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Arboricultural Impact Appraisal and Method Statement

86, 92 & ~~94~~ London Road, Purbrook

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Arboricultural Impact Appraisal and Method Statement

86, 92 & 94 London Road, Purbrook

Prepared by
David Cashman DipArb(RFS) FArborA MICFor

Date: 26 August 2008
Ref: 8098-AIA2-DC

Validation statement for council 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, this report contains the following:

- A full tree survey compliant to the requirements of ***BS5837: (2005) Trees in Relation to Construction – Recommendations***
- Plan to a suitable scale, with north point, 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
- Survey and report undertaken by a qualified arboriculturist

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Summary

This development proposal is to construct six new dwellings on land severed from three existing gardens. I have inspected all the trees that could be affected and list their details in Appendix 3. Based on this information, I provided guidance to White Young & Green Planning Consultancy 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 a small number of trees that are all low category because of their poor condition or small size. 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 adverse impact on the contribution of trees to amenity or character in the wider setting.

David Cashman **DipArb(RFS) FArborA MICFor**

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1 INTRODUCTION

1.1 **Instruction:** I am instructed by Burton Properties Ltd to inspect the significant trees that could be affected by the development proposal at 86, 92 and 94 London Road, Purbrook, 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
- a preliminary arboricultural method statement setting out appropriate protective measures and management for trees to be retained

1.2 **Purpose of this report:** 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 BT2 is derived from the following provided information:

- Land survey provided by ADP Architects, drawing number 1106_07_11_01, received by email on 28 April 2008
- Layout, drawing number 1405-10 Rev A, received by email on 22 August 2008

1.5 **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

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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.

1.6 **Tree preservation order or conservation area protection:** I have not confirmed whether the trees on this site are *covered by* a tree preservation order or located in a conservation area. You must check this if you intend carrying out any works before a formal planning consent is issued. If there is any statutory protection, it will be necessary to consult with the council before any works other than certain exemptions can be carried out.

1.7 **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.

1.8 **Relevant background information:** My Colleague, Barrie Draper, previously prepared an arboricultural impact appraisal and method statement (Our reference, 8098-AIA-BD, with Plan BT1, dated 30 April 2008). Following comments from Mr Gargett, tree officer with the council, I met with my clients and the architect on site on 12 August 2008 to discuss Mr Gargetts comments, and to consider how the scheme could be revised to overcome his concerns. This updated report and Plan BT2 is a result of that meeting.

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2 THE EVOLUTION OF THE LAYOUT DESIGN

2.1 Site visits and collection of data

2.1.1 **Site visits:** My colleague Barrie Draper, initially visited site on 6 March 2008. He did not have access to all the trees and confined his observations of them from what was visible from within the garden area of number 92, and from the public open space to the rear of the gardens. The weather at the time of his inspection was dull, still and dry, with average visibility. In addition, I carried out a further site visit on 12 August 2008.

2.1.2 **Brief site description:** London Road is located in Purbrook, which is located to the south of the town of Waterlooville. Numbers 86, 92 and 94 are on the eastern side of the road and surrounded by similar residential development. The properties consist of large houses that are set to the front of good sized gardens. A variety of broadleaved and coniferous trees are located on or close to the eastern boundary, separating the gardens of the dwellings from the public open space beyond.

2.1.3 **Collection of basic data:** I inspected each tree and have indicated the numbering on plan BT2 in Appendix 2. I identified obvious hedges and groups where appropriate. For each individual tree, group and hedge, I collected information 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, 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 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.

2.1.4 **Specific observations of individual trees:** During the initial data collection, my colleague noted significant defects in the trees in group 9. Specifically, many of the trees within the group are multi stemmed, with tight forks and included bark unions. Additionally, other trees are severely unbalanced, due to competition with

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neighbouring trees. I can fully concur with his comments and I believe that these significant structural defects are particularly relevant in the contexts of the assessments and management recommendations in this report.

2.1.5 **Advanced interpretation of data:** 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 4.

2.2 **The use of the tree information in layout design:** Following my colleagues 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:

- **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.

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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.

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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 1: 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	-	-	1, 2, G3, 4, G5
Retained trees that may be adversely affected through disturbance to RPAs	Removal of existing surfacing/structures/ landscaping and/or installation of new surfacing/structures/ landscaping	-	-	-
Retained trees to be pruned	Space for development	-	-	H8, G9

Abbreviations: G = group; H = hedge

3.2 **Detailed impact appraisal**

3.2.1 **Category C trees to be lost:** Three individual trees (1, 2 and 4) and two groups (G3 and G5) to be removed are category C because they are so small that they are not worthy of influencing any layout. I believe they are not important in the overall planning context and their loss should not influence the determination of this application.

