member of a range of related Arboricultural bodies. Including the Arboricultural Association (AA), International Society of Arboriculture (ISA), Royal Forestry Society (RFS), Forestry Contracting Association (FCA), and Arboricultural Mortgage & Insurance Users Group (AMUIG), which has been incorporated into the Consulting Arborist Society (CAS) of which I am a professional member. I am a corporate member of the Institute of Horticulture (MI Hort) and a Fellow of the Arboricultural Association (F.Arbor.A). An inclusive member of the British Mycology Society (BMS) in addition to being a Chartered Environmentalist (CEnv).

I am a registered consultant of the Arboricultural Association.

I regularly attend seminars and training events on issues relevant to Arboriculture these include events focusing on General Tree Management, Veteran Tree Management, Tree Health, Tree Pest management, Tree Diseases management, Trees Biology & Morphology, Tree Stability, Wind Loading of Trees, Tree Risk Assessment, in addition to keeping an up to date level of CPD.

I am a licensed user of the Quantified Tree Risk Assessment (QTRA) System and regularly attend updates.

I am a trained user of Picus 'Acoustic' Tomography and Picus Treetric and have attended training to extend my knowledge in this area.

I am trained and a licensed user of tree thermography as an aid to detecting defects in trees.

Relevant experience:

My career to date has involved me in a variety of tree care, dealing with trees in many different environments, and with differing management aims, these included: Tree planting schemes, including Woodland Design & Management, Detailed Health and Safety Appraisals, Tree inventories / population surveys, Management & selection on both proposed and active development sites, Advice upon trees in relation to structures, Additional areas of work such as Contract Specification & Management, Planning applications, Expert Witness. This has provided me with a range of experience, enabling me to comment upon trees and their management, in line with current best practice. Full CPD and training record can be forwarded upon request.

APPENDIX 2 – GENERAL GUIDANCE NOTES FOR DEVELOPMENT CLOSE TO TREES

Protection of trees on development sites is achieved by creating a circular zone around each tree that has a radius of 12 times the trunk diameter (10 times trunk diameter for trees with an 'm' suffix). This has been included on our site plan BA3310PRO included as Appendix 8 and the magenta line around each of the trees indicates this area. Ideally, this area should remain free from soil disturbance, as it is likely that tree roots will be found within this zone.

Ideally, building lines should ideally be at least 2 meters outside the Root Protection Area and Service runs should be routed outside the Root Protection Area. This has been included on our site plan BA3310PRO included as Appendix 8 and is indicated by the blue line around each of the trees. Limited use maybe made for parking, drives or hard surfaces within the Root Protection Areas, subject to advice from a qualified arboriculturist.

Retained trees, generally require a combination of fencing and management of the Root Protection Area, to avoid potentially damaging alterations to the soil characteristics within the rootzone. This can be most simply achieved through fencing, and specific methods to enable access into the root protection area.

The development process has the potential to damage trees irreparably I have therefore included a general guide regarding the threats to trees from construction in Appendix 7. Protection aims to prevent compaction or excavation within the soil profile or significant changes to the existing soil levels. The minimum distance of the fencing refers to the minimum protective distances out lined within BS5837:2005 Table 1 Section 7.0. These distances are detailed within the Tree Schedule in Appendix 2. The creation of the Root Protection Area will need to be undertaken following the initial tree works and remain in position for the whole of the Demolition, Construction and Completion phase.

On occasions, developments can be undertaken within the root protection area. The ability of trees to tolerate some disturbance depends on individual circumstances including prevailing site conditions. Accordingly, the advice of an arboriculturist should be sought for any operations within the root protection area. It should be noted that, in general, the older the tree, the less successfully it will adapt to new conditions.

Where it is intended to undertake demolition or construction operations within the root protection area, precautions should be taken to maintain the condition and health of the root system and in particular to prevent physical damage to the roots during demolition or construction by compaction or severing. Developments must preserve the soil structure at a suitable bulk density for root growth and function. I have included information upon the methods of construction within Appendix 6.

