

The future of development site management

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Barrell Tree Consultancy
www.barrelltreecare.co.uk
01425 651470

Tree officer/consultant/developer partnerships: The future of development site management

Our overwhelming experience is that development site management in the UK is relatively ineffective in terms of successfully retaining trees and there is scope for significant improvements. Many of the procedures and systems that have been developed do not work and are resulting in significant tree loss. We believe that much of it is preventable with minor tweaks to the way we work.

Such tree losses do not sit well with our passion for being professional and caring for trees, so we are highly motivated to identify where established procedures are failing and try out new ideas to see if we can improve the success of tree retention efforts. This approach is trial and error based; we think of potential solutions, try them out and, if they work, we incorporate them into our procedures. We do not have all the answers but we do know that we are working towards effective solutions because of the volume of sites we manage. We are instructed on over 600 sites a year, which is an unparalleled field-testing opportunity for our ideas.

We have found that there is no single answer or simple one-stop solution to improving the success of tree retention. Instead, there seem to be many small problems that have a synergetic effect, i.e. their combined impact is much greater than the sum of the individual effects. Significant problem areas we have identified include:

- Communication between consultants, tree officers and developers
- Internal communication within councils between planning officers and tree officers
- Internal communication within development companies between their design team and their contract implementation team
- Poorly worded planning conditions
- Ineffective enforcement
- Poor support and low priority given to tree matters by planners and elected members
- Poor documentation from consultants
- Unfocused tree officers
- Lack of tree awareness from architects, engineers, landscape architects and other professionals
- Lack of focus and help from BS 5837 on certain key issues
- Failure of the AA and other tree lead bodies to champion trees in the planning system

After years of dealing with literally thousands of sites, our conclusion is that minor improvements in all of these areas does make a big difference. However, it does require a shift

in attitude of all the major players; tree officers, planning officers, consultants and developers alike. As consultants, one of our main roles is as intermediaries between developers and councils, and we have found that one of our most effective tools to initiate change is through the documents we produce. Consequently, a major focus of our attention is on the reports and plans that provide the link between developers and councils.

Most of this delegate pack consists of a sample arboricultural impact appraisal report and plan to illustrate how we have evolved our document presentation to be most helpful to both developers and councils. From the council perspective, the thrust of our work has been to make the reports easy for councils to use when assessing the submission, selecting appropriate conditions and enforcement once the consent is implemented. From the developer perspective, our emphasis is on clear plans as an effective means of successfully explaining the importance and detail of tree protection, with the backup of detailed specifications in the report.

The sample report is an arboricultural impact appraisal with an arboricultural method statement incorporated into it. Although both reports can be prepared as separate documents, we have found that combining them is useful because it allows a single document to be referenced in a site-specific planning condition. This means the council sees as much of the detail as possible up-front before consent is given, providing the opportunity to assess whether the tree protection proposals are in fact feasible.

Throughout the sample report, we have added footnotes in red text to highlight and explain the features we think are important for tree officers to know about and understand. Please remember this is a sample report that has been adapted from an actual case but with all identifying references removed. Its purpose is to illustrate points relevant to the PowerPoint presentation and there are some minor inconsistencies in its detail resulting from the editing. It does not cover all the scenarios that can be encountered but does illustrate many of the principles we follow in our approach to these issues.

At the back of this delegate pack are the following relevant documents:

- Example of planning consent directly referencing our report illustrating how this can be done in practice
- Summary of how tree officers can help in making tree retention more successful

Visit the downloads section of our website at www.barrelltreecare.co.uk for an extensive series of case studies relating to trees on development sites.

Sample Arboricultural Impact Appraisal and Method Statement
Sample site in the UK

Prepared by
Jeremy Barrell BSc CBIol MIBiol FArborA DipArb FICFor

Date: 10 December 2008
Ref: Sample-AIA-MTOA

Summary¹

This development proposal is to demolish an existing office building and replace it with a block of apartments. I have inspected all the trees that could be affected and list their details in Appendix 4. Based on this information, I provided guidance to the site architects on the constraints these trees impose on the use of the site. The current layout is a result of this detailed consultation and has evolved taking full account of these constraints.

This proposal will result in the loss of two trees that are low category because of their poor condition and small size. All the significant boundary tree cover will remain intact and no high category trees will need to be removed. There is plenty of space for new planting and a comprehensive new landscape scheme with semi-mature trees is included as part of the proposal. Development of new trees will significantly enhance the contribution of this site to local amenity and more than compensate for the loss of existing trees. The construction activity may adversely affect further trees if appropriate protective measures are not taken. However, 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 local amenity or character.

Jeremy Barrell **BSc FArborA DipArb CBiol FICFor FRICS**

¹ The summary is important because it sets out the key findings of the report so that the reader can quickly identify the issues and conclusions without wading through the detail.

1 INTRODUCTION

- 1.1 **Instruction:** I am instructed by the developers to inspect the significant trees that could be affected by the development proposal at the site and to prepare the following information to accompany the recent planning submission:-
- a schedule of the relevant trees to include basic data and a condition assessment
 - an appraisal of the impact of the proposal on trees and any resulting impact that has on local amenity
 - a preliminary arboricultural method statement setting out appropriate protective measures and management for trees to be retained
- 1.2 **Purpose of this report²:** This report provides an analysis of the impact of the development proposal on trees and local amenity with additional guidance on appropriate management and protective measures. Its primary purpose is for the council to review the tree information in support of the planning submission and use as the basis for issuing a planning consent or engaging in further discussions towards that end. Within this planning process, it will be available for inspection by people other than tree experts so the information is presented to be helpful to those without a detailed knowledge of the subject.
- 1.3 **Further explanations:** To make this report easier to use, its emphasis is on keeping the main text concise with minimal background explanations. Where appropriate, further explanations and information are included as appendices.
- 1.4 **Documents provided:** Plan BT4 is derived from information provided by the site architects as their final layout, drawing number 21/06, and the original the site survey
- 1.5 **Relevant background information:** Sixteen trees on the site were the subject of the Borough Council provisional tree preservation order (TPO) 143/05. I submitted objections relating to the inclusion of three trees (3, 5 and 14) and the council agreed to remove trees 3 and 5 from the confirmed TPO. I visited the site to discuss the tree

² Although tree officers only need a small proportion of the overall information in the report, it is also seen and needs to be understood by planning officers, the general public and elected members who quite often know very little about the technical detail relating to trees. The author also has to be protected by setting out the limitations, restrictions and references that apply to the report preparation. These are the reasons why formal reports can be long and bulky. We try to focus the report to the key points by relegating as much material to the Appendices as possible and keeping the main body text concise, whilst at the same time trying to make it readable and comprehensible.

issues with the planning officer and tree officer from the Borough Council. During the past three months, I had discussions with the engineers dealing with the flooding issues, about how those proposals will affect trees. The proposals in this report reflect those discussions.

- 1.6 **Ecological constraints:** 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. These could impose significant 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 beyond my area of expertise and you must seek advice from an ecologist to check if any such constraints apply to this site.
- 1.7 **Tree preservation order protection:** All the trees on this site except T3 and T5 are covered by a tree preservation order. You cannot carry out any works to the protected trees before a formal planning consent is issued.
- 1.8 **Qualifications and experience:** This report is based on my site observations and the provided information, interpreted in the context of my experience. I have experience and qualifications in arboriculture and enclose a summary in Appendix 1.

2 THE EVOLUTION OF THE LAYOUT DESIGN

2.1 Site visit and collection of data

2.1 **Site visit:** I visited the site on 13 September 2007. All my observations were from ground level without detailed investigations and I estimated all dimensions unless otherwise indicated. I did not have access to trees outside the boundaries and have confined observations of them to what was visible from within the property. The weather at the time of inspection was dull, still and dry, with average visibility.

2.2 **Brief site description:** The site is on an east to west orientated road in the northwestern suburbs of the city. It is on the southern side of the road, with commercial development either side and residential properties to the rear. The property consists of a large commercial building and associated parking set to the front with a landscaped area to the rear. There are significant landscape belts of maturing broadleaved trees dominating the front and rear boundaries.

2.3 **Collection of basic data:** I inspected each tree and have indicated the numbering on the site plan extract enclosed as plan BT4 in Appendix 2. For each tree I collected information on species, height, diameter, maturity and potential for contribution to amenity in a development context. When collecting this information, I specifically considered any low branches that may influence future use, age class, physiological condition, structural condition and remaining contribution. Where appropriate, I also considered crown spreads where they differed from those shown on the provided land survey. This data with more detailed explanatory notes is set out in the tree schedule included as Appendix 3 and the supporting plan information. I stress that my inspection was of a preliminary nature and did not involve any climbing or detailed investigation beyond what was visible from accessible points at ground level. This data collection is fully compliant with the BS 5837 recommendations set out in subsection 4.2.6.

2.4 **Specific observations of tree 14:** During the data collection, I noted defects in the tree 14 that resulted in it being categorised as C although from a distance it would appear to be category B. More specifically, it has a severe included bark defect at the junction of a large side stem to the main trunk at about 2m (photos 1 and 2). There is also

extensive mower damage to many of the structural roots close to the surface near its trunk (photo 1).³



Photo 1: T14 showing the structural defect on the trunk at 2m and the extensive mower damage to roots



Photo 2: Close up of the structural defect on the trunk

2.5 **Advanced interpretation of data⁴:** Section 5 of BS 5837 recommends that the trunk diameter measurement for each tree is used to calculate the RPA, which can then be interpreted to identify the design constraints and, once a layout has been consented, the exclusion zone to be protected by barriers. These interpretations with explanatory notes are set out for each tree in Appendix 5.

2.3 **The use of the tree information in layout design:** Following my inspection of the trees, the information listed in Appendix 3 was used to provide constraints guidance to the architect based on the locations of all the category A and B trees. All the category C and R trees were discounted because they were not considered worthy of being a material constraint. This guidance identified two zones of constraints based on the following considerations:

³ Wherever there may be doubt about a specific tree and the reason for its categorisation, in this case a C tree instead of it being a B tree, we find it helpful to include photographs and explanations of our reasoning. This makes it easier for all the non-tree experts who have to assess the report to see for themselves and understand the points we are trying to make.

⁴ RPA calculations are important detail but they disrupt the flow of the text to have them in the main body of the report. We include them as an Appendix with detailed explanations of our interpretation of the minimum barrier distance as advocated by the BS.

- **Zone 1 (where ground disturbance must be carefully controlled):** This is called the root protection area (RPA) and was established according to the recommendations set out in Table 2 and section 5 of BS 5837. These recommendations quantify the RPA based on trunk diameter but there is no simplistic recipe for identifying a minimum distance for protective barriers. Instead, this has to be assessed by an arboriculturist taking into account a series of influencing factors set out in clause 5.2.4 of BS 5837. The RPA considerations for the trees on this site are set out in Appendix 4, with further explanations of any adjustments made because of site-specific circumstances. In principle, no significant disturbance should occur within the RPA of category A and B trees, and a high level of care is needed during any activities that are authorised within it if they are to be successfully retained.
- **Zone 2 (where shading/dominance/future growth may be an issue):** The second constraint is how much space trees need to be successfully retained after the development is finished, when the pressures of residential occupation come to bear. It has been estimated by taking account of the recommendations set out in subsection 5.3 of BS 5837. This area would not normally be suitable for occupied buildings but uninhabited single storey structures and hard surfacing may be acceptable within it.

These constraints identified the estimated developable footprint of the site and were considered by the architect to arrive at the submitted design. For conciseness, and because it is not a BS recommendation, this constraints advice has not been included in this report.⁵

⁵ When instructed at the beginning of the process, we prepare a constraints report based on the above descriptions. If there is already a layout before we get to site, we assess the impact based on these constraints. If they cannot change the layout and it will adversely affect a tree, we identify that and either argue why it is not an important issue or confirm the tree will be lost and put the case for mitigation planting. We do not include the constraints as a matter of course at this stage because it is confusing. The readers can refer to the RPA distances and categorisation in the Appendices, and check whether those details agree with our analysis.

3 ARBORICULTURAL IMPACT APPRAISAL

3.1 **Summary of the impact on trees:** I have assessed the impact of the proposal on trees by the extent of disturbance in RPAs and the encroachment of structures into zone 2. All the trees that may be affected by the development proposal are listed in table 1.

Table 1⁶: Summary of trees that may be affected by the development

Impact	Reason	Important trees		Unimportant trees
		A	B	C
Trees to be removed	Building construction, new surfacing and/or proximity	-	-	3, 5
Retained trees that may be damaged through disturbance to RPAs	Removal of existing surfacing/structures/landscaping and/or installation of new surfacing/structures/landscaping	9, 11	1, 2, 4, 7, 8, 16	-
Retained trees to be pruned	Space for development	11	12, 16	14

3.2 Detailed impact appraisal

3.2.1 **Category C trees to be removed, that may be damaged or may need to be pruned⁷:** Three trees (3, 5 and 14) to be removed or that may be damaged are category C because they are either in poor condition, unsustainable or so small that they are not worthy of influencing any layout. I believe their loss or damage should not influence the determination of this application. More specifically, the following points are relevant:-

- **Trees 3 and 5:** These are relatively small and poorly formed. They are not included in the TPO because they are interfering with better adjacent trees and their removal will benefit those trees. Their loss will not be noticeable beyond the immediate vicinity and will have no impact on the character of the wider setting.
- **Tree 14:** This tree is at the rear of the site and set against the backdrop of the large and extensive grouping of trees on the southern boundary. It has significant trunk defects that will require extensive pruning irrespective of the development

⁶ Tables are very effective at setting out lots of information and making it accessible at a glance. This summary allows readers to quickly identify the full impact in terms of tree loss and effects on retained trees.

