



ARBORICULTURAL METHOD STATEMENT **& TREE PROTECTION PLAN REPORT**

for

St. James Primary School, Bellevue Lane, Emsworth

- prepared on behalf of Havant Borough Council -

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ARBORICULTURAL METHOD STATEMENT (AMS) & TREE PROTECTION PLAN (TPP) **Including Arboricultural Impact Assessment (AIA) & Tree Constraints Plan (TCP)**

Client	Havant Borough Council
Site Location	St.James Primary School, Bellevue Lane, Emsworth
Project Arboricultural Consultant:	Bernie Harverson <i>M.Arb.</i> ,
Date Report Prepared	February 2010

Section	Subject Heading
1	INTRODUCTION & CLIENTS BRIEF
2	DOCUMENT DISCLOSURE STATEMENT
3	LAND SURVEY & TREE SURVEY - (in accordance with Section 4 of BS5837)
4	TREE CONSTRAINTS PLAN – RPA & ABOVE GROUND CONSTRAINTS - (in accordance with Section 5 of BS5837)
5	ASSESSMENT OF TREE CONSTRAINTS – AIA & DESIGN ISSUES & TREE PROXIMITY - (in accordance with Section 6 of BS5837)
6	ARBORICULTURAL METHOD STATEMENT & TREE PROTECTION PLAN - (in accordance with Section 7 of BS5837)
7	PRE – DEVELOPMENT TREE WORK & WORKING WITHIN THE RPA - (in accordance with Section 8 of BS5837)
8	CONSTRUCTION EXCLUSION ZONE : BARRIERS & GROUND PROTECTION - (in accordance with Section 9 of BS5837)



9	AVOIDING DAMAGE TO STRUCTURES BY TREES: DIRECT or INDIRECT ACTION - (in accordance with Section 10 of BS5837)
10	DEMOLITION & CONSTRUCTION IN PROXIMITY TO EXISTING TREES - (in accordance with Section 11 of BS5837)
11	SOFT LANDSCAPING WORKS - (in accordance with Sections 12; 13; 14 & 15 of BS5837)
12	MONITORING & SITE SUPERVISION
13	CONCLUSIONS
Appendices	Subject
BH1	Tree Survey Schedule (in accordance with – Table 1 of BS5837) + Figure 1 -Flow Diagram from BS5837 + Tree Survey Notes
BH2	Root Protection Area Schedule (RPA in accordance with – Table 2 of BS5837)
BH3	Arboricultural Impact Assessment (AIA) & Tree Constraints Plan (TCP) – BH.01/02 – NOT PREPARED FOR THIS PROJECT-
BH4	Pre-Development Facilitation Tree Works Schedule (in accordance with Section 8 of BS5837)
BH5	Tree Protection Plan– BH.03 + BS5837 Figure 2 & 3 Diagrams + Example Warning Notices
BH6	BS5837 Extracts – including Table 3 and Sections 13 &14 & 15 & NJUG10 Extracts
BH7	Qualifications & Experience

1.0 INTRODUCTION & CLIENTS BRIEF

- 1.1 My clients seek planning approval to remove 45m of the existing mature hedge and a Sycamore tree and in their place widen and improve the footpath linking the school to a new crossover point on the Horndean Road and provide for a cycle path. Planting a replacement tree(s) and hedge in the process.
- 1.2 My instructions come directly from Havant Borough Council (Engineers/Technical Services).
- 1.3 I have not been previously commissioned to consider the impact that development might have on the existing tree stock in order that this information can inform the design process prior to seeking planning approval – as advocated in the **Figure 1 - Flow Diagram from BS5837:2005** –Thus there is no data offered at Appendix 3.
- 1.3 I am to skip this step and instead proceed with the preparation of a **Method Statement & Tree Protection Plan** - based on the planning layout submitted to me.



- 1.6 In all other respects my work is compiled in accordance with the Recommendations contained within BS5837:2005 and this report follows the sequential progression through this document with Sections 7 to 15 in the **AMS & TPP**.

2.0 DOCUMENT DISCLOSURE STATEMENT

- 2.1 A copy of the Land Survey Topographical drawing as prepared at 1:250 scale by Havant Borough Council has been provided to me for the purposes of my work – Ref: Drwg No. **Hi52/132 – Dec 2009**.
- 2.2 A copy of the Planning Layout drawing as prepared at 1:250 scale by Havant Borough Council and referenced **Hi52/133- Dec 2009-** has been provided to me for the purposes of my work and I rely totally on the accuracy of this drawing.

3.0 LAND SURVEY & TREE SURVEY

- 3.1 A Land Survey Topographical drawing has been prepared and to the best of my knowledge this accords with the requirements of BS5837 as listed at Section 4 – *Paragraphs 4.1.1 to 4.1.5*.
- 3.2 I conducted a full Tree Survey exercise on 12th February 2010 in accordance with the requirements of BS5837 as listed at Section 4 – *Paragraphs 4.2.1 to 4.3.7, and Cascade Chart Table 1* – a copy of the survey schedule can be viewed at **appendix BH1**.
- 3.3 Additional Considerations –
- *BS5837 Para .4.4.1* – I found no trees on site that might represent an immediate and serious hazard to life or property.
 - *BS5837 Para .4.4.2* – There are trees on the development site which are suitable candidates for transplanting - but these do not impact on the form of development proposed.
 - *BS5837 Para .4.4.3* – There are no veteran trees on the development site

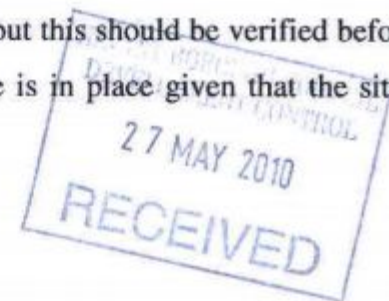


4.0 TREE CONSTRAINTS PLAN – RPA & ABOVE GROUND CONSTRAINTS

- 4.1 The RPA for each surveyed tree and group has been calculated using the Tree Survey data and by reference to Table 2 of BS5837.
- 4.2 A copy of the RPA schedule can be viewed at [appendix BH2](#) and the data has been applied to the TCP prepared for this current scheme.
- 4.3 In compiling the data and applying it to the TCP full consideration has been given to BS5837 – *Paragraph 5.2.4 and items a) to e)*.
- 4.4 In this regard it is to be noted that in respect of item *e)* if trees and groups have crown spreads which exceed the specified RPA then this has been taken into account on the TPP for those trees which are to be retained and either an increased protection zone applied to encompass the crown or where deemed appropriate 'access facilitation' tree surgery works specified that will avoid unnecessary contact and damage from site traffic during the demolition and/or construction works.

5.0 ASSESSMENT OF TREE CONSTRAINTS –AIA & DESIGN ISSUES

- 5.1 An AIA has not been prepared for this project.
- 5.2 At *Paragraph 6.2.2 of BS5837* there is a recommendation that *'Even if there are no trees on the site, areas for future planting should be plotted on the TCP 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 decompaction, aeration and mulching undertaken at the completion of works during the soft landscaping works phase. The TPP therefore indicates 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.
- 5.3 At *Paragraph 6.2.3 of BS5837* there is a recommendation that the following matters are taken into consideration:-
- a) The presence of tree preservation orders or conservation area protection.*
- I have not been advised of any extant **Tree Preservation Order or Conservation Area** cover on this site but this should be verified before any tree works that may be recommended within this report are undertaken. N.B. It is very unlikely that one is in place given that the site is in Education Authority ownership and is a Council project.



b) The effect that development proposals may have on the amenity value of trees, both on and near the site.

