



ARBORICULTURAL IMPACT ASSESSMENT

Oaklands Care Home - 216/218 Stakes Hill Road, Waterloooville

-prepared on behalf of PWP Architects –

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1.0 INTRODUCTION & CLIENTS BRIEF

- 1.1 The proposed development site is in everyday use as a residential Care Home and the current proposals involve demolition of parts of the existing format and revamping and adding a new extension to increase capacity.
- 1.2 There are trees on and adjacent to this site that might be affected by the proposals which is why I have been employed to address the arboricultural issues and to compile all necessary reports and plans in support of the scheme.
- 1.3 In advising my clients 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 & DRAWING DISCLOSURE STATEMENT

- 2.1 I have been provided with a base plan by **PWP Architects** for the purposes of illustrating the tree survey data and I place total reliance on the accuracy of this drawing for my plotting of tree positions; canopy spreads and Root Protection Zones.
- 2.2 For the purposes of my work on this project I have also been supplied with a set of the planning layout drawings as prepared by **PWP Architects** which I am advised will be submitted seeking planning approval:-
 - **5011-1400-Rev B – July 2014 - 1:200 scale @ A1**
 - **5011-1200-Rev A – July 2014 - 1:100 scale @ A1**
- 2.3 I have had these converted to 1:250 @A3 scale and place total reliance on the accuracy of these drawings in advising my clients on tree issues and compiling this report.

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

- 3.1 The Tree Survey exercise was carried out on **Monday 8th September 2014** and a copy of the **Tree Survey Schedule** is included at **appendix BH1 [with explanatory notes]** and the survey recorded **13** Individual trees, **1** Group and **2** Hedges.
- 3.2 The data obtained from the Tree Survey exercise has been utilised to prepare the **Root Protection Area Schedule** and a copy of the RPA Schedule is included at **appendix BH2 [with explanatory notes]**.
- 3.3 Plans have been prepared to accompany the schedules and a copy of the combined **Tree Survey and Root Protection Plan - BJH 01/02** is included at **appendix BH3**.

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 Layout Proposals and the implications for the above and below ground impact on trees both on and adjacent to the development site has been recorded onto earlier versions of the **Tree Retentions and Removals Plan - BJH.03** with a finalised copy provided at **appendix BH4** [*N.B. wherever possible this will have been disclosed to the clients as part of the ongoing arboricultural advice and guidance tendered during the design process leading up to the submission of this report which is based on the Finalised Layout Proposals*].

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 detail them and explain how they might be overcome or mitigated and this is dealt with in detail as part of the Arboricultural Impact Assessment at 6.0 below and shown on the **Tree Retentions & Removals Plan BJH.03** and **Tree Protection Plan BJH.04** both of which are included at **appendix BH4**.

6.0 ARBORICULTURAL IMPACT ASSESSMENT

6.1 The finalised planning layout drawing has been provided to me 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 and the data is presented here in tabular format:-

Key: UF = Under footprint **YES** = tree can be retained and fully protected **YES (1)** = tree can be retained subject to mitigation measures being applied

NO-RSAM = tree will be removed for sound arboricultural management reasons **NO-RTFD** = tree cannot be retained and will be removed to facilitate development

Tree No	Species	Cat	Stem Diameter mm	BS5837:2012 Radial Prot. Area m	BS5837:2012 Polygon Area m ²	Distance from Site Features (see key above)	Can Tree Be Retained (see key above)
1	Horse Chestnut <i>Aesculus hippocastanum</i>	A1	1100	13.2	547	3.2m to new parking bay 3.2m to revamped road access point 8.5m to revamped parking arrangements	YES (1)
2	Hawthorn <i>Crataegus monogyna</i>	B1	150 x4	3.6	41	8m to new footpath Existing road access and drive removed and converted to open space	YES
3	Dwarf Conifer <i>Juniperus</i>	C1	120	1.4	7	UF of development proposals	NO-RTFD
4	Common Ash <i>Fraxinus excelsior</i>	B1	500 300 200	7.4	172	7.4m to new building line	YES (1)
5	Sycamore <i>Acer pseudoplatanus</i>	C1	320 310	5.3	90	2.8m to new building line 1m to new footpath	YES (1)
6	Sycamore <i>Acer pseudoplatanus</i>	C1	400	4.8	72	3.7m to new building line 1m to new footpath	YES (1)
7	Sycamore <i>Acer pseudoplatanus</i>	C1	400	4.8	72	4.5m to new building line 1m to new footpath	YES (1)
8	Medlar <i>Mespilus germanica</i>	A1	250	3.0	28	5.2m to new building line 1.5m to new footpath	YES (1)
9	Common Ash <i>Fraxinus excelsior</i>	C1	600	7.2	163	5.8m to new building line 1.7m to new footpath	YES (1)

Tree No	Species	Cat	Stem Diameter mm	BS5837:2012 Radial Prot. Area m	BS5837:2012 Polygon Area m ²	Distance from Site Features (see key above)	Can Tree Be Retained (see key above)
10	Weeping Willow <i>Salix babylonica</i>	B1 / C1	400	4.8	72	5.8m to new building line 1.7m to new footpath	YES (1)
11	Sweet Gum <i>Liquidambar styraciflua</i>	B1	250 110	3.3	34	6.8m to new building line 1.6m to new footpath	YES (1)
12	Pedunculate Oak <i>Quercus robur</i>	C1	450	5.4	92	6m to new building line 1.6m to new footpath	YES (1)
13	Domestic Apple <i>Malus domestica</i>	B1	300 250 150 x2	5.3	89	5.6m to new building line 3.5m to new footpath	YES (1)
Hdge 1	Beech <i>Fagus sylvatica</i>	B2	Av 60	0.7	2	No change in circumstances	YES
Hdge 2	Golden Leylandii <i>Cupressocyparis</i>	C2	100	1.2	5	5.6m to new building line	YES
Grp 1	Birch (<i>Betula</i>) & Rowan (<i>Sorbus</i>)	B2	Av 120 #	1.4	7	No change in circumstances	YES

6.2 NO – RSAM

There are **0** trees within this category on this project which are recommended for removal for health and safety reasons regardless of any redevelopment proposals.

6.3 NO – RTFD

There is **1** tree within this category on this project which cannot be retained with the layout proposed.

Tree 3 Dwarf Conifer (C) – a small ornamental tree of small stature that makes very little impact in the landscape and is a tree of limited value and merit and as such would not be missed.

6.4 **YES**

There is **1** tree; **2** hedges and **1** group in this category on this project which can be retained and fully protected in accordance with BS5837 recommendations (see **Tree Protection Plan BJH.04** at **appendix BH4** and full listing in schedule at 6.1 above).

