



BJH.0458



ARBORICULTURAL IMPACT ASSESSMENT

for
land off Ranelagh Road, Havant

-prepared on behalf of Orchard Homes Limited –

- July 2012-

Bernie Harverson M.Arb.

3 foxcombe cottages • south harting • west sussex • GU31 5PL
tel: 01730 825297 • mob: 07875 520881 • email: bernie.harverson@virgin.net • VAT Reg No. 881 5056 16

ARBORICULTURAL IMPACT ASSESSMENT

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1.0 INTRODUCTION & CLIENTS BRIEF

- 1.1 This project involves the demolition of all of the sheds and stables blocks and hard surfacing and construction of a new residential layout on this site.
- 1.2 As part of this exercise the primary trees on and adjacent to the development site have been surveyed and will be referred to in this report.
- 1.3 In advising my client I am duty bound to comply with 'Best Practice' industry guidelines and to follow the recommendations contained in BS5837:2012 – Tree In Relation To Design, Demolition and Construction Recommendations – adopting the sequential approach illustrated in the *Figure 1 Flow Diagram – The design and construction process and tree care.*

2.0 DOCUMENT DISCLOSURE STATEMENT

- 2.1 The site layout proposals prepared by the clients Architects – **Sherlock Boswell - Ref: 1015-103-Rev Q. – July 2012 - 1:500 & A1** and I rely totally on the accuracy of this drawing for the purposes of my work on this project.

3.0 TOPOGRAPHICAL SURVEY & SOIL ASSESSMENT & TREE SURVEY & ROOT PROTECTION AREA (RPA) SCHEDULES & PLANS

- 3.1 A Topographical Survey has been undertaken and the drawing has been prepared, and to the best of my knowledge this accords with the requirements of BS5837 as listed at Section 4.2
- 3.2 No data has been made available to me in respect of a Soil Assessment.
- 3.3 The Tree Survey exercise was originally carried out for a previous submission in **June 2009** in accordance with the requirements of the then BS5837 2005 but has been checked and **verified (July 2012)** and partially adapted to meet the new BS5837:2012 (see copy of Schedule at **appendix BH1**).
- 3.4 The data obtained from the Tree Survey exercise has been utilised to prepare the Root Protection Area Schedule - in accordance with the requirements of BS5837:2012 – (see copy of RPA Schedule and tree survey and root protection plans BJH.01 & BJH.02 at **appendix BH2**).

4.0 CONSTRAINTS POSED BY EXISTING TREES – ASSESSMENT OF ABOVE AND BELOW GROUND CONSTRAINTS

- 4.1 The RPA's have been plotted onto a copy of the Draft Layout Proposals and the implications of the below ground impact on trees both on and adjacent to the development site has been recorded on the Tree Retentions and Removals Plan [see copy of Plan BJH.03 at [appendix BH3](#)] and this has been disclosed to the clients as part of the ongoing design process leading up to the submission of this report which is based on the Finalised Layout Proposals.
- 4.2 RPA's represent below ground constraints and the above ground constraints might arise from the following :-
- 4.2.1 ***The current and ultimate height and spread of the retained trees*** – in this situation the only mature tree of merit within the site itself is T7 – Oak and this tree is mature and has completed its main vigorous growth phase and will be expected to add minimal extension growth each year – its spread has been contained in the past so that it did not interfere with previous use of the site as an allotment garden - its location as shown in the new layout at the bottom of private rear gardens and behind a parking area in open grassed land means that it will not be a constraint in the future.
- 4.2.2 ***Species characteristics, including evergreen or deciduous, density of foliage, and factors such as susceptibility to honeydew drip, branch drop, fruit fall, etc.*** – on this site there is only one tree and some hedges to be retained and these are made up of deciduous tree species - these trees are all well spaced out and there is no dominant or oppressive sections of the site; tree crowns are not dense with foliage such that light cannot percolate through them as well as around them; to the best of my knowledge there are no other weaknesses or susceptibilities to be accounted for.
- 4.3 The BS warns that *'Whilst either shade or sunlight might be desirable, depending on the potential use of the area affected, the design should avoid unreasonable obstruction of light.* In this respect the BS suggests at *NOTE 1 'An indication of potential direct obstruction of sunlight can be illustrated by plotting a segment, with a radius from the centre of the stem equal to the height of the tree drawn from due north-west to due east, indicating the shadow pattern through the main part of the day.*
- It would only be necessary to undertake this exercise where shading is likely to be a significant or unacceptable issue with 'unreasonable obstruction of light' and this will not in my opinion be the case on this site. The site is open to the south side and the Oak tree T7 will block some of the early morning sunlight to two of the plots along Ranelagh Road but the majority of the sun's rotation from east to west during the main part of the day will be unobstructed.
- 4.4 The BS also lists the following factors as requiring to be taken into account during the design process:-

- 4.4.1 ***The presence of tree preservation orders, conservation areas or other regulatory protection*** – I am not aware of a Tree Preservation Order covering the Oak tree on this site but have at this juncture made no enquiries of my own in this respect as this is not part of my remit and in any event BS5837 will be the principle consideration for the planning process.
- 4.4.2 ***Potential incompatibilities between the layout and trees proposed for retention*** – these have already been explored in section 4.2 and 4.3 of this report or flagged up and dealt with in the draft Tree Retentions and Removals Plan submitted as part of the design process – the layout has been appropriately altered to accommodate these comments and there are now no major areas of potential conflict with the layout.
- 4.4.3 ***The working and access space needed for the construction of the proposed development*** – there are no constraints in this respect as the site is largely open and expansive with significant room to accommodate working and access arrangements for the construction phase.
- 4.4.4 ***The effect that construction requirements might have on the amenity value of trees, both on and near the site, including the effects of pruning to facilitate access and working space*** – there will not be a need to prune trees to facilitate access or provide working space – however, the construction of boundary fences means that several hedges and off site groups will need to be pruned back close to the boundary line to accommodate same – none of these groups/hedges is of significant merit and once pruned will readily adapt to their new situation without any long term detriment.
- 4.4.5 ***The requirement to protect the overhanging canopies of trees where they could be damaged by machinery, vehicles, barriers or scaffolding, where it will be necessary to increase the extent of the tree protection barriers to contain the canopy*** – it will not be necessary on this site to undertake ground clearance works or increase RPA's to counter for crowns which extend beyond them.
- 4.4.6 ***Infrastructure requirements in relation to trees e.g. easements for underground or above ground apparatus; highway safety and visibility splays; and other infrastructural provisions, such as substations, refuse stores, lighting, signage, solar collectors, satellite dishes and CCTV sightlines –***
- ***Easements for underground or above ground apparatus*** –there would appear to be ample room on this site such that all of this apparatus can be accommodated without it conflicting with tree RPA's and the route for services has been disclosed to me for consideration as part of this AIA and the location of drain runs and soakaways carefully considered in conjunction with Reuby Stagg Consultants and locations agreed where the impact on tree roots is kept to an absolute minimum. However, it is suggested that the best way to deal with this would be to have it under 'heads of terms' for the detailed Method Statement which will need to be submitted to satisfy a Planning Condition.
 - ***Highway safety and visibility splays*** – to the best of my knowledge there are no issues in this respect that affect tree cover.

- *Substations, refuse stores, lighting, signage, solar collectors, satellite dishes and CCTV sightlines* – no data has been made available to me for comment in relation to these issues and their potential for impact on retained trees although none is anticipated - it is suggested that the best way to deal with this will be to have it under 'heads of terms' for the detailed Method Statement which will need to be submitted to satisfy a Planning Condition.
- 4.4.7 *The proposed end use of the space adjacent to retained trees* – the arboricultural issues have all been discussed within this report and end use of space is not something in my opinion that can be determined by an arboriculturist as it is a subjective matter for my client and his architect to agree with the local authority planners to meet local plan and policy requirements – however having studied the layout I would comment that the buildings are well clear of retained trees and they have adequate and useable soft landscaped open space associated with them.
- 4.4.8 *The potential for new planting to provide mitigation for tree losses* – this site offers significant scope for establishing new tree planting and this would be shown on the Landscape Master Plan which I understand would be prepared in support of this application to satisfy a Planning Condition.

5.0 PROXIMITY OF STRUCTURES TO TREES

BS5837 states that the default position should be that structures are located outside the RPA's of trees to be retained. However, where there is an overriding justification for construction within the RPA, technical solutions might be available that prevent damage to the tree(s) and requires that if operations within the RPA are proposed, the project arboriculturist should:

- a) demonstrate that the tree(s) can remain viable and that the area lost to encroachment can be compensated for elsewhere, contiguous with its RPA
- b) propose a series of mitigation measures to improve the soil environment that is used by the tree for growth

- 5.1 This situation has been assessed as part of the Arboricultural Impact Assessment at 6.0 below and there are no circumstances that encroachment requires mitigation measures.
- 5.2 The BS also raises the issue of Shrinkable Soils and the need to cater for the potential for shrinkage or heave resulting from removed; retained or newly planted trees.
- 5.2.1 No soils information has been provided to me for consideration on this project so I am unable to offer any guidance and advice on this matter.
- 5.3 BS 5837 states that a realistic assessment of the probable impact of any proposed development should take account of the retained trees future growth and maintenance requirements to maximise the chances of successful tree retention. The following headings are listed and a realistic response is provided under each one relative to this specific development layout.