- This scheme will entail the loss of one middle aged Sycamore tree (T1) and also a 33m length of quality mature hedging and 12m of poor quality hedging (Hge1) as well as some root pruning of the Sycamore T2.
- The losses can in my opinion be readily mitigated by the provision of sufficient new quality tree and hedge planting which will have to be undertaken as part of this scheme.
- The root pruning of T2 if undertaken in accordance with the guidelines prescribed within this Method Statement should not have any adverse impact on health and vigour, although there is a risk attached to any form of pruning and the possibility of subsequent fungal attack through open wounds.
- It has to be acknowledged that there will be a short term loss of amenity value but the main group of trees will remain and new planting can be added and the hedge replaced over time. Thus provided that the follow up tree and hedge planting takes place and there is adequate provision for ongoing maintenance this could over time have an enhancing effect on the landscape of this area. Added to which the loss of the T1 Sycamore will provide more space for T2 Sycamore to develop and improve its crown.

c) The above and below ground constraints.

- Fully assessed and a management strategy devised to minimise damage – see Section 6 of this report for further information in this respect.

d) The construction of the proposed development.

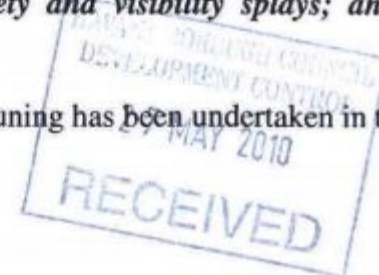
- As shown on the planning layout drawings and detailed in Section 6.0 of this report.

e) Whether the design and/or construction of the proposed development can be modified to accommodate retention of trees that would otherwise be at risk or lost. This includes appropriate tree surgery works that acceptably mitigate adverse effects caused by trees.

- No – the tree and hedge are in the direct line of the widened footpath and diverting it would put other valued trees at risk and also cause significant and unacceptable root damage to the retained Sycamores and hedge.

f) Infrastructure requirements, e.g. easements for underground or above ground services; highway safety and visibility splays; and other infrastructural provisions, such as substations, refuse stores, lighting, signage and CCTV requirements.

- There are already utility service runs in the current footway and links to two lamp columns so some root pruning has been undertaken in the past.



- One lamp column is positioned close to the two Sycamores and regardless of any redevelopment proposals the branches from Sycamore T2 would need to be pruned back to clear the light throw of this lamp column.
- The proposals will no doubt require the relocation of the lamp columns and the proximity of the column closest to the Sycamore T2 can perhaps be adjusted at this time to avoid future clashes.
- If the Sycamore T1 and hedge line are removed as proposed and the root pruning undertaken to the Sycamore T2 I cannot foresee any other risk to retained trees associated with utility service links.

g) The end use of the space

- This is ultimately an issue for Planners to consider but in arboricultural terms it is my opinion that the trees which are indicated for retention can exist in harmony with the proposed redevelopment without pressure to prune or fell.

h) Whether tree loss resulting from the development proposals can be acceptably mitigated by new tree planting.

- Yes – the tree to be lost is of a tree species of limited merit in the landscape and it will be replaced with high levels of new quality tree planting that would more than mitigate this initial loss.
- Perhaps the greater loss is the quality hedging but over time this too will be replaced by a new quality hedge of perhaps purer plant content.

5.4 Proximity of trees to structures

This is normally only applicable where the existing shade cast by the tree crowns and allowance for their future growth and development without there being pressure to prune or fell or to impinge on useable space. In this instance this is not an issue as there are no buildings involved in close proximity.

6.0 ARBORICULTURAL METHOD STATEMENT & TREE PROTECTION PLAN

- 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.
- 6.2 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



Tree No	Species	Cat	S or M	Stem Diam mm	BS5837:2005 Min.Radial Prot. Zone m	BS5837:2005 Min.Root Prot. Area m ²	Distance from Site Features (see key above)	Can Tree Be Retained
Hge 1	Holly Hawthorn Beech	A2/ B2	S & M	150 to 180	1.8	10.2	UF of new footpath	NO - RTFD
T1	Sycamore <i>Acer pseudoplatanus</i>	B1 / C1	M	550	5.5	95.1	UF of new footpath	NO - RTFD
T2	Sycamore <i>Acer pseudoplatanus</i>	B1	M	550	5.5	95.1	5m to new footpath	YES (1)
T3	Purple Plum <i>Prunus cerasifera</i> 'Nigra'	C1	S	280	3.4	35.5	7.5m to new footpath	YES
T4	Norway Maple <i>Acer platanoides</i>	B1	S	75	0.9	2.6	12.2m to new footpath	YES
T5	Horse Chestnut <i>Aesculus hippocastanum</i>	A1	M	520	5.2	85.0	14.6m to new footpath	YES
T6	Crab Apple <i>Malus species</i>	B1	S	180	2.2	14.7	17.6m to new footpath	YES
T7	Himalayan Birch <i>Betula jacquemontii</i>	A1	S	200	2.4	18.1	19m to new footpath	YES
T8	Norway Maple <i>Acer platanoides</i>	A1	S	500	6.0	113.1	19m to new footpath	YES

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6.3 **NO – RSAM**

- There are no surveyed trees in a dangerous condition which should be removed for sound arboricultural management reasons regardless of any re-development proposals.

6.4 **NO – RTFD**

- **Tree 1 & 45m of Hedge 1** - cannot be retained with these proposals as they will be under the footprint of the new footpath alignment. Allowance has been made for replacement planting of both the tree and the hedge feature on completion of development works.

6.5 **YES**

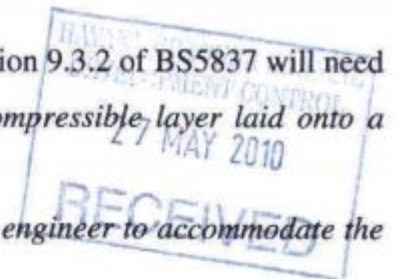
- **Trees 3; 4; 5; 6; 7 & 8 and 72m of Hedge 1** - can all be retained and afforded full protection in accordance with the BS5837 recommendations (see Plan BH.03 for details).

6.6 **YES (1)**

- **Tree 2** - can also be retained but not afforded full protection as works will take place 0.5m into the RPA to the West side and this will entail initial hand excavation of an exploratory trench to reveal root runs and sever them cleanly with secateurs or a 'Silky' saw. Some ground protection measures will also need to be employed for practical reasons to allow enough space for the work to take place.