Tree 2 Hawthorn (B)

Hedge 1 Beech (B)

Hedge 2 Leylandii (C)

Group 1 Birch & Rowan (B)

6.5 **YES (1)**

There are **11** trees in this category on this project where work will intrude into their RPA as listed at 6.1 above and as shown on the **TRR Plan BJH03** and thus require mitigation measures to be applied in order to provide adequate levels of root protection and ensure their survival :-

Tree 1 Horse Chestnut (A)

- The proposals include the addition of a parking bay to the northwest side of the tree and given that this would be only 3.2m from the tree centre it is well within the RPA and thus will need to be of porous No Dig form.
- There is also a new footpath shown which marginally intrudes into the RPA so a similar porous No Dig solution will need to be applied here.
- There is also a proposal to revamp the access arrangements and car parking to the northeast side of the tree and whilst removal of the wearing course and sub-base layer is possible no further excavation below this point would be possible without damaging tree roots. Thus the solution to this work and adding in the new parking bay must all be of porous No Dig form and this will need cross section drawings prepared and an Engineer designed solution to the form of porous No Dig to be used and specify materials. It is suggested that this can be covered by a mini Method Statement submission to satisfy a Planning Condition.
- The new building line will be just outside of the trees RPA so Ground Protection Measures will also need to be applied to facilitate scaffolding erection and standard building techniques.

Tree 4 Ash (B)

- The new building line is equal to this trees RPA so Ground Protection Measures will also need to be applied to facilitate scaffolding erection and standard building techniques.
- There is also a new footpath shown which traverses the RPA so a porous No Dig solution will need to be specified and applied here and with regards to timing of operations the construction of the building will need to be the priority and only on completion of same will it be appropriate to remove the protective fencing to allow for the construction of the footpath.

Trees 5 & 6 Sycamores (C)

- In both instances the RPA overlaps the new building line and the crowns would need to be cut back to both facilitate scaffold erection and future clearances from the building.
- One solution would be to remove these two trees and replace them at the conclusion of construction works on this project – however, the client would prefer to see them retained if possible. Having studied this situation carefully I would conclude that both of these trees have been very heavily topped out in the recent past to the degree that there would have been no foliage left on them and only a trunk and scaffold branches would have remained. The current crowns are comprised of regrowth from the old pruning points and as such now that this severe form of pruning has been adopted it will need to be sustained in the future with periodical repeat pruning operations. Given these circumstances and the fact that although these trees are of poor quality and visual amenity value they do show healthy and vigorous growth responses to the heavy pruning regime I would have no problem in recommending an ongoing management strategy that allowed for repeat pruning events to keep them in harmony with their surroundings.
- As to the below ground impact of the proposals the heavy lopping regime will mean that these trees no longer support a full crown - thus the ongoing demands on the root systems will be significantly reduced and an argument could be made for a reduction in their RPA's given that the BS5837 calculations are based on full canopied trees. However, rather than advocating this or indeed hand dug slit trenching and root severance I would advise the application of an Engineer designed pile and beam foundation for the rear building line thus minimising the impact on roots. It is suggested that this can be covered by a mini Method Statement submission to satisfy a Planning Condition.

Tree 7 Sycamore (C)

- This tree has been pruned in a similar fashion to trees 5 & 6 and the same comments therefore apply with regards to its current vigour and vitality and its ongoing management.
- The new building line is equal to this trees RPA so Ground Protection Measures will also need to be applied to facilitate scaffolding erection and standard building techniques.
- There is also a new footpath shown which traverses the RPA so a porous No Dig solution will need to be specified and applied here and with regards to timing of operations the construction of the building will need to be the priority and only on completion of same will it be appropriate to remove the protective fencing to allow for the construction of the footpath.

Tree 8 Medlar (A)

- This tree has a full crown of healthy branches and is of a rarely seen species and thus has considerable merit.
- Its RPA is well clear of the new building but there is a new footpath shown which traverses the RPA so a porous No Dig solution will need to be specified and applied here and with regards to timing of operations the construction of the building will need to be the priority and only on completion of same will it be appropriate to remove the protective fencing to allow for the construction of the footpath.
- There is currently a 2m ground clearance beneath this tree on the side shown to receive the footpath - which would be adequate for head clearance of pedestrians but there will be a need to prune to maintain this safe clearance in the future.

Tree 9 Ash (C)

- This tree has been pruned in a similar fashion to trees 5 & 6 and the same comments therefore apply with regards to its current vigour and vitality and its ongoing management.
- Although the RPA marginally overlaps the existing building line there would be no root impact but the crown would need to be cut back to maintain clearances from the building. In addition to this allowance will need to be made for ground protection to facilitate scaffolding erection for refurbishment and vertical extension works.

- There is a new footpath shown which traverses the RPA so a porous No Dig solution will need to be specified and applied here and with regards to timing of operations the construction of the building will need to be the priority and only on completion of same will it be appropriate to remove the protective fencing to allow for the construction of the footpath.

Tree 10 Weeping Willow (B/C)

- This tree has been pruned in a similar fashion to trees 5 & 6 and the same comments therefore apply with regards to its current vigour and vitality and its ongoing management.
- As the RPA does not overlap the existing building line there would be no root impact but the crown would need to be cut back to maintain clearances from the building. In addition to this allowance will need to be made for ground protection to facilitate scaffolding erection for refurbishment and vertical extension works.
- The new footpath shown traverses the RPA so a porous No Dig solution will need to be specified and applied here and with regards to timing of operations the construction of the building will need to be the priority and only on completion of same will it be appropriate to remove the protective fencing to allow for the construction of the footpath.
- There is currently a 2m ground clearance beneath this tree on the side shown to receive the footpath - which would be adequate for head clearance of pedestrians but there will be a need to prune to maintain this safe clearance in the future.

Tree 11 Sweet Gum (B)

- This tree has a full crown of healthy branches and is of fairly good shape and form overall.
- As the RPA does not overlap the existing building line there would be no root impact but allowance will need to be made for ground protection to facilitate scaffolding erection for refurbishment and vertical extension works.
- The new footpath shown traverses the RPA so a porous No Dig solution will need to be specified and applied here and with regards to timing of operations the construction of the building will need to be the priority and only on completion of same will it be appropriate to remove the protective fencing to allow for the construction of the footpath.

- There is currently a 2m ground clearance beneath this tree on the side shown to receive the footpath - which would be adequate for head clearance of pedestrians but there will be a need to prune to maintain this safe clearance in the future.

Tree 12 Oak (C)

- This tree has been pruned in a similar fashion to trees 5 & 6 and the same comments therefore apply with regards to its current vigour and vitality and its ongoing management.
- As the RPA does not overlap the existing building line there would be no root impact but allowance will need to be made for ground protection to facilitate scaffolding erection for refurbishment and vertical extension works.
- The new footpath shown traverses the RPA so a porous No Dig solution will need to be specified and applied here and with regards to timing of operations the construction of the building will need to be the priority and only on completion of same will it be appropriate to remove the protective fencing to allow for the construction of the footpath
- There is currently a 2.5m ground clearance beneath this tree on the side shown to receive the footpath - which would be adequate for head clearance of pedestrians but there will be a need to prune to maintain this safe clearance in the future.

Tree 13 Apple (B)

- An off-site tree of reasonable form.
- The new building line is equal to this trees RPA so Ground Protection Measures will also need to be applied to facilitate scaffolding erection and standard building techniques.
- There is also a new footpath shown which traverses the RPA so a porous No Dig solution will need to be specified and applied here and with regards to timing of operations the construction of the building will need to be the priority and only on completion of same will it be appropriate to remove the protective fencing to allow for the construction of the footpath.

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 and a key 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 – some of these matters will have been dealt with in this report but in the event that there are issues that have not been satisfactorily resolved at this juncture it is suggested that the Planning Authority seek detailed responses as part of Method Statement submissions to satisfy 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 levels, including the location of retaining walls, steps and making adequate allowance for foundations of walls; 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 and m) the effects of slope on the movement of potentially harmful liquid spillages towards or into protected areas.