- 5.3.1 ***Shading of Buildings*** – there is no direct overhang of branches over building lines and whilst some sunlight percolation will be constrained during the morning by the Oak it will not be excessive or unacceptable in my view.
- 5.3.2 ***Shading of Open Spaces*** – none anticipated with this layout.
- 5.3.4 ***Privacy and Screening*** – the majority of the current tree cover is concentrated around the periphery of the development site leaving the central area largely open for redevelopment – as such the existing hedges will need to be supplemented with new planting.
- 5.3.5 ***Direct Damage*** – the new buildings and car parking and road infrastructure will be far enough away from existing trees that this will not be an issue.
- 5.3.6 ***Future Pressure For Removal*** – the new buildings will be far enough away from existing trees that this will not be an issue.
- 5.3.7 ***Seasonal Nuisance*** – this would be an issue on any site with trees on it – as far as the buildings are concerned some relief can be gained from placing grills in guttering and over down pipes – however the distance from trees to property is such that the major leaf fall would be within soft landscaped areas which is simply a seasonal inconvenience which cannot be avoided but is easily cleared away – I would not regard the tree cover to be so dense on this site that this would create a problem.
- 5.3.8 ***Indirect Damage*** – I am unable to comment on the potential for this to take place in the future as I have not been provided with a soils assessment.
- 5.3.9 ***Hard Standing (less than 20% within any RPA)*** – this will not be an issue on this site and where there is incursion within the RPA of a retained tree/hedge it will be mitigated by the use of ‘hand digging’ techniques and the application of porous wearing courses.

6.0 ARBORICULTURAL IMPACT ASSESSMENT

6.1 The finalised planning layout drawing has been provided and an assessment made as to the viability of retaining trees as part of this layout in order that they meet the RPA requirements of BS5837 - The data is presented here in tabular format:-

Key: **RSAM** = Remove for sound arboricultural management reasons **RTFD** = To be removed to facilitate development

UF of. = Under footprint of development **TRANS** = Transplant to an alternative location on site

Tree No	Species	Cat	Stem Diam mm	BS5837:2012 Radial Protection Area m	BS5837:2012 Polygon Area m ²	Distance from Site Features (see key above)	Can Tree Be Retained
1	Bay Laurel <i>Laurus nobilis</i>	B1	est 400	4.8	72	1.5m to parking bays 5m to new building	YES
2	Cherry <i>Prunus spp.</i>	R	170	n/a	n/a	n/a	NO – RSAM
3	Apple <i>Malus domestica</i>	C1	est 400	4.8	72	3m to new building	NO – RTFD
H1	Hawthorn Holly Elderberry	B2	est 350	4.2	55	3.5m to new parking bays 4m to 9m to buildings Central portion is under footprint of development	YES – 70% NO – RTFD – 30%
4	Plum <i>Prunus domestica</i>	C1	150	1.8	10	5m to new building	NO – RTFD
5	Sycamore <i>Acer pseudoplatanus</i>	C1	200	2.4	18	UF of new build	NO – RTFD
6	Sycamore <i>Acer pseudoplatanus</i>	C1	est 400	4.8	72	UF of new build	NO – RTFD
7	Pedunculate Oak <i>Quercus robur</i>	B1	est 800	9.6	290	8.5m to new parking bays 11m to new building	YES (1)
Grp 1	Sycamore x 2 Beech x 2	B2	450	5.4	92	7m to new parking bays 11m to new building	YES

Tree No	Species	Cat	Stem Diam mm	BS5837:2012 Radial Protection Area m	BS5837:2012 Polygon Area m ²	Distance from Site Features (see key above)	Can Tree Be Retained
8	Sycamore <i>Acer pseudoplatanus</i>	B1	800	9.6	290	Clear of development	YES
Grp 2	Ash x 3 Sycamore x 2	B2	500	6.0	113	Clear of development	YES
9	Goat Willow <i>Salix caprea</i>	C1	250	3.0	28	UF of new build	NO – RTFD
10	Sycamore <i>Acer pseudoplatanus</i>	B1 / C1	est 500	6.0	113	9m to parking bays 9m to buildings 3m to turning head	YES (1)
Grp 3	Sycamore Elderberry Cherry	C2	250	3.0	28	Avg 7m to new buildings Off site tree is over 10m distance	NO – RTFD YES for off- site tree
Grp 4	Hawthorn Law. Cypress Birch	B2	est 400	4.8	72	3m to 4m to parking bays	YES (1)
Grp 5	Ash x 4	C2	400	4.8	72	UF of new build	NO – RTFD
Grp 6	Field Maples	B2	est 400	4.8	72	10m to buildings 1m to Acoustic Fence	YES (1)
H2	Hawthorn Elderberry Holly	B2	est 400	4.8	72	5m to parking bays 8m to building	YES (1)
H3	Hawthorn Elderberry	B2	est 400	4.8	72	UF of new build	NO – RTFD
H4	Hawthorn Field Maple Elderberry	B2 / C2	est 400	4.8	72	9m to buildings 1m to Acoustic Fence	YES (1)

6.2 NO – RSAM

- There is only **1** tree in this category on this project.

T2 – Cherry – as the tree survey shows this is a dead tree

6.3 NO – RTFD

- There are some trees and groups and hedges which it is intended would be removed to facilitate development – **T3; 4; 5; 6 & 9 – H1 (30%), H3 + Grp3 & Grp5 :-**

T3 – Apple – a middle aged tree of very poor quality tree with canker and ivy smothering.

T4 – Plum - a young tree that has been heavily topped out and is of very poor quality.

T5 – Sycamore – a young self sown tree that is entwined in the chain link fencing – of very poor quality.

T6 – Sycamore – a young self sown tree that is entwined in the chain link fencing – of very poor quality.

T9 – Goat Willow – a middle aged multi-stemmed tree which covers a large surface area and has been extensively damaged by horse browsing – a very poor quality tree.

H1 – Mixed Deciduous Species- a mature hedge of varying quality and height throughout but which with some formative pruning could be restored to a good hedge again – approximately **30% of the hedge** would have to be removed to create a road access to the south section of the development site – this is not a significant amount and will not detract from the visual amenity value afforded by the hedge line + the section to the rear of Plots 11 to 14 can be replanted.

H3 - Mixed Deciduous Species- a mature hedge of varying quality and height throughout that is in reasonable condition and moderate B graded –this hedge would need to be removed to facilitate the preferred layout- it is positioned to the back of the site and not visible from appoint of public access so the loss will not be significant and can be readily compensated by new planting.

Group 3 – Mixed Species – a scattering of small young trees along the boundary line which are of very poor quality and limited value – the best tree of the group is the off-site conifer and this can be retained but pruned back closer to the boundary line.

Group 5 – Ash x4 of – a collection of trees that are within the horse compounds and have been very badly damaged by horse browsing of the bark as well as the construction that encases them both the concrete slab and the corrugated panels secured to them – these are not good quality trees and have a limited life expectancy regardless of redevelopment proposals.

6.4 **YES**

These trees, groups and hedges can all be retained and afforded full protection measures in accordance with BS5837 requirements – see TPP plan:-

T1 – Bay Laurel; T8 – Sycamore; H1 – Mixed Species (70%); Grp1 - Sycamore x 2 & Beech x 2; Grp 2 – Ash x3 & Sycamore x 2 & Grp 3 - Conifer

6.5 **YES (1)**

- There is **1 tree; 2 groups and 2 hedges** in this category on this project which can be retained and safeguarded subject to special provisions being made :-
T7 – Pedunculate Oak – there is very minimal incursion into the RPA by new parking bays to the south side of this tree – this is not sufficient to justify whole sections of no dig parking and can readily be dealt with by ‘hand digging’ this zone and cleanly severing roots up to 25mm diameter under the monitoring of an arboricultural expert.

Grp 4 – Hawthorn/ Cypress & Birch – there is very minimal incursion into the RPA by new parking bays to the west side of these trees – this is not sufficient to justify whole sections of no dig parking and can readily be dealt with by ‘hand digging’ this zone and cleanly severing roots up to 25mm diameter under the monitoring of an arboricultural expert.

H2 – Hawthorn/ Elder & Holly – there is very minimal incursion into the RPA by new parking bays to the west side of these trees – this is not sufficient to justify whole sections of no dig parking and can readily be dealt with by ‘hand digging’ this zone and cleanly severing roots up to 25mm diameter under the monitoring of an arboricultural expert.

H4 – Hawthorn/ Field Maple /Elder & Grp 6 – Field Maples – in both instances it will be necessary to install an Acoustic Fence hard up against these hedges lines – this will entail heavy pruning back in the first instance and then hand digging of post holes at strategic spacings to avoid contact with surface roots – the full details of this operation can be covered in a Method Statement to satisfy a Planning Condition.