⁷ Although C trees are unimportant, for completeness we set out the ones that will be lost with explanations of why we think they are not important and why the impact of their loss is not sufficient to prevent the development.

proposal. Its crown will need to be significantly reduced in size to reduce the pressures on the stem defect and this will need to be repeated on a regular basis. Furthermore, there has been extensive mower damage to the roots all round the base of its trunk that can be clearly seen in photo 1. These will be a source of future problems and are unlikely to improve. Due to these multiple problems, I believe it is unsuitable for categorisation as an B tree. Although it is not necessary to remove the tree, it will require pruning works. However, it is not prominent from outside the site because it is set against the backdrop of other larger trees to be retained so the works will have no significant impact on local amenity.

3.2.2 **Category A and B trees that may be adversely affected⁸:** Nine trees (1, 2, 4, 7, 8, 9, 11, 12 and 16) may be adversely affected and I deal with the issues relating to them in more detail as follows:

- **Trees 1, 2 and 4:** These are important trees with a high potential to contribute to amenity so any adverse impacts on them should be minimised. There are three areas where limited excavation is proposed to extend the existing hard surfacing within the RPAs of retained trees. The parking is to be extended by just over 0.5m near tree 1 and a small widening of the access on either side is proposed near trees 2 and 4. The extension close to tree 1 is less than 0.5m on one side only, which is relatively small compared to the undisturbed rooting area available for the tree. The extension close to tree 2 is less than 0.5m, becoming greater into the site but further from the tree. I believe tree 3, which is to be removed, will have dominated the rooting in the area where the encroachment will be greatest. The dominance of tree 3 will have limited the root growth from tree 2 in that area. For this reason, I do not believe the excavation will result in significant root damage to tree 2 and there will be no significant adverse impact on it. Similarly, there is some very minor encroachment near tree 4 but tree 5 is to be removed, which will have dominated the rooting in the area of excavation. Again, this is only a very small encroachment compared to the area that will remain undisturbed, which is unlikely to have any significant adverse impact on the tree. Additionally, there is the possibility of a new service run along the centre of the access road. Although this is within the RPAs of trees 2 and 4, I believe the rooting conditions below the road will have been particularly hostile and it is unlikely that there are many roots in that area. I have reviewed all these changes carefully and my experience is that these trees

⁸ These are the important trees and the impact on all of them is discussed in some detail in the following subsections.

could be successfully retained without any adverse effects if appropriate protective measures are properly specified and controlled through a detailed arboricultural method statement.

- **Trees 7, 8, 9 and 11:** These are important trees with a high potential to contribute to amenity so any adverse impacts on them should be minimised. Removal of existing surfacing is proposed within RPAs to be replaced with new landscaping. These changes may cause harm if not carried out with care. I have reviewed the situation carefully and my experience is that these trees could be successfully retained without any adverse effects if appropriate protective measures are properly specified and controlled through a detailed arboricultural method statement.
- **Tree 16:** This tree is at the rear of the site with limited potential to contribute to amenity so any adverse effects on it are unlikely to have any impact beyond the immediate vicinity. In addition to surfacing that has to be removed and replaced with soft landscaping within its RPA, there is also a need to lower ground levels over part of its RPA to comply with the Environment Agency (EA) flood risk alleviation requirements. The engineer's advice is that this needs to be 2–8cm over a limited area and any significant roots encountered can be left undisturbed in an undulating finished ground level. Based on that advice, I believe this will not have any significant impact on the tree if the works are properly specified and controlled through a detailed arboricultural method statement.
- **Trees 11, 12 and 16:** These trees have potential to contribute to amenity so any adverse impacts on them should be minimised. Some of their longer branches extend very close to the existing building and shade the garden area beneath. Either removing these branches or cutting them back would be justified for normal garden management irrespective of any development. This would not adversely affect their health and have no significant impact on local character or amenity as their profile from public viewpoints would remain unchanged.

- 3.3 **Proposals to mitigate any impact⁹**
- 3.3.1 **Protection of retained trees:** The successful retention of trees depends on the quality of the protection and the administrative procedures to ensure those protective measures remain in place whilst there is an unacceptable risk of damage. An effective means of doing this is through an arboricultural method statement that can be specifically referred to in a planning condition. An arboricultural method statement for this site is set out in detail in section 4.
- 3.3.2 **New planting¹⁰:** In the context of the loss of trees, a comprehensive new landscaping scheme is proposed including six new semi-mature trees to be planted on the site boundary in prominent locations. Four of the trees will be in the parking area and with special below-ground preparation to ensure their long term survival without causing problems. This will include the provision of root deflectors to discourage surface damage from roots and structured tree soil to allow an adequate bearing capacity for the surfacing. The suggested selection of species, size and location are provisional and would not be considered final until all relevant parties had been fully consulted. The new trees will have the potential to reach a significant height without excessive inconvenience and be sustainable into the long term, significantly improving the potential of the site to contribute to local amenity and character.
- 3.4 **Summary of the impact on local amenity:** This proposal will result in the loss of two trees that are low category because of their poor condition and small size. All the significant boundary tree cover will remain intact and no high category trees will need to be removed. There is plenty of space for new planting and a comprehensive new landscape scheme with semi-mature trees is included as part of the proposal. Development of new trees will significantly enhance the contribution of this site to local amenity and more than compensate for the loss of existing trees. The

⁹ Mitigation is a very important part of our approach; we will always be realistic in our tree categorisation and never bias a category to favour the developer. This means we have to be up-front about tree losses and impact of activities near trees, but this need not be detrimental to the site being developed. Adequate precautions around retained trees and an emphasis on new planting are two effective ways of ensuring that local character is enhanced rather than damaged by the development proposal.

¹⁰ Our experience is that landscape architects do not normally have the expertise to understand the detail of sustainable tree selection and are generally more concerned with superficial characteristics such as texture and colour rather than the key aspects of suitability to the location and potential to contribute to local character and amenity. For those reasons, where possible we do not allow them to lead tree selection or become involved in any negotiations relating to structural landscaping. In conjunction with council officers, we decide the species and location based on maximising the potential of the site in a sustainable way. We detail that in the method statement part of the report, which then informs detailed landscaping that can be conditioned.

construction activity may adversely affect further trees if appropriate protective measures are not taken. However, 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 local amenity or character.

4 ARBORICULTURAL METHOD STATEMENT

4.1 Introduction

4.1.1 **Terms of reference:** The impact appraisal in section 3 identified the impact on trees and how that affects local character. Section 4 is an arboricultural method statement setting out management and protection details that must¹¹ be implemented to secure successful tree retention. It has evolved from an original idea described by O'Callaghan & Lawson set out in *Trees and Development Conflicts: The Importance of Advance Planning and Site Control in Tree Preservation Plans* (Trees and Building Sites – ISA – 1995). It is based on the assumption that the minimum general standards for development issues are those set out in British Standards Institution (2005) BS 5837: *Trees in relation to construction – Recommendations* and the National Joint Utilities Group (1995) Publication Number 10: *Guidelines for the planning, installation and maintenance of utility services in proximity to trees*. We have used our arboricultural expertise to interpret these references in the context of evolving good practice and the specific circumstances on this site.

4.1.2 **Plan BT4**¹²: Plan BT4 in Appendix 2 is illustrative and based entirely on provided information. This plan can only be used for dealing with the tree issues and all scaled measurements must be checked against the original submission documents. The precise location of all protective measures must be confirmed at the pre-commencement meeting before any demolition or construction activity starts. Its base is the existing land survey, which has the proposed layout superimposed so the two can be easily compared. It shows the existing trees numbered, with high categories highlighted green in triangles and low categories highlighted blue in rectangles. The trees to be removed because of this layout or for normal management are indicated with a red dashed crown outline. It also shows the locations of the proposed protective measures and new tree planting with anticipated 25 year radial crown spreads.

¹¹ The use of the word ‘must’ and underlined is to help with enforcement and dealing with any disputes once the work on site starts. This makes it very clear and harder for slippery developers to try to manipulate their way out of the tree protection responsibilities they signed up to in order to get the consent.

¹² The plan is one of the most important parts of this document because it is the most likely document to be referred to in detail on site and has a significant influence on whether the proposed protective measures are successfully implemented. Plans are the universal medium that everyone within the planning system is used to working with and can understand. Our emphasis is on large scales so it can be clearly seen where protective measures must go and annotation on the plan to clarify where it is helpful. If there is space and it adds clarification, we put photographs and specifications on the plan but try to avoid large blocks of text.

- 4.2 **Tree protection with barriers and ground protection**
- 4.2.1 **Barriers¹³**: Illustrative guidance for barrier design based on BS 5837 recommendations is included as Appendix 5. On this site, it has been agreed with the council that some of the barriers on the frontage can be removed once the demolition is completed to allow extra space for storage and the siting of the Sales Cabin as a temporary building. The approximate location of the permanent and temporary barriers, and the RPAs they will protect is illustrated on plan BT4 as set out on the plan key. The precise location of the barriers and the sequencing of their installation and removal must be agreed with the council on site before any development or demolition activity starts.
- 4.2.2 **Ground protection¹⁴**: Any RPAs outside the protective barriers must be covered in ground protection based on the BS 5837 recommendations, until there is no risk of damage from the demolition and construction activity. An illustrative specification for this ground protection is included as Appendix 6. On this site, it must be installed near trees 2, 4, 6, 7, 8 and 9 as illustrated on plan BT4 before any demolition and construction starts. Once the demolition is completed, it has been agreed with the council that the ground protection near trees 2, 4 and 6 can be used for temporary storage of solid materials excluding any liquid chemicals. It has also been agreed that a temporary Sales Cabin can be sited on the frontage to act as ground protection for the duration of the construction and until all the units have been sold.
- 4.3 **Precautions when working in RPAs**: Any work in RPAs must be done with care as set out in Appendix 7¹⁵. On this site, special precautions must be taken near trees 1, 2, 4, 7, 8, 9, 11 and 16 as illustrated on plan BT4 and summarised below:

¹³ Robust barriers, installed before any work starts on site, in the locations they are going to remain in for the duration of the development, is a fundamental requirement. We provide the specification sheet with photographs to show the construction and it is essential that the council insist this is adhered to. Moveable feet and lower specifications do not work.

¹⁴ It is very important for sites to work efficiently and the construction team are able to use every bit of space. It is quite acceptable in many instances to reduce barrier distances and substitute ground protection to allow storage. Our experience is that sites that allow maximum space cause the least problems. Temporary accommodation cabins are very effective ways of protecting RPAs provided any services are above ground.

¹⁵ This Appendix is very important because it acts as a direct reference for the practical requirements for any disturbance within RPAs. Primarily, this relates to anticipated activities that are identified in the following bullet points. However, we quite often find that further disturbance that was not anticipated at the time of the planning submission is often required, eg the installation of services through RPAs. This Appendix covers all of those eventualities and allows the council to refer developers back to this guidance without the need for further documentation. It also prevents developers carrying out works in an unsatisfactory manner under the excuse that they didn't realise; it is all set out here and is a very effective enforcement reference.

1. **Removal of existing surfacing and replacement with new soft landscaping:** Trees 7, 8, 9, 11 and 16 may be adversely affected by the removal of existing hard surfacing and its replacement with new soft landscaping. Any adverse impact must be minimised by following the guidance set out in Appendix 7.
2. **Installation of new surfacing:** Trees 1, 2 and 4 may be adversely affected by the extension of existing surfacing. The encroachment is so small it has been agreed that special surfacing is not feasible and that special care taken when dealing with exposed roots will be sufficient to minimise any adverse impact on the trees. Any adverse impact must be minimised by following the guidance set out in Appendix 7.
3. **Excavations to comply with EA flood alleviation requirements:** Tree 16 may be adversely affected by the requirement to lower levels by up to 8cm within its RPA. Any adverse impact must be minimised by following the general guidance set out in section 3.2 of Appendix 7.
4. **Installation of new soft landscaping¹⁶:** All trees near new landscaping may be adversely affected by this activity. All landscaping activity within RPAs has the potential to cause severe damage and any adverse impact must be minimised by following the guidance set out in section 5 of Appendix 7.
5. **Installation of new services or upgrading of existing services:** It is often difficult to clearly establish the detail of services until the construction is in progress. Where possible, it is proposed to use the existing services into the site and keep all new services outside RPAs. However, where existing services within RPAs require upgrading or new services have to be installed in RPAs, great care must be taken to minimise any disturbance. Trenchless installation should be the preferred option but if that is not feasible, any excavation must be carried out by hand according to the guidelines in Appendix 7. If services do need to be installed within RPAs, written approval must be obtained from the council before any works are carried out.

¹⁶ Our experience is that soft landscaping is a frequent cause of tree loss because it happens after all the protection has been removed and when the developers are desperately trying to get the site completed and the units sold. There is very little incentive for them to take any care as they will soon be gone and their responsibility transferred. Our experience is that it is crucial to get soft landscaping controlled by a condition that is only discharged once it has been done without any damage to retained trees. We mention it here, detail what should not be done in the Appendix and identify it as a separate item to be conditioned.

4.4 Other tree-related site works

4.4.1 **Tree work recommendations:** Tree work proposals based on my preliminary inspection are set out in the work recommendations column of the tree schedule in Appendix 3. The location of each tree is shown on plan BT4 and all trees to be removed are highlighted with a red dashed crown outline.

4.4.2 **Site storage, cement mixing and washing points:** All site storage areas, cement mixing and washing points for equipment and vehicles must be outside RPAs unless otherwise agreed with the council. Where there is a risk of polluted water run off into RPAs, heavy-duty plastic sheeting and sandbags must be used to contain spillages and prevent contamination.

4.5 Detailed specifications for new tree planting

4.5.1 **Site preparation, supply and planting of heavy standard and semi-mature trees¹⁷:** Six new trees must be planted according to the specification included as Appendix 8 at the locations illustrated on plan BT4. Extensive site preparation beyond the immediate planting pit must be carried out in compliance with this specification to maximise the chances of successful establishment of the new trees. Our provisional suggestions are fastigate oak and beech semi-matures 7–8m in height on the rear boundary, two semi-matures planes 7–8m in height at each end of the parking planting strip with heavy standard rowan and thorn 3–4m in height between the two planes.