8.0 ARBORICULTURAL METHOD STATEMENT

- 8.1 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.
- 8.2 On this project it will be critical to follow a carefully planned and phased form of development to avoid unnecessary damage to tree roots.
- 8.3 The following phased works are therefore recommended:-

- 8.3.1 Contractors vehicles will park off road utilising the existing northern area of parking bays and hard surfacing or make use of the existing access and hard surfacing in front of No. 218. This would also apply to the delivery and storage of materials and the siting of Portakabin Offices and Mess Rooms/Toilet facility.
- 8.3.2 Erect the protective fencing in accordance with BS5837:2012 – Section 6 and Figure 2 - as shown on Plan BJH 04.
- 8.3.3 Lay the Ground Protection necessary to afford adequate protection for retained trees as illustrated on Plan BJH 04 - in accordance with **BS5837:2012 – Section 6.2.3.3 a)**
- 8.3.4 Carefully demolish the parts of the existing building which are shown for replacement by pulling them in on their own footprint and removing arisings swiftly from site and not leaving them stockpiled.
- 8.3.5 On completion of the construction of the new building and its extensions the protective fencing can be relaxed or in places completely removed to allow for the footpath link surrounding the building to be constructed and this is to be of a porous No Dig format in accordance with engineering drawings and specifications submitted and agreed to satisfy a Planning Condition.
- 8.3.6 At this stage of proceedings the new car parking and access arrangements can be undertaken at the front of the building in the vicinity of T1 Horse Chestnut – once again this will need to be of a porous No Dig format in accordance with engineering drawings and specifications submitted and agreed to satisfy a Planning Condition.
- 8.3.7 The final stage of works will involve the removal of the access drive to No.218 and conversion to soft landscaping features.
- 8.3.8 I am advised that all utility service connections and communications links will be made linking to existing facilities and will not require incursion into retained tree RPA's.

9.0 DEMOLITION AND CONSTRUCTION PHASES OF WORK – GENERIC METHOD STATEMENT

9.1 Based on the finalised layout for the development a schedule of tree works will be required listing all trees that require work as follows :-

- Trees for removal to enable development to take place and also any stump grinding works required.
- 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.

This schedule can be found at [appendix BH5](#).

9.2 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 most importantly before any demolition, stripping of soil or commencement of construction works.**

9.3 Barriers are to be 'Fit For Purpose' to exclude construction activity and must be maintained to ensure that they remain rigid and complete and in the original setting out positions. These checks will need to be incorporated into a schedule of site monitoring visits to be agreed with the clients subject to phased development operations and subsequently copies of these site visit reports will need to be copied in to the Council.

9.4 The default position will always be to erect fencing to the standard illustrated at Figure 2 (see drawing and specification at [appendix BH4](#)).

9.5 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.

9.6 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.

9.7 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.

9.8 A copy of the **Tree Protection Plan – BJH.04** 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

- 9.9 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.
- 9.10 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.

10.0 SITE MONITORING & SUPERVISION

- BS5837 recommends that wherever trees on or adjacent to a site have been identified on the tree protection plan as requiring special protection measures, there should be an auditable system of arboricultural site monitoring. This should extend to direct arboricultural monitoring whenever demolition/construction and development activity is to take place within or adjacent to any RPA.
- It is suggested that for all major sites the following phased approach should be observed, but on smaller sites this would be simplified subject to agreement with the Council :-
 1. Pre-commencement site meeting between the development teams arboricultural consultant and the site manager and client representative where the full extent of arboricultural supervision/monitoring can be agreed for the project and the requirements of the AIA report and Tree Protection Plan

BJH.04 discussed. Please note that **IF** there is a Demolition Phase to the project then the demolition contractors representative would also need to attend to gauge the constraints which will be placed on vehicle movements by the requirement to have Demolition Phase Protective Fencing erected for the duration of their works.

2. Employ a qualified and experienced Tree Contractor to carry out all tree pruning and felling works that have been agreed with the Council.
3. Erect the Construction Phase Protective Fencing [or extend it out from the initial Demolition Phase fencing if applicable] and apply any Ground Protection measures as recommended in the AIA report and shown on the Tree Protection Plan BJH.04
4. Schedule a second pre-commencement meeting between the development teams arboricultural consultant and the site manager and client representative where the location of the Protective Fencing can be verified [and any adjustments to same requested] and the suitability of the materials used can also be verified [i.e. are they 'fit for purpose']. Subject to this all meeting the recommendations of the AIA report and as shown on the Tree Protection Plan BJH.04 the site may be released to the Site Manager and a letter issued by the Arboricultural Consultant to the Council verifying satisfactory completion of the initial site set-up Tree Protection measures – probably accompanied by details of how the requirements for an ongoing auditable system of arboricultural site monitoring are to be met on this project.

11.0 LANDSCAPE DESIGN - SITE WORKS, LANDSCAPE OPERATIONS AND MANAGEMENT

- 11.1 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 with a detailed scheme to accompany the planning application.
- 11.2 Any soft landscape works within the protected areas shall be carried out in accordance with Section 8 of BS5837 and BS4428 & BS8545.
- 11.3 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.
- 11.4 This is to be hand excavation works only within tree RPA's with no machinery being used unless specific ground protection has been laid. Even then only lightweight mini excavators are to be permitted access.

- 11.5 Excavation works to plant trees and shrubs or to lay grass must be undertaken carefully with the use of forks and trowels only and NOT spades as significant root damage could result from this – any roots that are teased out and exposed during this process may be cut with secateurs provided that they are 25mm or less in diameter and not in clusters where their loss could adversely affect the health and vigour of retained trees.

12.0 CONCLUSIONS

- This report covers the overall Methodology for detailed development of this site and recommends mitigation measures where necessary for the layout being proposed.
- The direct tree loss required to facilitate development as proposed is not significant at all - with only one small Dwarf Conifer tree needing to be removed and there will not be a need to plant a replacement for this tree.
- Provided that the methodology prescribed in this report is strictly adhered to I am of the opinion that the retained trees will readily cope with the levels of disturbance anticipated and survive the development works without adverse impact.