7.0 **TREE PROTECTION PLAN**

7.1 The Tree Protection Plan (TPP) has been superimposed on the layout plan based on the topographical survey.

7.2 The plan clearly indicates the location of protective barriers to form a Construction Exclusion Zone around the retained trees.

- 7.3 The TPP has been annotated with descriptive text where possible and additional information prepared as a separate text document where necessary that must accompany the Plan at all stages e.g. when handed to the Site Manager.
- 7.4 Where there is a need for Ground Protection this has been clearly indicated and a specification provided for same.
- 7.5 The following is a list of factors that BS recommends need to be considered to avoid disturbance to the barriers during the construction process and this list has been provided to the clients Architect and where responses have been received these details will have been addressed and incorporated on the Tree Protection Plan or in the text document – in the event that issues have not been satisfactorily resolved at this juncture it is suggested that the Planning Authority seek detailed responses as part of any Method Statement submission under Reserved Matters/Planning Conditions:-
- a) site construction access
 - b) the intensity and nature of the construction activity
 - c) contractors car parking
 - d) phasing of construction works
 - e) the space needed for foundation excavations and construction works
 - f) the availability of special construction techniques
 - g) the location and space needed for all temporary and permanent apparatus and service runs, including foul and surface water drains, land drains, soakaways, gas, oil, water, electricity, telephone, television or other communication cables
 - h) all changes in ground level, including the location of retaining walls, steps and making adequate allowance for foundations of such walls and backfillings
 - i) working space for cranes, plant, scaffolding and access during works
 - j) space for site huts, temporary toilet facilities (including their drainage) and other temporary structures
 - k) the type and extent of landscape works which will be needed within the protected areas, and the effects these will have on the root system
 - l) space for storing (whether temporary or long term) materials, spoil and fuel and the mixing of cement and concrete
 - m) the effects of slope on the movement of potentially harmful liquid spillages towards or into protected areas.

8.0 NEW PLANTING DESIGN

- 8.1 As an arboriculturist my level of expertise does not extend to Landscape design which is a specialist area requiring expert input from a Landscape Architect who will have been appointed to prepare a scheme to satisfy a Planning Condition.
- 8.2 Even if there are no trees on the site, areas for future planting should be plotted and protected from damage, especially soil compaction due to construction activity, by the erection of barriers and/or ground protection. Where such pre –development protection is not implemented, prior remediation measures should be employed, such as soil ripping with a winged-tined plough or subsoil aeration. In practice this is extremely difficult to implement and the best that can be hoped for is that the ground is adequately protected and then appropriate de-compaction, aeration and mulching undertaken at the completion of works during the soft landscaping works phase. The TPP may where appropriate indicate notional areas outside the RPA's where appropriate ground protection measures might be implemented to protect the ground during the course of demolition and construction works in anticipation of subsequent new tree planting.

9.0 ARBORICULTURAL METHOD STATEMENT – Heads of Terms

- 9.1 At the Planning Application stage BS5837 requires that the arboriculturist is to identify any areas where the ability to achieve a successful outcome for retained trees on a development site can be defined in principle. Then under 'Heads of Terms' list those areas where more detailed input from other specialists is required and/or where more technical information is required to be submitted to satisfy Reserved Matters / Planning Conditions.
- 9.2 ***Above Ground Formed – Pile and Beam Footings*** – not necessary on this project and all footings can be standard open slit trench excavations.
- 9.3 ***'Ground Protection Measures'*** – there will definitely be a need for ground protection in places and this has been dealt with in this report and shown on the Tree Protection Plan.
- 9.4 ***Utility Service Connections*** – full details of location and depth have to the best of my knowledge been covered in the Reuby Stagg report that accompanies the application and there are no areas of major conflict to deal with.
- 9.5 ***Highway safety and visibility splays*** – not applicable to this project.
- 9.6 ***Site Huts/Toilets/Materials Storage & Site Compound/Cement Mixing Area*** - full details are not available at this stage and may need to be addressed within a separate Method Statement to satisfy a Planning Condition.

- 9.7 *Substations, refuse stores, lighting, signage, solar collectors, satellite dishes and CCTV sightlines* - full details are not available at this stage and may need to be addressed within a separate Method Statement to satisfy a Planning Condition.
- 9.8 *Landscape Plan* – required and has to the best of my knowledge been submitted with the planning application.
- 9.9 *Site Monitoring Program* – to be carried out by an appointed arboricultural expert with an auditable system of recording visits and events noted – to be supplied to satisfy a planning condition.

10.0 BARRIERS AND GROUND PROTECTION & SITE MONITORING

- 10.1 All trees that are being retained on site are to be protected by barriers and/or ground protection before any materials or machinery are brought onto site, and before any development or stripping of soil commences.
- 10.2 Barriers are to be 'Fit For Purpose' to exclude demolition/construction activity and must be maintained to ensure that they remain rigid and complete and in the original setting out positions.
- 10.3 The default position will always be to erect fencing to the standard illustrated at Figure 2 (see drawing and specification at [appendix BH4](#)).
- 10.4 Where site circumstances and associated risk of damaging incursion into the RPA do not necessitate the default level of protection, an alternative specification will be agreed and deployed.
- 10.5 Where the fencing is to be erected over retained hard surfacing (whether temporary or permanent) it may not prove feasible or is undesirable to drive pins or struts down through the surfacing and through protected tree roots with the resultant high risk of damage. In these circumstances it will be appropriate to erect scaffolding as illustrated at Figure 3 (see drawing and specification at [appendix BH4](#)).
- 10.6 Where construction working space or temporary construction access is justified within the RPA, this will be facilitated by a set-back in the alignment of the protective fencing and the appropriate levels of Ground Protection laid. It is possible in certain circumstances to retain the existing hard surfacing to act as ground protection but where open ground has to be protected one of the following specifications will be applied :-
For Pedestrian Movements Only – a single thickness of scaffold boards placed either on top of a driven scaffold frame, so as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100mm depth of woodchip), laid onto a geotextile membrane.
For Pedestrian Operated Plant up to a gross weight of 2 tonnes – proprietary inter-linked ground protection boards placed on top of a compression resistant layer (e.g. 150mm depth of woodchip), laid onto a geotextile membrane.

For Wheeled or Tracked Construction Traffic exceeding a gross weight of 2 tonnes – an alternative system (e.g. proprietary systems of pre-cast reinforced concrete slabs) to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.

- 10.7 In any event the appropriate levels of protection for either Protective Fencing or Ground Protection will be illustrated and specified on the Tree Protection Plan and in its accompanying text.
- 10.8 A copy of the Tree Protection Plan is to be pinned up in the offices/mess hut on site for all site staff to see. The area within the fenced off exclusion zone is to be regarded as **sacrosanct** and the fencing shall not be taken down or relocated at any time without the prior written approval of the monitoring arboriculturist or local authority tree officer, unless this has already been agreed as part of the planning application consent process and is detailed in writing and shown on a plan.

The following prohibitions shall apply within the area enclosed by the Tree Protection Fencing :-

- **No** mechanical digging or scraping once the initial ground cover vegetation has been cleared and the site fenced off.
 - **No** storage of plant, equipment or materials
 - **No** vehicular or plant access
 - **No** fire lighting
 - **No** handling, discharge or spillage of any chemical substance, including cement washings
 - **No** action likely to cause localised water-logging
 - **No** change in ground levels
- 10.9 In addition any materials whose accidental spillage would cause damage to a tree are to be stored, handled or mixed well away from the outer edges of a retained trees RPA or if this is unavoidable then appropriate polythene sheeting must be laid to prevent soil contamination.
 - 10.10 It will be very important for any vehicle drivers to have undergone a pre-contract induction session where the trees to be retained are to be highlighted and the need for care and attention when working nearby with wide loads; tall loads; plant with swinging booms, jibs and counterweights (including drilling rigs) or slewing hydraulic arms to avoid contact with trunks or crowns.

10.11 Site Monitoring –

- BS5837 recommends that wherever trees on or adjacent to a site have been identified within the tree protection plan for protection measures, there should be an auditable system of arboricultural site monitoring and this is referred to under Reserved Matters/Planning Conditions in Table D1.
- This should extend to direct arboricultural monitoring whenever construction and development activity is to take place within or adjacent to any RPA.
- Existing planning regulations include the provision for local authorities to enforce planning requirements so it is important that local authorities recognise the need to include a Condition to require the supply and approval of an auditable system of arboricultural site monitoring.
- The project arboriculturist appointed by the developer can help monitor site activity, but enforcement is the responsibility of the local authority.
- In this instance I recommend at least one pre-start meeting – prior to the Construction Phase - which should be held out on site with the Contracts Manager to inspect the protective fencing and ground protection measures to verify that they are fit for purpose and in the correct location according to the Tree Protection Plan.
- Further meetings could be at agreed intervals for the duration of the works on site or as required by the Client to address any issues which may arise.

11.0 DEMOLITION AND CONSTRUCTION IN PROXIMITY TO EXISTING TREES (general points)

11.1 Demolition –

- There is Demolition work on this project but it represents no risk to tree cover.