In certain circumstances, traditional developments can be located closer to retained trees than suggested by the Root Protection Area. These areas may change its shape but not reduce its area to provide adequate protection for the root system and will need to consider the likely tolerance of the tree to root disturbance or damage. For individual open grown trees only, it may be acceptable to offset the distance by up to 20% in one direction, subject to normal conditions regarding development within the root protection area and only where additional space can be provided to achieve the desired area.

APPENDIX 3 – PROTECTIVE FENCING

The retained trees will require protection to prevent any potentially negative effects from development processes. A barrier should be used to define a **Root Protection Area**. This must be established around the retained trees examples are included below and must remain in situ undisturbed for the duration of the development as detailed with BS5837:2005 (section copied below). An example of a poster / flyer is included below and should be circulated to all site operatives.

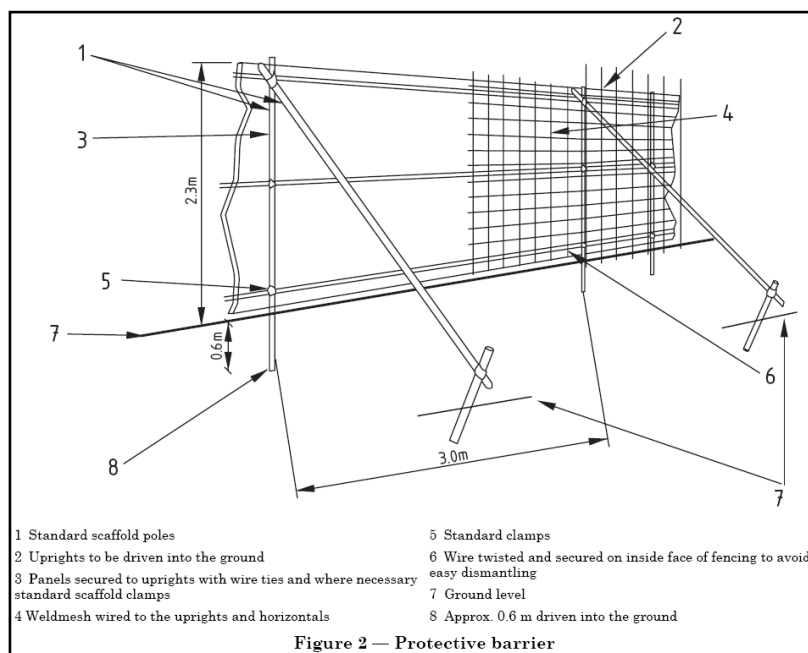
9.2 Barriers

9.2.1 Barriers should be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place around the retained tree(s). On all sites, special attention should be paid to ensuring that barriers remain rigid and complete.

9.2.2 In most cases, barriers should consist of a scaffold framework in accordance with Figure 2 comprising a vertical and horizontal framework, well braced to resist impacts, with vertical tubes spaced at a maximum interval of 3 m. Onto this, weldmesh panels should be securely fixed with wire or scaffold clamps. Weldmesh panels on rubber or concrete feet are not resistant to impact and should not be used.

NOTE the above is preferred because it is readily available, resistant to impact, can be re-used and enables inspection of the protected area.

9.2.3 It may be appropriate on some sites to use temporary site office buildings as components of the tree protection barriers.



The fence should display warning signs with the wording "Root Protection Area – Strictly No Entry" an example is included below.

Refer to tree schedule minimum distance of protective fencing

Once erected, the fencing must be regarded as the boundary of the site and not crossed or removed or otherwise altered. Absolutely no entry must be allowed into these zones for persons or materials and the site should be organised to ensure that protected zones are safe from cement washings, fuels or any other potentially toxic materials.

Example of Root Protection Area signage, copies of this should be attached to FENCING at 8 metre centres.



APPENDIX 4 – GROUND PROTECTION

Access within **the Root Protection Area** - To enable Foot Traffic and Scaffolding within the Root Protection Area the following system can be adopted, with the agreement of the Consulting Arborist or LPA. This is detailed within Section 9.3 of BS5837:2005 (section copied below).