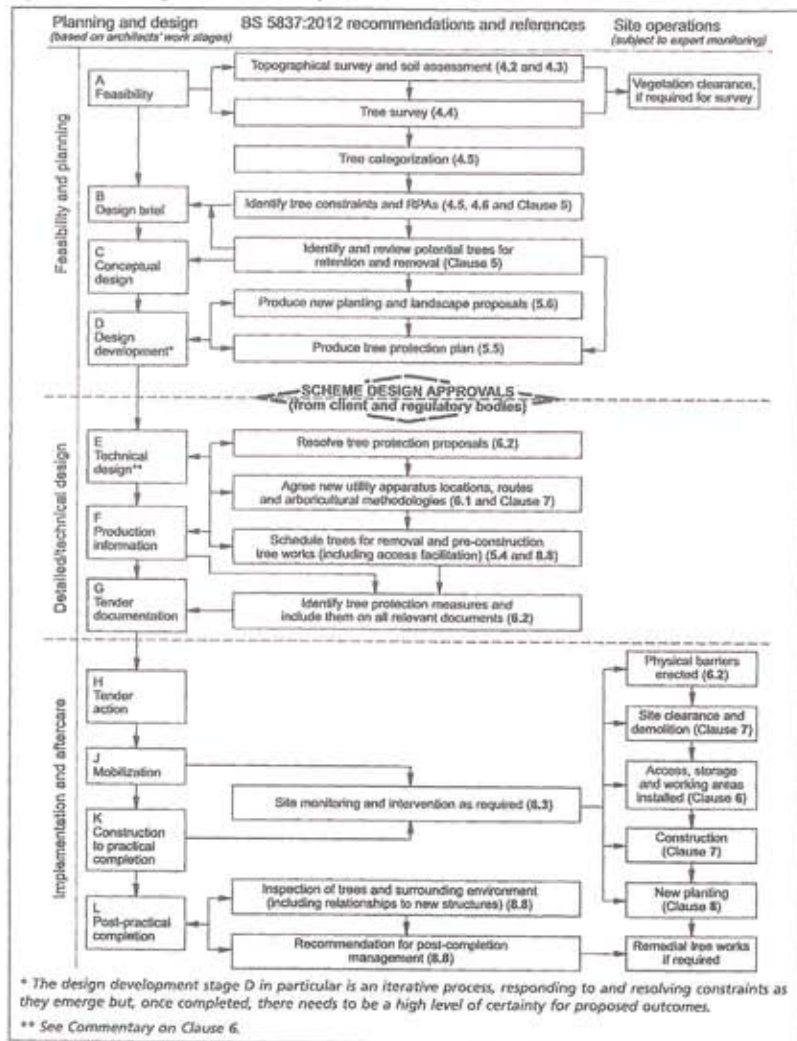


BH 1

Tree Survey Schedule

with Figure 1 Flow Diagram & Tree Survey Notes

Figure 1 The design and construction process and tree care



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 :- **U** (dark red); **A** (light green); **B** (mid-blue) and **C** (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.

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

Table 1 – Cascade chart for tree quality assessment

Category and definition	Criteria			Colour on plan
Trees unsuitable for retention				
Category D 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



TREE SURVEY SCHEDULE

Client : PWP Architects

Site Location : Oaklands Care Home, Stakes Hill Road

Surveyor : Bernie Harverson *M.Arb.*

Date Surveyed : 8th September 2014

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	Horse Chestnut <i>Aesculus hippocastanum</i>	22	1100	N10 E12 S8 W7	1.5	4 nesw	M	Ivy smothering base, trunk and through crown-multi stemmed 2.5m above ground level-small and large diameter deadwood-crown lifted to clear above road to 6m-good shape and form	Sever ivy	>40	A1
2	Hawthorn <i>Crataegus monogyna</i>	5	150 x4	N3 E4.5 S4.5 W4.5	1.5	1.5 nesw	EM	Off site tree on open space area-ivy smothering base, trunk and through crown-cables through upper crown	No work considered essential at time of survey	20-30	B1
3	Dwarf Conifer <i>Juniperus</i>	2	120	N1 E1 S1 W1	0	0 nesw	EM	Low branching habit	No work considered essential at time of survey	10-20	C1
4	Common Ash <i>Fraxinus excelsior</i>	12	500 300 200 #	N6 E6 S6 W6	3	4 nesw	EM	Unable to access-off site tree-ivy and climbers smothering base , trunk and through crown -previously heavily topped out-multi stemmed at ground level-tight forks with included bark	Sever ivy and climbers	>40	B1
5	Sycamore <i>Acer pseudoplatanus</i>	12	320 310	N2 E5 S5 W3	3	4 nesw	EM	High crown lifted-old pruning wounds partially occluded-previously heavily topped out-crown comprised of regrowth from old pruning wounds	No work considered essential at time of survey	>40	C1
6	Sycamore <i>Acer pseudoplatanus</i>	14	400	N3 E4 S3 W3	4	4 nesw	EM	Suckers-crown lifted-old pruning wounds partially occluded-previously heavily topped out-crown comprised of regrowth from old pruning wounds	No work considered essential at time of survey	>40	C1
7	Sycamore <i>Acer pseudoplatanus</i>	14	400	N5 E5 S3 W5	4	4 nesw	EM	Suckers-crown lifted-old pruning wounds partially occluded-previously heavily topped out-crown comprised of regrowth from old pruning wounds	No work considered essential at time of survey	>40	C1
8	Medlar <i>Mespilus germanica</i>	5	250	N3 E3 S3 W3	2	1.5 nesw	M	Fair shape and form	No work considered essential at time of survey	>40	A1

9	Common Ash <i>Fraxinus excelsior</i>	16	600	N7 E5 S5 W7	4	4 nesw	M	Multi stemmed at 3m-epicormics on trunk-small and large diameter deadwood and stubs-crown lifted –old pruning wounds partially occluded-previously heavily topped out-crown comprised of regrowth from old pruning wounds-poor quality tree	No work considered essential at time of survey	>40	C1
10	Weeping Willow <i>Salix babylonica</i>	12	400	N5 E5 S5 W3	2	6 nesw	EM	Contorted trunk-small diameter deadwood-crown lifted-old pruning wounds partially occluded-previously heavily topped out-crown comprised of regrowth from old pruning wounds	No work considered essential at time of survey	30-40	B1 / C1
11	Sweet Gum <i>Liquidambar styraciflua</i>	15	250 110	N2.5 E4 S1.5 W1	2	2.5 nesw	SM	Bifurcated at ground level-tight forks with included bark-epicormics-good shape and form	No work considered essential at time of survey	>40	B1
12	Pedunculate Oak <i>Quercus robur</i>	15	450	N6 E7 S5 W2	2.5	2.5n	SM	Multi stemmed 2.5m above ground level-open splayed habit-extensive suckers following heavy thinning/lopping works-low crown density-heavily topped out-flat pruned on west side-poor quality tree	No work considered essential at time of survey	>40	C1
13	Domestic Apple <i>Malus domestica</i>	7	300 250 150 150 #	N5 E4 S4 W2	2	3 nesw	M	Unable to access –off site tree-multi stemmed at ground level-suckers –epicormics-crown weighted to the north and east-small and large diameter deadwood and stubs-crown lifted over garden fence	No work considered essential at time of survey	30-40	B1
Hdge 1	Beech <i>Fagus sylvatica</i>	1.5	Av 60	N0.3 E0.3 S0.3 W0.3	0	0 nesw	Y	Unable to access-off site tree-heavily topped out-regrowth from old pruning points	No work considered essential at time of survey	30-40	B2
Hdge 2	Golden Leylandii <i>Cupressocyparis</i>	2.5 to 3	100	N0.5 E0.5 S0.5 W0.5	0	0 nesw	SM	Dieback on east face where hedge has been cut hard back	No work considered essential at time of survey	10-20	C2
Grp 1	Birch (<i>Betula</i>) & Rowan (<i>Sorbus</i>)	4 to 6	Av 120 #	N2.5 E2.5 S2.5 W2.5	1	1.5 nesw	Y	Unable to access-off site trees-fair shape and form	No work considered essential at time of survey	>40	B2



BH 2

Root Protection Area Schedule

[including RPA calculation methodology]

4.6 Root Protection Area (RPA)

4.6.1 For single stem trees, the RPA should be calculated as an area equivalent to a circle with a radius 12 times the stem diameter measured at a height of 1.5m from ground level. For trees with more than one stem, one of two calculation methods should be used as illustrated and explained below.