4.5.2 **Maintenance¹⁸:** These trees must be maintained according to the specification included as Appendix 8 for 3–5 years as necessary until successful establishment is confirmed by the council. Any trees that die or progressively decline within this period will be replaced and the replacements will be maintained until successful establishment is confirmed by the council.

¹⁷ Our experience is that developers frequently try to reduce the size and number of trees if it is left to a landscaping condition, which is contrary to the spirit of our discussions where we agree significant mitigation to compensate for tree losses. For this reason, we now include very clear descriptions of what was agreed to be planted to help effective enforcement in the event that developers fail to honour their tree planting promises.

¹⁸ We also find that although many trees are planted as agreed, there is an ineffective commitment to maintenance and the trees either never successfully establish or they die soon after the developer hands over the site. Again, we set out the clear maintenance requirements to aid enforcement action should the trees fail to establish.

- 4.5.3 **Structured tree soil¹⁹**: Four of the trees have hard surfacing close to them and so a minimum of nine cubic metres of below ground preparation using structured tree soil and a root guidance product must be installed according to the detailed specification in Appendix 9.
- 4.6 **Programme of tree protection and supervision²⁰**
- 4.6.1 **Overview**: Tree protection cannot be reliably implemented without arboricultural input. The nature and extent of that input varies according to the complexity of the issues and the resources available on site. For this site, a summary of the level of arboricultural input that is likely to be required is set out in Appendix 10. An arboricultural consultant must be instructed to work within this framework to oversee the implementation of the protective measures and management proposals set out in this arboricultural method statement.
- 4.6.2 **Supervision and the discharge of planning conditions²¹**: Arboricultural planning conditions cannot be reliably or effectively discharged without supervision by an arboricultural consultant. The framework in Appendix 10²² must form the basis for the discharge of planning conditions through site visits by an arboricultural consultant. These supervisory actions must be confirmed by formal letters circulated to all relevant parties, including the council. These permanent records of each site visit will accumulate to provide the proof of compliance and allow conditions to be discharged as the development progresses. The developer must instruct an arboricultural consultant to comply with the supervision requirements set out in this document before any work begins on site.

¹⁹ Another common cause of new planting failures is inadequate ground preparation before planting where hard surfacing surrounds the planting pit. We set out the detail of the below ground preparation with root deflectors and structured tree soil so that enforcement is easier in the event of short cuts is this essential preparation. This type of detail allows enforcement to make developers dig it up and do it again.

²⁰ Documenting each specific tree supervision task and when it should be done is essential so the developer knows what is required and a robust reference is needed in enforcement scenarios. This section adds full explanations of the requirements to be read in conjunction with the schedule in Appendix 11.

²¹ This section sets out the requirements for arboricultural supervision that can be directly referred in a condition and called upon if enforcement action is necessary.

²² Appendix 11 sets out more detail of the supervision requirements and the last column provides a means of the council recording when each element has been complied with that remains on the file and with the report. Although the consultant will normally confirm all these points with a letter, it is often useful to have this record on the file in a way that cannot be lost or separated.

4.6.3 **Phasing of arboricultural input:** Trees can only be properly budgeted for and factored into the developing work programmes if the overall project management takes full account of tree issues once consent is confirmed. An arboricultural consultant must be involved in the following phases of the project management:-

1. **Administrative preparation before work starts on site²³:** It is normal for a development proposal to vary considerably from the expectations before consent as the detailed planning of implementation evolves. The early instruction of an arboricultural consultant ensures that tree issues are factored into the complexities of site management and can often help ease site pressures through creative approaches to tree protection. Pre-commencement discussions between the arboricultural consultant and the developer's team is an effective means of project managing the tree issues to maximise site efficiency within often difficult constraints.
2. **Pre-commencement site visit²⁴:** A pre-commencement meeting must be held on site before any of the demolition and construction work begins. This must be attended by the site manager, the arboricultural consultant and a council representative. If a council representative is not present, the arboricultural consultant must inform the council in writing of the details of the meeting. All tree protection measures detailed in this document must be fully discussed so that all aspects of their implementation and sequencing are understood by all the parties. Any clarifications or modifications to the consented details must be recorded and circulated to all parties in writing. This meeting is where the details of the programme of tree protection will be agreed and finalised by all parties, which will then form the basis of any supervision arrangements between the arboricultural consultant and the developer.

²³ One of the ways we try to smooth the development process relating to tree protection that council officers rarely see is very early meetings with the developer's technical staff to discuss the detail of implementation. Where it is helpful, we prepare working drawings detailing the specific requirements of each tree protection requirement that clarify what is needed for the site operatives and minimise the risk of problems. This is not a planning requirement so there is no need to submit such drawings for approval but they are done and they save lots of problems. Sadly, it is the minority of developers who realise the benefit of such an approach although more are becoming switched on to how it can help.

²⁴ A pre-commencement meeting with the tree officer is essential on almost every site. Most developers will not do anything that they see as an expense unless they have no choice. This report and all the work that went into it will stand for nothing if there is not a strong tree officer driving its adoption. One of the best ways of doing this is for the tree officer to attend the pre-commencement meeting and lay the law down in no uncertain terms. Our experience is that a little time spent at this point by a tree officer can set the scene for the length of the development process and prevent multiple future problems.

3. **Site supervision²⁵**: Once the site is active, the arboricultural consultant must visit at an interval agreed at the pre-commencement site meeting. The supervision arrangement must be sufficiently flexible to allow the supervision of all sensitive works as they occur. The arboricultural consultant's initial role is to liaise with developer and council to ensure that appropriate protective measures are designed and in place before any works start on site. Once the site is working, that role will switch to monitoring compliance with arboricultural conditions and advising on any tree problems that arise or modifications that become necessary.

4.6.4 **Site management²⁶**: It is the developer's responsibility to ensure that the details of this arboricultural method statement and any agreed amendments are known and understood by all site personnel. Copies of the agreed documents must be kept on site at all times and the site manager must brief all personnel who could have an impact on trees on the specific tree protection requirements. This must be a part of the site induction procedures and written into appropriate site management documents.

²⁵ Site supervision does work and does save tree officers time but they have to drive it. Developers may promise to do it but they will not instruct us unless they are forced to by a vigilant tree officer. Site supervision does not prevent all problems but it does help to sort issues out quickly and reduce the risk of the continual deterioration of situations beyond the point of recovery.

²⁶ Developers will only follow these rules if they are pestered and forced to by persistent tree officers. Having all the documents on site seems like an obvious requirement but, more often than not, it does not happen.

5 HOW TO USE THIS REPORT IN THE PLANNING PROCESS²⁷

5.1 **Limitations:** It is common that the detail of logistical issues such as site storage and the build programme are not finalised until after consent is issued. As this report has been prepared in advance of consent, some of its content may need to be updated as more detailed information becomes available once the post-consent project management starts. Although this document will remain the primary legal reference in the event of any disputes, some of its content may be superseded by authorised post-consent amendments.

5.2 **Suggestions for the effective use of this report²⁸:** Section 4 of this report, including the relevant appendices, is designed as an enforcement reference. It is constructed so the council can directly reference the detail in a planning condition. Referencing the report by name and relating conditions to specific subsections is an effective means of reducing confusion and facilitating enforcement in the event of problems during implementation. More specifically, the following issues should be directly referenced in the conditions for this site:

1. Pre-commencement meeting (4.6 and Appendix 10)²⁹
2. Barriers (4.2.1 and Appendix 5)
3. Ground protection (4.2.2 and Appendix 6)
4. Removal of surfacing (4.3 and Appendix 7)
5. Services (4.3 and Appendix 7)
6. Tree planting (4.5 and Appendices 8 & 9)

²⁷ This is the most important section of the whole report for tree officers. It is designed to make it easy for councils to use in the preparation of conditions. If this report is properly referenced in a condition, then this whole report becomes the main reference for any enforcement action. We make sure we have as much detail as possible in the report so that it can be successfully used as a detailed reference to establish exactly what the developer signed up to do and check whether they have done that.

²⁸ Our experience is that conditions that lump tree protection issues and landscaping together are not effective because they are often discharged before some parts of them have been observed, i.e. a requirement for fencing to be agreed before commencement must be separate from a supervision requirement. If it isn't, then quite often the condition can be discharged for the fencing and the supervision isn't then done. Discharging conditions is very important to developers because if they remain in force, it can slow down the final sale of the property, which is the ultimate sin. We find that identifying each tree protection issue separately in a condition means that each part can be discharged separately when it has been completed. Although a clever developer may do the fencing, if they do not continue with the supervision, then that condition will not be discharged and they may pay a very heavy price.

²⁹ This list summarises all the tree protection issues on the site that will need supervision and can be copied directly into a condition save time and effort. We do all the work and the council copies that text straight into the condition. We find this is being used by an increasing number of councils and the option to refuse to discharge a part of a condition where there has been non-compliance is proving to be a very powerful deterrent.

7. Installation of new landscaping (4.5 and Appendix 7)
8. Programming of tree protection (4.6 and Appendix 10)
9. Arboricultural supervision (4.6 and Appendix 10)

Each of the above matters must be supervised by an arboricultural consultant and the relevant conditions can only be discharged once that supervision has been confirmed in writing to the council. The last column of the table in Appendix 10 is for council use so that the various supervision issues can be recorded as they are confirmed by supervision letter. This is intended to act as a summary quick-reference within the council file to help keep track of the progress of the supervision.

Jeremy Barrell BSc FArborA DipArb CBiol FICFor FRICS

Appendix 1: Brief qualifications and experience of Jeremy Barrell

- 1 **Formal qualifications:** I have an Honours Degree in Environmental Forestry (1978). I am a Fellow of the Institute of Chartered Foresters (1996) and a Fellow of the Institution of Chartered Surveyors (2008). I am a Fellow (1989) and Registered Consultant (1994) of the Arboricultural Association (AA). I was an AA Approved Contractor from 1984–1995. I am a Chartered Forester (1980), a Chartered Biologist (1993), a Chartered Surveyor (2008) and hold the Royal Forestry Society's Professional Diploma in Arboriculture (1990). I am a Law Society 'Checked' expert witness and a founding member of the Institute of Expert Witnesses. In 2001, I was honoured with the AA Award in recognition for services to Arboriculture.
- 2 **Practical experience:** I was brought up in the New Forest and have been closely associated with trees all my life. In 1978, I joined the Forestry Commission as a Field Surveyor and, in 1980, I began my tree contracting business. Since then, I have been providing a comprehensive tree advisory service dealing with most aspects of tree and woodland management. This involved working for 15 years on a daily basis felling and pruning trees. In 1993, I obtained the NPTC FTC Units 20, 21 and 22 for using a chainsaw on the ground and in a tree. In 1995, I sold my contracting business and concentrated solely on consultancy, under the banner of Barrell Tree Consultancy (www.barrelltreecare.co.uk), which is now one of the largest arboricultural consultancies in the UK.
- 3 **Professional experience:** I have been dealing with the assessment of tree hazard and managing trees close to occupied areas throughout my career. Between 1993 and 1996, I was one of eight DoE tree preservation order appeal inspectors subcontracted to carry out site inspections and report to the Secretary of State. This involved impartially assessing a whole range of tree management issues including subsidence damage. During my career, I have been involved in many legal cases as an expert witness, from Magistrates Courts to the High Court. I regularly act as an expert witness in personal injury cases because of my extensive practical background within the tree industry. Most recently, I was the tree expert acting for the successful Claimant in the high profile case of *Poll -v- Bartholomew* and for the successful Defendant in the case of *Atkins -v- Scott*.
- 4 **Continuing professional development:** I regularly present to audiences around the world and have written numerous papers/articles on tree management. Most recently, these have focused on the role of trees in adapting to climate change. I have been instrumental in developing internationally recognised methods of assessing trees and authored both the SULE and TreeAZ methods. In the 1990s, I conceived, wrote and presented the first ever course on report writing for arboriculturists and foresters, which has now evolved into the successful AA course for aspiring consultants. I have been an occasional examiner for the RFS Professional Diploma and an assessor for the ICF chartered entrance test. I am currently retained by Horticulture Week to write their *Opinion* column on Arboriculture.

Appendix 2: Plan BT4 illustrating tree protection and management proposals

Content: 1 A2 plan



Two semi-mature *Tilia x euchlora*
6-7m in height



T14 showing root damage and defective main stem



Two heavy standard *Amelanchier lamarckii*
2-3m in height



Semi-mature *Fagus sylvatica*
6-7m in height



Semi-mature *Liquidambar styraciflua*
6-7m in height

Plan BT4
Location of trees, categorisation and illustrative protection/management proposals at The Site

Key					
Category AA: (BS Category A) Trees worthy of being a material constraint	Protective barrier and root protection area (RPA) within barrier	RPA where existing hard surfacing must be retained for the duration of the development before that reinstatement to soft landscaping	RPA outside fencing covered with ground protection for the duration of the development before that reinstatement to soft landscaping	Illustrative location of new heavy standard and semi-mature trees showing their anticipated 25-year crown spreads	
Category A: (BS category B) Trees not worthy of being a material constraint	Proposed route for any new service access midway between T2 and T4	RPA where special precautions must be taken when excavating to meet flood alleviation requirements	Temporary fencing to remain until ground protection measures are installed		
Category Z: (BS category C) Trees not worthy of being a material constraint	RPA where special precautions must be taken when extending existing surfacing	Area around semi-mature trees for the installation of root deflectors and structured tree soil	Proposed Layout		
Trees to be removed					

Permission is granted to scale from this drawing for Local Authority Planning Approval purposes relating to **tree protection measures only**. Where applicable this drawing is to be read in conjunction with the arboricultural report. This drawing is the copyright of Barrell Tree Consultancy ©2007.