9.3 Ground protection

9.3.1 Where it has been agreed during the design stage, and shown on the tree protection plan, that vehicular or pedestrian access for the construction operation may take place within the Root Protection Area (RPA), the possible effects of construction activity should be addressed by a combination of barriers and ground protection. The position of the barrier may be shown within the RPA at the edge of the agreed working zone but the soil structure beyond the barrier to the edge of the RPA should be protected with ground protection.

9.3.2 For pedestrian movements within the RPA the installation of ground protection in the form of a single thickness of scaffold boards on top of a compressible layer laid onto a geotextile, or supported by scaffold, may be acceptable (see Figure 3).

9.3.3 For wheeled or tracked construction traffic movements within the RPA the ground protection should be designed by an engineer to accommodate the likely loading and may involve the use of proprietary systems or reinforced concrete slabs (see 11.8 and 11.9.)

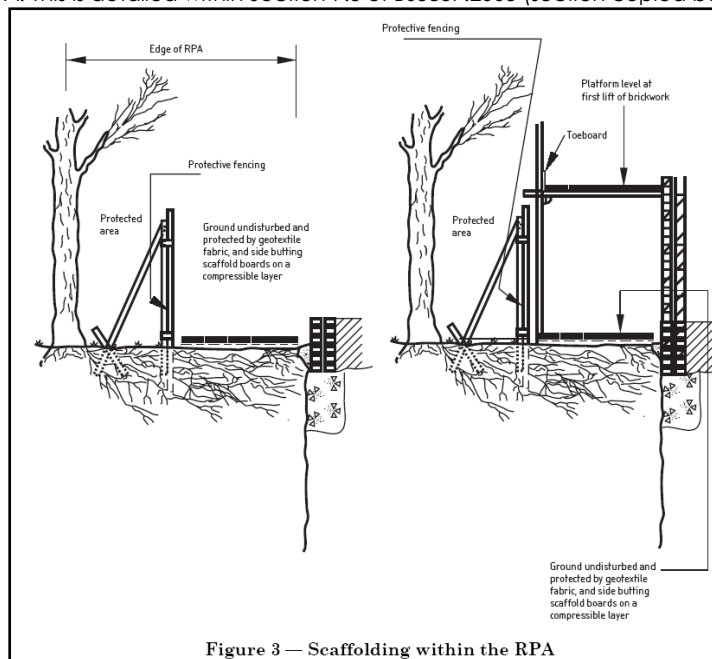


Figure 3 — Scaffolding within the RPA

Access within the RPA with machinery or for the storage of materials can be incorporated into the site protection scheme or method statement. Material storage can be achieved using a staged scaffolding system with an appropriate ground protection system below, further details upon request. Vehicle entry, within the RPA will require specific engineering solutions which mimic the above ground protection ideals detailed in Diagram 1.

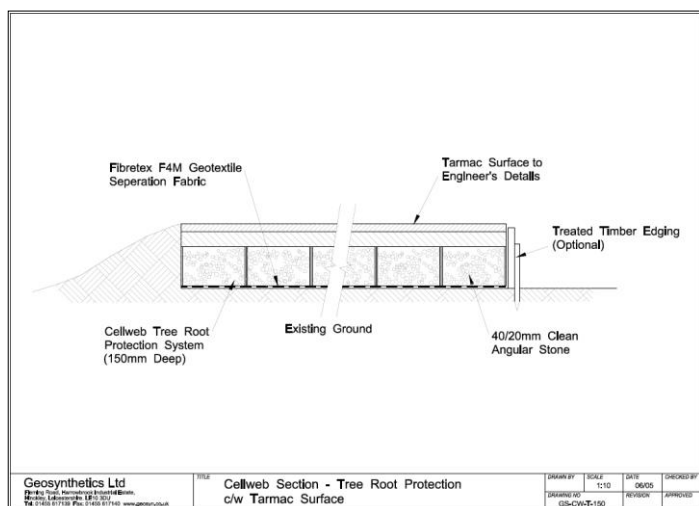
In general the creation of hard standing within the RPA needs to be avoided by providing sufficient space between the retained trees and constructed features. Where land is at a premium and where soil conditions allow, specific No-Dig hard standing can be created to provide pedestrian footpaths, parking areas and even Access Roads suitable for vehicles.