11.2 Construction –

- Whilst the default position is to exclude all excavation works from within the RPA of a tree that is to be retained under certain situations where it is agreed with the local authority some 'Hand Digging' work may be permitted.
- Roots, whilst exposed are to be immediately wrapped or covered to prevent desiccation and to protect them from rapid temperature changes. Any wrapping will be removed prior to backfilling, which is to take place as soon as practical after the initial exposure.
- Roots smaller than 25mm (Section 7.2.3 of BS5837) diameter are to be pruned back, making a clean cut with a suitable sharp tool (e.g. bypass secateurs or hand saw), except where roots occur in clumps. Roots occurring in clumps or of 25mm diameter or more are only to be severed after consultation with and approval from an arboriculturist, as such roots might be essential to the tree's health and stability.

- Prior to backfilling the retained roots are to be surrounded with topsoil or uncompacted sharp sand (builders sand is not suitable as it is high in salt content which is toxic to trees), or other loose inert granular fill, before soil or other suitable material is replaced. This material is to be free of contaminants and other foreign objects potentially injurious to tree roots.

12.0 SITE WORKS, LANDSCAPE OPERATIONS AND MANAGEMENT

- 12.1 Any soft landscape works within the protected areas shall be carried out in accordance with Section 8 of BS5837 and BS4428 & BS8545.
- 12.2 On completion of all building works and immediately prior to landscaping works being undertaken and with the agreement of the LPA Tree Officer the Protective Fencing may be removed and the area within opened up for soft landscaping and final surface treatments.
- 12.3 At this juncture appropriate de-compaction, aeration and mulching should be undertaken on any areas designated for planting, which for practical operational reasons could not be fully protected during the build process.
- 12.4 This is to be hand excavation works only with no machinery being used unless specific ground protection has been laid. Even then only lightweight mini excavators are to be permitted access.

13.0 TREE MANAGEMENT

- 13.1 Based on the finalised layout for the development a schedule of tree works listing all trees that require work as follows :-
- Trees for removal to enable development to take place
 - Remedial tree works, including those required to establish acceptable levels of risk and management in the context of the proposed land use
 - Access facilitation pruning
- 13.2 The Tree Works Schedule forms part of this report and is included at [appendix BH5](#).

14.0 CONCLUSIONS

- There will be some tree and hedge loss on this project in order to facilitate development but these are all poor quality trees and the high levels of replanting works that are shown will more than adequately compensate the losses.
- The primary feature tree on this site is the Oak T7 and this can be afforded adequate levels of protection such that its health and safety will not be compromised.
- Provided that the protection measures outlined in this report and in any subsequent Method Statements are strictly adhered to and an adequate level of arboricultural monitoring takes place then the retained trees and hedges would survive the development and continue to grow on safely and healthily in the future.
- Overall it is felt that in arboricultural terms a case has been made for this development to proceed and the proposals are therefore fully supportable.

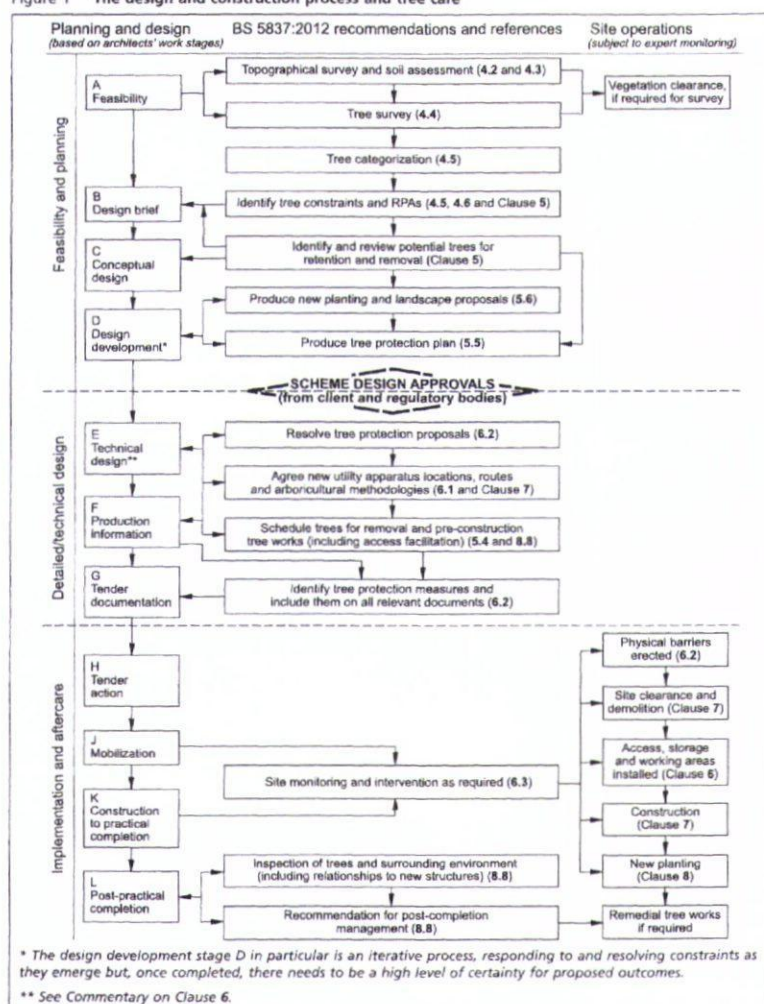


BH 1

Tree Survey Schedule

with Figure 1 Flow Diagram & Tree Survey Notes

Figure 1 The design and construction process and tree care



TREE SURVEY NOTES

These Tree Survey Notes have been prepared in accordance with the recommendations of **British Standard 5837:2012** and they define the criteria for pre-development tree surveys.

- Each tree/group/hedge/shelterbelt/woodland has been allocated a unique number (**No.**), where specifically requested and appropriate fees are agreed small durable numbered metal tags can be applied to each tree/group surveyed.
- The tree species (**Species**) is provided in both English and Latin name formats.
- Height assessments (**Ht**) are estimated in metres. This will be adequate for the majority of cases, but where accurate heights become a critical issue it may be necessary to return to site, as a separately commissioned exercise, to collect accurate measurements with the aid of optical instruments.
- Trunk/stem diameters (**Diam**) are measured in millimetres **at 1.5m above ground level** – where the tree is inaccessible the diameter is estimated as indicated by suffix #
- Radial crown spread assessments (**Brch Sprd**) are estimated in metres from the centre of the trunk/group to each of the four primary points of the compass (**N**-north; **E**-east; **S**-south and **W**-west) in order to achieve a representation of the crown shape which will be shown on the accompanying tree survey plan. These provide a general guide as to the main bulk outline of a tree/groups crown but **are not tape measured dimensions**. These would only be undertaken as part of a separately commissioned exercise, where precise dimensions are critical to the project at hand.
- Both the canopy ground clearance (**GC**) and the height & compass direction of the lowest major branch (**LMB**) are estimated and shown in metres
- An assessment of a tree/groups 'life stage' (**LS**) is made in terms of its site specific maturity as part of the surrounding landscape, taking into account its overall shape and form in that setting, and is recorded thus :-
Y - Young tree/group; **SM** - Semi-Mature tree/group; **EM** - Early-Mature tree/group;
M - Mature tree/group; **OM** - Over-mature tree/group
- Data on the structural condition (**Condition Comments**) of the tree/group is provided to give its visual appearance and any significant health and safety issues.
- Details of any recommended tree works required at the time of survey is given under the heading – **Preliminary Management Recommendations**.
- An estimate of a tree/groups remaining contribution in years (**RC**) is made and is recorded thus :-
0-5; 5-10; 10-20; 20-30; 30-40 or >40 years.
- The category grading (**Cat**) for each tree/group is assessed according to the criteria provided within **BS5837:2012**. The assessment is made of the tree/group in its current condition and within the

environment encountered bearing in mind its suitability for retention as part of any future proposed development; although the exact layout detail of any specific scheme will not be known at the time of surveying. The trees have been classified into one of four categories and colour coded as BS5837 recommends :- **■** (dark red); **■** (light green); **■** (mid-blue) and **■** (grey). Please note that suffixed numerical sub-categories are also applied for guidance only and do not carry any cumulative or increased value for the tree/group. This colour coding scheme will be applied to all drawings provided.

Table 1 – Cascade chart for tree quality assessment

Category and definition	Criteria			Colour on plan
Trees unsuitable for retention				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years.	- Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (i.e. where, for whatever reason the loss of companion shelter cannot be mitigated by pruning) - Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline - Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve.			Dark Red
Trees to be considered for retention				
	Criteria – Subcategories			
	1	2	3	
Category A Trees of high quality with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual, or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and /or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	Light Green
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years	Trees that might be included in the category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value	Mid Blue
Category C Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value, and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value	Grey



BJH.0458

TREE SURVEY SCHEDULE

Client : Orchard Homes Limited

Site Location : Ranelagh Road Site, Havant

Surveyor : Bernie Harverson M.Arb.