7.0 **PRE-DEVELOPMENT TREE WORK and WORKING WITHIN THE RPA**

- 7.1 Undertake all tree work as listed in the Tree Works Schedule – see appendix BH4. Inclusive of all development facilitation felling requirements and all tree pruning works for facilitation or access or health and safety reasons.
- 7.2 The tree surgery specialist contractors are to be given clear guidelines and a remit that prohibits heavy plant (Lorries, Cranes and Work Platforms) tracking through the site within tree protection zones where there is no existing hard surfacing protection.
- 7.3 If there are to be heavy pedestrian movements within the RPA's then Ground Protection measures in accordance with Section 9.3.2 of BS5837 will need to be applied – *'installation of ground protection in the form of a single thickness of scaffold boards on top of a compressible layer laid onto a geotextile, or supported by scaffold..'*
- 7.4 *'For wheeled or tracked construction traffic movements within the RPA the Ground Protection should be designed by an engineer to accommodate the likely loading and may involve the use of proprietary systems or reinforced concrete slabs.'*



- 7.5 Where trees are to be felled in proximity to others that are to be retained it will be necessary to use special dismantling techniques to avoid both above and below ground damage, lowering sections to the ground in a careful manner with the aid of slinging ropes.
- 7.6 Unless otherwise specifically instructed - all cut wood and arisings are to be removed from site and safely disposed of.
- 7.7 Tree stumps within RPA's are to be ground out and **NOT grubbed out** to avoid damage to the root systems of retained trees.

8.0 CONSTRUCTION EXCLUSION ZONE : BARRIERS and GROUND PROTECTION

- 8.1 Protective fencing barriers are to be located exactly as specified on the **Tree Protection Plan BH03** and in full accordance with the recommendations contained within British Standard 5837:2005- Figure 2.
- 8.2 A copy of the Tree Protection Plan is to be pinned up in the temporary offices/mess hut on site for all site staff to see. The area within the construction exclusion zone is to be regarded as **sacrosanct** and the fencing shall not be taken down or relocated at any time, unless this has been agreed as part of the planning application consent process and is detailed in writing and shown on a plan.
- 8.3 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 of).
 - **No** storage of plant, equipment or materials
 - **No** vehicular or plant access
 - **No** fire lighting within 10m of tree canopies
 - **No** handling, discharge or spillage of any chemical substance, including cement washings and vehicle washings within 10m
 - **No** action likely to cause localised water-logging
 - **No** alteration of ground levels
 - **No** construction of hard surfaces
 - **No** attachment of boards, hoarding, cables or notices or fencing to trees

Special care is to be taken on sloping ground where spillages could run towards the trees – a collecting channel dug along the outer line of the protective fencing would be one method of avoiding such damage.



- 8.4 Barriers must be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place around the retained tree(s).
- 8.5 Special attention must be paid to these barriers during the course of works to ensure that they remain in situ and rigid and complete. Any breaches or failures are to be repaired immediately and no works undertaken in the vicinity until they have been fully restored/repaired.
- 8.6 Barriers should consist of a scaffold framework, well braced to resist impacts, with vertical tubes spaced at a maximum interval of 3m. Onto this Weldmesh or Wooden Hoarding Panels should then be securely fixed with wire or scaffold clamps.
- 8.7 It may be appropriate on some sites to use temporary site office buildings as components of the tree protection barriers along with the necessary ground protection measures beneath them. In such cases all doors must open outwards away from the trees with no access into the RPA and all discharges (clean or effluent) must be piped outside the RPA and into an existing drainage system. No excavation will be permitted within the RPA to make water or sanitary pipe connections to the offices or toilet blocks.
- 8.8 Where specified on the Tree Protection Plan – Ground Protection measures must be applied in accordance with Figure 3 and Sections 9.3.2 & 9.3.3 of BS5837 please see copy at **appendix BH5**.

9.0 AVOIDING DAMAGE TO STRUCTURES BY TREES : DIRECT or INDIRECT ACTION

- 9.1 Buildings should be constructed to allow for future growth of existing; planted or self sown trees.
- 9.2 Direct damage can be caused by :-
- a) the disruption of underground services and pipelines
 - b) displacement of underground services and pipelines
 - c) the impact of branches with the superstructure
 - d) structural failure of the tree

In this respect the Tree Survey exercise will have identified any trees within categories c) or d) and tree works advised accordingly to remedy risk. Items a) and b) can be avoided by judicious design and careful placement of utility services and by adherence to Table 3 planting distances.

- 9.3 Indirect damage by root action causing the shrinkage or swelling of clay soils can be avoided by adherence to the new tree planting distances specified under Table 3 – see at **appendix BH6**; and by having engineer designed foundations to accord with NHBC Standards.



10.0 DEMOLITION & CONSTRUCTION IN PROXIMITY TO EXISTING TREES

10.1 This project involves NO demolition and only a construction phase.

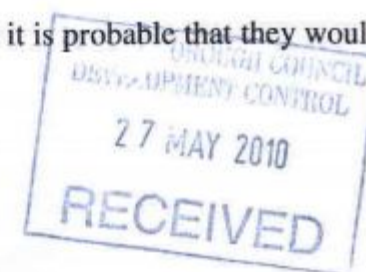
10.2 Construction Phase –

Specific Actions:

- Prior to commencement of work on site a check is to be made to verify that all of the protective fencing barriers are where they should be by reference to the Tree Protection Plan and that they are in good order and fit for the purpose.
- Prior to felling and grubbing out the tree and hedge line the contractors must dig the exploratory 'hand dug' trench and sever any roots from T2 that are found to cross the line of the trench using only secateurs or a 'Silky' hand saw.
- Works may now proceed with caution exercised when working close to the protective fencing barrier

Generic Actions:

- It is suggested that clear and concise points of contact and lines of communication are established prior to commencement of the works on site including:- Arboricultural Consultant; Local Authority Tree Officer; Local Authority Planning Officer; Site Manager and Foreman
- It is advised that the Site Manager establishes his own listing of contact details at the Pre-Start site meeting and pins this up in site office for all to refer to.
- Care must be taken when planning site operations to ensure that wide or tall loads, or plant with booms, jibs and counterweights can operate without coming into contact with retained trees.
- **ALL** machine operators should undergo an induction session prior to being allowed to work on site, where the Method Statement is explained to them and a copy pinned up in the site office for their reference.
- In addition a copy of the Tree Protection Plan will be provided and pinned up in the site hut and the trees which are to be retained and protected will be pointed out to the operator and they will also be shown which trees these are on site before they start work. In this way it is hoped that unnecessary damage, by root disturbance and collision of machinery booms and operating arms with tree crowns can be avoided.
- At the time of writing this Method Statement the exact route of underground service connections is not confirmed but it is probable that they would link in with the existing service runs in the footway with no impact on retained trees within the site.



- This matter is therefore best dealt with to satisfy a Condition of Planning Approval and it can be worded to allow for the need for a further Method Statement and Protection Plan if required prior to undertaking any excavations for the implementation of service runs.
- In the interim details of NJUG 10 Guidelines are included (at appendix BH6) as a basic Method Statement and as the basis for further detailed discussion in the unlikely event that it should prove necessary to run service routes through RPA's.

11.0 SOFT LANDSCAPING WORKS

- Any soft landscape works within the protected areas shall be in accord with Table 3 and Sections 13 & 14 of BS5837:2005 (see copy extracts at appendix BH6).
- It is strongly recommended that the plans and specifications for the landscaping of this development are drawn up by a qualified Landscape Architect.
- 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.
- At this juncture appropriate decompaction, 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.
- 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.
- It is acknowledged that by the nature of the works some surface excavation is needed to prepare for tree and shrub planting or laying of lawns. This work shall be undertaken with hand forks and any exposed roots are to be cleanly severed to encourage new growth and an adequate soil medium laid around them to encourage same.

12.0 MONITORING & SITE SUPERVISION

- It is recommended in BS5837:2005 that either an arboriculturist or a person suitably experienced in the subject is retained to advise on all tree related aspects of site monitoring and supervision and it is the local authority's responsibility to make this a condition of planning approval with the said Condition ideally requiring a set schedule of operations and timings prior to undertaking works on site.