3.2.2 **Category C trees to be pruned:** One group (G9) and one hedge (G8) will require some limited pruning. Some of the longer branches growing over the site from group 9 have been recently pruned; this is something the residents have been planning for a while. Ideally, due to the poor structural condition of the majority of the trees within this group it would be better if pruning could be carried out to the whole of the group. As they grow within the public open space this would need the consent and co operation of the owners, which I understand to be the council. This work is required to ensure their long term sustainability and also provide acceptable levels of risk to incoming residents. The further works proposed are set out in Appendix 3 and would be justified for sensible arboricultural management irrespective of any development. Mr Gargett was initially concerned regarding shade and dominance issues from these trees to incoming residents. As a result, the dwellings have been re sited further away from the trees. In addition, the pruning and long term

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management of the trees, due to existing structural problems, will ensure that the trees do not dominate the rear gardens of the new dwellings. Furthermore, plot 5, which Mr Gargett raised as a concern, will enjoy uninterrupted southern and western daylight. Hedge 8 adjacent to the rear boundary has not been maintained for some time and it is now proposed to reduce this in height to maintain an even height hedge.

3.2.3 **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 trees in group 7. Whilst these trees have been shown for removal on plan BT2 and in the tree schedule, I do not believe their loss will be a direct result of implementing this development proposal and it would not be appropriate to consider that loss as an impact arising from the construction activity.

3.3 **Proposals to mitigate any impact**

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.

3.4 **Summary of the impact on local amenity:** This proposal will result in the loss of a small number of trees that are all low category because of their poor condition or small size. 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 adverse impact on the contribution of trees to amenity or character in the wider setting.

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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 must 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 (2007) Volume 4, Issue 1: *Guidelines for the planning, installation and maintenance of utility apparatus 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 BT2:** Plan BT2 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 (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. It also shows the locations of the proposed protective measures.

4.2 *Tree protection with barriers*

4.2.1 **Barriers:** Illustrative guidance for barrier design based on BS 5837 recommendations is included as Appendix 5. The approximate location of the barriers and the RPAs is illustrated on plan BT2 as set out on the plan key. The precise location of the barriers must be agreed with the council on site before any development activity starts.

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4.3 **Precautions when working in RPAs:** Any work in RPAs must be done with care as set out in Appendix 6. On this site, special precautions must be taken near group 9 if new landscaping is proposed and is summarised below:

1. **Installation of new soft landscaping:** Group 9 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 6.

2. **Installation of new services or upgrading of existing services:** My client and the architect have carefully considered this issue, especially following concern raised by Mr Gargett, and have confirmed that all underground services can be located outside RPAs of retained trees.

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 BT2 and all trees to be removed are indicated 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 **Programme of tree protection and supervision**

4.5.1 **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 7. 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.

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4.5.2 **Supervision and the discharge of planning conditions:** *Arboricultural planning* conditions cannot be reliably or effectively discharged without supervision by an arboricultural consultant. The framework in Appendix 7 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.

4.5.3 **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 site:** 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 visit:** A pre-commencement meeting must be held on *site before any of the 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

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will then form the basis of any supervision arrangements between the arboricultural consultant and the developer.

3. **Site supervision:** 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.

4.5.4 **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 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.

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5 HOW TO USE THIS REPORT IN THE PLANNING PROCESS

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 report:** 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 (4.5 and Appendix 7)
2. Barriers (4.2.1 and Appendix 5)
3. Installation of new landscaping (4.3, and Appendix 6)
4. Programming of tree protection (4.5 and Appendix 7)
5. Arboricultural supervision (4.5 and Appendix 7)

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 7 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.

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Appendix 1: Brief qualifications and experience of David Cashman

1 **Qualifications:** I hold the City and Guilds Certificate in Arboriculture, and the Royal Forestry Society's Professional Diploma in Arboriculture, which is the premier qualification within the Arboricultural Profession. I am a Fellow and Registered Consultant of the Arboricultural Association. I am a Chartered Forester and a member of the Royal Forestry Society.

2 **Practical experience:** I have worked in local government and commercial tree management for over 25 years. I started my career as an apprentice arborist at London Borough of Sutton where I gained valuable experience and practical skills in all aspects of arboriculture. In 1986, I was promoted to Assistant Arboricultural Officer (Technical) within the Borough. In 1987, I joined Aspan Leisure, a commercial tree company, where I managed a busy tree section dealing with private and council contracts across southern England. In 1988, I was founding partner of Oakwood Tree Services, a successful Arboricultural Association Approved Contractor that is still trading today. In 1993, I joined New Forest District Council where I stayed for 10 years as a Tree Officer. In addition to making and administering Tree Preservation Orders, my other duties included consulting on major development proposals, acting as an expert witness at planning inquiries and administering tree work contracts. In 2003, I joined Barrell Treecare as a practice consultant bringing my public sector planning expertise to the private sector.