Date Surveyed : Original - 15th June 2009 Verified – April 2012

Tree No.	Species	Ht m	Diam mm	Brch Sprd m	GC m	LMB m	LS	Condition Comments	Preliminary Management Recommendations	Rem Con yrs	Cat
1	Bay Laurel <i>Laurus nobilis</i>	6	est 400	N3 E3 S3 W3	2	-	EM	Unable to access base of tree as it is off site-multi stemmed at ground level-yellowing of leaves	No work required at time of survey	>40	B1
2	Cherry <i>Prunus spp.</i>	4.5	170	N- E- S- W-	0	-	Y	Dead tree	Advise fell and stump grind	0-5	R
3	Apple <i>Malus domestica</i>	4.5	est 400	N2.5 E2.5 S2.5 W2.5	1	-	EM	Base and trunk smothered in ivy-epicormics-minor deadwood throughout-previously heavily topped-canker present on branchwork	No work required at time of survey	10-20	C1
H1	Hawthorn Holly Elderberry Field Maple Wych Elm	5	est 350	N2.5 E- S2.5 W-	0	-	M	Base and trunk smothered in ivy-multi stemmed at ground level-ivy through crown-crown shape dictated by group pressure-merged crowns	Remove ivy on worst affected trees	>40	B2
4	Plum <i>Prunus domestica</i>	4	150	N1.5 E1.5 S1.5 W1.5	1	-	Y	Multi stemmed at 0.5m above ground level-previously heavily topped	No work required at time of survey	10-20	C1
5	Sycamore <i>Acer pseudoplatanus</i>	6	200	N1.5 E1.5 S1.5 W1.5	0	-	Y	Suckers-growing through wire fence	No work required at time of survey	10-20	C1
6	Sycamore <i>Acer pseudoplatanus</i>	8	est 400	N4 E4 S4 W4	0	-	Y	Suckers-epicormics-stubs-previously crown lifted to 3m	No work required at time of survey	30-40	C1
7	Pedunculate Oak <i>Quercus robur</i>	16	est 800	N8 E6 S10 W5	2	-	M	Unable to access base of tree due to dense vegetation and allotment gate locked-smothered in ivy-epicormics-minor deadwood throughout-major stubs-previously crown lifted	No work required at time of survey	>40	B1

Grp 1	Sycamore x 2 Beech x 2	19	450	N8 E8 S8 W6	1	-	EM	Smothered in ivy-two Beech are sandwiched by the dominant end Sycamores-crown shape dictated by group pressure-merged crowns-minor deadwood throughout	No work required at time of survey	>40	B2
8	Sycamore <i>Acer pseudoplatanus</i>	19	800	N8 E6 S6 W8	3	-	EM	Base and trunk smothered in ivy-bifurcated at 3m above ground level-minor deadwood throughout	No work required at time of survey	>40	B1
Grp 2	Ash x 3 Sycamore x 2	16	500	N3 E5 S6 W8	2	-	EM	Base and trunk smothered in ivy-ivy through crown on one Ash-crown shape dictated by group pressure-merged crowns-minor deadwood throughout	No work required at time of survey	>40	B2
9	Goat Willow <i>Salix caprea</i>	6	250	N5 E1 S5 W5	1	-	EM	Ivy smothering-minor deadwood throughout-horse browsing damage to lower branches	No work required at time of survey	10-20	C1
10	Sycamore <i>Acer pseudoplatanus</i>	12	est 500	N5 E5 S5 W5	2	-	SM	Unable to access base of tree due to dense vegetation and it is off site-smothered in ivy-ivy smothering trunk and through crown	No work required at time of survey	>40	B1 / C1
Grp 3	Sycamore Elderberry Cherry Hawthorn	7	250	N3 E3 S3 W3	1	-	Y	Smothered in ivy-crown shape dictated by group pressure-merged crowns-poor quality trees of limited value	No work required at time of survey	10-20	C2
Grp 4	Hawthorn Lawsons Cypress Birch Elderberry	10	est 400	N4 E4 S4 W4	1	-	EM	Unable to access base of trees as they are off site-smothered in ivy-trunk and through crowns also smothered in ivy-some dieback in Hawthorn and Elder-minor deadwood throughout	No work required at time of survey	30-40	B2
Grp 5	Ash x 4	10	400	N5 E5 S5 W5	2	-	Y	Bark wounds-horse browsing damage-some trunks embedded in corrugated roof and have grown up through the concrete slab-crown shape dictated by group pressure-merged crowns	No work required at time of survey	10-20	C2
Grp 6	Field Maples	6 to 12	est 400	N4 E4 S4 W4	0	-	Y to SM	Unable to access base of trees due to dense vegetation and they are off site-a hedge line with one individual tree at eastern end-crown shape dictated by group pressure-merged crowns-some dieback-minor deadwood throughout	No work required at time of survey	>40	B2

H2	Hawthorn Elderberry Holly	5	est 400	N3 E3 S3 W3	0	-	M	Unable to access base of trees due to dense vegetation-ivy on base, trunk and through crowns-crown shape dictated by group pressure-merged crowns	Remove ivy on worst affected trees	>40	B2
H3	Hawthorn Elderberry	5	est 400	N3 E3 S3 W3	0		M	Unable to access base of trees due to dense vegetation-ivy on base, trunk and through crowns-crown shape dictated by group pressure-merged crowns	Remove ivy on worst affected trees	>40	B2
H4	Hawthorn Field Maple Elderberry	7	est 400	N4 E4 S4 W4	0		M	Unable to access base of trees due to dense vegetation-ivy on base, trunk and through crowns-crown shape dictated by group pressure-merged crowns	Remove ivy on worst affected trees	>40	B2 / C2



BH 2

Tree Root Protection Area Schedule
& Plan BJH 01/02

ROOT PROTECTION ZONE/AREA SCHEDULE

Client : Orchard Homes Limited

Site Location : Ranelagh Road Site, Havant

Tree No.	Tree Species	Cat	Diam mm	BS5837:2012 Table D1- Radial Protect.Area m	BS5837:2012 Table D1- Polygon Area m ²	Is An Offset Required To Cater For Existing Rooting Pattern Restrictions
1	Bay Laurel <i>Laurus nobilis</i>	B1	est 400	4.8	72	YES – the boundary wall and differences in levels will constrain the rooting pattern
2	Cherry <i>Prunus spp.</i>	R	170	n/a	n/a	NO – this tree should be removed for sound arboricultural management reasons regardless of any redevelopment proposals
3	Apple <i>Malus domestica</i>	C1	est 400	4.8	72	NO – free rooting to all directions
H1	Hawthorn Holly Elderberry	B2	est 350	4.2	55	YES – mutual suppression will focus rooting to the north and south sides
4	Plum <i>Prunus domestica</i>	C1	150	1.8	10	NO – free rooting to all directions
5	Sycamore <i>Acer pseudoplatanus</i>	C1	200	2.4	18	YES – consolidated and compacted track will focus rooting out into the allotments
6	Sycamore <i>Acer pseudoplatanus</i>	C1	est 400	4.8	72	YES – consolidated and compacted track will focus rooting out into the allotments
7	Pedunculate Oak <i>Quercus robur</i>	B1	est 800	9.6	290	NO – free rooting to all directions
Grp 1	Sycamore x 2 Beech x 2	B2	450	5.4	92	YES – consolidated and compacted track will focus rooting out into the allotments
8	Sycamore <i>Acer pseudoplatanus</i>	B1	800	9.6	290	YES – consolidated and compacted tracks will focus rooting out into the allotments
Grp 2	Ash x 3 Sycamore x 2	B2	500	6.0	113	YES – consolidated and compacted track will focus rooting out into the allotments
9	Goat Willow <i>Salix caprea</i>	C1	250	3.0	28	NO – free rooting to all directions

10	Sycamore <i>Acer pseudoplatanus</i>	B1 / C1	est 500	6.0	113	NO – free rooting to all directions
Grp 3	Sycamore Elderberry Cherry	C2	250	3.0	28	YES – mutual suppression will focus rooting to the east and west sides
Grp 4	Hawthorn Law. Cypress Birch	B2	est 400	4.8	72	YES – mutual suppression will focus rooting to the east and west sides
Grp 5	Ash x 4	C2	400	4.8	72	NO – concrete hard surfacing and stable blocks surround these trees
Grp 6	Field Maples	B2	est 400	4.8	72	YES – mutual suppression and competition from Ash trees will in places focus rooting to the south side
H2	Hawthorn Elderberry Holly	B2	est 400	4.8	72	YES – mutual suppression and presence of stable blocks will focus rooting to the north side
H3	Hawthorn Elderberry	B2	est 400	4.8	72	YES – mutual suppression will focus rooting to the east and west sides
H4	Hawthorn Field Maple Elderberry	B2 / C2	est 400	4.8	72	YES – mutual suppression and presence of industrial units will focus rooting to the north side