13.0 CONCLUSIONS

- Provided that the methodology prescribed in this AMS & TPP report is strictly adhered to I would expect the retained trees to survive the development and to continue to grow on safely and healthily in the future.
- There is only one tree that needs to be removed to facilitate development and this is of a species of limited value and readily replaced with one (or more) new semi-mature specimen(s) of high quality located within the school grounds close to the original trees location at the road frontage.
- A 60m length of high quality mature hedging will need to be removed in order to facilitate this development work which is regrettable but necessary if works are to proceed as shown on the submitted layout plans. In mitigation it will be necessary to plant a replacement hedge along the back edge of the new footpath which should be of native plant species (suggest Beech) and will over time mature to replace the original feature at this location.

Advisory Notes:

1. The timing of these works will be critical given that the hedge is an ideal habitat for bird nesting.

The recognised bird nesting season runs from – **1st March to 31st August** – and it is an offence under the Wildlife & Countryside Act to disturb or destroy a nesting bird. Work can be undertaken during this period **but** this would first require an assessment by a qualified ecologist to verify that no birds were actively nesting at the time of grubbing out the hedge line. The Sycamore has no holes or cavities and does not generally provide a suitable nesting site; but it would be as well to have this checked out as well prior to commencing felling works.



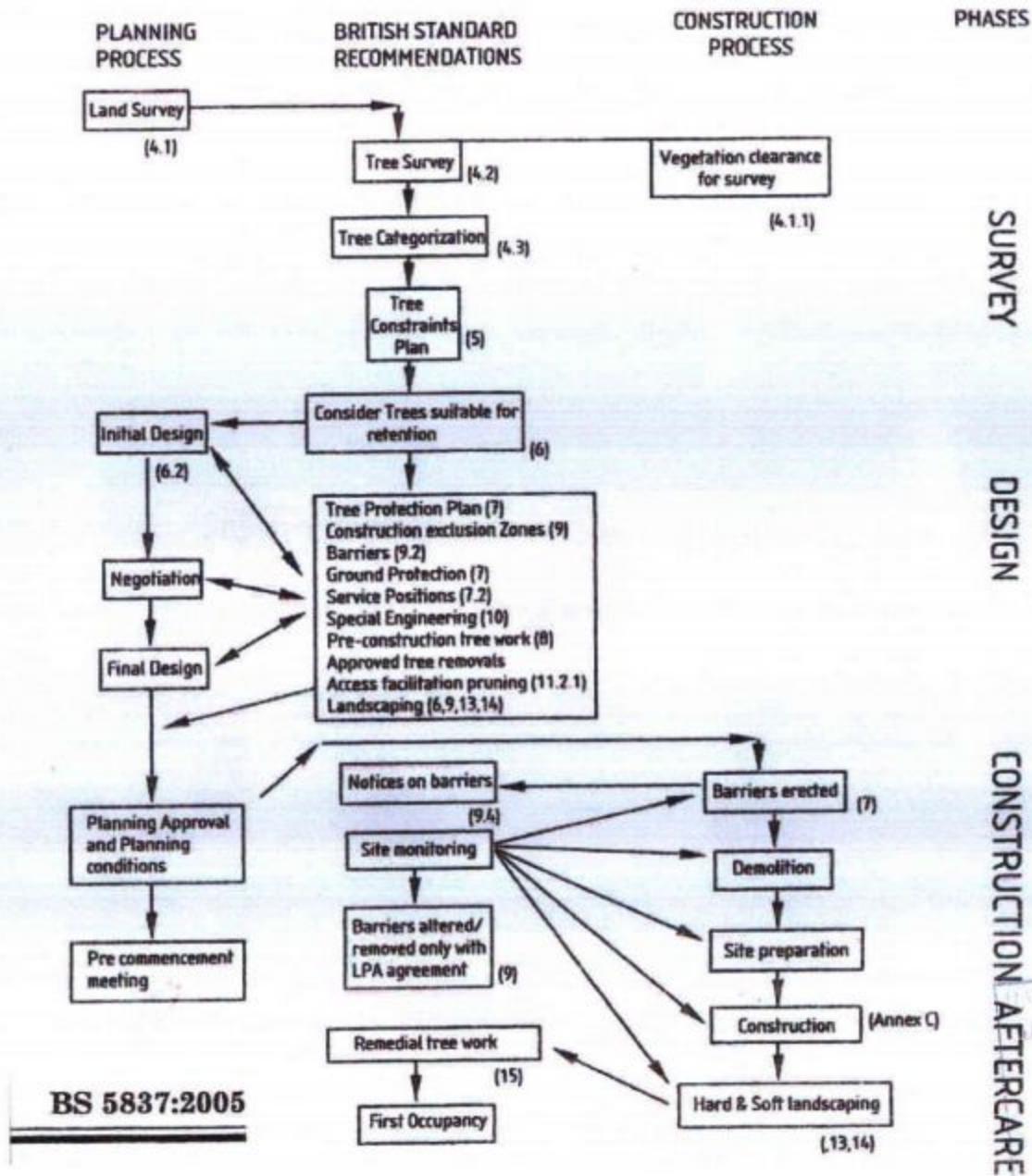


BH 1

Tree Survey Schedule

(in accordance with Table 1 of BS5837)
+ Tree Survey Notes + Flow Diagram





Figures in brackets refer to Clause numbers.

Figure 1 — Flow diagram, summarizing planning for trees on development sites

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TREE SURVEY NOTES

These Tree Survey Notes have been prepared in accordance with the recommendations of **British Standard 5837:2005** and define the criteria for pre – development tree surveys.

- Each tree/group has been allocated a unique number (No.). Where specifically commissioned small durable numbered metal tags can be applied to each tree/group surveyed.
- The tree species (**Species**) is provided in both English and Latin 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 (**Trunk Diam**) are measured in millimetres at 1.5m above ground level and denoted as **S** single stemmed trees or **M** for multi-stemmed trees which are measured immediately above the root flare.
- 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 recorded 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.
- The average ground clearance (**Grd Cl**) is estimated and shown in metres.
- An assessment of a tree/groups age (**Age**) class 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
MA	-	Middle – aged tree/group
M	-	Mature tree/group
OM	-	Over – mature tree/group
V	-	Veteran tree/group
- An assessment of a tree/groups overall physiological condition (**Fm**) is recorded as :-

G	-	Good
F	-	Fair
P	-	Poor
D	-	Dead
- Data on the structural condition (**Condition Comments**) of the tree/group is provided to give an indication of its visual appearance and any significant health and safety issues.
- Details of necessary tree works required at the time of survey is given under the heading – **Preliminary Management Recommendations**
- An estimate of a tree/groups future life expectancy (**Rem Cont**) is made and is recorded thus :-
1-10; 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 **BS5837:2005**. 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 the numerical sub-categories which are also applied are 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.