- a) For trees with 2 to 5 stems, the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{stem diameter } 1)^2 + (\text{stem diameter } 2)^2 \dots \text{up to } + (\text{stem diameter } 5)^2}$$

In words - measure the diameter of each of the stems – square each one and add it to the next - finally assess the square root of the combined total to derive one measurement which you look up in Table D.1 to find the radial RPA and area measurement equivalent to the area of a circle with that radius - in case you have to apply a polygon protection zone [see at 4.6.2 below].

The calculated RPA for each tree is to be capped at 707 m²

- b) For trees with more than five stems the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{mean stem diameter})^2 \times \text{the total number of stems}}$$

In words – measure all of the stem diameters – add them all together and divide by the total number of stems (= mean stem diameter) – then square this figure – then multiply that figure by the total number of stems and then finally assess the square root of that figure to derive one measurement which you look up in Table D.1 to find the radial RPA and area measurement equivalent to the area of a circle with that radius - in case you have to apply a polygon protection zone [see at 4.6.2 below].

4.6.2 The RPA for each tree should initially be plotted as a circle centred on the accurate position of the trunk of the tree. Where pre-existing site conditions or other factors indicate that rooting has occurred asymmetrically, a polygon of equivalent area to the circle should be plotted instead of the circle. Modifications to the shape of the RPA should reflect a soundly based arboricultural assessment of likely root distribution.

4.6.3 Any deviation in the RPA from the original circular plot should take account of the following factors whilst still providing adequate protection for the root system:

- the morphology and disposition of the roots, when influenced by past or existing site conditions (e.g. the presence of roads, structures and underground apparatus);
- topography and drainage;
- the soil type and structure;
- the likely tolerance of the tree to root disturbance or damage, based on factors such as species, age, condition and past management.

Stem Diam. mm	Circle Rad. m	Area m ²	Stem Diam. mm	Circle Rad. m	Area m ²	Stem Diam. mm	Circle Rad. m	Area m ²	Stem Diam. mm	Circle Rad. m	Area m ²	Stem Diam. mm	Circle Rad. m	Area m ²
75	0.9	3	310	3.7	43	545	6.5	134	780	9.4	275	1015	12.2	466
80	1.0	3	315	3.8	45	550	6.6	137	785	9.4	279	1020	12.2	471
85	1.0	3	320	3.8	46	555	6.7	139	790	9.5	282	1025	12.3	475
90	1.1	4	325	3.9	48	560	6.7	142	795	9.5	286	1030	12.4	480
95	1.1	4	330	4.0	49	565	6.8	144	800	9.6	290	1035	12.4	485
100	1.2	5	335	4.0	51	570	6.8	147	805	9.7	293	1040	12.5	490
105	1.3	5	340	4.1	52	575	6.9	150	810	9.7	297	1045	12.5	494
110	1.3	5	345	4.1	54	580	7.0	152	815	9.8	301	1050	12.6	499
115	1.4	6	350	4.2	55	585	7.0	155	820	9.8	304	1055	12.7	504
120	1.4	7	355	4.3	57	590	7.1	157	825	9.9	308	1060	12.7	508
125	1.5	7	360	4.3	59	595	7.1	160	830	10.0	312	1065	12.8	513
130	1.6	8	365	4.4	60	600	7.2	163	835	10.0	315	1070	12.8	518
135	1.6	8	370	4.4	62	605	7.3	166	840	10.1	319	1075	12.9	523
140	1.7	9	375	4.5	64	610	7.3	168	845	10.1	323	1080	13.0	528
145	1.7	10	380	4.6	65	615	7.4	171	850	10.2	327	1085	13.0	533
150	1.8	10	385	4.6	67	620	7.4	174	855	10.3	331	1090	13.1	538
155	1.9	11	390	4.7	69	625	7.5	177	860	10.3	335	1095	13.1	542
160	1.9	12	395	4.7	71	630	7.6	180	865	10.4	339	1100	13.2	547
165	2.0	12	400	4.8	72	635	7.6	182	870	10.4	342	1105	13.3	552
170	2.0	13	405	4.9	74	640	7.7	185	875	10.5	346	1110	13.3	557
175	2.1	14	410	4.9	76	645	7.7	188	880	10.6	350	1115	13.4	562
180	2.2	15	415	5.0	78	650	7.8	191	885	10.6	354	1120	13.4	568
185	2.2	16	420	5.0	80	655	7.9	194	890	10.7	358	1125	13.5	573
190	2.3	16	425	5.1	82	660	7.9	197	895	10.7	362	1130	13.6	578
195	2.3	17	430	5.2	84	665	8.0	200	900	10.8	366	1135	13.6	583
200	2.4	18	435	5.2	86	670	8.0	203	905	10.9	371	1140	13.7	588
205	2.5	19	440	5.3	88	675	8.1	206	910	10.9	375	1145	13.7	593
210	2.5	20	445	5.3	90	680	8.2	209	915	11.0	379	1150	13.8	598
215	2.6	21	450	5.4	92	685	8.2	212	920	11.0	383	1155	13.9	604
220	2.6	22	455	5.5	94	690	8.3	215	925	11.1	387	1160	13.9	609
225	2.7	23	460	5.5	96	695	8.3	219	930	11.2	391	1165	14.0	614
230	2.8	24	465	5.6	98	700	8.4	222	935	11.2	396	1170	14.0	619
235	2.8	25	470	5.6	100	705	8.5	225	940	11.3	400	1175	14.1	625
240	2.9	26	475	5.7	102	710	8.5	228	945	11.3	404	1180	14.2	630
245	2.9	27	480	5.8	104	715	8.6	231	950	11.4	408	1185	14.2	635
250	3.0	28	485	5.8	106	720	8.6	235	955	11.5	413	1190	14.3	641
255	3.1	29	490	5.9	109	725	8.7	238	960	11.5	417	1195	14.3	646
260	3.1	31	495	5.9	111	730	8.8	241	965	11.6	421	1200	14.4	652
265	3.2	32	500	6.0	113	735	8.8	244	970	11.6	426	1205	14.5	657
270	3.2	33	505	6.1	115	740	8.9	248	975	11.7	430	1210	14.5	662
275	3.3	34	510	6.1	118	745	9.0	251	980	11.8	435	1215	14.6	668
280	3.4	35	515	6.2	120	750	9.0	255	985	11.8	439	1220	14.6	673
285	3.4	37	520	6.2	122	755	9.1	258	990	11.9	443	1225	14.7	679
290	3.5	38	525	6.3	125	760	9.1	261	995	11.9	448	1230	14.8	685
295	3.5	39	530	6.4	127	765	9.2	265	1000	12.0	452	1235	14.8	690
300	3.6	41	535	6.4	130	770	9.2	268	1005	12.1	457	1240	14.9	696
305	3.7	42	540	6.5	132	775	9.3	272	1010	12.1	462	1245	14.9	701
												1250	15.0	707

Root Protection Area – Table D1

The RPA's given in Table D.1 should be used for single stem trees and the equivalent resultant combined stem diameter for multi-stemmed trees