BH 3

Tree Retentions & Removals Plan BJH 03



BH 4

Tree Protection Plan
BJH 04

Figure 2 Default specification for protective barrier

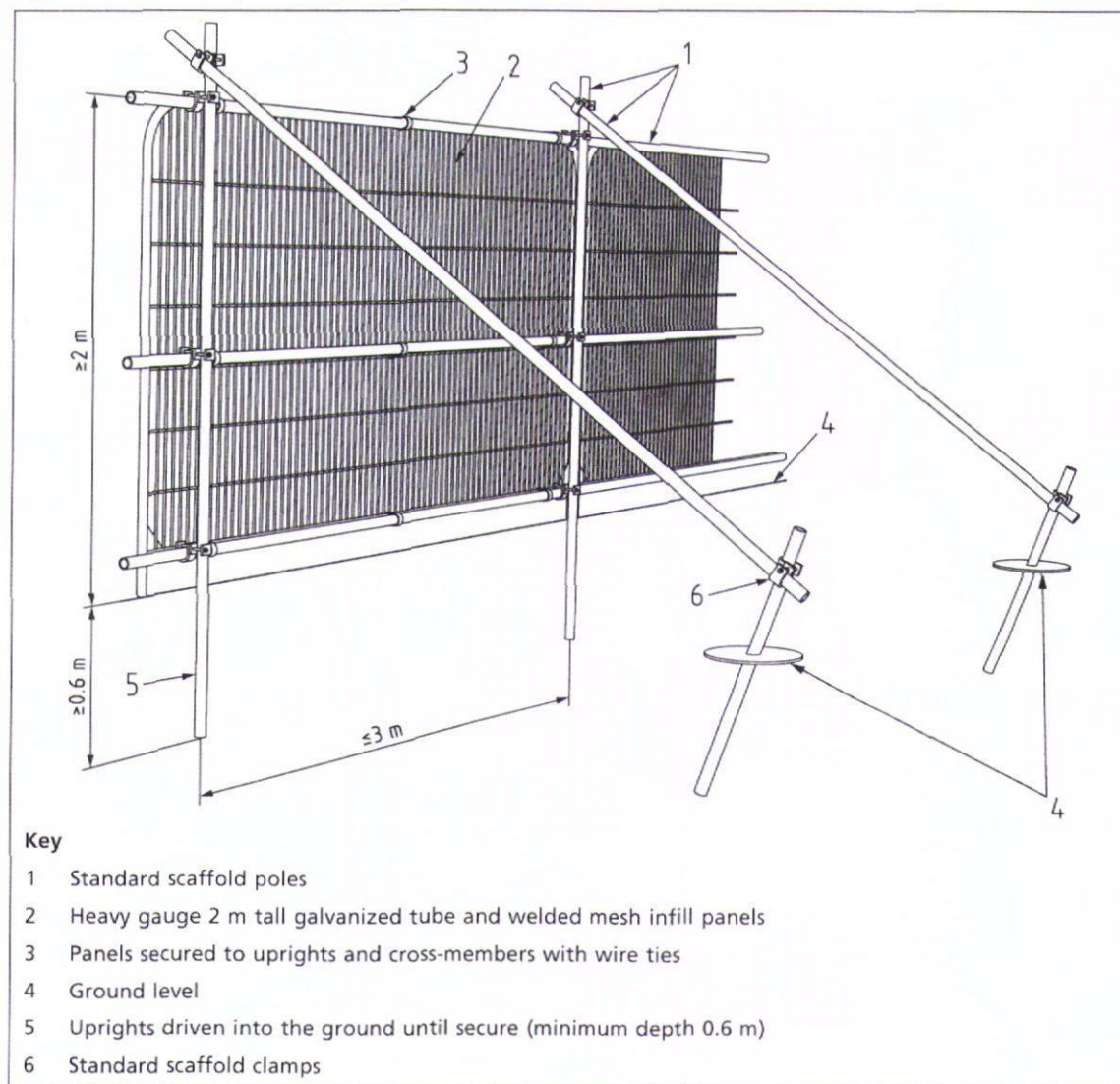
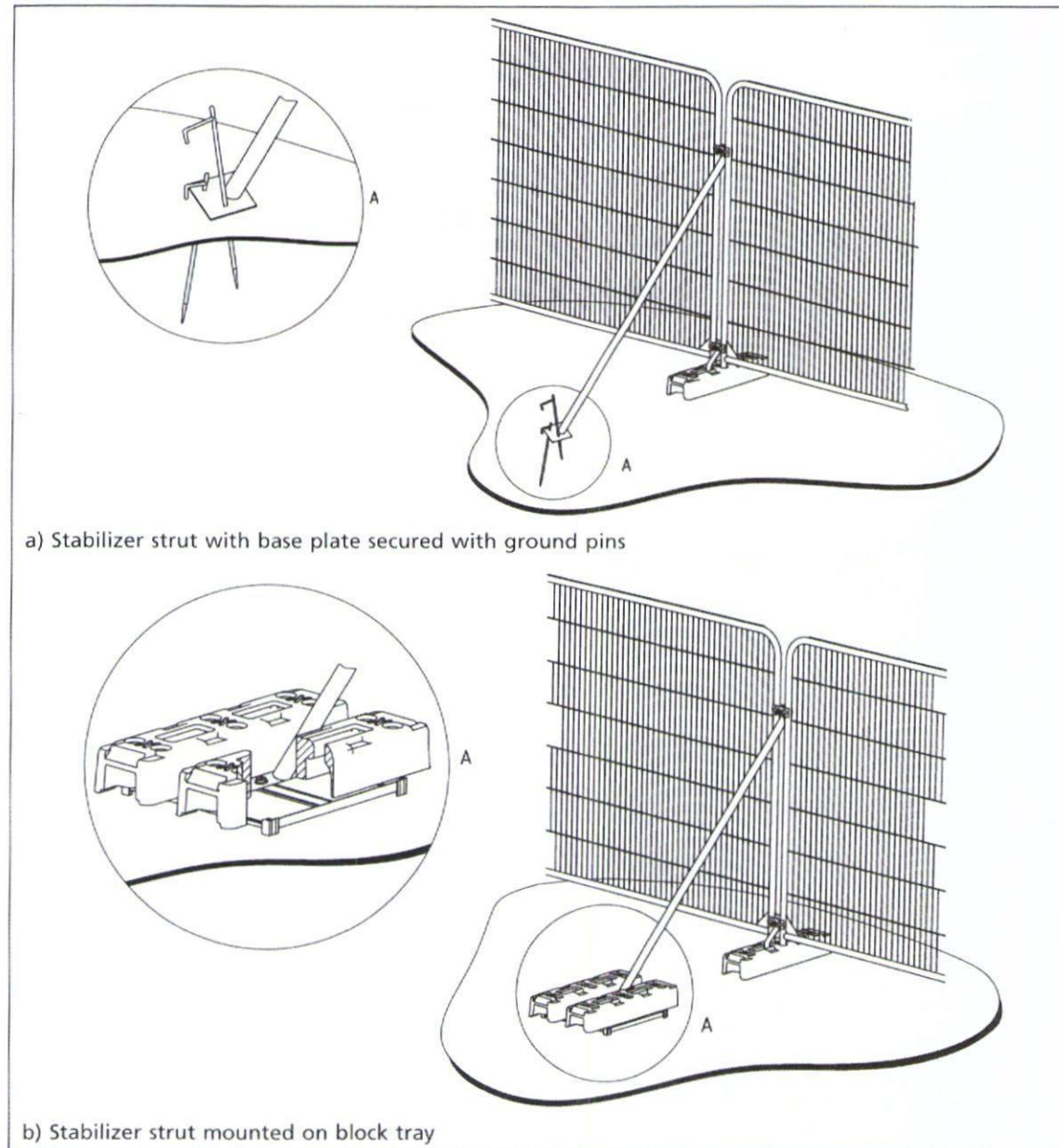


