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Arboricultural Impact Appraisal and Method Statement

Ahmad Tea, Chandlers Ford

F/10/67765

Prepared by

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Validation statement for Local Planning Authority (LPA) registration of this report

In accordance with the ***Department for Communities and Local Government Circular 02/2008*** and its guidance document ***Validation of Planning Applications***, this report fulfils the recommended national list criteria for tree survey/arboricultural information. More specifically, it contains the following:

- A full tree survey compliant to the requirements of ***BS5837: (2005) Trees in Relation to Construction – Recommendations*** undertaken by a qualified arboriculturist
- A plan to a suitable scale with a north point and showing tree survey information, retention categorisation and root protection areas
- An assessment of the arboricultural implications of development detailing trees to be retained/removed and appropriate protection measures
- An arboricultural method statement detailing the means of tree protection, implementation and phasing of works

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Summary

USING THIS REPORT

For ease of use, this report is organised with the most frequently used information at the front and the less frequently used, but equally as important administrative and background information, towards the back, as follows:

- **Section 1** is an arboricultural impact appraisal, which describes the impact of the development proposal on trees
- **Section 2** is an arboricultural method statement, which describes the proposed tree management and protection measures
- **Section 3** is the Appendices, where other useful information such as illustrative specifications can be referenced

Important Note: Appendices 1 and 2 in Section 3 must be reviewed before relying on the analysis in Sections 1 and 2.

BACKGROUND TO THE PROPOSAL

The development proposal is to construct an extension to the existing factory and undertake various external works. All the trees that could be affected were inspected and their details are listed in Appendix 5.

IMPACT OF THE PROPOSAL ON TREES

This proposal will result in the loss of one tree that is low category because of its poor condition or small size. All the significant boundary tree cover will remain intact and no high category trees will need to be removed. The proposed changes may 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 impact on the contribution of trees to amenity or character in the wider setting.

Chris Allder **MSc HNDArb FArborA MICFor**

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Section 1

Arboricultural impact appraisal

This arboricultural impact appraisal describes our assessment of how the proposal will affect trees and any impact this will have on local amenity and character. The impact on trees is summarised at the beginning in 1.1, more detailed explanation of this analysis is set out in 1.2 and the proposed mitigation measures are described in 1.3.

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1.1 SUMMARY OF THE IMPACT ON TREES

Development proposals can impact on trees by causing them to be removed either immediately or in the future, by adversely affecting their potential for retention through disturbance in root protection areas (RPAs) or through the need for pruning. Our assessment of the impact of this proposal on trees is summarised in table 1.

Table 1: Summary of trees that may be affected by the proposal

Impact	Reason	A	B	C
Trees to be removed	Building construction proximity			6
Retained trees that may be affected through disturbance to RPAs	Reconditioning of existing surfacing	24	25	23
Retained trees to be pruned	Space for development		4	3

NOTE: This analysis is based on the premise that if retained trees can be protected from disturbance by the use of barriers and/or ground protection, then they will not be affected and they are not listed in table 1.

1.2 DETAILED IMPACT APPRAISAL

1.2.1 Category A and B trees to be removed

No category A / or B trees will be removed.

1.2.2 Category A and B trees that may be affected through RPA disturbance

- **Trees 24 and 25:** These are important trees with potential to contribute to amenity so any impacts on them should be minimised. Existing surfacing is proposed to be reconditioned within RPAs. 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 effects if appropriate protective measures are properly specified and controlled through a detailed arboricultural method statement.

1.2.3 Category B trees to be pruned

One category B tree (4) will require limited pruning. This is not a highly important tree with a limited potential to contribute to amenity so any impacts on it is unlikely to have any impact beyond the immediate vicinity. Some of its longer branches extend close to the proposed building. Either removing these branches or cutting them back would be justified for normal management irrespective of any development. This would not

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affect their health and have no significant impact on local character or amenity as their profile from public viewpoints would remain unchanged.

1.2.4 Category C trees to be lost

One tree (6) to be removed is category C because it is either in poor condition, unsustainable or so small that it is not worthy of influencing any layout. It is not important in the overall planning context and its loss should not influence the determination of this application. More specifically, it is relatively small and poorly formed so not particularly significant in the street scene. Its loss will not be noticeable beyond the immediate vicinity and will have no impact on the character of the wider setting.

1.2.5 Retained category C trees that may be affected through RPA disturbance

One tree (23) that may be affected is category C because it is either in poor condition, unsustainable or so small that it is not worthy of influencing any layout. However, it is proposed for retention and so special precautions will be necessary to ensure that any impact is minimised. These are set out in more detail in section 4 of this report. Although this tree is proposed for retention, it is not important in the overall planning context and any risk of damage to it should not influence the determination of this application.

1.2.6 Category R trees to be removed for management reasons

Trees categorised as R are in such poor condition that they have been assessed as needing removal for management reasons irrespective of any development proposals. On this site, this relates to one small group comprising two trees (G30). Although these trees have been shown for removal on plan BT1 and in the tree schedule, their loss will not be caused by this proposal and it should not be considered as a direct impact.

1.3 PROPOSALS TO MITIGATE ANY IMPACT

1.3.1 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 Section 2 of this report.

1.4 SUMMARY OF THE IMPACT ON LOCAL AMENITY AND CHARACTER

This proposal will result in the loss of one tree that is low category because of its poor condition or small size. All the significant boundary tree cover will remain intact and no high category trees will need to be removed. The proposed changes may affect further trees if appropriate

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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 impact on the contribution of trees to amenity or character in the wider setting.

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Section 2

Arboricultural method statement

This arboricultural method statement describes the proposed tree management and protection measures. It is divided into two subsections, in order of their priority for application to this site.

Subsection 2.1 identifies the specific issues that apply to this site and cross-references the types of precautions detailed in Section 3 that are feasible to ensure successful tree protection. It covers the project management of the tree issues first, i.e. the supervision and timing of works. These administrative aspects are followed by the practical operations, listed in the sequence that they are likely to occur on site, i.e. tree works first, then the installation of protective measures, then any special precautions for identified areas and, finally, provision for new tree planting.

Subsection 2.2 describes how the planning framework and technical guidance applies to trees on all sites, including this one. It discusses the principles behind all tree management and protection, and cross-references them with the more detailed explanations in Section 3.

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Section 2: Arboricultural method statement

2.1 SPECIFIC PROPOSALS FOR THIS SITE

2.1.1 Arboricultural advice and supervision

All operations that could affect trees must be factored into the wider project management of the site. This can only be done effectively if an arboricultural consultant is appointed as part of the management team. An arboricultural consultant must be appointed by the developer to advise on the tree management for the site and to attend:

1. the pre-commencement meeting before any work starts;
2. regular supervision visits every two to four weeks, or as otherwise agreed; and
3. as needed to oversee any specific works that could affect trees.