ROOT PROTECTION ZONE/AREA SCHEDULE

Client : PWP Architects

Site Location : Oaklands Care Home, Stakes Hill Road

Tree No.	Tree Species	Cat	Diam mm	BS5837:2012 Table I Radial Protection Zone m	BS5837:2012 Table D1 Polygon Area m ²	Is An Offset Required To Cater For Existing Rooting Pattern Restrictions
1	Horse Chestnut <i>Aesculus hippocastanum</i>	A1	1100	13.2	547	NO – there are constraints all around this tree which cancel each other out
2	Hawthorn <i>Crataegus monogyna</i>	B1	150 x4	3.6	41	YES – this tree is likely to root a lot more out into the open space area
3	Dwarf Conifer <i>Juniperus</i>	C1	120	1.4	7	NO – there are constraints all around this tree which cancel each other out
4	Common Ash <i>Fraxinus excelsior</i>	B1	500 300 200	7.4	172	NO – fairly free rooting to all directions
5	Sycamore <i>Acer pseudoplatanus</i>	C1	320 310	5.3	90	NO – fairly free rooting to all directions
6	Sycamore <i>Acer pseudoplatanus</i>	C1	400	4.8	72	NO – fairly free rooting to all directions
7	Sycamore <i>Acer pseudoplatanus</i>	C1	400	4.8	72	NO – fairly free rooting to all directions
8	Medlar <i>Mespilus germanica</i>	A1	250	3.0	28	NO – fairly free rooting to all directions
9	Common Ash <i>Fraxinus excelsior</i>	C1	600	7.2	163	NO – fairly free rooting to all directions
10	Weeping Willow <i>Salix babylonica</i>	B1 / C1	400	4.8	72	NO – fairly free rooting to all directions
11	Sweet Gum <i>Liquidambar styraciflua</i>	B1	250 110	3.3	34	NO – fairly free rooting to all directions
12	Pedunculate Oak <i>Quercus robur</i>	C1	450	5.4	92	NO – fairly free rooting to all directions

13	Domestic Apple <i>Malus domestica</i>	B1	300 250 150 150	5.3	89	NO – fairly free rooting to all directions
Hdge 1	Beech <i>Fagus sylvatica</i>	B2	Av 60	0.7	2	YES – the retaining wall restricts rooting
Hdge 2	Golden Leylandii <i>Cupressocyparis</i>	C2	100	1.2	5	NO – fairly free rooting to all directions
Grp 1	Birch (<i>Betula</i>) & Rowan (<i>Sorbus</i>)	B2	Av 120 #	1.4	7	YES – the retaining wall and levels will promote more rooting into the open grassed areas



BH 3

Tree Survey & Root Protection
Area Plan BJH 01/02

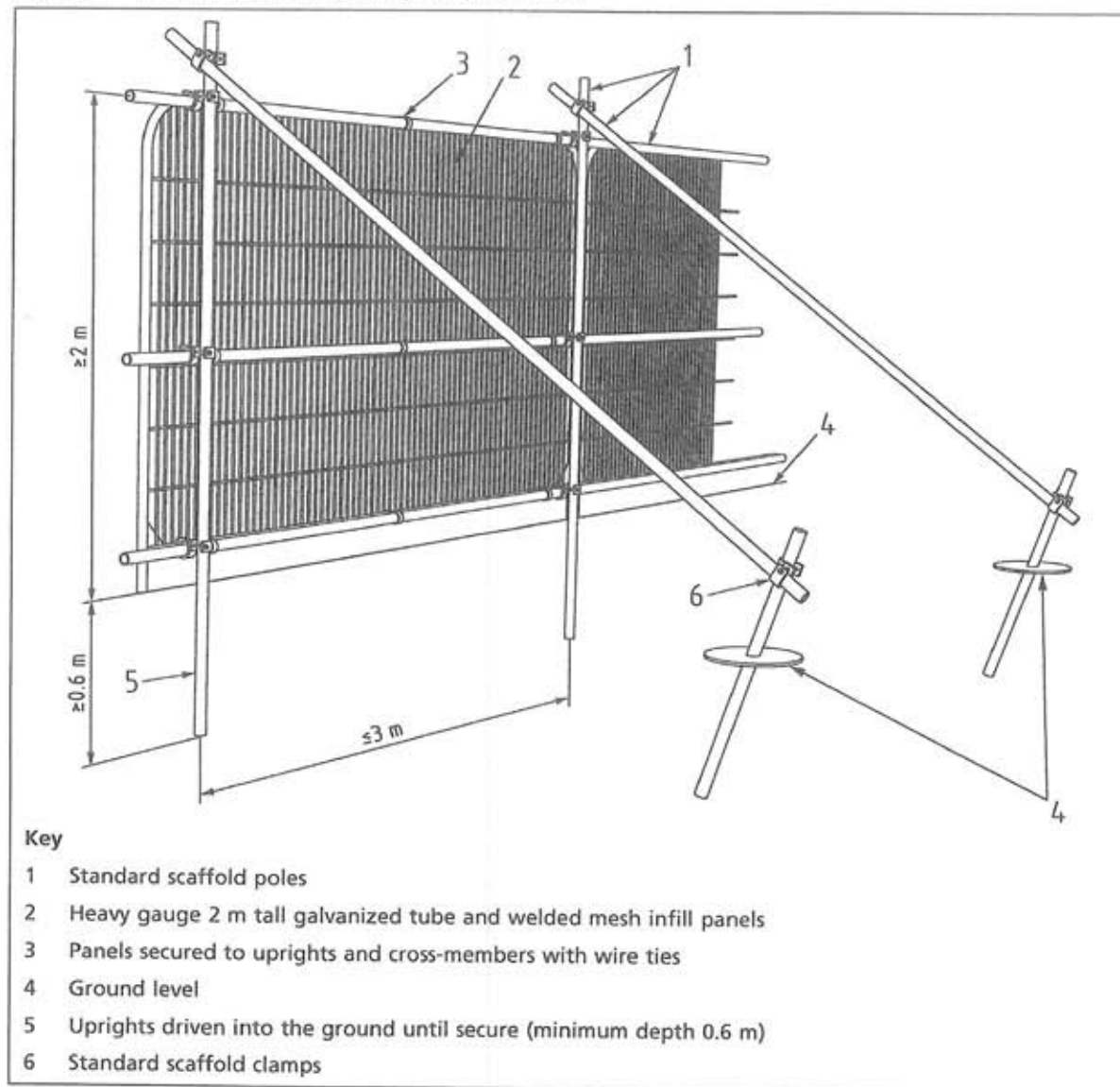


BH 4

Tree Retentions & Removals Plan BJH 03 + Tree Protection Plan BJH 04

+ BS5837 Extracts + Example Warning Notices
+ Examples of No Dig Construction Form