Figure 3 Examples of above-ground stabilizing systems

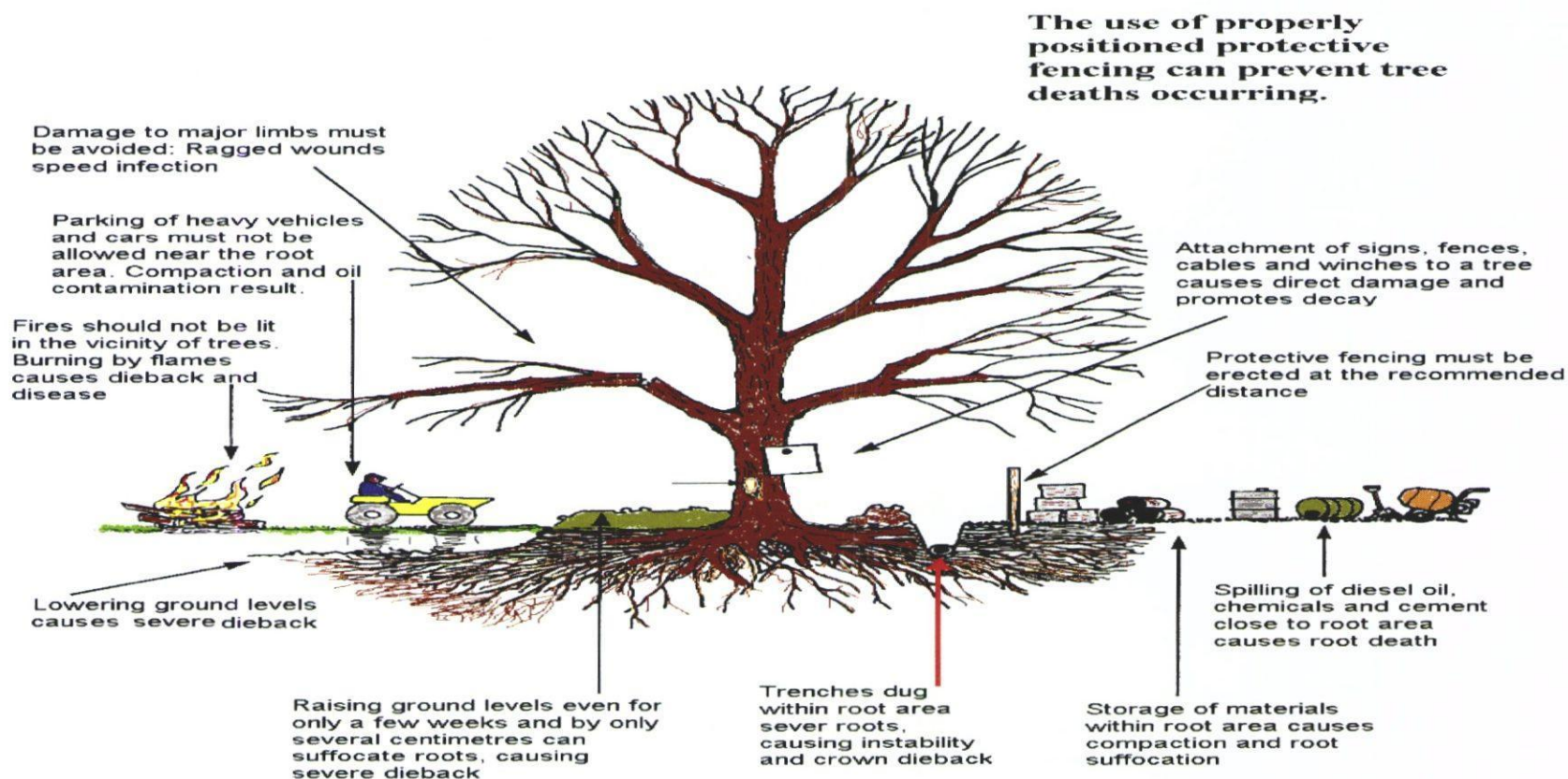


TREE PROTECTION AREA

KEEP OUT

- **NO EXCAVATION OR TRENCHING WORKS PERMITTED**
- **NO STORAGE OF PLANT OR MATERIALS PERMITTED**
- **NO VEHICLE ACCESS PERMITTED**
- **NO FIRE LIGHTING PERMITTED**
- **NO CHEMICAL HANDLING**
- **VEHICLES WORKING CLOSE TO PROTECTIVE FENCING MUST AVOID CONTACT WITH OVERHANG FROM TREE CANOPY**

Common causes of Tree Death



Please use copies of this as an on-site poster for personnel





BH 5

Tree Works Schedule

TREE WORK SPECIFICATION

Client : Orchard Homes Limited

Site Location : Ranelagh Road Site, Havant

Attention is drawn to the fact that some mature trees could provide suitable habitat for bird nesting (ivy and cavities) and bat roosting (ivy, branch cracks and cavities) and this might at certain times of year influence and possibly restrict the form of management which can be applied. Given the legal constraints imposed by the Habitat Regulations and the Wildlife and Countryside Act this may necessitate expert ecological advice being sought before proceeding with recommendations.

No	Species	Tree Works Recommended
1	Bay Laurel <i>Laurus nobilis</i>	Prune back in line with the boundary wall to give a more upswept form and avoid any conflict with development
2	Cherry <i>Prunus spp.</i>	- Fell to ground level - Grub out the stump
3	Apple <i>Malus domestica</i>	- Fell to ground level - Grub out the stump
H1	Hawthorn Holly Elderberry	- Prune back lightly on north side of retained section from Plots 5 to 10 to allow wooden boundary fence to be erected - Prune back heavily on south side of retained section from Plots 54 to 60 to achieve useable garden areas - Completely remove and grub out the section that is shown to be under the footprint of the new access road and also along the rear of Plots 11 to 14 – hand grubbing ONLY within the RPA of Oak T7 - Prune back lightly on south side of retained section beside Plot 16
4	Plum <i>Prunus domestica</i>	- Fell to ground level - Grub out the stump
5	Sycamore <i>Acer pseudoplatanus</i>	- Fell to ground level - Grub out the stump
6	Sycamore <i>Acer pseudoplatanus</i>	- Fell to ground level - Grub out the stump
7	Pedunculate Oak <i>Quercus robur</i>	No works required at this point in time
Grp 1	Sycamore x 2 Beech x 2	Trim back any branch overhang of the parking bays making all final cuts adjacent to living growth points and wherever possible removing whole smaller diameter branches rather than shortening them back
8	Sycamore <i>Acer pseudoplatanus</i>	No works required at this point in time
Grp 2	Ash x 3 Sycamore x 2	No works required at this point in time

9	Goat Willow <i>Salix caprea</i>	- Fell to ground level - Grub out the stump
10	Sycamore <i>Acer pseudoplatanus</i>	Crown lift to clear the development making all final cuts adjacent to living growth points
Grp 3	Sycamore Elderberry Cherry	- Fell and grub out those trees which are within the site boundary line - Off site tree- prune back and crown lift any low branch overhang of the site to give a more upswept form and maximise useable garden space
Grp 4	Hawthorn Law. Cypress Birch	Prune back low branch overhang of the site to give a more upswept form and avoid damage during construction as well as maximise useable garden space
Grp 5	Ash x 4	- Fell to ground level - Grub out the stumps
Grp 6	Field Maples	Prune back low branch overhang of the site to give a more upswept form and avoid damage during construction as well as maximise useable garden space – plus allow the acoustic fencing to be erected
H2	Hawthorn Elderberry Holly	- Prune back heavily on south side of retained section from Plots 74 to 77 to achieve useable garden areas and allow boundary fence to be erected - Wherever possible make final cuts adjacent to main stem or a living growth point
H3	Hawthorn Elderberry	- Fell to ground level - Grub out the stumps
H4	Hawthorn Field Maple Elderberry	- Prune back heavily on north side to achieve useable garden areas and allow acoustic boundary fence to be erected - Wherever possible make final cuts adjacent to main stem or a living growth point



BH 6

BS 5837:2005 Extracts

NJUG 10 Extracts

NJUG 10 - NATIONAL JOINT UTILITIES GROUP**2. HOW ROOTS ARE DAMAGED**

2.1 Contrary to popular belief, the root system of a tree is not a mirror image of the branches, nor is there usually a 'tap root'. The majority of the root system of any tree is in the surface 600mm of soil, extending radially in any direction for distances frequently in excess of the tree's height. Excavation or other works within this area are liable to damage roots.

The root system

2.2 The base of the trunk typically flares out in buttresses, with these extending into the main lateral structural roots. These rapidly subdivide into the mass of smaller roots which serve to anchor the tree into the soil, and to conduct water and nutrients. Even a short distance (3m) from a large mature tree, most roots will be less than 10mm in diameter, but these may extend to well beyond the branch spread of the tree. A mass of fine roots, less than 1mm diameter, develop off all parts of this root system. These fine roots absorb the water and nutrients which are essential for the growth of the tree.

2.3 The main structural roots (close to the trunk) develop as the tree grows in response to the need for the tree to have physical stability. Beyond these major roots, root growth is influenced by the availability in the soil of water, air and nutrients. The cultivation of soil provides ideal conditions for root growth. Services are often cooler than surrounding soil, encouraging moisture within the soil to condense on the surface, thereby encouraging roots to grow close to the service. For all these reasons, root growth is often most prolific within the backfilled trench and in the soil around the services. The variability of soil conditions and the presence of obstacles to root growth results in a very variable and unpredictable distribution of the roots within the general guidance in para 2.1.

Types of damage

2.4 Root systems can be damaged by:-

- The severance of a root, for example by trenching, which will destroy all parts of the root beyond that point. Even roots less than 10mm diameter may be serving the fine roots over a wide area. The larger the root severed, the greater the impact on the tree.
- Damage to the bark on the root. The bark protects the root from decay, and is also essential for further root growth. It is loosely attached and easily damaged. If damage to the bark extends around the whole circumference, the root beyond that point will be killed.
- Compaction of the soil. Compaction which is avoidable may occur from storage of material or passage of heavy equipment over the roots. This can restrict or even prevent gaseous diffusion through the soil, and thereby asphyxiate the roots. The roots must have oxygen for survival, growth and effective functioning.
- Alterations in soil level. Lowering the level will strip out the mass of roots near the surface. Raising levels will have the same effect as soil compaction.
- Incorrect application of herbicide.
- Spillage of oils or other harmful materials.

2.5 If roots are damaged:-

1. close to the trunk, the anchorage and stability of the tree can be adversely affected.
2. anywhere along their length, all of the fine roots which they serve will be destroyed.