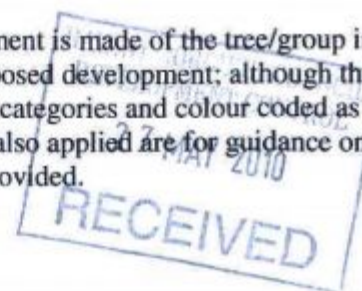


Table 1 – Cascade chart for tree quality assessment

TREES FOR REMOVAL				
Category and definition	Criteria			Colour on plan
Category R Those in such a condition that any existing value would be lost within 10 years and which should, in current context, be removed for reasons of sound arboricultural management.	- 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 R category 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 (e.g. Dutch Elm Disease), or very low quality trees suppressing adjacent trees of better quality			Dark Red
TREES TO BE CONSIDERED FOR RETENTION				
	Criteria – Subcategories			
	1	2	3	
Category H – Those of high quality and value: in such a condition as to be able to make a substantial contribution (a minimum of 40 years is suggested)	Trees that are particularly good examples of their species, especially if rare or unusual, or essential components of groups, or of formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands which provide a definite screening or softening effect to the locality in relation to views into or out of the site, or those of particularly visual importance (e.g. avenues or other arboricultural features assessed as groups)	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	Light Green
Category M – Those of moderate quality and value: in such a condition as to make a significant contribution (a minimum of 20 years is suggested)	Trees that might be included in the high category, but are downgraded because of impaired condition(e.g. presence of remediable defects including unsympathetic past management and minor storm damage)	Trees present in numbers, usually as groups or woodlands, such that they form distinct landscape features, thereby attracting a higher collective rating 3than they might as individuals but which are not, individually, essential components of formal or semi-formal arboricultural features (e.g. trees of moderate quality within an avenue that includes better, A category specimens), or trees situated mainly internally to the site, therefore individually having little visual impact on the wider locality	Trees with clearly identifiable conservation or other cultural benefits	Mid Blue
Category L – Those of low quality and value: currently in adequate condition to remain until new planting could be established (a minimum of 10 years is suggested), or young trees with a stem diameter below 150mm	Trees not qualifying in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater landscape value, and/or trees offering low or only temporary screening benefit	Trees with very limited conservation or other cultural benefits	Grey
Note: Whilst C category trees will usually not be retained where they would impose a significant constraint on development, young trees with a stem diameter of less than 150mm should be considered for relocation				





TREE SURVEY SCHEDULE

Client : Havant Borough Council

Site Location : St James Primary School, Bellevue Lane, Emsworth

Surveyor : Bernie Harverson *M.Arb.*

Date Surveyed : 12th February 2010

No	Species	Ht m	S or M	Trunk Diam mm	Brch Sprd m	Grd Cl m	Age	F	Condition Comments	Preliminary Management Recommendations	Rem Cont yrs	Ca
Hge 1	Holly Hawthorn Beech (+ odd Oak, Bay & Yew)	1.2 to 1.8	S & M	150 to 180	N- E1 S- W0.4	0	M	G to P	Gaps and weak growth 10m north side of T1- otherwise a strong and healthy dense hedge	No work considered essential at time of survey	>40	A2 / B2
T1	Sycamore <i>Acer pseudoplatanus</i>	13	M	550	N8 E4 S5 W7	4	MA	F	Multi stemmed with tight forks with included bark at 1m above ground level-upright habit to crown- suppressed to the west by dominant T2-some minor deadwood throughout-previously crown lifted to 4m-old pruning wounds occluding	No work considered essential at time of survey	>40	B1 / C1
T2	Sycamore <i>Acer pseudoplatanus</i>	10	M	550	N7 E8 S7 W9	2	MA	G	Suckers-roots exposed on surface to 1m-mower damage to surface roots-also compaction damage- multi stemmed at 1m above ground level-low branching habit interfering with lighting column on footpath-some minor deadwood-previously crown lifted to 3m and cleaned out in centre-old pruning wounds occluding	Prune back to clear light column	>40	B1
T3	Purple Plum <i>Prunus cerasifera 'Nigra'</i>	9	S	280	N6 E4 S4 W4	2	M	F	Roots exposed on surface to 1m-mower damage to surface roots and compaction damage-suppressed by dominant T2	No work considered essential at time of survey	10-20	C1



T4	Norway Maple <i>Acer platanoides</i>	4.5	S	75	N1.5 E1 S2 W2	2	Y	F	Leans to the west-open habit - no dominant central leader	No work considered essential at time of survey	>40	B1
T5	Horse Chestnut <i>Aesculus hippocastanum</i>	9	M	520	N6 E5 S6 W4	1.5	Y	G	Roots exposed on surface to 2m-mower and compaction damage to surface roots-multi stemmed with tight forks with include bark at 1.2m-low branching habit-good shape and form-outwardly sound and healthy	No work considered essential at time of survey	>40	A1
T6	Crab Apple <i>Malus species</i>	5	S	180	N4 E6 S5 W4	2	MA	F	Pronounced root graft union visible at ground level-roots exposed on surface to 2m-mower and compaction damage to surface roots-bifurcated at 1.8m above ground level-arching lean to the east side-crown weighted to the east-previously crown lifted to 2m-old pruning wounds occluding	No work considered essential at time of survey	20-30	B1
T7	Himalayan Birch <i>Betula jacquemontii</i>	12	S	200	N3 E4 S3 W2.5	1.5	MA	G	Roots exposed on surface to 2m with compaction damage-leans to the west-good shape and form-outwardly sound and healthy	No work considered essential at time of survey	>40	A1
T8	Norway Maple <i>Acer platanoides</i>	12	S	500	N7 E7 S7 W7	1.5	MA	G	Roots exposed on surface to 1.5m with compaction damage-multi stemmed at 1.8m above ground level-good shape and form-outwardly sound and healthy	No work considered essential at time of survey	>40	A1





BH 2

Tree Root Protection Area Schedule
(in accordance with Table 2 of BS5837)



ROOT PROTECTION ZONE/AREA SCHEDULE

Client : **Havant Borough Council**
Site Location : **St James Primary School, Bellevue Lane, Emsworth**

Tree No.	Tree Species	Grade	Single or Multi Stem	Diam. mm	BS5837:2005 Table2- Radial Protect. Zone m	BS5837:2005 Table2- Root Protect. Area m ²	Is An Offset Required To Cater For Existing Rooting Pattern Restrictions
Hge 1	Holly Hawthorn Beech	A2/ B2	S & M	150 to 180	1.8	10.2	YES –will tend to root more into the site because of the hard surfacing to the west side
T1	Sycamore <i>Acer pseudoplatanus</i>	B1 / C1	M	550	5.5	95.1	NO - there are constraints all around this tree which cancel each other out
T2	Sycamore <i>Acer pseudoplatanus</i>	B1	M	550	5.5	95.1	NO - there are constraints all around this tree which cancel each other out
T3	Purple Plum <i>Prunus cerasifera</i> 'Nigra'	C1	S	280	3.4	35.5	NO – fairly free rooting to all directions
T4	Norway Maple <i>Acer platanoides</i>	B1	S	75	0.9	2.6	NO – free rooting to all directions
T5	Horse Chestnut <i>Aesculus hippocastanum</i>	A1	M	520	5.2	85.0	NO – fairly free rooting to all directions
T6	Crab Apple <i>Malus species</i>	B1	S	180	2.2	14.7	NO - there are constraints all around this tree which cancel each other out
T7	Himalayan Birch <i>Betula jacquemontii</i>	A1	S	200	2.4	18.1	NO – fairly free rooting to all directions
T8	Norway Maple <i>Acer platanoides</i>	A1	S	500	6.0	113.1	NO – fairly free rooting to all directions





BH 3

Tree Constraints Plan -BH01/02





BH 4

Pre-Development Facilitation Tree Works Schedule



TREE WORK SPECIFICATION

Client : Havant Borough Council

Site Location : St James Primary School, Bellevue Lane, Emsworth

The abbreviations used in the header block below are fully explained within the attached Tree Survey Notes. The assessment of remaining contribution in years and the category are made as viewed and may be subject to variation where the management strategy suggests further investigations/actions followed by re-surveying. Group details/dimensions are recorded as an average.