Additionally, the consultant must have a supervisory input into the following operations:

- Site preparation, including tree works and any demolition requirements
- Installation, maintenance and removal of barriers
- Reconditioning of surfacing

2.1.2 Project management of tree issues

Successful tree retention relies on careful integration of the tree protection proposals into the programme of works for the whole development project. It is essential that the tree protection measures and any activities that may affect trees are project managed by an appointed arboricultural consultant who is part of the project team. All arboricultural supervision must be recorded and formally confirmed to the developer and the LPA. A programme for the actions needed at different phases of development, from start to finish, is set out in table 2.

Table 2: Phased project management of tree issues throughout development

Finalising tree management details after consent, but before work starts	
Action	**Arboricultural input**
Review of tree protection and any emerging design issues that may affect trees with the construction team	• Meeting/discussion with relevant members of the developer's team to explain the extent of the tree constraints • Review working space requirements to consider barrier adjustments to improve site functionality • Review drainage proposals and identify potential conflicts with RPAs • Review any post-consent layout changes that may affect trees • Review all works within RPAs that may affect trees • Identify any potential conflicts and work towards resolutions • Preparation of working drawings, if necessary
Review consented tree protection proposals for discussion at pre-commencement meeting	If necessary: • prepare revised plans and specifications • liaise with LPA to discuss modifications
Briefing landscape architect on restrictions imposed on new landscape design by RPAs	• Advise landscape architect of the RPA locations, the restrictions to landscaping activity that applies and the details of agreed new tree planting • Review the final landscaping proposals to identify any conflicts between tree protection and landscaping

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Finalising tree management details after consent, but before work starts	
Action	**Arboricultural input**
Pre-commencement site meeting with supervising arboriculturist, site manager and the LPA representative (if appropriate)	• Meeting on site • Agree detail of supervision requirements, i.e. frequency of visits and reporting • Review any updated proposals • Review tree protection, if already installed

Site operations before construction starts on site	
Action	**Arboricultural input**
Tree works carried out	• Review the site requirements with the tree work contractor
Installation of tree protection for agreement by the LPA	• If appropriate, preparation of any revised plans and specifications for agreement by the LPA • Photographs showing relevant aspect of installed tree protective measures • Liaise with the contractor installing protection until satisfactorily completed

Operations that could affect trees during construction	
Action	**Arboricultural input**
Reconditioning of surfacing	• Meeting with contractor for briefing before installation, with further supervision visits as necessary at the discretion of the arboricultural consultant
Removal of barriers	• Meeting with contractor for briefing before work starts, with further visits as necessary at the discretion of the arboricultural consultant • **NOTE:** This should only be authorised once there is no risk of RPA damage from the construction activity
Installation of new services	• Meeting with contractor for briefing before work starts, with further visits as necessary at the discretion of the arboricultural consultant

Operations that could affect trees after construction is completed	
Action	**Arboricultural input**
Soft and hard landscaping	• Meeting with contractor for briefing before work starts, with further visits as necessary at the discretion of the arboricultural consultant

2.1.3 Tree works

Tree works, based on our assessment of the proposal and the original site inspection, are set out in the work recommendations column of the tree schedule in Appendix 5. Any trees to be removed are highlighted with red text in the schedule. The location of each tree by number is shown on the plan and any to be removed are indicated with a red dashed crown outline.

2.1.4 Barriers

Once the tree works are finished, the installation of the primary tree protection measures, i.e. the barriers can be completed. The location of the barriers is shown on the plan as the heavy black dashed line.

2.1.5 Summary of precautionary measures in Area 1

Area 1 is the construction exclusion zone. It is shown on the plan with the black dashed surround indicating the location of protective fencing and the diagonal black hatching indicating the enclosed RPA. All work operations in this area must be strictly controlled as detailed in BS 5837 and summarised in the explanatory notes of the fencing specification sheet in the Appendices. These precautions are necessary to protect the RPAs of retained trees from disturbance for the duration of the development activity.

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Additionally, any landscaping activity must be carefully controlled once the fencing is removed.

2.1.6 Summary of precautionary measures in Area 2

Area 2 is shown on the plan with the green shading. It is within the RPAs of three retained trees (23, 24 and 25), but outside the protective barriers. All work operations in this area must be strictly controlled to protect RPAs from disturbance for the duration of the development activity, as set out in Appendix 8. More specifically, the precautions required include:

1. **Removal of existing surfacing and replacement with new surfacing:** Trees 23, 24 and 25 may be affected by the upgrading of the existing surfacing at the access to the car park. I have carefully reviewed the levels in these areas and it would be feasible to install custom designed no-dig specification surfacing without causing any significant disturbance to the RPAs. From our previous experience at installing such surfacing (www.barrelltreecare.co.uk/case-studies/SurfacingNearTrees.pdf), I am confident that this can be implemented without significant harm to the trees, with the detail to be agreed as part of a planning condition. This surfacing solution is within the advice set out in BS 5837 (11.8.1) and would be appropriate in this situation. Any impact should be minimised by following the guidance set out in Appendix 8. Illustrative specifications for special surfacing are included as Appendix 9.

2.2 GENERAL TREE PROTECTION PRINCIPLES THAT ALSO APPLY TO THIS SITE

2.2.1 The feasibility of proposals and detail that can be conditioned

The ground conditions on development sites are often so variable and complex that it is not practical or necessary to know about every detail in order to make reliable decisions. This often applies to trees, where unexpected obstacles below ground or levels are not accurately recorded on standard land surveys, and yet can have a significant impact on the way operations are carried out on site. For that reason, our analysis of the issues is focused on establishing that operations can be carried out in principle, with the detail to be agreed on site through careful liaison between the tree consultant and the operatives who actually do the work, once the precise site conditions are known. If an operation is accepted as being feasible by the LPA, then the detail is a matter to be enforced through planning conditions, and it is not usually necessary to provide it before consent is given.

For example, BS 5837 acknowledges that special surfacing can be used in RPAs and there is an increasing body of practical examples where it has been successfully installed. If such surfacing is proposed, it would only be necessary to demonstrate that the ground levels will allow it to be installed without any significant excavation. This could reasonably involve the provision of cross-sections showing that it is feasible, but it would not normally extend to the provision of detailed engineering specifications for the product. Provided that the planning submission adequately demonstrates that the

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solution is feasible, then the detail would normally be a matter to be conditioned for agreement before works commence.