Plan Scale: 1:200 @ A2 | File Path: Bar-02-Talk.dwg

Barrell tree consultants
Field House, Fordingbridge Business Park, Ashford Road, Fordingbridge SP6 1BY. Tel: 01425 651470 Fax: 01425 653449 www.barrelltreecare.co.uk

Appendix 3: Tree schedule and explanatory notes

NOTE: Colour annotation is A & B trees with green background; C & R trees with blue background; trees to be removed in red text.

Tree No	Species	Height (m)	Diameter (cm) @1.5m Base	Maturity	Low branches	Category	Notes	Tree works
All trees/hedges								Crown clean trees and lift to 4m over site as necessary. Clip to reform hedges as appropriate.
1 ³⁰	Sugar maple	11	42*	Maturing		B		
2	Sugar maple	10	38*	Maturing		B		
3	Sugar maple	9	M	Young		R	Poor form, interfering with adjacent trees	Fell
4	Sugar maple	14	45*	Maturing		B		
5	Sugar maple	12	26*	Maturing		C	Interfering with adjacent trees, unbalanced	Fell
6	Sugar maple	14	32*	Maturing		B		
7	Sugar maple	15	62*	Maturing		B	Unbalanced but part of group	
8	Sugar maple	14	50*	Maturing		B	Unbalanced but part of group	
9	Plane sp	15	70*	Maturing		A		
10	Purple plum	5	20	Maturing		C		
11	Plane sp	15	50*	Maturing		A	Branches touching building	Prune back branches to clear existing building by up to 2m
12	Sugar maple	18	53*	Maturing		B	Some defects, squirrel damage to some branches	Reduce/shape longest branches towards building by up to 3m to form a more compact crown
13	Sugar maple	15	39*	Maturing		B	Some defects, squirrel damage to some branches	
14	Sugar maple	16	38*	Maturing		C	Severe included bark defect, heavy mower damage to roots	Reduce/shape by up to 2-3m to reduce pressure on weak areas
15	Sugar maple	17	52*	Maturing		B	Some defects	
16	Sugar maple	17	64*	Maturing		B	Some defects	Reduce/shape longest branches over site by up to 3m to form a more compact crown

³⁰ We find colour coding all the green trees as good and all the poor trees as blue is an intuitive way of seeing at a glance which trees are important.

Appendix 3: Tree schedule and explanatory notes

Explanatory Notes

- **Abbreviations:**
 - RPA : Root protection area
 - > : Greater than
 - < : Less than

- **Botanical tree names:**
 - Plane sp : *Platanus* sp
 - Purple plum : *Prunus cerasifera* 'Nigra'/'Pissardii'
 - Sugar maple : *A. saccharinum*

- **BS 5837 (2005) compliance:** All data has been collected based on the recommendations set out in subsection 4.2 of BS 5837.
- **NHBC limitations:** All data has been collected for the sole use of identifying the development constraints in the planning process. It is not intended for use in conjunction with the NHBC guidance for calculating foundation depths and should not be used for that purpose without authorisation from Barrell Tree Consultancy.
- **Site limitations:** Where there is restricted access to the base of a tree, its attributes are assessed from the nearest point of access. Climbing inspections are not carried out during a walkover tree survey and, if heavy ivy is present, tree condition is assessed from what can be seen from the ground.
- **Crown spreads:** Crown spread dimensions are not listed in the tree schedule because they are illustrated on the land survey base to all the plans in this document. Where crown spreads of significant trees on site are found to deviate from those shown on the provided land survey, we have noted it in the text of the report and annotated it on our plans.
- **Dimensions:** All dimensions are estimated unless annotated with a '*'.
- **Species:** Species identification is based on visual observations. Where there is some doubt over tree identity, sp is noted after the genus name to indicate that the species cannot be reliably identified at the time of the survey. Where there is more than one species in a group, only the most frequent are noted and not all the species present may be listed.
- **Height:** Height is estimated to provide a broad indication of the size of the tree.
- **Trunk diameter:** Trunk diameter is estimated or measured and recorded in centimetres. It is measured with a diameter tape unless access is restricted, direct measurement is not possible because of ivy on the trunk or the tree is assessed as poor quality. Where diameter is estimated, it is recorded in 5cm increments. For trees with a single trunk, it is taken at 1.5m above ground level. Where trees have multiple stems, it is taken immediately above the root flare.
- **Maturity:** In planning context, maturity provides a simplistic indication of a tree's ability to cope with change and its potential for further growth. For the purposes of this report, young indicates a potential to significantly increase in size and a high ability to cope with change, maturing indicates some potential to increase in size and a medium ability to cope with change, and mature indicates little potential to increase in size and limited ability to cope with change.
- **Low branches:** Only large, low branches that would not be feasible for removal during normal management and should be considered as a design constraint are noted.
- **Category:** Our assessment automatically considered tree physiological condition (BS 5837 4.2.6h) and structural condition (BS 5837 4.2.6i), so these are not listed separately in the schedule. Additionally, the category accounts for the remaining contribution (BS 5837 4.2.6k) as greater than 10 years for A and B trees and less than 10 years for C and R trees, so this is also not listed separately in the schedule.

Appendix 3: Tree schedule and explanatory notes

- **Notes:** Only relevant features relating to physiological or structural condition and low branches that may help clarify the categorisation are recorded. If there are no notes, then the presumption is that no relevant features were observed.
- **Tree works:** The inspection of all trees was of a preliminary nature and only defects visible from the ground have been identified. Each individual tree may not have been inspected closely because of access difficulties and only defects visible from the inspection point have been noted. In addition to tree removals for development and management reasons, further works are listed to establish acceptable levels of risk. All trees should be crown cleaned and lifted to 4m above the site and hedges pruned back to reform the original hedge form where appropriate. Only works in excess of this have been listed for individual trees. The following points should also be noted before carrying out any works:
 1. **Reporting during work operations:** In the context of the preliminary nature of the tree inspection, any defects that may affect tree safety discovered by the contractor when carrying out the work recommendations should be reported to the supervising officer. Modification to the schedule of works may be required because of these reports. The contractor should be specifically instructed on this point.
 2. **Implementation of works:** All tree works should be carried out to BS 3998 *Recommendations for Tree Work* as modified by more recent research. It is advisable to select a contractor from the local authority list and preferably one approved by the Arboricultural Association. Their Register of Contractors is available free from Ampfield House, Romsey, Hants, SO51 9PA - Telephone 01794 368717; website www.trees.org.uk/contractors.htm.
 3. **Statutory wildlife obligations:** 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. All tree work operations are covered by these provisions and advice from an ecologist must be obtained before undertaking any works that might constitute an offence.
 4. **Stumps:** Stumps to be removed within the RPAs of retained trees should be ground out with a stump grinder to minimise any disturbance unless otherwise authorised by the supervising officer.

Appendix 4: Advanced interpretation of tree data and explanatory notes

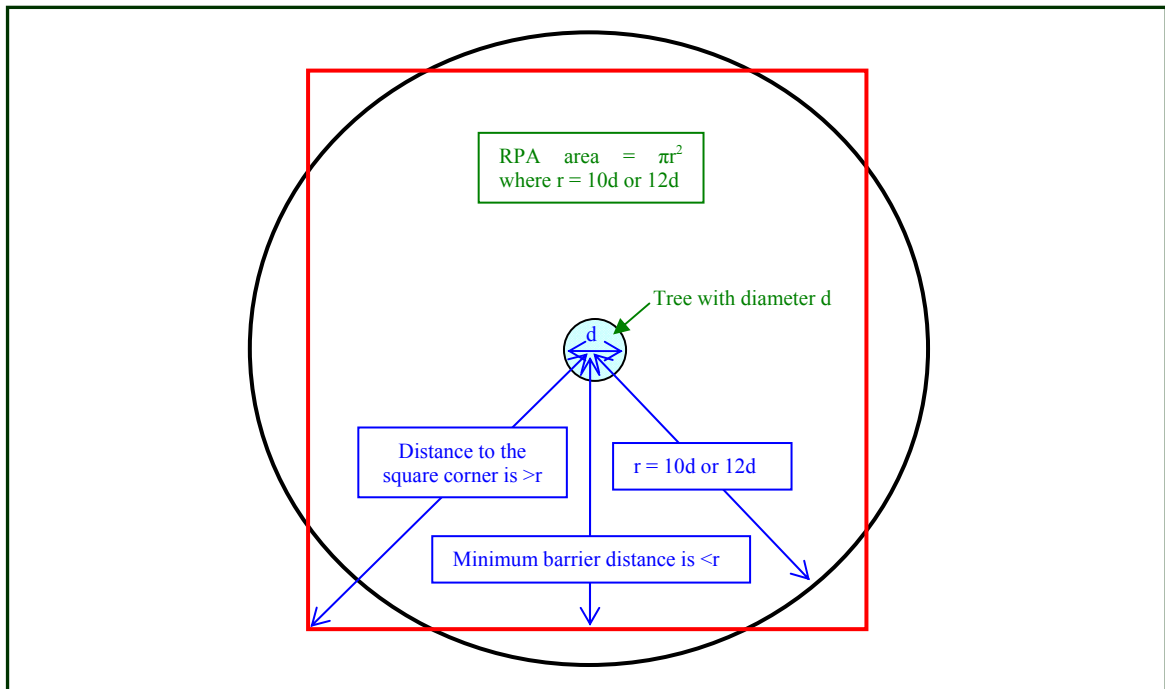
Tree No	Diameter (cm)		RPA radius (m)	RPA area (m ²)	Minimum barrier distance (m)	Explanation of any adjustment to the minimum barrier distance
	@1.5m	Base				
1	42		5.0	80	4.5	
2	38		4.6	65	4.0	
3		25	2.5	20	2.2	
4	45		5.4	92	4.8	
5	26		3.1	31	2.8	
6	32		3.8	46	3.4	
7	62		7.4	174	6.6	
8	50		6.0	113	5.3	
9	70		8.4	222	7.4	
10	20		2.4	18	2.1	
11	50		6.0	113	5.3	
12	53		6.4	127	5.6	
13	39		4.7	69	4.1	
14	38		4.6	65	4.0	
15	52		6.2	122	5.5	
16	64		7.7	185	6.8	

Explanatory notes

- **General:** The basic data listed in the first three columns above is identical to that listed in the tree schedule in Appendix 4. The data listed in columns 3–6 is derived from the basic data in columns 1–3 by simple calculation as described in BS 5837. The last column explains any adjustments that have been to the minimum barrier distance.
- **RPA radius:** The RPA radius has been calculated by multiplying the trunk diameter by 12 if it is measured at 1.5m above the ground or by 10 if it is measured at ground level.
- **RPA area:** The RPA has been assessed according to the recommendations set out in Table 2 and section 5 of BS 5837. It is calculated by multiplying the radius squared by 3.142, derived from the area of a circle being πr^2 .
- **Minimum barrier distance:** The minimum barrier distance has been assessed according to the recommendations set out in 5.2.3 of BS 5837. This advises that the basic RPA can be interpreted as a square surrounding the trunk. Based on this recommendation, the closest point to the perimeter of that square creates a minimum barrier distance that is listed in this column.
- **Explanation of any minimum barrier distance adjustment:** In clause 5.2.4 of BS 5837, it is recommended that the RPA may be changed in shape, taking into account local site factors as assessed by an arboriculturist. Where such an adjustment is appropriate and results in a reduced minimum barrier distance, it is noted in the last column of the table with a short explanation.

Appendix 4: Advanced interpretation of tree data and explanatory notes

Figure 1: Explanatory diagram for RPA assessment



In Figure 1, a tree with diameter d is in the centre. Its RPA radius is established by measuring its diameter (d) at 1.5m or at ground level (See Clause 5.2.2 of BS 5837) and multiplying that by 12 or 10 respectively. The RPA is calculated by multiplying the square of the radius by π (3.142), i.e. the $RPA = \pi r^2$, which is shown by the black circle above. In Clause 5.2.3 of BS 5837, it sets out that the RPA can also be represented by a square centred on the trunk of the tree as shown by the red square above. This square has the same area as the circle but, unlike the circle, where the distance to the centre remains the same for any point on the circumference, the distance of the sides from the centre vary from a minimum that is less than r to a centre-to-corner distance that is greater than r . This is why the minimum barrier distance can be less than r if there is a distance greater than r that allows the RPA to remain the same. The minimum barrier distance is calculated by finding the square root of the RPA, which gives the length of one side of the square, and dividing that by two to give the distance from the side to the centre.

Appendix 5: Illustrative specification for tree protective barriers

Illustrative specification for barriers near trees according to BS 5837 (2005) recommendations.
Note: The final design must be site specific and detailed by an appropriately qualified expert.



Heras fencing wired to scaffold braced posts

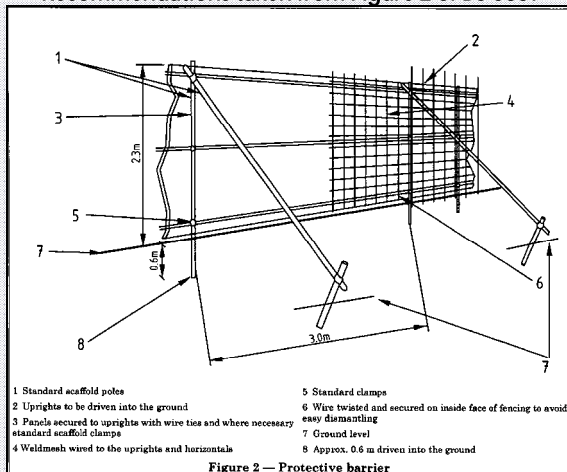


Board specification on secure wooden posts

Explanatory notes

- 1 Barriers should be installed at the location illustrated on the Barrell Tree Consultancy plan and agreed as acceptable in writing by the council before any site works start that could affect protected trees.
- 2 All uprights should be fixed in position for the duration of the development activity as either scaffold tubes or wooden posts banged or dug into the ground and braced sufficiently to withstand the pressures of everyday site work.
- 3 The framework supported by the uprights must be suitable for firmly attaching either heras panels or heavy duty ply in a way that will not allow the facing to be easily moved.
- 4 Minimum barrier height is 2.3m unless otherwise agreed with council.
- 5 Inside the protective barrier, the following rules must be strictly observed:-
 - No vehicular access
 - No fires
 - No storage of excavated debris, building materials or fuels
 - No mixing of cement
 - No service installation or excavation without written consent of council
 - No excessive cultivation for landscape planting
- 6 No barriers should be moved or temporarily dismantled without the written permission of the council.
- 7 Barrier condition to be regularly monitored to ensure it remains effective.