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 the recommendations.

No	Species	Tree Works Recommended
Hge 1	Holly Hawthorn Beech	- Grub out a 44m section of this hedge as shown on the Tree Protection Plan BH.03 at Appendix BH5. - The remaining hedge line is to be left untouched.
T1	Sycamore <i>Acer pseudoplatanus</i>	- Fell to ground level - Grind out the stump
T2	Sycamore <i>Acer pseudoplatanus</i>	- Shorten the lateral spread on the west side to clear away from the lamp column - Make all final cuts adjacent to living growth points.
T3	Purple Plum <i>Prunus cerasifera 'Nigra'</i>	No works required at this time
T4	Norway Maple <i>Acer platanoides</i>	No works required at this time
T5	Horse Chestnut <i>Aesculus hippocastanum</i>	No works required at this time
T6	Crab Apple <i>Malus species</i>	No works required at this time



T7	Himalayan Birch <i>Betula jacquemontii</i>	No works required at this time
T8	Norway Maple <i>Acer platanoides</i>	No works required at this time





BH 5

Tree Protection Plan BH03



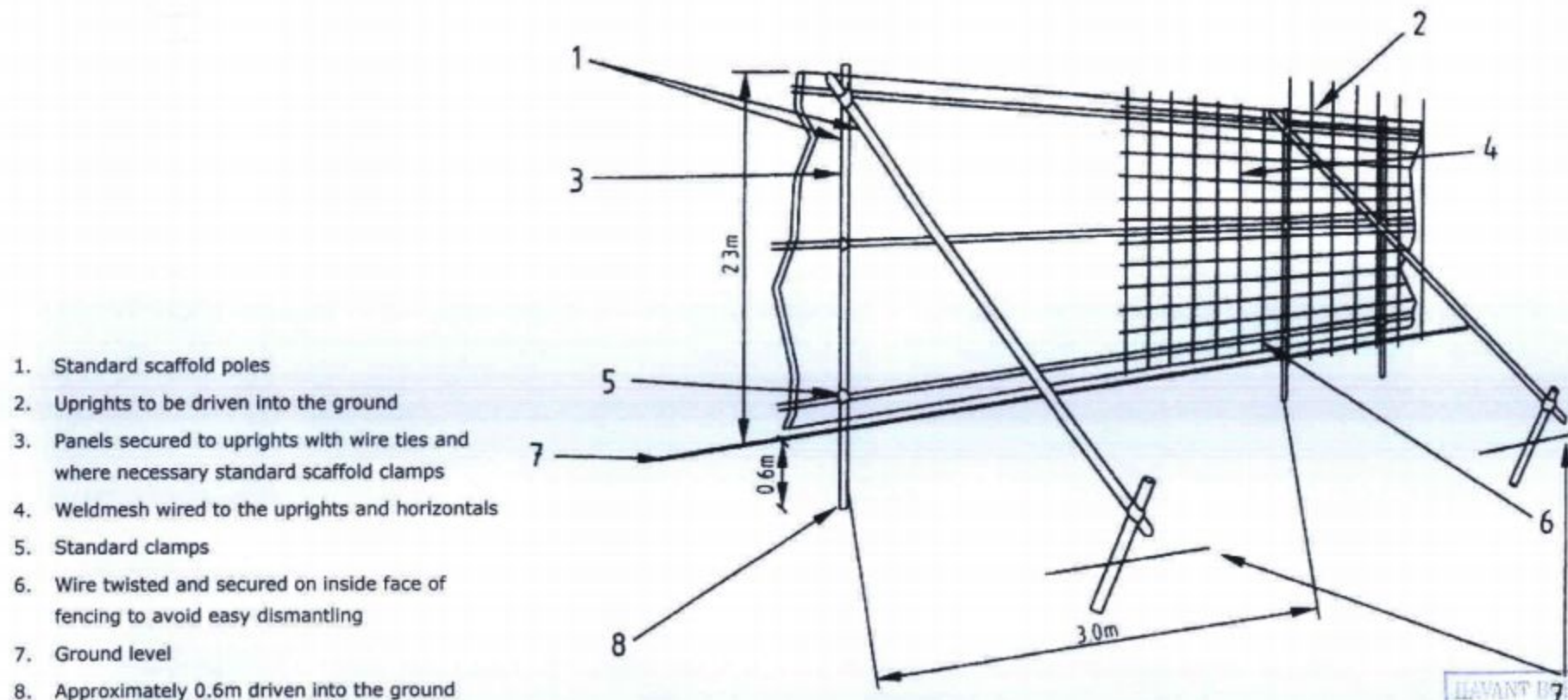


Figure 2 - Protective Barrier

Extract taken from BS5837:2005



9.2 Barriers

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

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

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

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

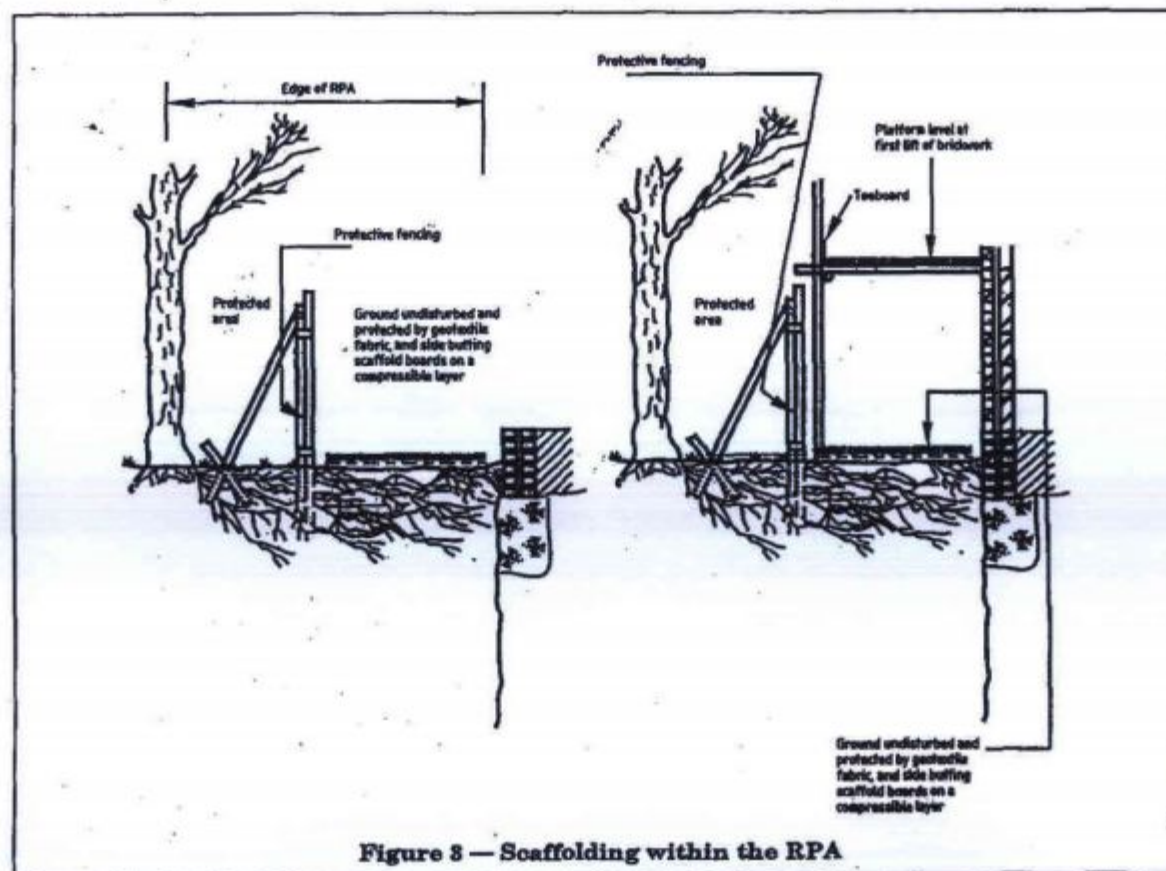


Figure 3 — Scaffolding within the RPA



Extract taken from BS5837:2005

9.3 Ground Protection

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

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

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

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**

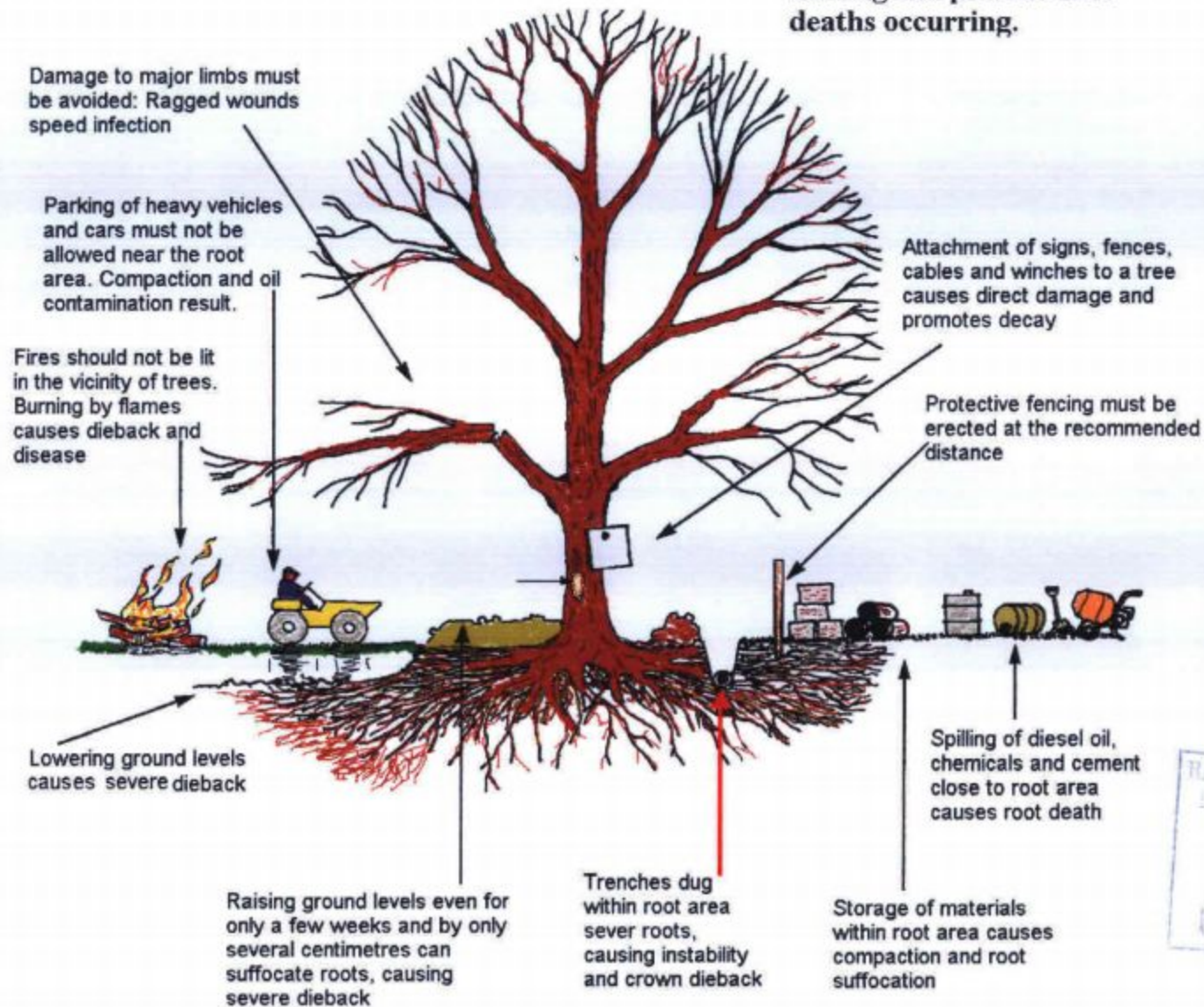
REPORT DAMAGE TO TREES OR FENCING IMMEDIATELY



Common causes of Tree Death

(Source: Arboricultural Information Exchange website, 2005)

The use of properly positioned protective fencing can prevent tree deaths occurring.





BH 6

BS 5837:2005 Extracts
Table 3 - Sections 13, 14 and 15
& NJUG 10 Extracts



Table 3 – Minimum distance (m) between young trees or new planting and structures to avoid direct damage to a structure from future growth.