2.2.2 Illustrative specifications

Some of the Appendices in this report provide examples of products we believe may be suitable for use within RPAs. As set out in BS 5837, all products and protective measures must be fit for purpose, rather than be of any specific make or brand. For that reason, our specifications are illustrative in that they show a means of achieving the desired objective, but there may well be other ways and products capable of delivering the same result. Our role as tree consultants is to identify if an end result is feasible and illustrate how it can be achieved. That role does not extend to specifying detail on the installation of individual products, which is a matter for the technical expertise of the appropriate specialist.

2.2.3 Arboricultural supervision

BS 5837 confirms (Section 3 and Annex A4.5) that arboricultural supervision is necessary where there is a risk to retained trees. It essential for all operations within the RPAs behind barriers (shown on the plan by the black diagonal hatch within the heavy black dashed line) and within all the identified precautionary areas not enclosed by barriers (shown on the plan by the shaded areas outside the heavy black dashed line). An effective means of doing this is for all operations that could affect trees to be project managed by an arboricultural consultant appointed as part of the development team (BS 5837, 3.2.5). Specialist supervision is a means of facilitating any conditioned tree protection being effectively implemented on site by operatives who may not be familiar with the practical requirements for successful tree retention. Effective arboricultural supervision must include provision for the following:

- **Pre-commencement meeting:** A pre-commencement meeting should be held on site before any of the site clearance and construction work begins. This would normally be attended by the site manager, the arboricultural consultant and a LPA representative. If a LPA representative is not present, the arboricultural consultant should inform the LPA in writing of the details of the meeting. All tree protection measures detailed in this document should be fully discussed so that all aspects of their implementation and sequencing are understood by all the parties. Any agreed clarifications or modifications to the consented details should 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.

- **General site management:** 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 should be available on site and the site manager should brief all personnel who could have an impact on trees on the specific tree protection requirements. This

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should be a part of the site induction procedures and written into appropriate site management documents.

- **Ongoing supervision of operations that could affect trees:** Once the site is active, the arboricultural consultant should visit at an interval agreed at the pre-commencement site meeting. This would normally be every two to four weeks for general supervision, but could be at a longer interval if agreed between the parties. The supervision arrangement should 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 LPA to ensure that protective measures that are fit for purpose are in place before any works start on site. Once the site is working, that role will switch to monitoring compliance with arboricultural planning conditions and advising on any tree problems that arise or modifications that become necessary.

- **Proof of compliance to help refute liability and facilitate the discharge of planning conditions:** All supervisory visits will be formally confirmed in writing and circulated to all relevant parties, including the LPA. The purpose of these written records is firstly to provide proof of compliance that will allow the developer to robustly demonstrate adherence to best practice in the event of any disputes, and secondly to help the LPA efficiently discharged the relevant planning conditions.

2.2.4 Barriers and enclosed RPAs

The primary means of protecting RPAs is through the use of barriers formed by protective fencing and ground protection. Various illustrative specifications for barriers are included in Appendix 7. Their precise form can vary, provided they are fit for purpose in that they prevent damaging activities within the RPS that they enclose. Their locations are illustrated on the plan by the heavy black dashed line. Barriers must remain intact and fit for purpose for the duration of any development activity that could cause damage. The barriers are intended to restrict access to the enclosed RPAs and prevent any unsupervised activities. All activities within the RPAs behind barriers must be subject to arboricultural supervision at all times.

2.2.5 Control of activities within RPAs

Where activities have been authorised within RPAs through a planning consent, sufficient care must be taken to ensure that any impact on retained trees is minimised. This specifically applies to excavation, but also covers all other development operations with the potential to adversely affect trees. **All activities within RPAs must be carried out in accordance with the detailed guidance set out in Appendix 8 and be supervised by an arboricultural consultant. In particular, this guidance applies to removing surfacing and structures, installation of new surfacing, structures and services, and soft landscaping.** Illustrative specifications for special surfacing suitable for use within RPAs is included as Appendix 9.

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2.2.7 Control of activities near RPAs

Any risk to trees from activities outside RPAs, but close enough to have a knock-on impact, must be assessed and appropriate precautions put in place to reduce that risk. For example, all cement mixing and washing points for equipment and vehicles must be outside RPAs, but the contours of the site may create a risk of polluted water running off into RPAs. An appropriate precautionary measure would be to use heavy-duty plastic sheeting and sandbags to contain spillages and prevent contamination.

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Section 3
Appendices

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Appendix 1: Relevant background and administrative information

1 Instruction

We are instructed by Ahmad Tea Ltd to inspect the significant trees that could be affected by the development proposal at Ahmad Tea, and to prepare the following information to accompany their 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
- an arboricultural method statement dealing with the protection and management of the trees to be retained

2 Documents provided

Plan BT1 is derived from the following provided information:

- Land survey, drawing number AHMEDT.dwg, received by email on 28 July 2010
- Layout, drawing number 3446-SK002, received by email on 29 July 2010

3 Technical references

This report is based on our interpretation of the following primary technical references:

- British Standards Institution (2005) BS 5837: *Trees in relation to construction – Recommendations*
- National Joint Utilities Group (2007) Volume 4, Issue 1: *Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees*

4 Limitations of this report

The following limitations apply to this report:

- **Statutory protection:** The existence of tree preservation order or conservation area protection does not automatically mean trees are worthy of being a material constraint in a planning context. Trees can be formally protected, but be in poor structural condition or in declining health, which means that they are unsuitable for retention or influencing the future use of the site. Furthermore, a planning consent automatically takes precedent over these forms of protection, which makes them of secondary importance. For these reasons, we do not check statutory protection as a matter of course in the process of preparing this report. However, if any tree works are proposed before a planning consent is given, then the existence of any statutory protection must be checked with the LPA.
- **Ecology and archaeology:** Although trees can be valuable ecological habitat and can grow in archeologically sensitive locations, we have no specialist expertise in these disciplines and this report does not consider those aspects.

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Appendix 1: Relevant background and administrative information

5 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 3.

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Appendix 2: Site visit, collection of data and its use in the design process

1 Site visit

I visited the site on 28 July 2010. 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 clear and dry, with good visibility.

2 Brief site description

Winchester Road is located in the residential suburbs of Chandlers Ford. Ahmad Tea is situated at the rear of retail units fronting the road. Accessed by a side road through the car park the site is bordered by a stream to the east and railway to the south. The site consists of a factory with associated buildings, offices and parking. The site slopes downward to the east but is not particularly exposed. A variety of broadleaved trees are scattered around the site boundaries.