3 **Relevant experience to this project:** During my service with New Forest District Council, I worked closely within a team including urban designers and landscape architects, providing detailed guidance to developers on major housing schemes. This gave me invaluable experience in balancing tree retention with new landscaping to create high quality residential developments.

4 **Continuing professional development:** I keep professionally current through subscription to the Arboricultural Advisory and Information Service and by regular attendance at seminars and conferences. I have presented workshops in New Zealand and frequently speak to UK audiences about trees in a planning context.

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Appendix 2: Plan BT2 illustrating tree protection and management proposals

Content: 1 A2 plan

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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	Diameter (cm) 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	Purple plum	7		30	Maturing		C1	Twin stemmed with fork failure	Fell
2	Fruit sp	4		28*	Maturing		C1	Small tree	Fell
G3	Fruit sp	<4	<16		Young		C1	Small trees	Fell
4	Laurel	7	35		Mature		C1	Small tree/shrub	Fell
G5	Fruit sp	<2	<16		Young		C1	Small trees	Fell
6	Eucalyptus sp	8	12		Young		C1	Small tree	
G7	Ash & sycamore	<10		40	Young		R	Multi stemmed with included bark	Fell
H8	Leyland cypress	<8		30	Maturing		C2		Reduce height to 4m to form an even height hedge
G9	Sycamore, ash, oak & field maple	<19	<40		Mature		C2	Tall drawn up form, some multi stemmed with tight forks, others with unbalanced crowns	Crown reduce height and spread by 20%. Reshape crowns, as appropriate
10	Sycamore	15		90	Mature		C2		

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Appendix 3: Tree schedule and explanatory notes

Explanatory Notes

- **Abbreviations:**

G	: Group
H	: Hedge
RPA	: Root protection area
>	: Greater than
<	: Less than

- **Botanical tree names:**

Ash	: *Fraxinus excelsior*
Eucalyptus sp	: *Eucalyptus* sp
Field maple	: *Acer campestre*
Fruit sp	: *Malus* sp, *Prunus* sp or *Pyrus* sp
Laurel	: *Prunus laurocerasus*
Leyland cypress	: x *Cupressocyparis leylandii*
Oak	: *Quercus robur*
Purple plum	: *Prunus cerasifera* 'Nigra'/'Pissardii'
Sycamore	: *Acer pseudoplatanus*

- **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.

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Appendix 3: Tree schedule and explanatory notes

- **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 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.

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Appendix 4: 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
1		30	3.0	28	2.7	
2		28	2.8	25	2.5	
G3	16		1.9	12	1.7	
4	35		4.2	55	3.7	
G5	16		1.9	12	1.7	
6	12		1.4	7	1.3	
G7		40	4.0	50	3.5	
H8		30	3.0	28	2.7	
G9	40		4.8	72	4.3	
10		90	9.0	254	8.0	

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.

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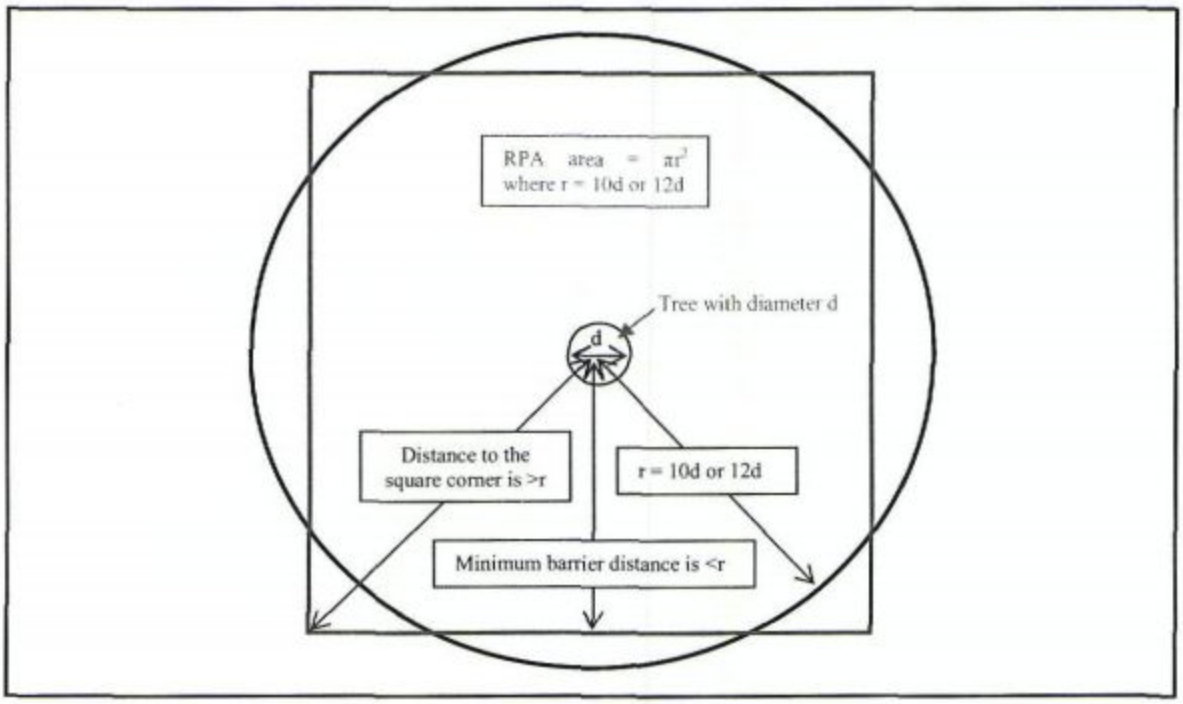
Appendix 4: Advanced interpretation of tree data and explanatory notes