These systems are not generic and need to be designed by arborists to suit the particular site characteristics along with Structural engineers to ensure the support characteristics of the materials are suitable to the task in hand. These generally are separated into two types Above Ground Construction and Below Ground Construction.

Examples of the Above Ground Construction methods can be incorporated in to a site design and detailed within the **Arboricultural Method Statement AMS**. Where levels on site enable the final levels to be above the existing ground level a **WEIGHT TRANSFER BLANKET** or **SUPPORTED DECK** can be constructed to restrict damage to the tree roots assumed to be within the volume of retained soil within the RPA.

Weight Transfer Blankets can be constructed from various materials an example is 'Cellweb' or similar which work on the principal of a vehicles weight being transferred side wards and avoids the formation of compaction within the rootzone and can be readily be detailed within conditions. Final surfacing can be fine gravels, resin bonded gravel or porous paving / Key block or porous tarmac.

Above Ground Foundation – No Dig – Three dimensional CellWeb



Supported Decks can be either simple timber deck or more complex pile with a cast platform design. Damage is limited to the location of the piles. The bridging section avoids compaction and maintains aeration and water ingress. Again this can be incorporated into a site design and detailed within the Arboricultural Method Statement AMS.

Examples of the Below Ground Construction methods can be incorporated in to a site design and detailed within the AMS, though tend to require heightened monitoring. Where levels on site are marginally above the final required level, careful excavation and replacement of the excavated soil with an appropriate medium will enable continued root development within an engineering sub base. These methods aim to retain the tree roots assumed to be within the volume of retained soil within the RPA.

APPENDIX 5 – GENERAL GUIDE TO CONSTRUCTION WITHIN THE ROOT PROTECTION AREA

Retained trees require protection to prevent any potentially negative effects from development processes. Above ground foundations should be adopted where construction is proposed either within or close to a **Root Protection Area (RPA)**. These methods must be adopted around the retained trees examples are included below. The principal of construction close to or even within the RPA is detailed within section 11.6 of BS5837:2005 (section copied below).

11.6 Foundations within the RPA

11.6.1 The insertion of structures within root protection areas may be justified if this allows the retention of a good quality tree (category A or B, see Table 1). However, it is essential that careful consideration is given to foundation design (see **11.6.2**). In such cases, the use of traditional strip footings, in particular those constructed tangentially across the root zone, can result in severe damage to tree roots and should be avoided.

11.6.2 Root damage can be minimized by using a combination of the following:

— piles or radial strip footings both of which should be located to avoid major tree roots;— beams, slabs, suspended floors, where all should be laid at or above ground level, and cantilevered as necessary to avoid tree roots. In order to arrive at a suitable solution, site specific and specialist advice regarding foundation design should be sought from an arboriculturist and an engineer.

11.6.3 Where piling is to be installed near to trees, the smallest practical pile diameter should be used as this reduces the possibility of striking major tree roots, and reduces the size of the rig required to sink the piles. The latter is particularly important where piling within the branch spread is proposed, as mini-rigs reduce the need for access facilitation pruning. Sheathed piles protect the soil and adjacent roots from the potential toxic effects of concrete.

Notes on Pile and Beam Foundation Design in respect of Root Protection Areas.

1. Piles The method of installation, be the piles driven or augured, will require some form of protection against ground compaction in tree protection zones. This is usually achieved with a piling mat of some form of load bearing material, which in turn should be laid over a woodchip mulch to dissipate ground loading and provide a visual demarcation to the existing ground level when the mat is taken up. Whether the mat needs to be taken up after the operation will depend on circumstances, but it is usually good practice to do so.