3 Collection of basic data

Each tree was inspected and the numbering scheme is indicated on plan BT1 in Appendix 4. Obvious groups were identified where appropriate. For each individual tree and group, information was collected on species, height, diameter, maturity and potential for contribution to amenity in a development context. As advocated in BS 5837, each tree was then allocated to one of four categories (A, B, C or R), which reflected its suitability as a material constraint on development. When collecting this information, specific consideration was given to any low branches that may influence future use, age class, physiological condition, structural condition and remaining contribution. Where appropriate, crown spreads were also noted where they differed from those shown on the provided land survey. This data with explanatory notes is set out in the tree schedule included as Appendix 5 and the supporting plan information. Each tree 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. Subsection 4.6.6 of BS 5837 sets out recommendations for the collection of data and this report is fully compliant with that advice.

4 Advanced interpretation of data

Section 5 of BS 5837 recommends that the trunk diameter measurement for each tree is used to identify a radius from the centre of the trunk that can then be used to calculate the RPA. This radius is not the extent of the RPA boundaries, but just a notional means of establishing the area need for the tree to survive. In many instances, the RPA boundaries can be closer to the tree than this radius. The RPA derived from this calculation 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 6.

5 Plan updates

During the site visit, several trees and groups of trees (G1, 2, 6, G7, G18, G21, G30 and G31) were noted that were not shown on the site survey. Their approximate locations have been

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illustrated on plan BT1, but these positions have not been accurately surveyed. It is unlikely that this has affected the report conclusions, but if their locations are considered important, they should be accurately surveyed. Additionally, some of the crown spreads shown on the plan did not accurately reflect those on the ground. These were estimated on site and plan BT1 has been annotated to more accurately reflect the present situation.

6 **The use of the tree information in layout design**

Following the inspection of the trees, the information listed in Appendices 5 and 6 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 the estimated developable footprint of the site and was considered by the architect to arrive at the submitted design. For conciseness, and because it is not a BS recommendation, this detailed constraints advice has not been included in this report, although there is a summary in Appendix 6. However, the detailed analysis can be provided if necessary.

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Appendix 3: Brief qualifications and experience of Chris Allder

1. **Qualifications:** I hold the Masters of Science Degree in Arboriculture (2003) and the Higher National Diploma in Arboriculture (1994). I am a Fellow of the Arboricultural Association (2001) and a Professional Member of The Institute of Chartered Foresters (2009).

2. **Practical Experience:** I have worked with trees for 20 years, starting out on a large estate gaining valuable practical experience of estate forestry and vegetation management. I then undertook the Higher National Diploma at Houghall College during which time I spent a work placement at the college as an arboricultural technician responsible for designing and implementing a biomass plantation on the college farm. Following graduation, I took up the post of Assistant Tree Officer at East Dorset District Council, where I stayed for three years before moving to North Dorset District Council to take up the post of Trees and Landscape Officer. I was the only officer dealing with tree issues at the authority and had responsibility for protected trees, planning related issues and council-owned trees. After four years, I moved to ADAS to take up the role of Lead Arboricultural Consultant within a multi-disciplinary team of ecologists, surveyors, soil and water engineers, and wildlife consultants. At ADAS, I worked on projects for various corporate clients in planning, transport, utility and local government. Although focusing mainly on tree risk related issues, I also had experience of managing large scale tree surveys and resolving conflicts between utility/transport providers and tree owners. Planning issues started to become more important and I worked with ecologists as part of a project team to provide solutions to landowners. I joined Barrell Tree Consultancy in February 2008, bringing my varied experience to this specialist practice.

3. **Continuing Professional Development:** I keep professionally current through subscription to professional/industry publications and by regular attendance at seminars and conferences. I have completed and passed the LANTRA Professional Tree Inspection certification (2007).

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10223-BT1

Location of trees, categorisation and illustrative protection/management proposals at Ahmad Tea, Chandlers Ford

BS category A	Trees worthy of being a material constraint	Trees to be removed	Estimated tree positions and crown spreads not included on original land survey
BS category B		Precautionary Area 1	
BS category C	Trees **not** worthy of being a material constraint	• Construction exclusion zone within protective barrier	Site boundary
BS category R		Precautionary Area 2	
		• Reconditioning of existing hard surfacing	Proposed Layout

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 2010. ©

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Provided Plan Refs: AHMEDT.dwg and 3446-SK002

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Appendix 4: Plan BT1 illustrating tree protection and management proposals

Explanatory notes for the enclosed plan

Plan BT1 is illustrative and based on the 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 should be confirmed at the pre-commencement meeting before any construction activity starts. Its base is the existing land survey with the proposed layout superimposed, so the two can be easily compared. It shows the existing trees numbered, with high categories (A & B) highlighted in green triangles and low categories (C & R) highlighted in blue rectangles. The trees to be removed are indicated with a red dashed crown outline.

Pocket content: 1 A1 plan

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Appendix 5: 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	Diameter (cm) Base	Maturity	Low branches	Category	Notes	Tree works
All retained trees									Crown clean and lift to 3–4m over site as necessary
G1	Sycamore, cherry, birch, oak	12	20		Maturing		C	Small slender trees, regeneration	
2	Oak	10	15		Maturing		C	Small slender tree	
3	Birch	18		90	Mature		C	Twin stemmed from base, ivy clad, leaning	Remove stem growing into site
4	Oak	20		45	Mature		B	Twin stemmed from base	Remove two minor stems growing over site
5	Oak	20		60	Mature		B	Tri-stemmed from base, wound on stem, two stems leaning and poor	
6	Goat willow	6	10		Maturing		C	Small, poor, leaning	Fell
G7	Goat willow, sycamore	10	20		Maturing		C	Poor, multi stemmed group	
8	Turkey oak	15	25		Maturing		B	Slender	
9	Oak	16	50		Mature		B		
10	Oak	14	45		Mature		C	Suppressed, low vigour	
11	Oak	18		150	Mature		B	Multi stemmed from base, ivy clad, minor deadwood	
12	Sycamore	14	55		Mature		C	One sided, close to oak	
G13	Hazel	8		100	Mature		C	Coppiced stool	
14	Oak	14		40	Mature		C	One sided, close to sycamore	
15	Ash	8	20		Maturing		C	Wound on stem, ivy clad	
G16	Goat willow, sycamore, alder, hawthorn	8	15		Maturing		C	Small trees, poor quality	
17	Sycamore	10	20		Maturing		C	Twin stemmed @ 1.5m, leaning on stream bank	
G18	Sycamore	5	<10		Young		C	Small trees	
19	Goat willow	6		65	Mature		C	Multi stemmed from base	
20	Birch	12	20		Maturing		C		
G21	Sycamore	14	15		Maturing		C	Dense line	
22	Horse chestnut	12	40		Mature		C	Multi stemmed at 1.5m, one sided	

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Appendix 5: Tree schedule and explanatory notes