Type of Structure	Diameter of stem at 1.5m above ground level at maturity		
	<30cm	(30-60) cm	>60cm
Buildings and heavily loaded structures	-	0.5	1.2
Lightly loaded structures such as garages and porches	-	0.7	1.5
Drains and underground services:			
<1m deep	0.5	1.5	3.0
>1m deep	-	1.0	2.0
Masonry boundary walls ^a	-	0.5	1.0
	-	(1.0)	(2.0)
In situ concrete paths and drives ^a	-	0.5	1.5
	(0.5)	(1.0)	(2.5)
Paths and drives with flexible surfaces or paving slabs ^a	-	0.5	1.0
	(0.7)	(1.5)	(3.0)
^a These distances assume that some movement and minor damage might occur. Guidance on distances which will generally avoid all damage is given in brackets.			



Extract taken from BS5837:2005

13 Design considerations for new planting**13.1 General**

13.1.1 The purpose of proposed new planting should be understood from the start of the design process so that appropriate choices of structure, location and species can be made. Advice on detailed design should be sought from a landscape architect or other competent person experienced in landscape design.

13.1.2 Trees may perform a variety of roles, both aesthetic and functional:

- shelter planting to benefit buildings, people, crops or stock;
- screen planting to hide the unsightly or create privacy;
- planting to define or divide spaces, or to define or direct routes or views;
- specimens or groups can be used for architectural effect to complement buildings;
- for their inherent aesthetic qualities;
- providing character or sense of place;
- softer, natural elements to counter the artificial lines of the built environment;
- for their contribution to nature conservation, biodiversity and biomass;
- reducing air pollution; providing shade and controlling erosion.

13.1.3 All new tree planting proposals should take into consideration the future use, layout and design of a development site, constraints of soil and climate, the local landscape character and the contextual surroundings. As trees generally form the dominant elements of the long-term landscape structure of a site, careful consideration should be given to their ultimate height and spread, form, habit and colour, density of foliage and maintenance implications.