Figure 2 Default specification for protective barrier

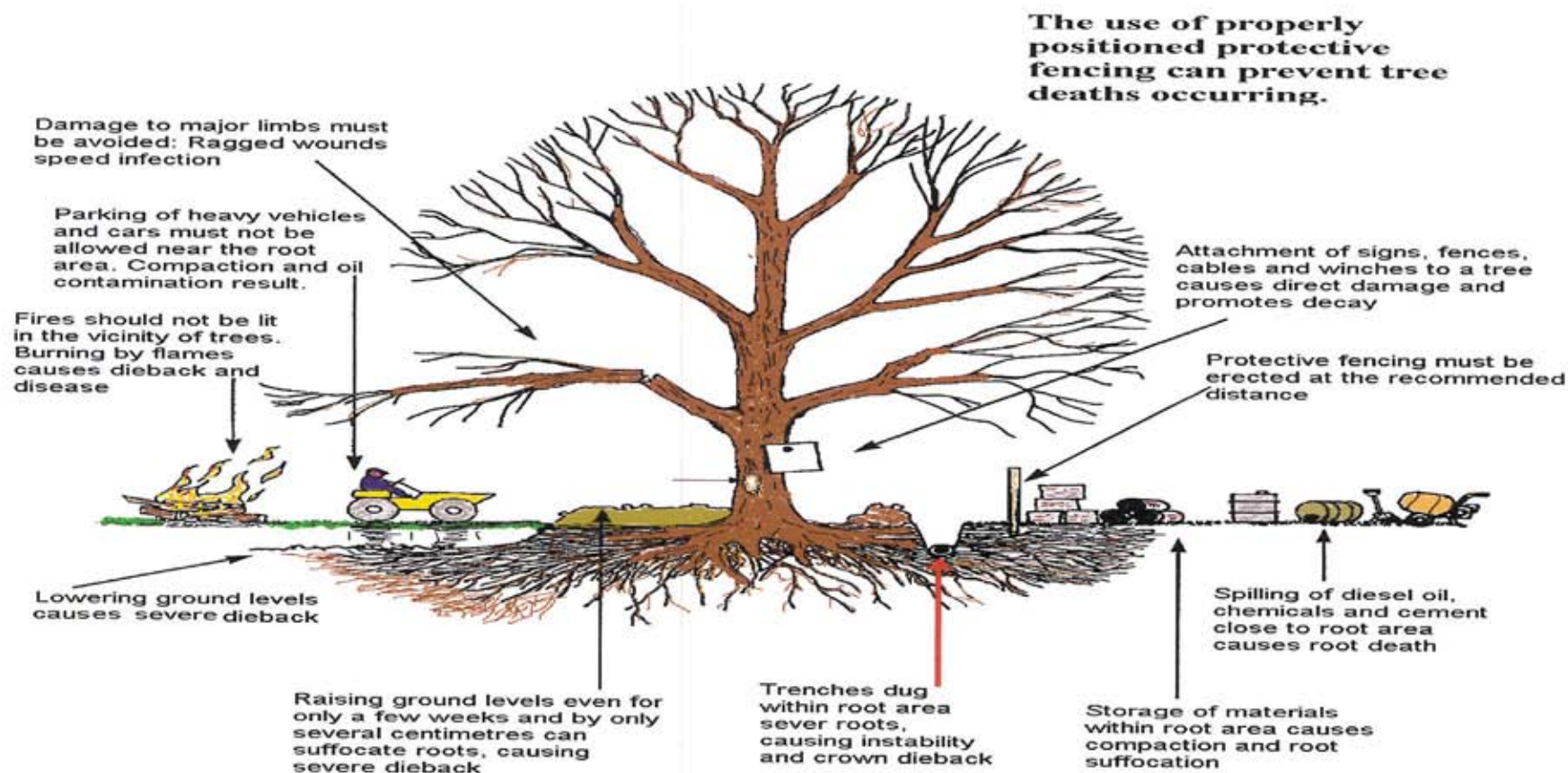


TREE PROTECTION AREA

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 WORKS SCHEDULE

Client : PWP Architects

Site Location : Oaklands Care Home, Stakes Hill Road

- Where whole branches are to be removed final cuts close to the trunk or branch union are to be made adjacent to a live bud or lateral as shown in Figure 2 of BS3998:2010 and all shortened branches are to be cut at the correct angle also shown at Figure 2 of BS3998:2010.
- 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 and the fact that it is a criminal offence to disturb or destroy nest sites, this may necessitate expert ecological advice being sought before proceeding with these recommendations. As a minimum requirement it will be necessary for the appointed Tree Contractor to climb the trees and verify that there are no birds nesting or bats present in splits; holes and cavities prior to commencement of works.

No	Species	Tree Works Recommended
1	Horse Chestnut <i>Aesculus hippocastanum</i>	• Sever the ivy at ground level
2	Hawthorn <i>Crataegus monogyna</i>	• Off-site tree • No works required at this time
3	Dwarf Conifer <i>Juniperus</i>	• Fell and grub out the stump
4	Common Ash <i>Fraxinus excelsior</i>	• Off-site tree • Advise owner has the ivy and climbers severed or removed • Shorten back lateral spread to the east side by 1.5m to 2m overall making all final cuts adjacent to living growth points wherever possible
5	Sycamore <i>Acer pseudoplatanus</i>	• Shorten back lateral spread to the east side by 3m overall making all final cuts adjacent to living growth points wherever possible • Shorten back lateral spread to the south side by 1.5m to 2m overall making all final cuts adjacent to living growth points wherever possible
6	Sycamore <i>Acer pseudoplatanus</i>	• Shorten back lateral spread to the east side by 1.5m to 2m overall making all final cuts adjacent to living growth points wherever possible • Shorten back lateral spread to the west side to balance by approximately 1m.
7	Sycamore <i>Acer pseudoplatanus</i>	• Shorten back lateral spread to the east side by 1.5m to 2m overall making all final cuts adjacent to living growth points wherever possible • Shorten back lateral spread to the west side to balance by approximately 1.5m

8	Medlar <i>Mespilus germanica</i>	No works required at this time
9	Common Ash <i>Fraxinus excelsior</i>	- Shorten back lateral spread to the east side by 1.5m to 2m overall making all final cuts adjacent to living growth points wherever possible - Shorten back lateral spread to the west side to balance by approximately 2m to 3m overall
10	Weeping Willow <i>Salix babylonica</i>	- Shorten back lateral spread to the east side by 1.5m overall making all final cuts adjacent to living growth points wherever possible - Shorten back lateral spread to the south side by 1.5m overall making all final cuts adjacent to living growth points wherever possible
11	Sweet Gum <i>Liquidambar styraciflua</i>	No works required at this time
12	Pedunculate Oak <i>Quercus robur</i>	Shorten back lateral spread to the east side by 1.5m overall making all final cuts adjacent to living growth points wherever possible
13	Domestic Apple <i>Malus domestica</i>	- Off-site tree - Shorten back lateral spread to the south side by 1.5m overall making all final cuts adjacent to living growth points wherever possible
Hdge 1	Beech <i>Fagus sylvatica</i>	No works required at this time
Hdge 2	Golden Leylandii <i>Cupressocyparis</i>	No works required at this time
Grp 1	Birch (<i>Betula</i>) & Rowan (<i>Sorbus</i>)	No works required at this time



BH 6

NJUG 10 Extract

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 out 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 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.

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project	Oaklands Care Home 216/218 Stakes Hill Road Waterlooville
client	PWP Architects
title	Tree Survey & Constraints Plan
dwg	BJH.01/02
scale	1:250 @ A3
date	September 2014
job	0738
drawn by	bjh
Bernie Harverson M.Arb. 31acombe cottages • south haring • west sussex • GU31 5PL tel: 01730 925297 • mob: 07675 520881 • email: bernie.harverson@virgin.net • VAT Reg No. 681 5056 16	



Key:

- = Trees of A (high) grading
- = Trees of B (moderate) grading
- = Trees of C (low) grading
- = Trees of U (fell) grading



- = Root Protection Area in accordance with BS5837 recommendations.
- = The crown spread exceeds the recommended RPA – IF the tree has a low branching habit then it may prove necessary to increase the RPA to encompass the full crown or undertake facilitation pruning works.