Tree No	Species	Height (m)	Diameter (cm) @1.5m	Diameter (cm) Base	Maturity	Low branches	Category	Notes	Tree works
23	Whitebeam	8	20		Maturing		C		
24	White poplar	25	95		Mature		A	Multi stemmed at 2m	
25	Sycamore	16	45		Maturing		B	Multi stemmed at 3m, ivy clad	
26	Sycamore	18		65	Maturing		B	Multi stemmed, ivy clad	
G27	Sycamore	14		40	Maturing		C	Small, multi stemmed trees	
28	Rowan	14	30		Mature		B	Ivy clad	
29	Sycamore	14	40		Mature		B	Dense canopy, ivy clad	
G30	Sycamore	15	20		Maturing		R	Poor, in decline	Fell
G31	Hawthorn, sycamore, goat willow	6	15		Maturing		C	Approximately 20 stems of small trees	

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Appendix 5: Tree schedule and explanatory notes

Explanatory Notes

- **Abbreviations:**

G	: Group
RPA	: Root protection area
<	: Less than

- **Botanical tree names:**

Alder	: *Alnus cordata*
Ash	: *Fraxinus excelsior*
Birch	: *Betula pendula*
Cherry	: *Prunus avium*
Goat willow	: *Salix caprea*
Hawthorn	: *Crataegus monogyna*
Horse chestnut	: *Aesculus hippocastanum*
Hazel	: *Corylus avellana*
Oak	: *Quercus robur*
Rowan	: *Sorbus aucuparia*
Sycamore	: *Acer pseudoplatanus*
Turkey oak	: *Quercus cerris*
Whitebeam	: *Sorbus aria*
White poplar	: *Populus alba*

- **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.

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Appendix 5: Tree schedule and explanatory notes

- **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.
- **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 3–4m above the site, 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 Ullenwood Court, Ullenwood, Cheltenham, Glos GL53 9QS; phone 01242 522152; website www.trees.org.uk.
    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.

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Appendix 6: Advanced interpretation of tree data and explanatory notes

Tree No	Diameter (cm) @1.5m	Diameter (cm) Base	RPA radius (m)	RPA area (m^2)	Minimum barrier distance (m)	Explanation of any adjustment to the minimum barrier distance
G1	20		2.4	18	2.1	
2	15		1.8	10	1.6	
3		90	9.0	254	8.0	
4		45	4.5	64	4.0	
5		60	6.0	113	5.3	
6	10		1.2	5	1.1	
G7	20		2.4	18	2.1	
8	25		3.0	28	2.7	
9	50		6.0	113	5.3	
10	45		5.4	92	4.8	
11		150	15.0	707	13.3	
12	55		6.6	137	5.8	
G13		100	10.0	314	8.9	
14		40	4.0	50	3.5	
15	20		2.4	18	2.1	
G16	15		1.8	10	1.6	
17	20		2.4	18	2.1	
G18	10		1.2	5	1.1	
19		65	6.5	133	5.8	
20	20		2.4	18	2.1	
G21	15		1.8	10	1.6	
22	40		4.8	72	4.3	
23	20		2.4	18	2.1	
24	95		11.4	408	10.1	
25	45		5.4	92	4.8	
26		65	6.5	133	5.8	
G27		40	4.0	50	3.5	
28	30		3.6	41	3.2	
29	40		4.8	72	4.3	
30	40		4.8	72	4.3	
G31	20		2.4	18	2.1	

Explanatory notes

- **General:** The basic data listed in the first three columns above is identical to that listed in the tree schedule in Appendix 5. 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 made 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

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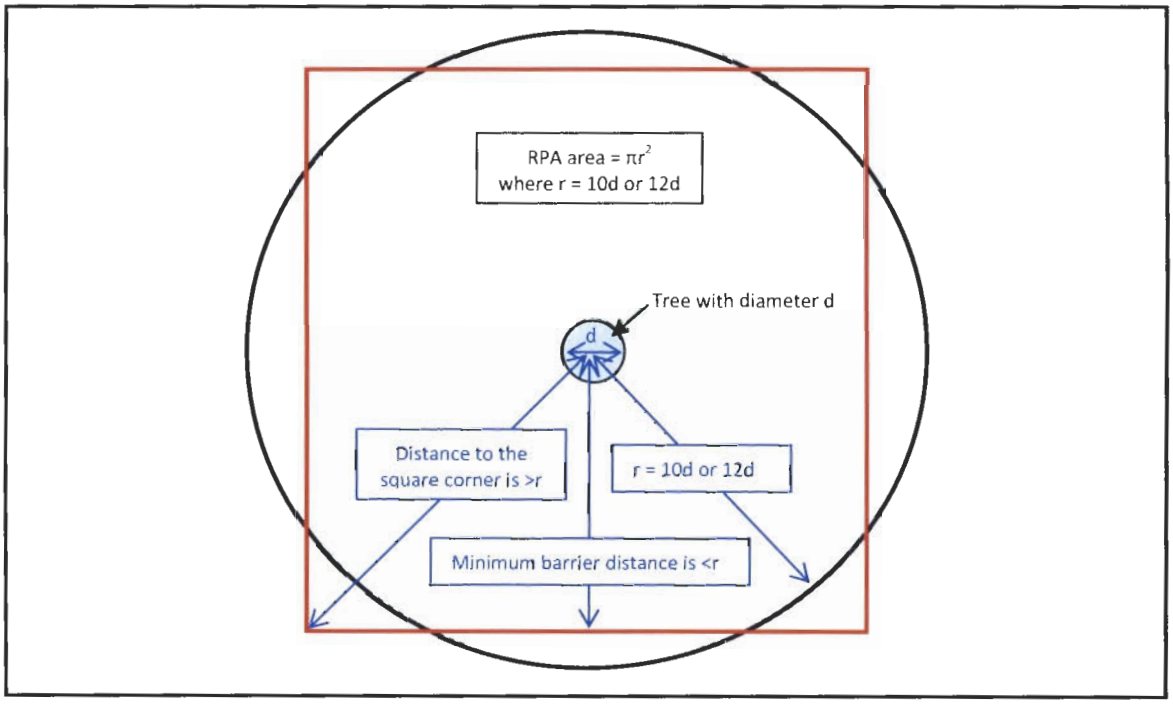
assessed by an arboriculturist. Where such an adjustment is appropriate and results in a reduced minimum barrier distance, it is noted in the last column of the table with a short explanation.

Figure 3: Explanatory diagram for RPA assessment



In Figure 3 above, 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 = πr^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.

CLARIFICATION NOTE ON RPA RADIUS: The RPA radius is not the automatic minimum distance of protection from the centre of the tree trunk. It is a notional figure purely for use as a means of calculating the actual area of the RPA. Relevant extracts from BS 5837 clarifying this include:

5.2.4 The RPA, for each tree as determined in Table 2, should be plotted on the TCP taking full account of the following factors, as assessed by an arboriculturist, which may change its shape but not reduce its area whilst still providing adequate protection for the root system.