The other factor is headroom. Clearly some judgement of clearance to trees is required. However, it is not always desirable to prune branches to create the required clearance and as an alternative this can be achieved by tying them back to deflect them. Again, this is a matter of judgement on site and may require a specific choice of piling rig and the adoption of mini rigs in close proximity to trees.

The position of piles should as far as is possible be determined by the need to minimise intrusion into a Root Protection Area. This may have implications for the design of the building. Particularly when a long ground beam is the only solution.

The main loss of root mass from pile installation is the pile cap, as this usually has to be under the ground surface level. Calculations as to the area of roots lost must include a "plume" of loss roots extending away from the tree from each pile cap to the edge of the Root Protection Area. Depending upon the soil type and other site circumstances this plume may be three or four times the area of the pile cap if entirely within the Root Protection Area.

2. Beams Referred to as 'ground beams'. Normally a ground beam will be designed to have its top edge more or less level with the ground. The principle of root protection is the recognition that the majority of the assimilative root mass is shallow, averaging no more than 60 centimetres in depth. Where a beam crosses a tree protection zone it must not be any deeper than can be accommodated in an excavation of an absolute maximum of 10 centimetres in depth. This allows for positive contact with the ground to provide a barrier to rodents, although air must be allowed to circulate if there is a void underneath. Alternatively the underside of the beam can be installed above the existing ground level and incorporate rodent protection. Where the soil is shrinkable there may be a need for a compressible zone beneath the beam, often 15–20 centimetres. Roots might be severed to this depth and is therefore unacceptable. An acceptable method is to use some form of expanded polystyrene as the compressible material that can be cut or inserted between roots. The "trench" is opened using either a water jet or compressed air jet so that roots are not severed. (This former method can be messy, but can be contained using tarpaulin screens). An assessment of the exposed roots can then be made to determine a sensible degree of pruning. This must strike the correct balance between retaining as much root material as possible whilst allowing the compressible material to be structurally coherent.

The other factor with a ground beam that protrudes above ground level is its architectural or cosmetic appearance. It is possible to attach some form of bonded finish but it is also practical to cast or weld a ledge extending outwards at ground level to support facing brickwork or other material. Building up a sloping shoulder of soil may only be possible in exceptional circumstances. Ducted rainwater to the underneath may also be necessary if the building covers a significant proportion of the Root Protection Area.

APPENDIX 6 – THREATS TO TREES DURING DEVELOPMENT

The following operations are all very damaging to trees, I have included a poster that demonstrates these points, and this might be useful for full circulation:

Compaction of the soil - Compaction will destroy the soil structure by removing the spaces between soil particles preventing the uptake of oxygen and nutrients. Compaction is caused by storage of materials, including bricks, soil, gravel and cement, and even a single vehicle movement will cause damage. Compacted ground will also damage soil drainage which may then become waterlogged.

Excavations - any excavations close to the tree are likely to cause root severance. The closer excavations occur to the tree the more severe the damage. Root severance will lead to loss of vigour of the tree, reduce uptake of water and nutrients, allow access for decay organisms and increase likelihood of wind throw.