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 = 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.

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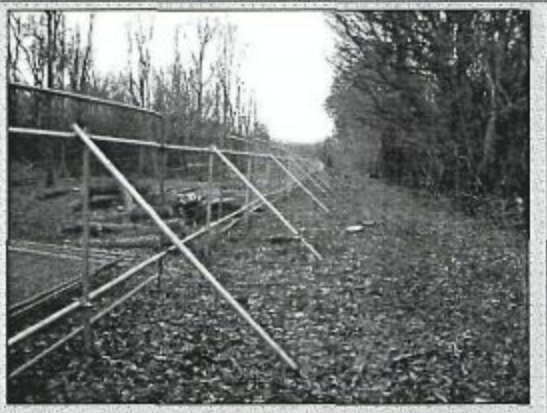
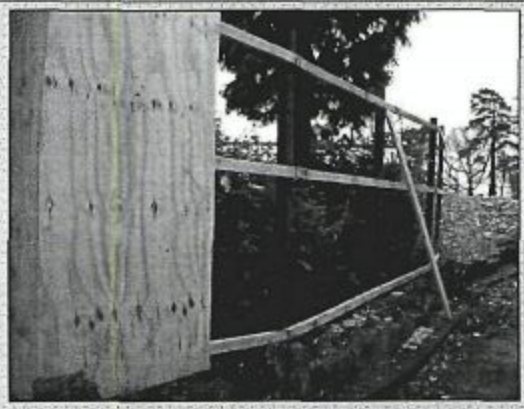
Appendix 5: Illustrative specification for tree protective barriers

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

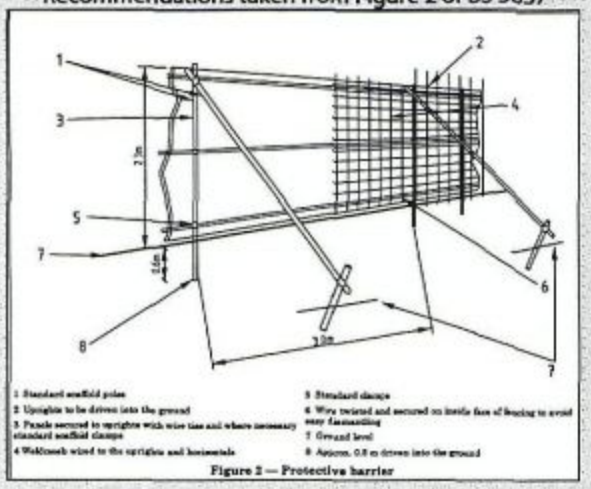


Figure 2 — Protective barrier

Close up of bracing detail



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Appendix 6: *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 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.

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.

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Appendix 6: 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:

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Appendix 6: 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.

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Appendix 6: 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 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 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

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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.

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Appendix 7: Programme of arboricultural input

Arboricultural action	Programming of action	Extent of arboricultural input	Nature of supervision	Signed off (Council use)
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	• Meeting on site • Review any updated proposals • Confirm tree protective measures are acceptable if already installed • Preparation of final plans and specifications for agreement by the council	Site meeting and letter/email	
Finalising tree protection proposals and installation for agreement by council	Before any heavy machinery enters the site	• 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/email	
Installation of new services	At the discretion of the developer	• Meeting with contractor for briefing before work starts with further visits as necessary, at the discretion of the arboricultural consultant	Site meeting and letter/email	
General landscaping	After barriers have been removed and new tree planting has been finished	• Meeting with contractor for briefing before work starts with further visits as necessary, at the discretion of the arboricultural consultant	Site meeting and letter/email	

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