7.1(c) NOTE 1 While the root protection area may be plotted as a circle on the constraints plan. the position of the barrier and any ground protection should be shown on subsequent plans as a polygon representing the actual position of the protection.

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Appendix 7: Illustrative specification for tree protection 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



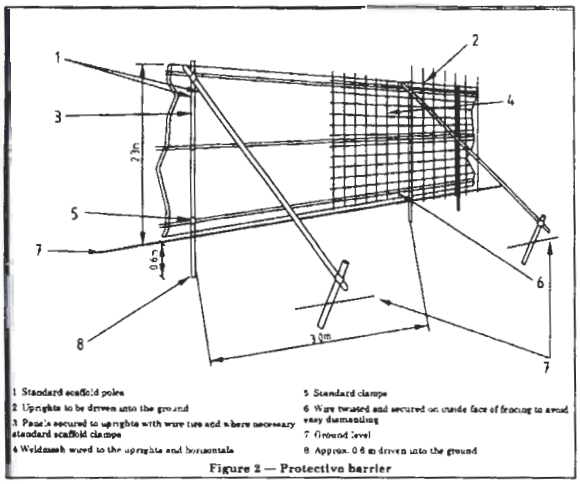
Board specification on secure wooden posts

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 LPA 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 the LPA.
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 LPA.
7 Barrier condition to be regularly monitored to ensure it remains effective.

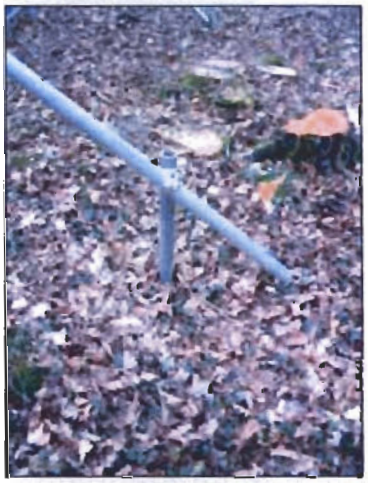
Recommendations taken from Figure 2 of BS 5837



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

Figure 2 — Protective barrier

Close up of bracing detail



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Appendix 7: Illustrative specification for tree protection barriers

Illustrative specification for low specification barriers near trees. **Note:** The final design must be site specific and detailed by an appropriately qualified expert.



Example of sign fixed to fencing



Example of sign fixed to fencing

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 chestnut paling.
4 Minimum barrier height is 1.3m unless otherwise agreed with the LPA.
5 Barriers should have clear signs attached at 20m intervals saying '**Keep Out - protected trees**' or a similar wording.
6 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 the LPA

Recommendations taken from Figure 4 of BS 5837 (1991)

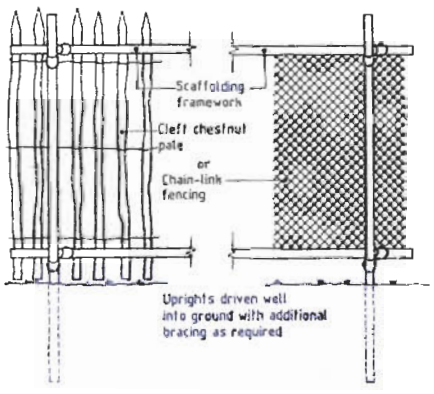

Figure 4. Protective fencing on scaffolding framework

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Appendix 8: Site guidance for working in 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 LPA 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 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 the National Joint Utilities Group (2007) Volume 4, Issue 1: *Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees*. It is interpreted in the context of our experience of managing trees on development sites.

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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.

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:

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Appendix 8: Site guidance for working in RPAs

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:

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

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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.

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 paviours 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 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

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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 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

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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.

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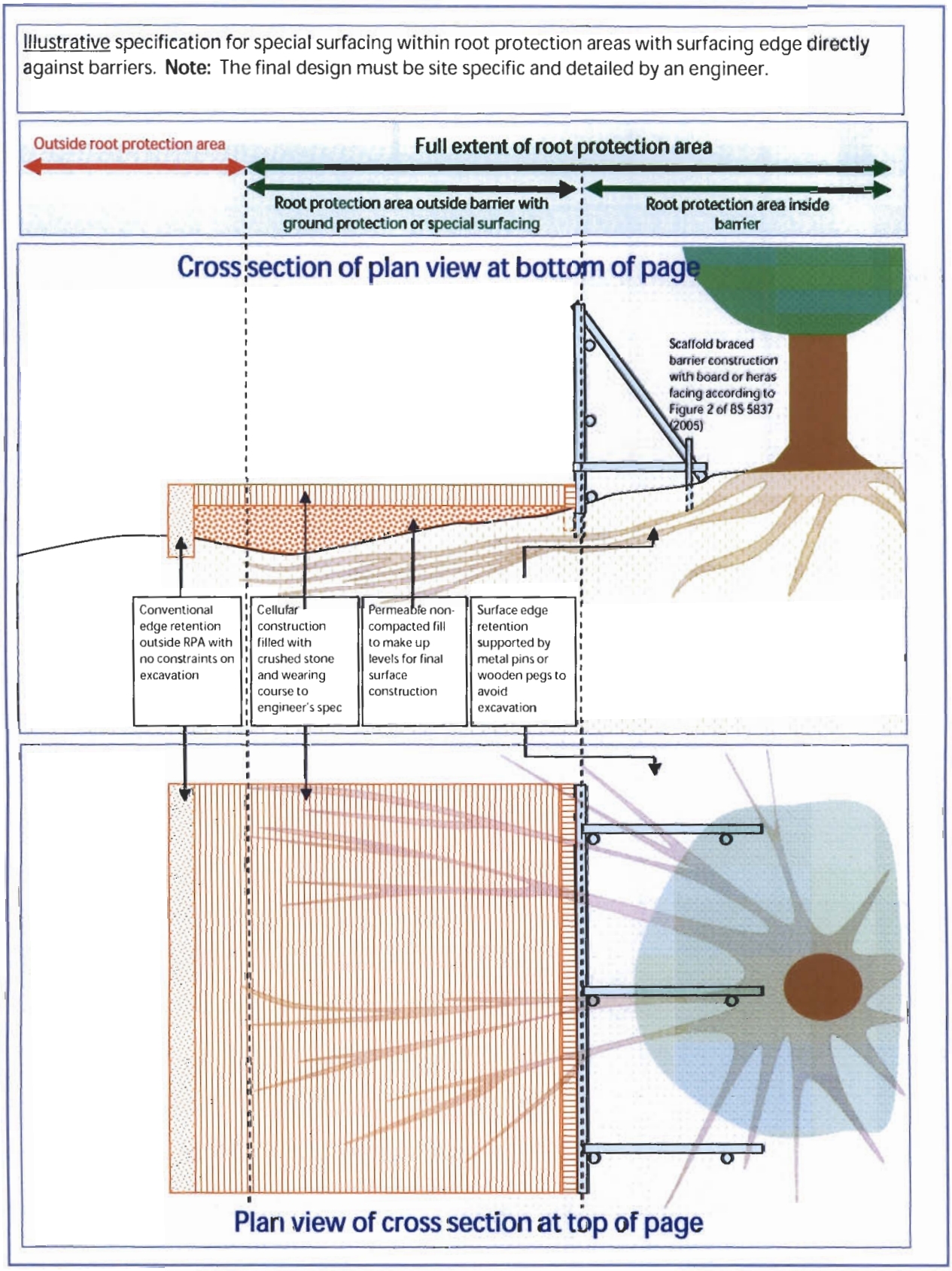
Appendix 9: Illustrative specification for special surfacing