N.B. - these options would only be necessary if the tree is to be retained.



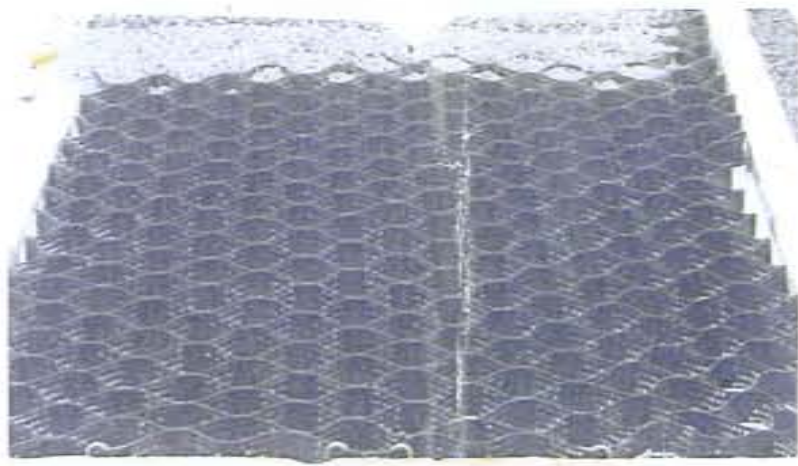
for tree
survey
purposes

	
project	Oaklands Care Home 216/218 Stakes Hill Road Waterloooville
client	PWP Architects
title	Tree Retentions & Removals Plan
dwg	BJH.03
scale	1:250 @ A3
date	February 2015
job	0738
drawn by	bjh
Denise Harverson M.Arb. 11 Homefields - Waterloooville - 7801 501 08 703 6200 / mob 0953 500821 / email deniseharverson@denise.co.nz / 141 High Rd, 501 502 503	

Key:

-  = Footprint of latest proposed extension
-  = Root Protection Area in accordance with BS5837 recommendations
-  = Trees which can be retained and fully protected during construction
-  = Trees which cannot be retained with this layout
-  = Trees which could be retained – given that they have been very heavily topped out in the past and with a combination of facilitation pruning and arboricultural expert supervised hand digging and severance of roots of up to 25mm diameter with bypass secateurs they would suffer only minimal root disturbance. The footpath link around the rear will need to be of 'No Dig' porous construction form.
-  = To avoid damage to the roots of tree 1 it will be necessary for any revamping of the road access arrangements to be 'No Dig' works with raised porous wearing course and sub-base layer. Also new car parking bays and footpath links must be undertaken with ONLY shallow hand digging operations and a porous surface laid as the wearing course.

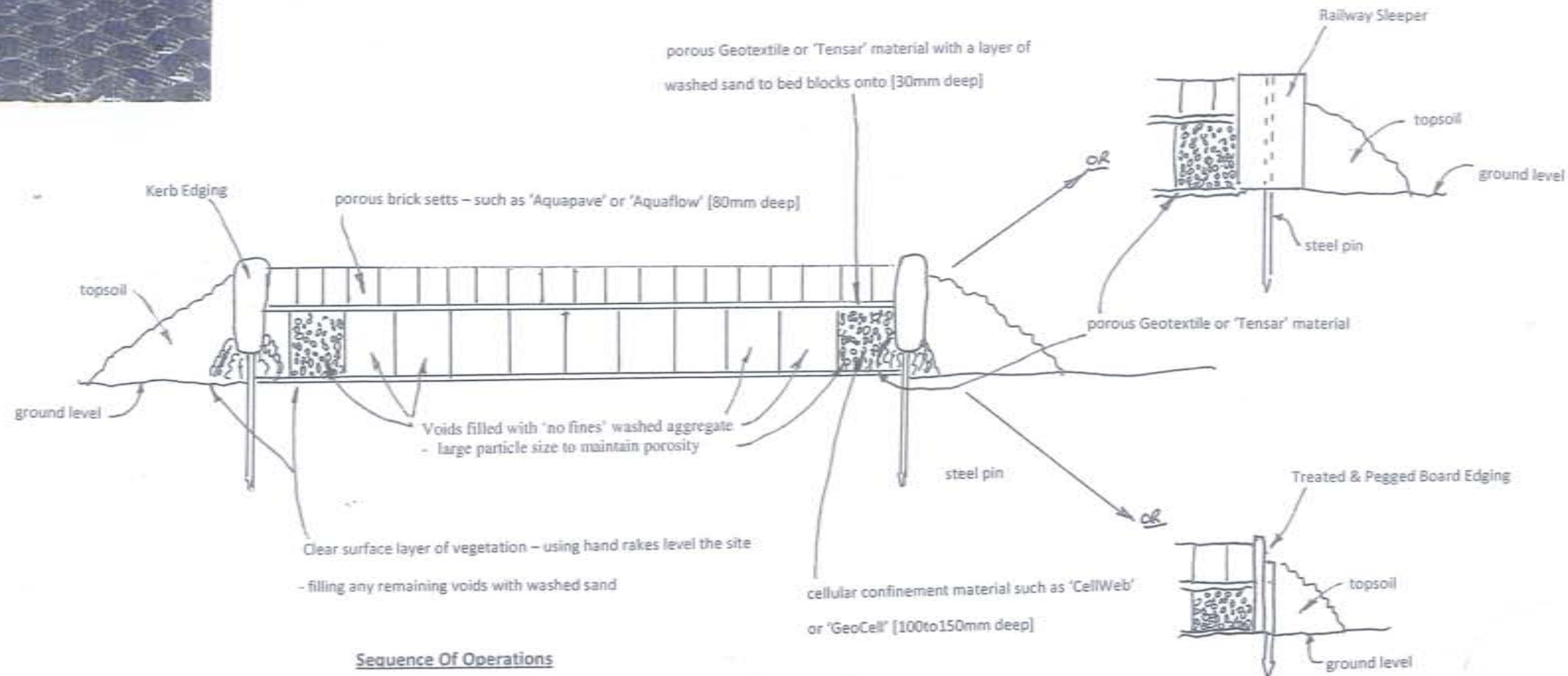




Ambleside Cellweb TRP site prior to installation.



Cellweb TRP access road during filling with clean stone.



Sequence Of Operations

1. Spray the surface vegetation layer with an approved selective weedkiller containing Glyphosate – allow the necessary period for this to be absorbed by the root system
2. Using Strimmers break down and shred the surface vegetation and then using hand operated rakes clear the surface layer - rake the surface as level as can be achieved and if necessary fill any voids with washed sand
3. Lay and peg out the porous geotextile membrane so that it has an overlap on each side – which can be trimmed at a later date
4. Decide on the edging material to be applied to each side and pin/peg or haunch this in place
5. Lay the cellular confinement material to fill the gap between each sides edging material and then fill the voids with washed large diameter aggregate – using a hand operated vibrating tamper lightly bed the materials down
6. Cover this surface with a geotextile membrane and over this apply a 30mm layer of washed sand
7. Over this lay a course of porous brick setts and bed them down level onto the sand - using a hand operated vibrating tamper lightly bed the materials down
8. Apply topsoil up to the top of the raised edging materials on each side to ramp down to ground levels and leave the site safe with no 'trips'