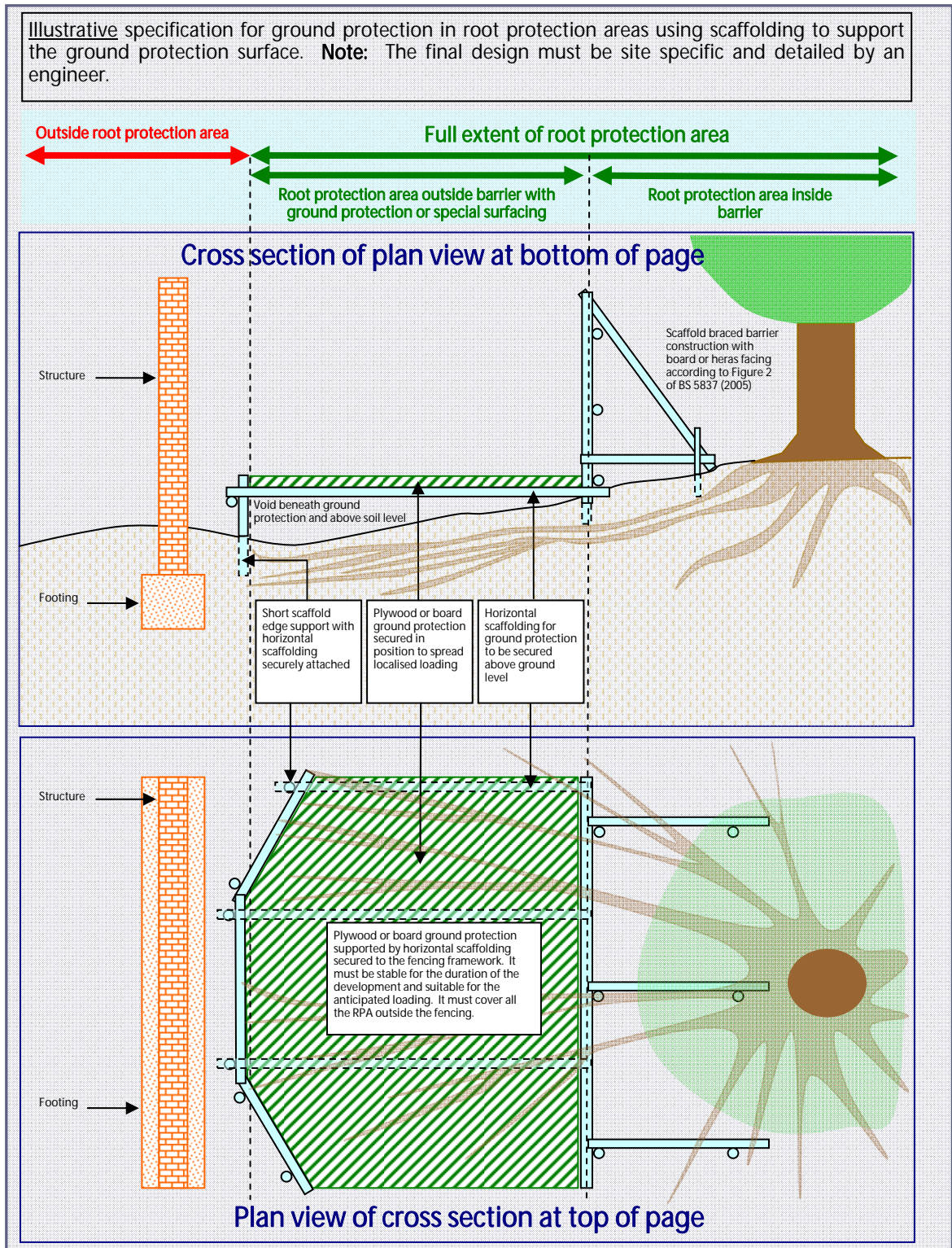
Recommendations taken from Figure 2 of BS 5837



Close up of bracing detail



Appendix 6: Illustrative specification for ground surface protective measures within root protection areas



Appendix 7: Site guidance for working in root protection areas (RPAs)

1 GENERAL GUIDANCE FOR WORKING IN RPAs

- 1.1 **What is the purpose of this guidance?** This guidance sets out the general principles that must be followed when working in RPAs. Where more detail is required, it will be supplemented by illustrative specifications in other appendices in this document. Before work starts on site, the purpose of this guidance is to demonstrate to the council that tree protection issues have been properly considered and to provide a written record of how they will be implemented. Once the site works start, this guidance is specifically for the site personnel to help them understand what has been agreed and explain what is required to fully meet their obligations to protect trees. All personnel working in RPAs must be properly briefed about their responsibilities towards important trees based on this guidance.
- 1.2 **What are RPAs?** RPAs are the areas surrounding important trees where disturbance must be minimised if they are to be successfully retained. All RPAs close to the construction area are illustrated on the tree protection plans accompanying this guidance. Damage to roots or degradation of the soil through compaction and/or excavation within RPAs is likely to cause serious damage. Any work operations within RPAs must be carried out with great care if trees are to be successfully retained.
- 1.3 **When should this guidance be followed?** Anyone entering a RPA must follow this guidance if important trees are to remain unharmed. Anyone working in a RPA must take care to minimise excavation into existing soil levels and limit any fill or covering that may adversely affect soil permeability. There are two main scenarios where this guidance must be followed when entering and working within a RPA:-
1. Removal of existing surfacing/structures and replacement with new surfacing, structures and/or landscaping.
 2. Preparation and installation of new surfacing, structures and/or landscaping.
- Broad definitions of surfacing, structures and landscaping are set out in the following sections.
- 1.4 **Where does this guidance apply?** This guidance should always be read in conjunction with the site plans illustrating the areas where specific precautions are necessary. Each area where precautions are required is annotated on the plans as identified on their keys. All plans are illustrative and intended to be interpreted in the context of the site conditions when the work is started. All protective measures should be installed according to the prevailing site conditions and agreed as satisfactory by the appropriate supervising officer before any demolition or construction work starts.
- 1.5 **What references is this guidance based on?** This guidance is based on the assumption that the minimum general standards for development issues are those set out in British Standards Institution (2005) BS 5837: *Trees in relation to construction – Recommendations* and National Joint Utilities Group (1995) Publication Number 10: *Guidelines for the planning, installation and maintenance of utility services in proximity to trees*. It is interpreted in the context of our experience of managing trees on development sites.
- 1.6 **Preventing adverse impact to the RPA beyond the immediate work area:** Any part of the RPA beyond the agreed work area must be isolated from the work operations by protective barriers or ground protection to at least the minimum standard described in BS 5837 for the duration of the work.

Appendix 7: Site guidance for working in root protection areas (RPAs)

- 1.7 **Excavation and dealing with roots:** All excavation must be carried out carefully using spades, forks and trowels, taking care not to damage the bark and wood of any roots. Specialist tools for removing soil around roots using compressed air may be an appropriate alternative to hand digging, if available. All soil removal must be undertaken with care to minimise the disturbance of roots beyond the immediate area of excavation. Where possible, flexible clumps of smaller roots, including fibrous roots, should be retained if they can be displaced temporarily or permanently beyond the excavation without damage. If digging by hand, a fork should be used to loosen the soil and help locate any substantial roots. Once roots have been located, the trowel should be used to clear the soil away from them without damaging the bark. Exposed roots to be removed should be cut cleanly with a sharp saw or secateurs 10–20cm behind the final face of the excavation. Roots temporarily exposed must be protected from direct sunlight, drying out and extremes of temperature by appropriate covering. Roots greater than 2.5cm in diameter should be retained where possible. Roots 2.5–10cm in diameter should only be cut in exceptional circumstances. Roots greater than 10cm in diameter should only be cut after consultation with the appropriate supervisory officer.
- 1.8 **Arboricultural supervision:** Any work within RPAs requires a high level of care. Qualified arboricultural supervision is essential to minimise the risk of misunderstanding and misinterpretation. Site personnel must be properly briefed before any work starts. Ongoing work must be inspected regularly and, on completion, the work must be signed off by the arboriculturist to confirm compliance by the contractor. In the context of this guidance, an appropriate supervising officer would normally be an arboriculturist.

2 REMOVING SURFACING/STRUCTURES IN RPAs

- 2.1 **Definitions of surfacing and structures:** For the purposes of this guidance, the following broad definitions apply:-
- **Surfacing:** Any hard surfacing used as a vehicular road, parking or pedestrian path including tarmac, solid stone, crushed stone, compacted aggregate, concrete and timber decking. This does not include compacted soil with no hard covering.
 - **Structures:** Any man-made structure above or below ground including service pipes, walls, gate piers, buildings and foundations. Typically, this would include drainage structures, car-ports, bin stores and concrete slabs that support buildings.
- 2.2 **Access:** Roots frequently grow adjacent to and beneath existing surfacing/structures so great care is needed during access and demolition. Damage can occur through physical disturbance of roots and/or the compaction of soil around them from the weight of machinery or repeated pedestrian passage. This is not generally a problem whilst surfacing/structures are in place because they spread the load on the soil beneath and further protective measures are not normally necessary. However, once they are removed and the soil below is newly exposed, damage to roots becomes an issue and the following guidance must be observed:-
1. No vehicular or repeated pedestrian access into RPAs unless on existing hard surfacing or custom designed ground protection.
 2. Regular vehicular and pedestrian access routes must be protected from compaction with temporary ground protection as set out in BS 5837.
 3. RPAs exposed by the work must be protected as set out in BS 5837 until there is no risk of damage from the development activity.
- 2.3 **Removal:** Removing existing surfacing/structures is a high-risk activity for any adjacent roots and the following guidance must be observed:-

Appendix 7: Site guidance for working in root protection areas (RPAs)

1. Appropriate tools for manually removing debris may include a pneumatic breaker, crow bar, sledgehammer, pick, mattock, shovel, spade, trowel, fork and wheelbarrow. Secateurs and a handsaw must also be available to deal with any exposed roots that have to be cut.
2. Machines with a long reach may be used if they can work from outside RPAs or from protected areas within RPAs. They must not encroach onto unprotected soil in RPAs.
3. Debris to be removed from RPAs manually must be moved across existing hard surfacing or temporary ground protection in a way that prevents compaction of soil. Alternatively, it can be lifted out by machines provided this does not disturb RPAs.
4. Great care must be taken throughout these operations not to damage roots as set out in 1.7 above.
5. If appropriate, leaving below ground structures in place should be considered if their removal may cause excessive root disturbance.

3 INSTALLATION OF NEW SURFACING IN RPAs

- 3.1 **Basic principles:** New surfacing is potentially damaging to trees because it may require changes to existing ground levels, result in localised soil structure degradation and/or disrupt the efficient exchange of water and gases in and out of the soil. Mature and over-mature trees are much more prone to suffer because of these changes than young and maturing trees. Adverse impact on trees can be reduced by minimising the extent of these changes in RPAs. Generally, the most suitable surfacing will be relatively permeable to allow water and gas movement, load spreading to avoid localised compaction and require little or no excavation to limit direct damage. The actual specification of the surfacing is an engineering issue that needs to be considered in the context of the bearing capacity of the soil, the intended loading and the frequency of loading. The detail of product and specification are beyond the scope of this guidance and must be provided separately by the appropriate specialist.
- 3.2 **Establishing the depth of excavation and surfacing gradient:** The precise location and depth of roots within the soil is unpredictable and will only be known when careful digging starts on site. Ideally, all new surfacing in RPAs should be no-dig, i.e. requiring no excavation whatsoever, but this is rarely possible on undulating surfaces. New surfacing normally requires an evenly graded sub-base layer, which can be made up to any high points with granular, permeable fills such as crushed stone or sharp sand. This sub-base must not be compacted as would happen in conventional surface installation. Some limited excavation is usually necessary to achieve this and need not be damaging to trees if carried out carefully and large roots are not cut. Tree roots and grass roots rarely occupy the same soil volume at the top of the soil profile, so the removal of a turf layer up to 5cm is unlikely to be damaging to trees. It may be possible to dig to a greater depth depending on local conditions but this would need to be assessed by an arboriculturist if excavation beyond 5cm is anticipated. On undulating surfaces, finished gradients/levels must be planned with sufficient flexibility to allow on-site adjustment if excavation of any high points reveals large unexpected roots near the surface. If the roots are less than 2.5cm in diameter, it would normally be acceptable to cut them and the gradient formed with the preferred minimal excavation of up to 5cm. However, if roots over 2.5cm in diameter are exposed, cutting them may be too damaging and further excavation may not be possible. If that is the case, the surrounding levels must be adjusted to take account of these high points by filling with suitable material. If this is not practical and large roots have to be cut, the situation should be discussed with the supervising officer before a final decision is made.