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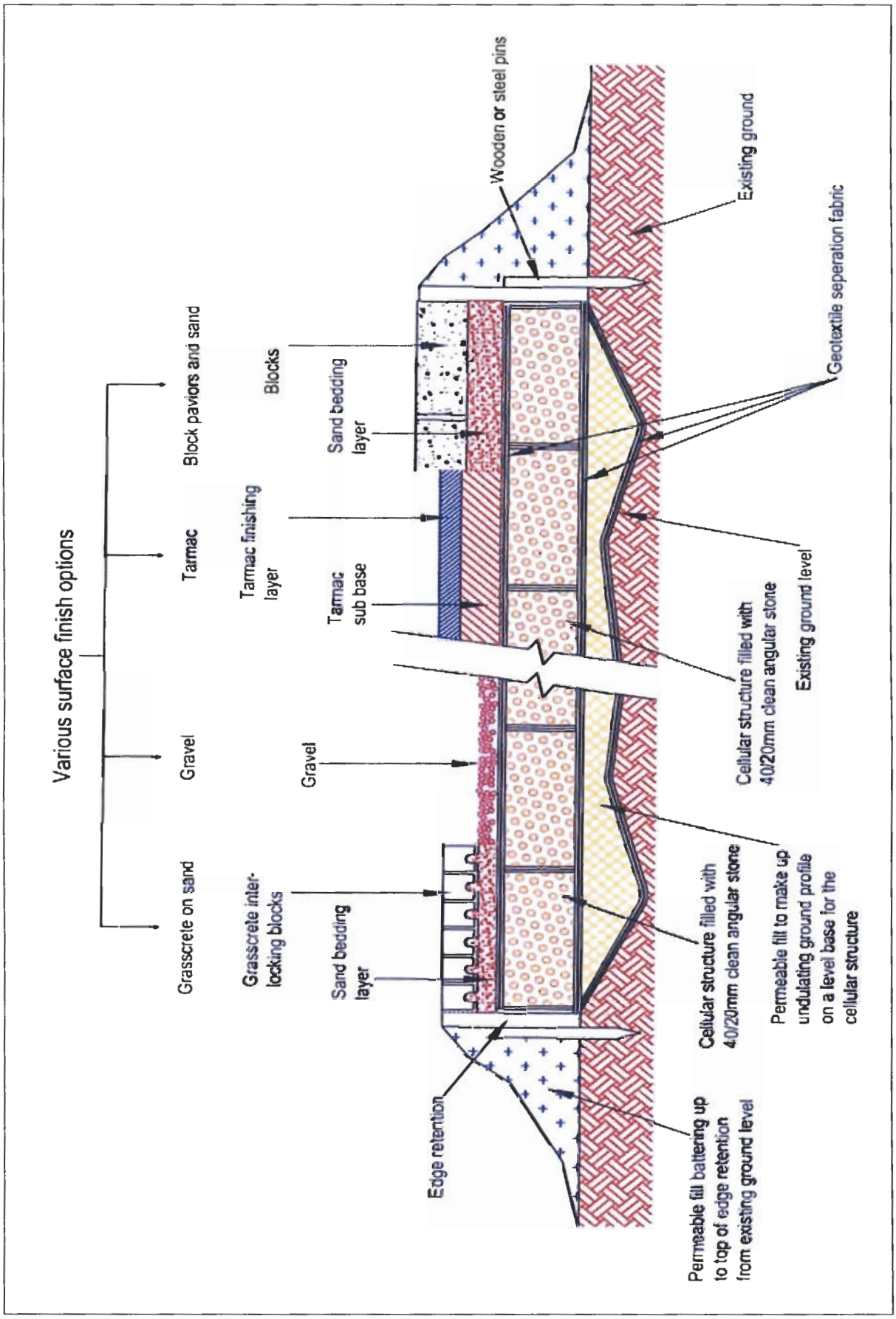
Appendix 9: Illustrative specification for special surfacing



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Appendix 9: Illustrative specification for special surfacing

CellWeb

Tree Root Protection System

GEOSYNTHETICS



fig. 1

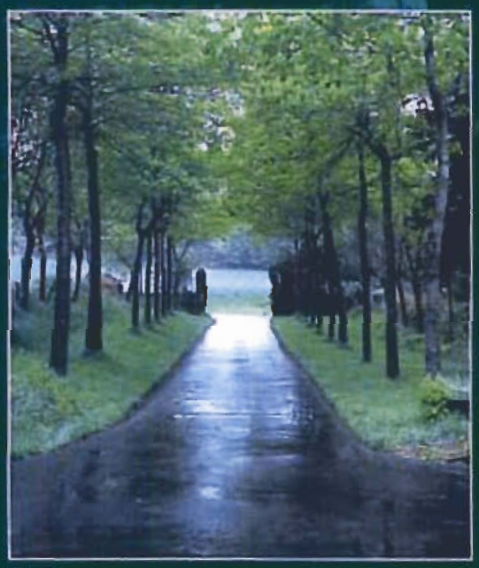

fig. 2

Problems associated with the construction of new developments around mature or any existing trees is well documented. BS5837 (1991) and later APN1 (1996) offer guidelines to those concerned with the protection of trees during the construction process.

The provision of car parking facilities and access roads around trees can lead to problems culminating in the premature loss of the tree itself unless preventative measures are taken to protect the tree roots during and after construction. *(fig. 1)*

Vehicular traffic above tree roots creates compaction of unconfined sub-soils causing oxygen depletion and even a loss of vital nutrients. Creating an impermeable surface above tree roots by installing a compacted sub base for load support also adds to these problems.