13.2 Planting adjacent to buildings

13.2.1 On all soils, it is inadvisable to plant trees at distances closer to a structure than those shown in Table 3 unless special precautions have been taken. Paths, patios and driveways, where they are not constructed to appropriate standards (see **10.3** and **[14]**) can be vulnerable to damage by trees with surface rooting characteristics. In addition, on shrinkable soils account should be taken of the foundation construction of existing and proposed nearby structures; planting should not compromise the structural performance of the foundation.

13.2.2 The effect of shade created by new trees and the likely extent and density of the tree crown when fully grown should be taken into consideration before new planting adjacent to buildings. Careful design and species selection should allow residents to enjoy reasonable light and the trees to develop into mature specimens. Special care should be exercised when considering planting large and/or fast growing evergreen trees as screens or hedging as these can be particularly oppressive, obstructing light all year round and requiring frequent maintenance to restrict their growth.

NOTE For information on planting adjacent to boundaries see Annex A and [6], [12] and [13].

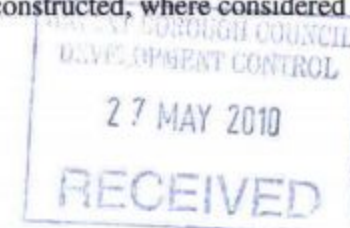
13.3 Planting adjacent to roads

Roadside trees can make a significant contribution to the character of new developments. Their siting and species selection should be carefully co-ordinated at an early stage with other highway design considerations and, in the case of adopted roads, with the agreement of the relevant highway authority.

Sight line requirements, lighting schemes, CCTV, underground and overhead service routes and avoidance of physical obstruction or damage should all be taken into account with due consideration for future growth and periodic maintenance requirements.

13.4 Planting in the vicinity of services

Trees should not be planted where they might obstruct overhead power lines or cables. In new developments, underground services should be ducted or otherwise protected at the time of construction to enable trees to be planted nearby without conflict (see utilities guidance documents [17]). Root barriers should be constructed, where considered necessary, under expert advice to reduce the risk of tree root intrusion into service runs.



14 Ground works and preparation for new planting

NOTE BS 4428 contains recommendations and guidance on general landscape operations with sections on preliminary investigation, drainage, grading and cultivation, tree planting and woodland planting.

14.1 Drainage

New development may have an effect on the existing drainage pattern and ground water levels of a site, due to increased areas of hard surface and consequential drainage requirements. Existing trees may suffer due to an alteration in the supply of groundwater, whilst younger specimens and new plantings may be more likely to adapt to the changed conditions. Expert advice on both drainage and trees should be taken where ground water conditions are liable to such change.

14.2 Soil conditions

Before any of the landscape operations listed in BS4428 are undertaken and where contamination is apparent, soils in areas to be planted should be analysed for structure and content by a specialist laboratory and expert advice taken on remediation measures for new planting if this is required. If contaminants (e.g. oil or diesel fuel, toxic materials, heavy metals, etc.) are present, soils should either be removed to the full depth for planting and new soil imported or expert advice obtained on remediation measures, which may include limiting the choice of species for planting. Where the structure of the soil is in an unsuitable condition to encourage growth, a number of remediation measures may be required including physical decompaction by mechanical plant or compressed air injection, the incorporation of bulky additive materials and new drainage systems. The advice of an arboriculturist should be sought for all works in the root protection area.

14.3 Surfaces around newly planted trees

NOTE BS4428 provides recommendations for the treatment of soft surfaces, but excludes hard surfaces.

14.3.1 Where surfaces are paved, the settlement of the soil in tree pits which occurs gradually after planting may cause movement of the paved areas. This may involve the partial collapse or instability of paving or disruption of flexible surfaces, where these are laid over prepared pits. The unpaved area around new plantings should, therefore, be of an adequate size to enable surrounding paving to be retained by a conventional edging and foundation (e.g. brick, concrete, stone or treated timber) set at a distance where it is unlikely to be affected by settlement. It may be appropriate for the outer edges of the backfilled area to be treated as a transition zone using interlocking surface reinforcement grids backfilled with a surface dressing of a permeable, granular material (e.g. gravels, shingles and other aggregates) which can be topped up if required. Due allowance should be made for future growth of stem and roots of a tree when considering the finished dimensions and the design of edge or kerb treatments of tree pits and planted areas.

Where load-bearing paving is to be laid over pits, it should either:

- a) be laid when the soil has settled and the level made good; or
- b) be laid on a supported foundation that spans the tree pit; or
- c) incorporate a tree grille with appropriate support around the edges.
- d) utilise structural soil.

NOTE Such foundation may be constructed from reinforced concrete, or comprise bearers made from steel or concrete.

14.3.2 Where there is any risk of a tree pit receiving surface water run off that may be contaminated, for example by rock salt, fuel spillage or other materials that may be toxic or harmful to plants, paving should be designed and laid to fall away from the pit.



15 Post development management**15.1 Existing trees**

15.1.1 Trees growing on a site before development takes place may, if adversely affected, be in decline over a period of several years before they die. This varies greatly depending on the age, species and condition of the tree, the soil conditions, climate and the extent of damage incurred during development. A programme of inspections and necessary work for the treatment of symptoms as they develop should be drawn up in conjunction with an arboriculturist. This programme may include recommendations for frequency of inspection and/or beneficial tree work and should take the form of an arboricultural management plan.

15.1.2 Where the trees in question are protected by planning controls, the planning authority should be informed and any necessary agreements obtained prior to such work.

15.1.3 Prior to handover, following completion of development, the arboriculturist should look for signs of intolerance to change in conditions and the effect of the development and any accidental damage to identify the need for further tree works in addition to those originally specified at the beginning of the development process.

15.1.4 An arboriculturist, should consider appropriate cultural operations. These may include irrigation, or measures to enhance the soil structure and organic nitrogen levels in the soil.

15.1.5 Where the development design incorporates the need for active management intervention following the completion of construction works, a tree or landscape management plan should be prepared and a copy supplied to all parties who may have an interest in the future management of the site or parts of it.

15.2 New plantings

Maintenance of newly planted trees is of particular importance during the critical establishment period, of at least two years and may, where required by planning conditions, be five years or more following planting. A detailed maintenance schedule covering the establishment period should be prepared in conjunction with the landscape design proposals and appropriate arrangements made for its implementation.



-EXTRACTS TAKEN FROM-

NJUG 10

NATIONAL JOINT UTILITIES GROUP

GUIDELINES FOR THE PLANNING, INSTALLATION AND MAINTENANCE OF UTILITY SERVICES IN PROXIMITY TO TREES

GAS - ELECTRICITY - TELECOMMUNICATIONS - WATER

UNDERGROUND SERVICES

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.

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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.



4 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.

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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.

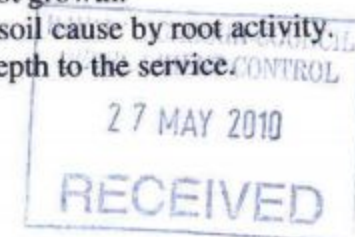
4.10 Special Considerations when planning service routes

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 caused by root activity. Special precautions for differential movement should be incorporated where services join rigid structures founded at a different depth to the service.





BH 7

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 **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.

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