Appendix 7: Site guidance for working in root protection areas (RPAs)

- 3.3 **Base and finishing layers:** Once the sub-base has been formed, the load spreading construction is installed on top without compaction. In principle, the load spreading formation will normally be cellular and filled with crushed stone although the detail may vary with different products. Suitable surface finishes include washed gravel, permeable tarmac or block pavements set on a sand base. However, for lightly loaded surfacing of limited widths (<3m) such as pedestrian paths, pre-formed concrete slabs may be appropriate if the sub-base preparation is as set out above. In some situations, limited width floating concrete rafts constructed directly on to the soil surface may be acceptable but the design must not include any strip-dug supports.
- 3.4 **Edge retention:** Conventional kerb edge retention set in concrete filled excavated trenches is likely to result in damage to roots and should be avoided. Effective edge retention in RPAs must be custom designed to avoid any significant excavation into existing soil levels. For most surfaces, the use of pre-formed edging secured by metal pins or wooden pegs is normally an effective way of minimising any adverse impact on trees from the retention structure.
- 3.5 **Installing new surfacing on top of existing surfacing:** In some instances, existing surfacing can be retained and used as a base for new surfacing. Normally, this will not result in significant excavation that could expose roots so special precautions are not necessary. However, if large roots already protrude above the proposed sub-base level, then the precautions and procedures set out above must be observed.

4 INSTALLATION OF NEW STRUCTURES IN RPAs

- 4.1 **Basic principles:** New structures in RPAs are potentially damaging to trees because they may disturb the soil and disrupt the existing exchange of water and gases in and out of it. Mature and over-mature trees are much more prone to suffer because of these changes than young and maturing trees. Adverse impact on trees can be reduced by minimising the extent of these changes in RPAs. This can be done by constructing the main structures above ground level on piled supports and redirecting water to where it is needed. The detailed design and specification of such structures is an engineering issue that should be informed and guided by tree expertise.
- 4.2 **Small sheds and bin stores:** These light structures do not normally require substantial foundations and can have permeable bases. Ideally, their bases should be of a no-dig, load-spreading construction set directly on to the soil surface. They require a flat base and so an undulating site will need levelling to provide a suitable surface. Excavation of any high points by up to 5cm and filling depressions with permeable fill to provide a flat base will normally be acceptable provided no roots greater than 2.5cm in diameter need to be cut. If large roots are found, the preferred course of action would be to raise the base level of the structure by filling rather than cutting roots. However, if this is not practical and large roots have to be cut, the situation should be discussed with the supervising officer before a final decision is made. Above the base, there will often be a protective covering fixed onto a frame that can rise directly from the base or be fixed to supports either banged into the ground or set in carefully dug holes. Provided the supports are well spaced, i.e. greater than 1.5m apart, and of a relatively narrow diameter, i.e. not in excess of 15cm, it is unlikely they will cause any significant disturbance to RPAs.
- 4.3 **Walls, gate piers, buildings and bridges on new foundations:** Conventional strip foundations in RPAs for any significant structure may cause excessive root loss and are unlikely to be acceptable. However, disturbance can be significantly reduced by supporting the above ground part of the structures on small diameter piles and beams or

Appendix 7: Site guidance for working in root protection areas (RPAs)


cast floor slabs set above ground level. The design should be sufficiently flexible to allow the piles to be moved if significant roots are encountered in the preferred locations. Before the actual installation of the new structure starts, all RPAs that may be affected should be covered with temporary ground protection as set out in BS 5837. Gaps in the ground protection should be left where it is expected to install the piles or dig the holes for gate piers. Pile locations should be initially hand dug to a depth of 75cm to establish if there are any significant roots over 2.5cm in diameter that could be damaged. If significant roots are found, then the pile location must be moved slightly and a new exploratory hole dug. Once the piles have been installed, the lowest points of the supporting beams for the structure must be above the ground level between the piles and there should not be any further excavation. The beams between the piles can be pre-cast and imported to the site ready to fix or can be cast in position using shuttering for the sides and a biodegradable void-former for the base. Gate piers generally require larger holes and have less flexibility for relocation if large roots are found. Localised loss of roots may be unavoidable so each situation should be assessed on its own merits by an appropriate supervising officer once the careful excavations have been completed. Any roots found should be dealt with as set out in 1.7 above. When installing any of these structures, the ground protection must remain in place until the construction is completed and there is no risk of damage to RPAs.

- 4.4 **Walls on existing foundations:** A free-standing wall on an existing foundation is unlikely to require any additional excavation and so its construction should have no adverse impact on RPAs if the appropriate protection is in place. However, replacing walls that retain the soil of RPAs normally requires some limited excavation back into the exposed soil face to provide a working space of at least 10–20cm behind the inside wall face. This should be done carefully and limited to no more than required to construct the new wall. Any roots found should be dealt with as set out in 1.7 above. Once the wall is completed, any voids behind it should be filled with good quality top soil and firmed into place but not over compacted. Specific difficulties with large roots that emerge during the course of the construction should be referred to the supervising officer.
- 4.5 **Services:** For the purposes of this guidance, services are considered as structures. Excavation to upgrade existing services or install new services in RPAs may damage retained trees and should only be chosen as a last resort. In the event that excavation emerges as the preferred option, the decision should be reviewed by the supervising officer before any work is carried out. If excavation is agreed, all digging should be done carefully and follow the guidance set out in 1.7 above.


5 SOFT LANDSCAPING IN RPAs

- 5.1 **Upgrading existing soft landscaping or replacing existing surfacing/structures with new soft landscaping:** For the purposes of this guidance, soft landscaping includes the re-profiling of existing soil levels and covering the soil surface with new plants or an organic covering (mulch). It does not include the installation of solid structures or compacted surfacing. Soft landscaping activity after construction can be extremely damaging to trees. No significant excavation or cultivation, especially by rotovators, should occur within RPAs. Where new designs require levels to be increased to tie in with new structures or the removal of an existing structure has left a void below the surrounding ground level, good quality and relatively permeable top soil should be used for the fill. It should be firmed into place but not over compacted in preparation for turfing or careful shrub planting. Ideally, all areas close to tree trunks should be kept at the original ground level and have a mulched finish rather than grass to reduce the risk of mowing damage.

Appendix 8: Illustrative specification for the planting of heavy standard and semi-mature trees



Specification for semi-mature tree planting for both root-ball and container grow stock



Forestry House PO Box 23
Tring Hertfordshire HP23 4AE

t 01442 825401
f 01442 890275
e sales@civictrees.co.uk
w www.civictrees.co.uk

Introduction

Semi-mature trees are defined by the British Standards Institution and HTA as:-
"Trees with an overall height in excess of 4 metres and or a stem girth measurement (circumference) of 20 centimetres or larger."
 They will have been transplanted several times and are likely to be more than 10-15 years old.

Specification

1. Planting locations are agreed and inspected, a site assessment made with consideration given to tree species, access, overhead and underground services plus general safety to operatives and members of the public.
2. The planting site shall be naturally or physically drained or raised to prevent the trees from being waterlogged at any time. The soil texture and structure will retain and release moisture and nutrients to the trees and have a structure that will promote root growth. The planting site can be improved with the addition of peat-free compost, water retaining polymer, fertiliser and topsoil where necessary.
3. The excavated hole shall be of sufficient size to accommodate the root-ball or container, allowing approximately 500mm clearance. Before planting the sides of the pit shall be broken up and the base dug over to a depth of 150mm to improve drainage. The tree will be planted to the same depth as it was in the nursery. Backfill will be firmed in around the rootball to prevent any air pockets.
4. An irrigation/aeration system will be installed comprising of a 60mm diameter, perforated pipe around the rootball 100mm below the surface.
5. Installation of a supporting system for the tree will be necessary. This will either be overhead or underground guying. The overhead guying comprises of 4mm steel cable attached to the main stem of the tree and to 1m metal stakes to secure the root-ball in the ground.
6. Any necessary formative pruning will be carried out and where appropriate woodchip/bark mulch applied to a depth of 50mm, and to at least the edge of the planting pit.
7. A properly planned maintenance programme should be kept up until successful establishment of the trees. this may include watering when necessary, checking of the support systems, weed control and further mulching. Support guys or stakes should be removed once the trees are established, usually after 2-3 years.

Summary

Successful establishment of trees will depend on:-

1. The planting site being properly prepared, suitable drainage and being compatible with the chosen tree species.
2. The trees being specially grown to produce semi-mature stock, being healthy and having been correctly lifted, stored and transported as relatively fragile living organisms.
3. The planting being done correctly and in the right season relative to the growing medium, followed by proper aftercare.

growing since 1963

Appendix 8: Illustrative specification for the planting of heavy standard and semi-mature trees

Planting detail Semi-mature conifer trees

The detail shows how the trunk and branches of the tree are protected from charring by the guy wires by the use of rubber hose pipe. The guy wire should be fed through the piping and secured by galvanised u-bolts

Planting detail Semi-mature deciduous trees

Tree size comparison

Tree Size* cm	Definition	Height Range m	Min Root-ball** mm	Crown Spread*** m (min)
18/18	Extra Heavy Standard	4.0-4.5	500	0.50
18/20	Extra Heavy Standard	4.0-5.0	600	0.75
20/25	Semi-mature	4.5-5.5	700	1.00
25/30	Semi-mature	5.0-6.0	800	1.25
30/35	Semi-mature	5.5-6.5	900	1.50
35/40	Semi-mature	6.0-7.0	1100	1.75
40/45	Semi-mature	6.5-7.5	1200	2.00
45/50	Semi-mature	7.0-8.0	1350	2.25
50/60	Semi-mature	7.5+	1500	2.50

Note: All trees should be root-balled or container grown. Trees this size must not be planted Bare Root

* Tree size is the circumference of the trunk at 1m above ground level for trees with a clear stem over 1m high.

** Diameter

*** Depending on species and variety, assumes a standard broadleaf shape, i.e. NOT Fastigiata or Columnar varieties

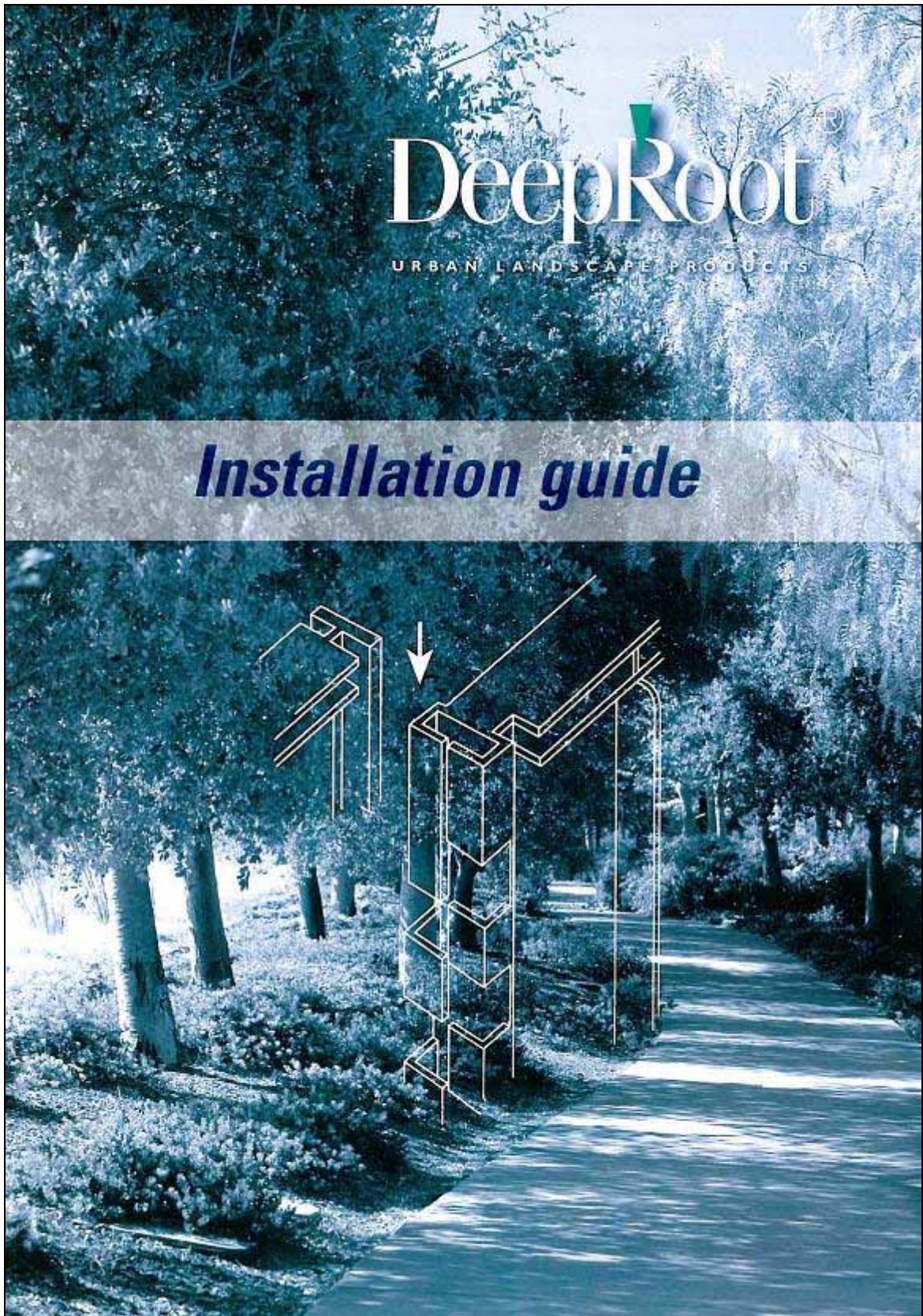
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Sample arboricultural impact appraisal and method statement for trees at sample site, for WTOG meeting
Our ref: **Sample-AIA-MTOA.doc - 10/12/08**

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Appendix 9: Illustrative specifications for the installation of structured soil and DeepRoot deflectors for tree planting in hard surfacing



Appendix 9: Illustrative specifications for the installation of structured soil and DeepRoot deflectors for tree planting in hard surfacing

WHAT DOES THE DEEPROOT GUIDING SYSTEM DO?