The solution is CellWeb, a three dimensional Cellular Confinement System that provides a load transfer blanket significantly reducing vertical loads on unprotected tree roots. *(fig. 2)*

Please contact:

Geosynthetics Limited
Fleming Road,
Harrowbrook Ind. Estate,
Hinckley, LE10 3DU.

Telephone: 01455 617139
Facsimile: 01455 617140 Email: sales@geosyn.co.uk

www.geosyn.co.uk

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Appendix 9: Illustrative specification for special surfacing

CellWeb

GEOSYNTHETICS

The CellWeb System uniquely prevents rutting action of sub-soils by confining infill material within the hoop structure of the panel, increasing the infills shear strength. The use of a CellWeb System increases the load capacity of granular infill by up to 50% reducing the overall construction depth required. Perforated cell walls permit through drainage and also provides frictional interlock of the infill again increasing the shear strength of the system.

A non woven geotextile filtration/separation membrane is used beneath the system to prevent migration of materials and also to aid with drainage vertically through the system.

The CellWeb panels are infilled with a clean angular gravel which provides load support and permits air and moisture transfer to the roots ensuring the long term preservation of the tree root structure. *(fig. 5)*

Surfacing materials are at the discretion of the client, however for specific advice please contact our sales office.

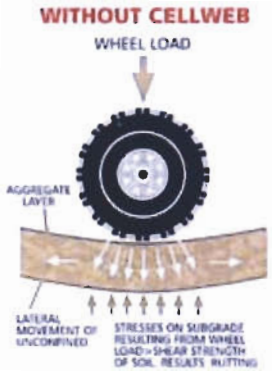


fig 3

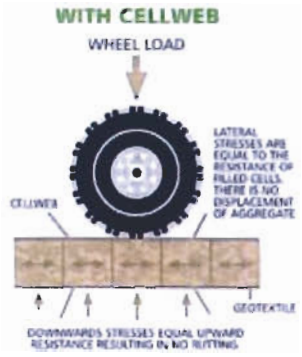
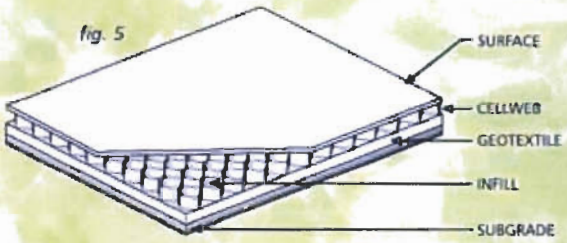


fig 4

Benefits of using CellWeb

- **Reduction in construction depth.**
- **Prevent compaction of sub-soils.**
- **Prevent oxygen/nutrient depletion.**
- **Environmentally friendly option.**
- **Fast and economic installation.**
- **Technical support available.**

fig. 5



CellWeb is available in four cell depths; 75mm, 100mm, 150mm and 200mm.

The cell depth required is dependant upon specific site conditions. For specification details or project specific design assistance please contact our sales office.

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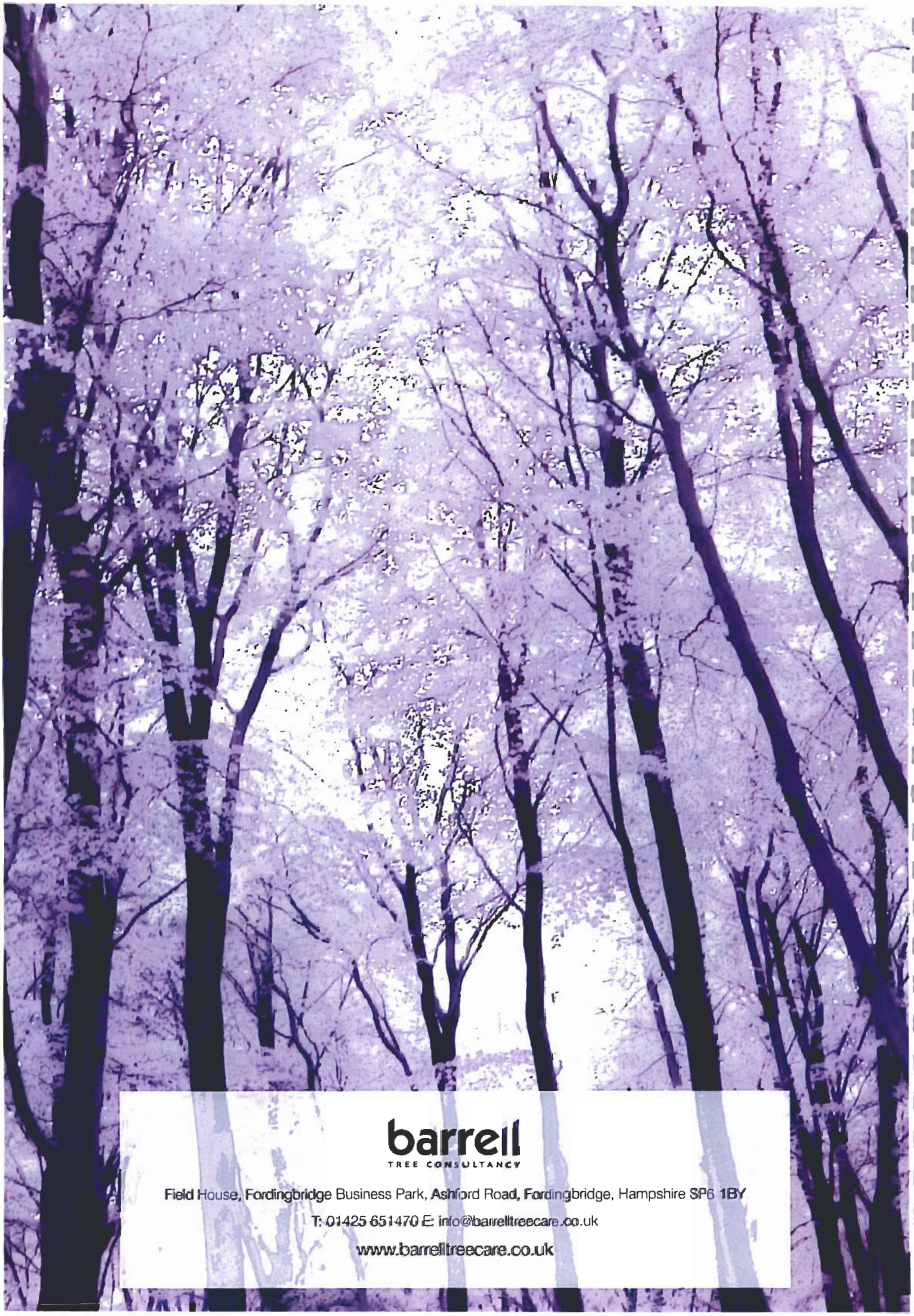

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