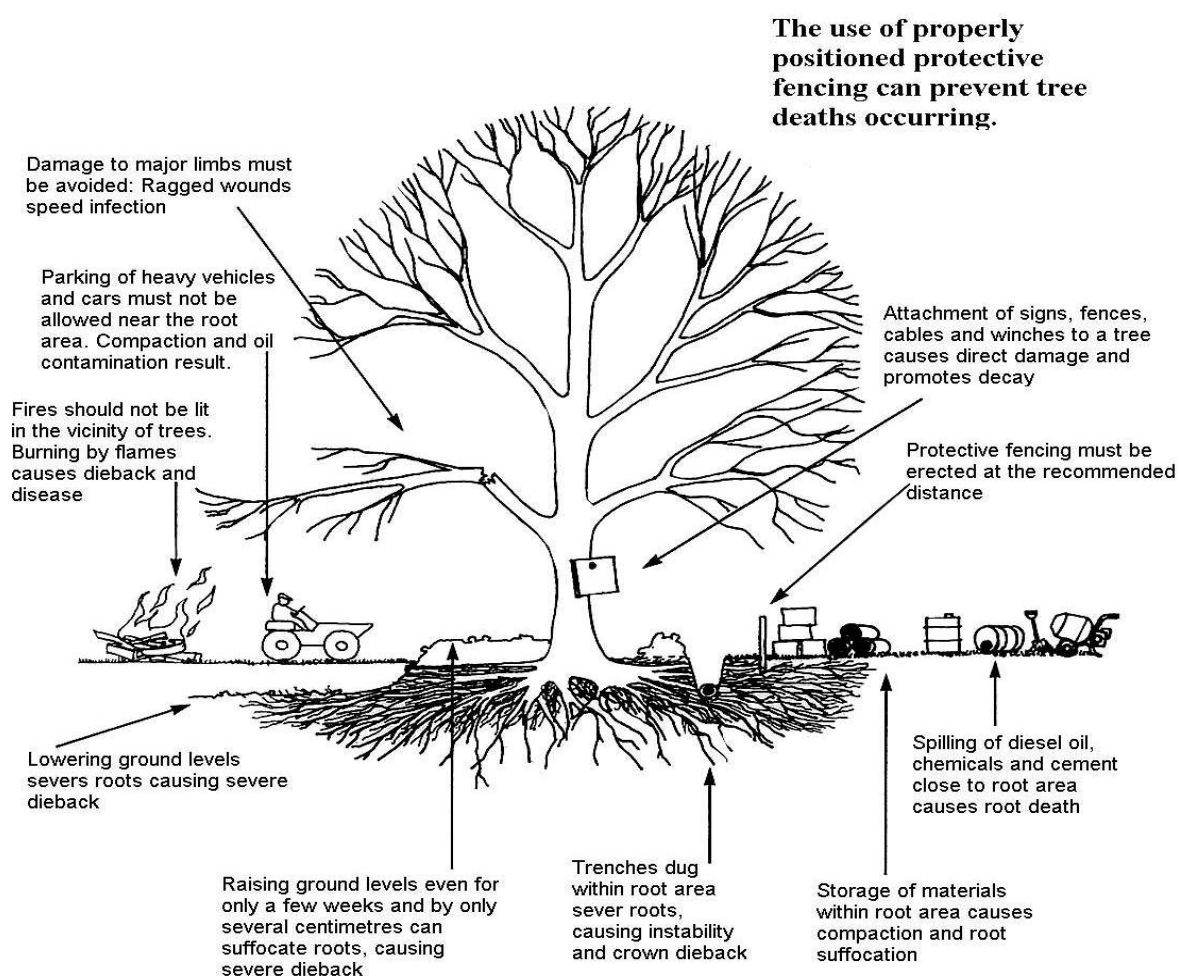
Ground level changes - both reduction and raising of soil levels will be detrimental even if this is only by a few centimetres. Reducing ground levels will sever roots, and can increase the drainage of a site thereby reducing water availability. Raising ground levels will cause compaction, suffocate roots and damage fibrous roots.

Impact damage - this can be caused by machinery - including torn branches and damage to bark and trunks. This will lead to entry for decay organisms and reduced vigour.

Soil contamination - this can be caused by spillage of oil, fuel and chemicals and mixing cement or other materials. Allow for sloping ground – keeping toxic material down hill from trees and aim to store them 10m from the Protected Zone to allow for leaching through the soil.

Fires - both the intense heat and direct flame will damage the trees causing loss and damage to both major roots and fibrous roots. Intense heat will damage the trees vascular system under the bark even if the bark does not appear burnt.

Common causes of Tree Death



APPENDIX 7 – ARBORICULTURAL IMPLICATION ASSESSMENT PLAN

Drawing No – BA3310AIA – Attached

APPENDIX 8 – TREE PROTECTION PLAN

Drawing No – BA3310PRO - Attached