The system is designed to prevent the lifting of hard landscapes; it can be applied with new tree planting or renovation projects. The guiding system is a series of interlocking panels that act as a root deflector placed between roots and hard landscapes. The 90 degree vertical ribs guide roots downward, deeper into the soil surrounding the barrier. Without ribs, the roots would continue to swirl around the walls of the barrier (flower pot effect), which can lead to instability and suffocation. When the roots have reached the lower edge of the guiding barrier they exit the system, accessing the soil volumes required to achieve a mature healthy tree. Before installation be well aware of the local ground conditions and water levels as it is necessary to have a layer of soil that will allow the roots to penetrate sufficiently.

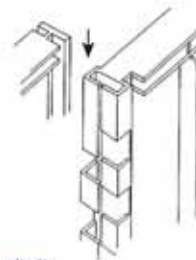
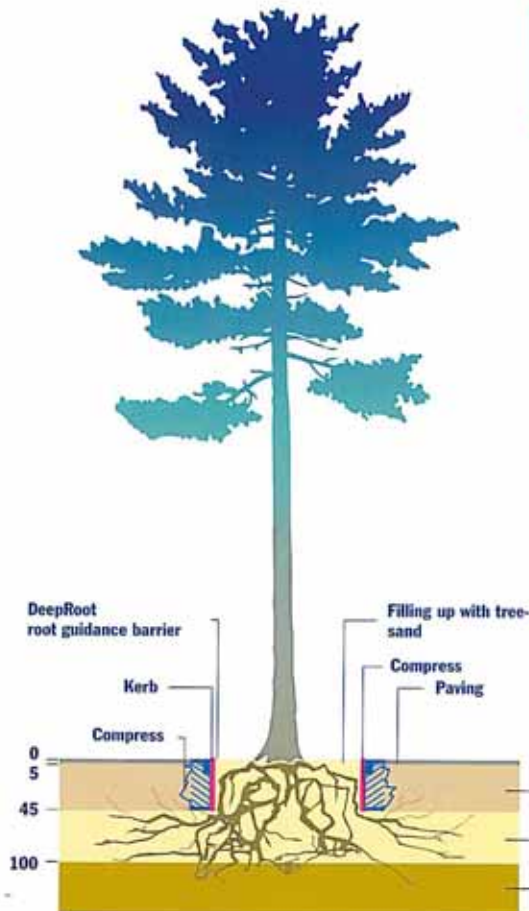


GENERAL PROCEDURE USING DEEPROOT GUIDING SYSTEM

Tree roots always choose the path of least resistance. For the best possible results a good penetrable layer of soil under the panels and the correct construction of the planting hole is very important.

The tree pit can be pre prepared during construction allowing trees to be transplanted at a later date.

Unique features of the DeepRoot guiding system are the incorporated ground anchors that prevent the possible lifting of the barriers, a double top edge to prevent root overgrowth and a joining system that allows individual panels to be simply locked together. The barrier needs to be positioned 1cm above ground level in the planting pit after planting of the tree, then soil on the outside of the barrier should be compressed to greater than 3Mpa. The barriers with articulated joiners are 2mm thick and 60cm wide, available in heights of 30cm, 45cm and a maximum 60cm. The essential needs of the tree are generally found in the top 60cm of soil and for this reason in most situations we do not recommend guiding roots deeper.



Deep

WWW.DEEPROOT

Appendix 9: Illustrative specifications for the installation of structured soil and DeepRoot deflectors for tree planting in hard surfacing




TWO INSTALLATION METHODS

• DeepRoot Circular Method



DeepRoot Barriers are linked together

Ø 5 panels	96 cm
Ø 6 panels	115 cm
Ø 8 panels	153 cm
length panels divided by	3,14 cm = ... cm

The surround planting style is based on a continuous barrier of linked panels which encloses the root ball on all sides.

GENERAL

The Barriers need to be placed as follows:

- With the root guiding ribs face towards the tree.
- With the double protection strip to the top edge, 13 mm above finished ground level.
- In a suitable soil layer for root penetration

PLANTING SITE SET UP WITH HIGH GROUND WATER LEVELS

If the water level is 60cm or less below the surface, it is recommended to drain the planting hole or consider a raised planting hole with DeepRoot guiding barriers. It is essential that the roots are able to find a layer of soil to penetrate easily in order to grow. The full capillary zone can be extended by means of tree soil, it may also be necessary to use a drainage system.

When preparing the planting hole, never dig further than the ground water level to prevent percolating water.

• DeepRoot Linear Method



Linear planting style is a series of linked panels placed where roots have the possibility to grow in two or three directions. The DeepRoot guiding panels are linked together in a line along the area that needs protection, e.g. between roads and green centre strips. It may be necessary to only place barriers on two sides.



DeepRoot (DR 30 or 45) root guidance barriers

Elevated tree surface
1. prevents soaking with road salt
2. applicable with high groundwater level

Compress

Paving

Street sand (not salted) > 3 Mpa compressed

Tree soil < 2 Mpa compressed

Full-capillary zone

Groundwater



U R O P E . C O M

Appendix 9: Illustrative specifications for the installation of structured soil and DeepRoot deflectors for tree planting in hard surfacing

DEEPROOT APPLICATION FOR EXISTING TREES

The root guiding system is not solely intended for trees that are to be transplanted; the system can give excellent results with established trees too. Care must be taken during the root pruning of fully grown roots. A tree that has developed steadily in its environment is a balanced organism. When pruning the root system the following risks may occur:

- Loss of stability
- Increased liability to fungal infections
- Rotting deformation

Some guidelines for the pruning of Roots

- Work only with qualified professionals
- Let the expert on site decide on the minimal pruning distance
- Spare the tension roots by pruning as superficially as possible
- Always use sharp tools Seek professional guidance when pruning the crown after diminishing the root system

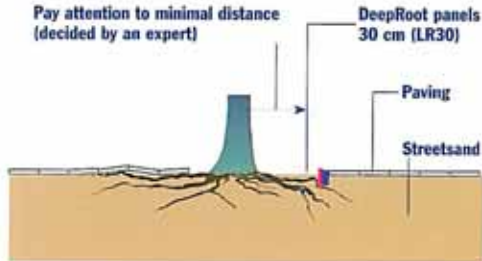
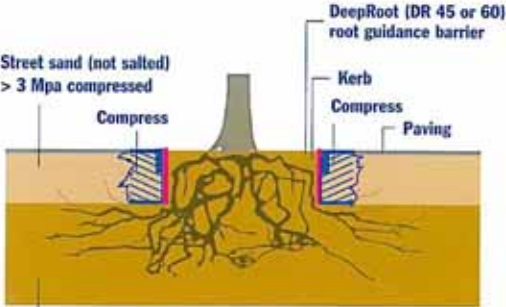
SET UP OF THE PLANTING SITE BY USING COMPRESSED AIR INJECTIONS


Modern techniques such as injection of fertilizers and organic substances by means of compressed air can be used when placing DeepRoot guiding systems.

DEVELOPMENT OF THE ROOT SYSTEM

After the planting process a young tree will quickly try to anchor itself in the surrounding area. In its urge to survive and grow it aims a large part of its energy, particularly in the beginning, at the development of the roots. During growth, the roots will choose the path of least resistance and the highest yield, which means the growing behavior of trees will never be 100 percent the same. For mechanical and biological reasons the roots that are situated the highest will grow the fastest. From the moment the tree encounters forces such as wind a number of roots (tension roots) will have the responsibility of keeping the tree upright and the other roots, usually cellular airy roots that hardly cause any upward pressure, remain responsible for the transportation of water, oxygen and nutrients.

By using the natural ability of the tree to adjust to its surroundings and making use of a DeepRoot guiding system, the growth of the trees roots can be influenced in such a way that can help to prevent damage they cause to hard landscapes.



URBAN LANDSCAPE PRODUCTS

DeepRoot® Europe UK Ltd
PO BOX 2593
STONE ST15 9AD
Telephone: 01782 551861
Fax: 01782 551862
E.mail: info@deeprooteurope.com
Website: www.deeprooteurope.com

Appendix 9: Illustrative specifications for the installation of structured soil and DeepRoot deflectors for tree planting in hard surfacing



The natural solution

Tree soil is a blend of highly graded sand and organics which can be compacted sufficiently to control settlement for laying pavements or car parking yet still function as a healthy medium promoting growth.


It's unique properties have released the tree roots from the limitations of the tree pit's size by allowing the effective soil volume to extend beneath surrounding hard surfaces. Typically a trench can be excavated which will connect the trees below ground level allowing an extended root run. Previously trees planted in conventional tree pits have stagnated after a few years and become highly vulnerable to even small deteriorations in local conditions.

Long term monitoring of established trees that have been planted in tree soil has shown satisfactory nutrient levels without the need for inorganic fertilisers — indeed high levels of fertiliser at the planting stage are not desirable.


This new technique gives the designer the possibility to create schemes where the trees will have the opportunity to become the magnificent specimens envisaged at the outset.


Tree soil trench being backfilled



Laying grasscrete over tree soil



1983



1993

Appendix 9: Illustrative specifications for the installation of structured soil and DeepRoot deflectors for tree planting in hard surfacing



Why use 'tree soil?'

Newly planted trees in the UK generally have a miserable existence, their roots so tightly constrained that they rarely grow for more than a few years. Tree Soil has been designed to extend their life to decades.

The problem is that pavement trees are often surrounded by highly compacted material or worse still, planted inside concrete manhole rings. Trees stagnate and the pit acts as a sump for surface water exacerbating an already impoverished growing area.

The typical life of a newly planted tree can be just five to seven years. They exhaust their small patch of soil and then start a spiral of decline. The leaf size gets smaller, shoots die back, the roots no longer grow and the tree becomes vulnerable to pests and disease. Often the trees will have to be replaced, or worse - left to rot, leaving a blight on the urban landscape.

Compaction is the main source of the problem. Hard surfaces are needed around the trees to provide pavements, cycleways or parking, all of which require compact bases.

Tree Soil has been developed as a compactible material for use under hard surfaces yet will still permit movement of air and water for root growth, allowing the tree to thrive.



urban soils

Research into pavement trees began in 1972



Typical manhole/soakaway rings



Tree pit broken out of sub-base

Appendix 9: Illustrative specifications for the installation of structured soil and DeepRoot deflectors for tree planting in hard surfacing

Surface Design

Hard surface detailing around trees often incorporates iron grilles to support the surrounding pavement edge and to straddle the soil in the tree pit. Unfortunately, as the soil gradually settles they can become litter traps and an area for weed establishment.

A solution to this problem makes use of the load bearing performance of tree soils by using a honeycomb panel (Matrix Block) to act as a retainer for a gravel finish. This introduces a softer element into the surface detailing enhancing the textural qualities of the design and allowing the possibility of more fluid surface shapes.

The honeycomb pockets of the block, control the gravel from being spread out, aided by the angularity of the granite chips (Harden Stone). The detail also considerably increases the availability of air and water as its surface is over 50% open.

The high loading performance of the panel makes the detail suitable for car parks that are built amongst established trees. Here a layer of tree soil can be covered with matrix block and harden gravel to give a more sympathetic treatment.

For further information and a full Urban Tree Soil brochure please contact:



Urban Soils Limited
High Legh Estate
Knutsford
Cheshire WA16 0QS
Tel: 01925 757800
Fax: 01925 756599



Typical problems associated with iron grilles



Tree pit illustrating Matrix Block partially exposed



Matrix block constitutes many interlocking hexagonal cells



Matrix block allows for sympathetic treatment where blight could normally be expected - car park in High Wycombe


















Appendix 9: Illustrative specifications for the installation of structured soil and DeepRoot deflectors for tree planting in hard surfacing



Method

Typically for paved areas, such as town squares, roadside planting, superstores, municipal car parks etc..., a trench should be excavated approximately 1.00m deep, sufficiently wide and long to allow a minimum of 5 cubic metres per tree. If conditions will not allow this then individual pits should be 2.8m x 2.8m x 1m deep. The trench, or tree pit should be backfilled in layers 300mm thick, each layer being compacted to 1.5-2.0 mega pascals and checked with a penetrograph. The tree soil is topped with 150mm of compacted bedding sand with paving tiles, bricks or concrete blocks laid over the top of the trench. As the type of surface detail influences the amount of air exchange between the tree soil and the atmosphere it is recommended to use a product that has a large amount of jointing such as brick pavers. This can be introduced into the pattern of surface detailing. For areas where there is extremely limited space a highly porous surface such as grasscrete or wide-nib pavers are needed.

urban soils

Urban Soils Limited
High Legh Estate Office
Knutsford
Cheshire WA16 0QS
Tel: 01925 757800
Fax: 01925 756599



A whacker is used to compact the tree soil



Compaction level is checked with a penetrograph



Brick pavers allow good air exchange



Grasscrete blockwork

Appendix 9: Illustrative specifications for the installation of structured soil and DeepRoot deflectors for tree planting in hard surfacing

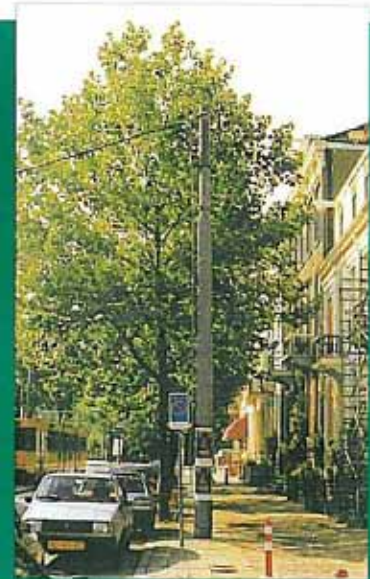
Application

The merit of tree soil is in its ability to transfer oxygen to the trees roots under hard surfaces. So where open soil beds are used there is no requirement for tree soil. However under pavements where it is not possible to use normal top soil, tree soils offer the possibility of extending the tree pit or trench in whatever direction is most suitable on site. For example, on new schemes it may be possible to dedicate a strip of ground along the roadside. This will allow the tree pit to effectively run the whole length of the road underground. Or, on existing paved areas the tree pit can be extended to a convenient change in surface detail.