Damage to the fine roots by severance of a main root, or by compaction or alteration in levels, will prevent these fine roots from absorbing the water and nutrients which are essential for the well-being and growth of the tree. The effects of damage from different causes, for instance by successive excavations for different services, or by excavation in one part and compaction in another part of the system, will be cumulative.

2.6 If the root system is damaged, new roots must develop to sustain the tree. These may develop from damaged root or by increased growth of other parts of the system. It may take years to replace all the lost roots. Vigorous young trees are the most likely to be capable of rapid root regeneration, but mature trees find it very difficult to recover from major root damage, if at all. While roots may regenerate, they will not necessarily provide their original anchorage.

2.7 Trees with damage may not show any immediate symptoms. If the root system is capable of rapid regeneration the tree may recover without any noticeable ill-effects, but usually the symptoms will take several years to develop. Such symptoms may range from only minor branch dieback to deterioration and ultimate death of the tree, dependant on the severity of damage and the ability of the roots to regenerate.

2.8 There is frequently a need for operational land (e.g. substations) to be kept clear of weed growth for safety and as a fire precaution. Herbicides provide an efficient method of killing both herbaceous and woody weeds. There are several types of herbicide with different modes of action and persistence. The most attractive chemicals are those that can be applied to the ground, usually as a granule, and which remain active in the soil for long periods. The wide-ranging root system of a tree may extend into the operational land from adjoining properties, and may absorb some types of herbicides which have been applied to the ground. Material absorbed in one part of the root system can kill the whole tree.

2.9 Other materials which can leach into the soil can also damage the root system. For instance, oil spilled into the soil is broken down by soil bacteria which deplete the soil of oxygen and so asphyxiate the roots. Other materials may have a direct toxic effect on roots.

HOW TO AVOID DAMAGE TO TREES

4.1 This section gives general guidance on methods of work to minimise damage to trees which should be adopted by utilities. The local authority (or for privately owned trees, the owner or his advisor), should be informed about planned work at an early stage prior to commencement.

4.2 Wherever trees are present, precautions should be taken to minimise damage to the root system. As the shape of the root system is unpredictable, there should be careful control and supervision of any excavation, particularly if this involves digging through the surface 600mm where the majority of roots develop.

4.3 The precautions advocated in this section are applicable to any excavations or other works occurring within a distance from the tree equal to 4 times the circumference of the trunk (circumference measured around the trunk at a height of 1.5m above ground level; distance measured from the centre of trunk to nearest part of any excavation or other work). This area around the trunk is referred to as "the precautionary area" hereafter.

4.4 Although, ideally, services should be diverted or re-aligned outside the precautionary area, it is recognised that this will not always be practicable. Where works are required for the laying or maintenance of any service within the precautionary area, there are various techniques to minimise the damage. The appropriate method of laying will depend on the circumstances, such as:

- scope of the works (one off repair, or part of an extensive operation)
- degree of urgency (for restoration of supplies)

- soil conditions
- amenity value of tree
- cost

Acceptable techniques in order of preference are:-

1. **Trenchless**
2. Broken trench – hand dug
3. Continuous trench – hand dug

Excavation of open trenches by machine is totally unacceptable within the precautionary area.

4.5 Trenchless

4.5.1 Wherever possible trenchless techniques should be used. The pit excavations for starting and receiving the machinery should be located outside the precautionary area.

4.5.2 IN order to avoid damage to roots by the **mole**, it is recommended that the depth of run should be below 600mm. Techniques involving external lubrication of the mole with materials other than water (e.g. oil, bentonite) should be avoided, unless precautions are taken to ensure that there is no contamination of the soil within 600mm of the surface within the precautionary area.

4.6 Broken Trench

4.6.1 This technique combines hand dug trench sections with trenchless techniques. If excavation is unavoidable, it should be limited to practical access and installation around/below the roots. The trench is excavated by hand with precautions taken as for continuous trench below. Open sections of the trench should only be long enough to allow access for linking to the next section. The length of sections will be determined by local conditions, especially soil texture and cohesiveness, as well as the practical needs for access. In all cases the open sections should be kept as short as possible.

4.7 Continuous Trench

4.7.1 The object of the exercise is to use manual excavation so as to retain as many roots as possible, bearing in mind the need for working space, access to the service in question and room to install the new service. Hand digging needs to be undertaken with great care and for this reason is likely to require closer supervision than normal operations and an understanding by all operatives and staff as to exactly what is expected.

4.7.2 After careful removal of the hard surface material, digging should proceed with hand tools. All roots greater than 25mm diameter should be retained and worked around. Where clumps of smaller roots (including fibrous roots) are found these should also be retained. During the excavation great care should be taken to minimise damage to retained roots, including the bark around the roots. Roots with a diameter in excess of 25mm must not be severed without the advice of the owner of the tree or the local authority arboriculturist, who should respond *within one working day*. If severance is unavoidable, roots must be cut back using a sharp tool (as listed below), leaving the smallest wound. Suggested tools required: fork, breaker bar, secateurs, handsaw (folding, silky or bow saw), post hole shoveller and hand fork and trowel.

4.8 Backfilling

4.8.1 Any reinstatement must comply with the requirements of street works in Great Britain must comply with the requirements of the code of practice approved under the New Roads and Street Works Act 1991 (Specification for the Reinstatement of Openings in Highways). Without prejudice to the requirements of this code as to the specification of materials to be used and the standards of workmanship to be observed, backfilling of any excavation should be carefully carried to avoid direct damage to the retained roots and excessive compaction of the soil around them.

4.8.2 The backfill should, where possible, include the placement of an inert granular material mixed with top soil or sharp sand (not builders sand) around the retained roots. This should allow the soil to be compacted for resurfacing without damage to the roots, and should secure a local aerated zone enabling the root to survive in the longer term.

4.8.3 Backfilling outside the highway limits should be carried out using the excavated soil. This should not be compacted but lightly “tamped” and usually left slightly proud of the surrounding surface to allow natural settlement. Other materials should not be incorporated into the backfill.

4.8.4 Fine roots are vulnerable to desiccation once they are exposed to the air. Larger roots have a bark layer which provides some protection against desiccation and temperature change. The greatest risk to these roots occurs when there are rapid fluctuations in air temperature around them, e.g. *winter diurnal temperatures*. It is important, therefore, to protect exposed roots where a trench is to be left open overnight when there is a risk of frost. In winter, before leaving the site at the end of the day, the exposed roots should be wrapped with dry sacking. This sacking must be removed before the trench is backfilled.

4.10 Special Considerations when planning service routes

4.10.1 The potential for future conflict with trees can be reduced at the stage of initial planning approval by the appropriate alignment of services and the provisions for future tree and shrub planting. Appropriate and separate space should be provided for each. Local authorities should liaise with developers.

4.10.2 If planning requirements and site constraints dictate that trees (existing or to be planted) and services share the same area, consideration should be given to increasing the depth of services, if possible to a minimum of 600mm, and to laying the service in ducts which will resist root penetration but allow replacements to be laid without extensive excavation. As this may incur additional costs, allowance must be made for these costs and the responsibility for meeting them at the planning stage.

4.10.3 When laying new services or replacements, to avoid risk of future direct damage, allowance should be made for future root growth.

4.10.4 Services laid in clay or peat should be constructed to tolerate movements associated with swelling or shrinking of the subsoil cause by root activity. Special precautions for differential movement should be incorporated where services join rigid structures founded at a different depth to the service.



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Qualifications & Experience



QUALIFICATIONS AND EXPERIENCE

- My name is Bernie Harverson and I am a self employed independent arboricultural consultant in private practice. I take instructions primarily in the South of England but also on occasions work nationwide and abroad and have offices at : –
3 Foxcombe Cottages, South Harting, West Sussex GU31 5PL and also at Cedar Court, 5 College Street, Petersfield GU31 4AE
- I hold the following arboricultural qualification - **Master of Arboriculture** (Royal Forestry Society – 1976)
- I have over **forty** years of practical and managerial experience in the arboricultural industry including periods in both the public and private sectors.
- My Local Government sector experience comprises one year as a tree surgeon with Brighton Parks and nine years spent in Arboricultural Officer posts with both Westminster City Council and Portsmouth City Council
- My past practical experience in the private sector includes two years at Tilhill Forest Nursery and over ten years for various companies as a Climbing Arborist/Tree Surgeon.
- Managerial work in the private sector includes two years as manager of Beechings tree surgery company and twelve years with CBA Trees as an Arboricultural Consultant.
- As an independent self employed Arboricultural Consultant I now provide a comprehensive range of services including :-
tree surveys, appraisals, assessments and inspections with particular reference to planning and development and tree safety audits with a service offered as a climber to undertake full climbing inspections to better understand the condition of a given tree before prescribing a management strategy.
 - I also undertake litigation work appearing as an Expert Witness in Court Actions and at Planning Appeals, Hearings and Public Local Inquiries.

Bernie Harverson M.Arb.

3 foxcombe cottages • south harting • west sussex • gu31 5pl
tel: 01730 825297 • mob: 07875 520881 • email: bernie.harverson@virgin.net • VAT Reg No. 881 5056 16