Excellent results have also been achieved where tree soil has been introduced around established trees which are showing stress through poor rooting conditions. In these cases the pavement is lifted and the existing soil is carefully removed to avoid damaging tree roots. The tree soil is then backfilled and the surface re-instated.



Trench being backfilled in 1983



Same pavement 1993



urban soils

Urban Soils Limited
High Legh Estate Office
Knuttsford
Cheshire WA16 0QS
Tel: 01925 757800
Fax: 01925 756599

Appendix 9: Illustrative specifications for the installation of structured soil and DeepRoot deflectors for tree planting in hard surfacing



Detailing

Illustrated are some examples of tree pit detailing that show how simplified the design can become by eliminating a number of construction details such as concrete manholes or soakaway rings.

As site requirements and conditions vary widely it is recommended that the tree pit detail should be modified accordingly. Constraints such as ground water levels, final tree crown development and adequate soil aeration are all inter-related to the tree soil and should be considered at the design stage.

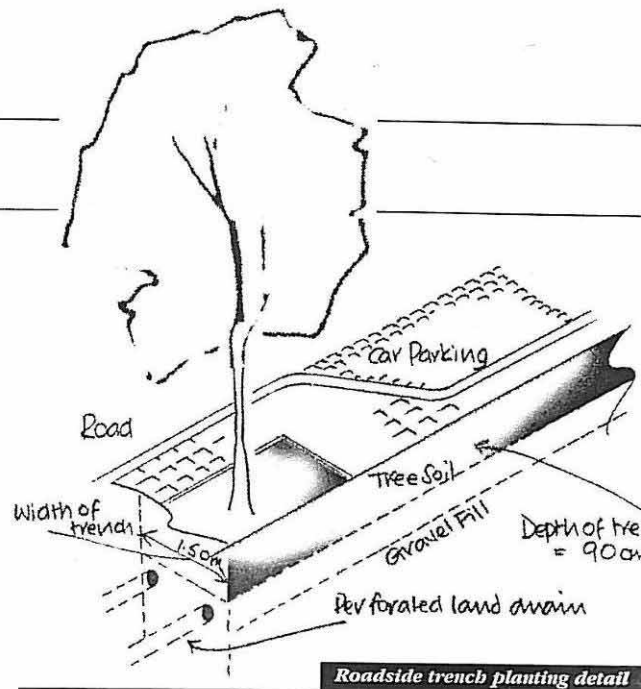
Tree soil should be specified as:

'Amsterdam Tree Soil'®. This is a specific blend that is now produced in the U.K. under a certification scheme monitored by the S.T.R.I. Each batch is quality checked prior to delivery.

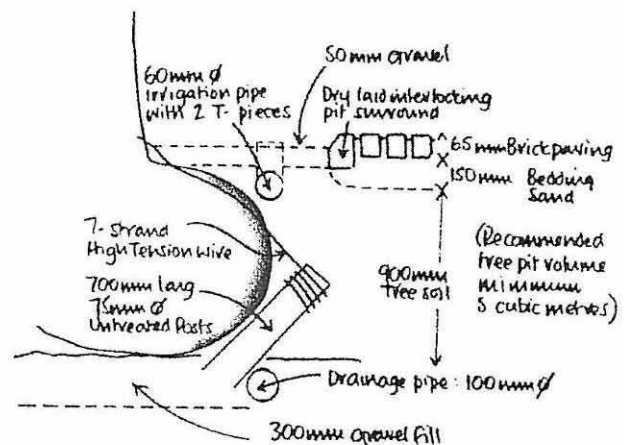
Omegam, who have extensive experience with tree soils and all issues concerning the underground landscape are able to offer a consultant who can advise on tree soils and their application.

urban soils

Urban Soils Limited
High Legh Estate Office
Knutsford
Cheshire WA16 0QS
Tel: 01925 757800
Fax: 01925 756599



Roadside trench planting detail

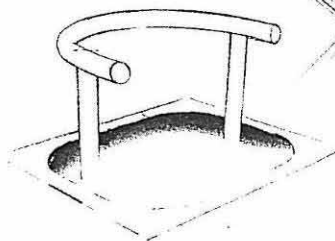


Tree pit detail

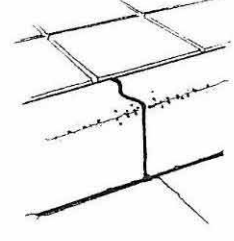


Wide-nib pavers

Pavement detail



Trunk protection



Related tree pit products

Appendix 10: Programme of arboricultural input

Arboricultural action	Programming of action	Extent of arboricultural input	Nature of supervision	Signed off (Council use)
Meeting with construction team to discuss tree protection and any emerging design issues that may affect trees	Before any site activity starts	<ul style="list-style-type: none"> • Meeting with relevant members of the developer's team to explain the extent of the tree constraints, i.e. architect, site manager, engineer, landscape architect, etc • Review working space requirements to consider barrier and ground protection adjustments to improve site functionality • Review drainage proposals and identify conflicts with RPAs • Review any post-consent layout changes that may affect trees • Review all special works that may affect trees • Identify any potential conflicts and work towards resolutions • Preparation of draft working drawings if necessary 		
Updating consented tree protection proposals in the context of the above meeting for discussion at pre-commencement meeting	Before any site activity starts	<ul style="list-style-type: none"> • Preparation of revised plans and specifications 		
Briefing landscape architect on restrictions imposed on new landscape design by RPAs	Before landscape design is finalised	<ul style="list-style-type: none"> • Supply appointed landscape architect with a plan of RPAs, a description of the restrictions that apply and details of agreed new tree planting • Review final landscaping plans to make sure there are no conflicts between tree protection and landscaping 	Letter and plan to landscape architect	
Pre-commencement site meeting with supervising arboriculturist, site manager and council tree officer	Before any site activity starts or once tree protective measures have been installed	<ul style="list-style-type: none"> • Meeting on site • Review any updated proposals • Confirm tree protective measures are acceptable if already installed 	Site meeting and letter	
Tree works carried out	Before protective measures are installed	<ul style="list-style-type: none"> • Meeting with contractor if necessary at the discretion of supervising arboriculturist 	Site meeting and letter	

Appendix 10: Programme of arboricultural input

Arboricultural action	Programming of action	Extent of arboricultural input	Nature of supervision	Signed off (Council use)
Finalising tree protection proposals and installation for agreement by council	Before any heavy machinery enters the site	<ul style="list-style-type: none"> Preparation of final plans and specifications for agreement by the council Provide photographs showing relevant aspect of installed tree protective measures Meeting with contractor to finalise specifications and locations before installation with a further visit on completion to verify correct installation, at the discretion of the arboricultural consultant 	Site meeting and letter	
Demolition near trees	Not until protective measures are installed	<ul style="list-style-type: none"> Meeting with contractor if necessary, at the discretion of arboricultural consultant 	Site meeting and letter	
Installation of new services	At the discretion of the developer	<ul style="list-style-type: none"> Meeting with contractor for briefing before work starts with further visits as necessary, at the discretion of the arboricultural consultant 	Site meeting and letter	
Removal of barriers and ground protection	Not until the construction activity is finished	<ul style="list-style-type: none"> Meeting with contractor for briefing before work starts 	Site meeting and letter	
Removal of surfacing retained as ground protection near trees 8, 9, 10, 11 and 16	Not until the construction activity is finished	<ul style="list-style-type: none"> Meeting with contractor for briefing before work starts 	Site meeting and letter	
Careful excavation by hand of area near T16 to comply with floodplain requirements	After barriers have been removed at the end of development	<ul style="list-style-type: none"> Meeting with contractor for briefing before excavation with further visits as necessary at the discretion of the arboricultural consultant 	Site meeting and letter	
New tree planting	After barriers and ground protection have been removed	<ul style="list-style-type: none"> Arboricultural consultant checks plant compliance with specification and oversees site preparation and planting 	Site meeting and letter	
General landscaping	After barriers have been removed and new tree planting has been finished	<ul style="list-style-type: none"> Meeting with contractor for briefing before work starts with further visits as necessary, at the discretion of the arboricultural consultant 	Site meeting and letter	
Tree planting maintenance	For a period of 3–5 years after planting until successful establishment confirmed by council	<ul style="list-style-type: none"> Supervision provided by supply and plant contractor 	Letters by planting contractors after each maintenance visit	



**NEW FOREST DISTRICT COUNCIL
TOWN AND COUNTRY PLANNING ACT 1990
Town and Country Planning (General Development Procedure) Order 1995**

GDonvito Architects
117 Ramley Road
Pennington
Lymington
Hampshire
SO41 8LH

Application Number: 06/89111

Applicant: Mr D Fisher

Date of Application: 21 November 2006

THE NEW FOREST DISTRICT COUNCIL as the Local Planning Authority **GRANTS PLANNING PERMISSION** for the following development:

Development: **House; detached garage; demolition of existing**

Site Address: **THE COTTAGE, RIDGEWAY LANE, LYMINGTON SO41 8AA**

This decision has been taken in respect of the plans and particulars which were submitted with the application and numbered PL3a, PL3b, PL3c and SU 1 received on 23 November 2006.

Subject to the following Conditions:

1. The development hereby permitted shall be begun before the expiration of three years from the date of this permission.

Reason: To comply with Section 91 of the Town and Country Planning Act 1990 as amended by Section 51 of the Planning and Compulsory Purchase Act 2004.
2. No development shall take place above damp proof course level until samples or exact details of the facing and roofing materials have been submitted to and approved by the Local Planning Authority.

Reason: To ensure an acceptable appearance of the building in accordance with policy DW-E1 of the New Forest District Local Plan First Alteration.
3. Within one month of the date when development first commences a scheme of landscaping of the site shall have been submitted for approval in writing by the Local Planning Authority. This scheme shall include :
 - (a) the existing trees and shrubs which have been agreed to be retained;
 - (b) a specification for new planting (species, size, spacing and location);
 - (c) areas for hard surfacing and the materials to be used
 - (d) a method and programme for its implementation and the means to provide for its future maintenance.

Planning consent with condition specifically cross-referencing report

No further development shall take place after 3 months unless these details have been approved and then only in accordance with those details.

Reason: To ensure that the development takes place in an appropriate way and to prevent inappropriate car parking to comply with Policy DW-E1 of the New Forest District Local Plan First Alteration.

4. The works hereby approved shall be undertaken in full accordance with the provisions set out within the Barrell Arboricultural Impact Appraisal reference 5029-A1A2-DC dated 09/10/2006 and with reference to Appendix 10 of that report, or as may otherwise be agreed in writing by the Local Planning Authority.

Reason: To ensure the enhancement of the development by the retention of existing trees and natural features during the construction phase in accordance with Policy DW-E8 of the New Forest District Local Plan First Alteration.

5. All service routes, drainage runs, soakaways or excavations in connection with the same shall remain wholly outside the tree protective fencing as set out in Barrell Tree Consultancy Report 5029-A1A2-DC dated 09/10/2006 without the prior written agreement of the Local Planning Authority.

Reason: To ensure the enhancement of the development by the retention of existing trees and natural features during the construction phase in accordance with Policy DW-E8 of the New Forest District Local Plan First Alteration.

6. No other first floor windows on the western elevation, other than those hereby approved, shall be inserted into the building unless express planning permission has first been granted.

Reason: To safeguard the privacy of the adjoining neighbouring properties in accordance with policy DW-E1 of the New Forest District Local Plan First Alteration.

Reason(s) for granting permission:

The proposed development is in accordance with Policies DW-E1, DW-E8 and BU-H1 of the adopted New Forest District Local Plan First Alteration.

The proposed development would not be out of character, and would compliment the surrounding development. In addition, the proposal would not significantly impact on the amenities of neighbouring properties, and would provide suitable protection to nearby TPO's, whilst allowing for further planting.

A full copy of the officer's report explaining in more detail the reason(s) for the grant of this permission is available for inspection in the planning office.


Notes to applicant

1. Important notes, including the rights of appeal, are set out on a sheet attached to this notice and you are advised to read these carefully.

Planning consent with condition specifically cross-referencing report

2. This decision does not purport or convey any approval or consent which may be required under the Building Regulations or any other Acts, including Byelaws, Orders or Regulations made under such Acts.
3. If this permission leads to the creation of any new properties you should contact the Council's Address Management Section on 023 8028 5402 or e-mail address.management@nfdc.gov.uk regarding the addressing of the development.

Date: 18 January 2007



C J Elliott
Head of Planning
Appletree Court ^(W)
Lyndhurst
Hampshire
SO43 7PA

Summary of what Tree Officers can do to improve the success rate of tree retention on development sites

- Use new BS to lobby other council officers
 - Non-registration for insufficient tree information
 - Talk to planners about conditions
 - Do not mix landscape and tree protection conditions
 - Specifically refer to each tree protection issue as a separate item
 - Talk to enforcement about documentation
- Realistic expectations for tree retention
- Focus scarce resources on most important sites
- Demand details on drainage, construction methods and levels cross-sections before consent is given
- Pre-commencement site meetings are an investment
- Robust barriers installed early on is essential
- Insist on written certification of supervision
- Do not discharge conditions unless certified
- Spot check sensitive sites
-



Barrell Tree Consultancy
Field House
Fordingbridge Business Park
Fordingbridge
Hampshire SP6 1BY

01425 651470
www.barrelltreecare.co.uk
jeremy@barrelltreecare.co.uk