

99 ST PETER'S
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CAVERSHAM
RG4 7DP

ARBORICULTURAL
IMPACT
ASSESSMENT
&
METHOD
STATEMENT

ACD

Ecology

Archaeology

Arboriculture

Landscape Architecture

Prepared by
ACD Arboriculture

for
BOYES
DEVELOPMENT

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1. Executive Summary

- 1.1. ACD was initially instructed, to carry out a tree survey, and present constraints details in accordance with BS5837:2012 *Trees in relation to design, demolition and construction*. This was to identify the quality and value of existing trees on site, allowing decisions to be made as to the retention or removal of trees during development. Subsequently, the subject layout has been produced and is in line with recommendations of the British Standard. Adequate protection can be provided to ensure all retained trees are protected throughout development.
- 1.2. The single house is to be replaced with two residential dwellings. Trees to be removed are limited to low quality trees, which have a limited life and current landscape value.
- 1.3. Some site supervision will be required during the removal of the existing hard features within the RPA of T1 and the no-dig drive surfacing.
- 1.4. The relationship between the building and retained trees is sustainable and is not likely to result in any pressure to prune requests from future occupants.
- 1.5. The arboricultural method statement and tree protection plan include details of all tree protection measures required.
- 1.6. The fencing and ground protection must be erected after tree removals and surgery but before any demolition or construction contractor enter the site, and before any soil stripping takes place.
- 1.7. There will be no changes in levels, service routing, machine activity, storage of materials or site hut positioning within areas to be protected, and the protective fencing shall remain in position for the duration of the construction process.

2. Introduction

- 2.1. Boyes Developments instructed ACD Arboriculture in April 2015 to prepare the following impact assessment.
- 2.2. Following the recommendations of the British Standard¹, this report includes the necessary information to support a planning application. It demonstrates that the impact, both direct and indirect, of the proposed development within the site, has been assessed and where appropriate, mitigation and tree protection proposed.
- 2.3. The implementation of the protection methods recommended within this report are critical for ensuring the retained trees are successfully protected through the construction process and must be implemented prior to any work on site.
- 2.4. This assessment is based upon the supplied layout drawing, ref: A14009 AL(2-)07 Rev B and site survey, ref: 19510 supplied by Midland Surveys Ltd.
- 2.5. The controlling authority is Reading Borough Council, Planning, Bridge Street, Civic Offices, Reading, RG1 2LU.
- 2.6. This assessment considers the impact of the development on the constraints posed by the retained trees (both beneath ground: the root protection area (RPA), and above ground: the canopy).
- 2.7. Direct impact from development comes in six main forms: 1) Surface installation within RPAs, 2) Root loss from excavation for foundations, drainage and other utilities within RPAs, 3) Soil stripping, removal and level changes within RPAs, 4) Excessive access facilitation pruning to retained trees, 5) Soil compaction from storage and vehicle movements within RPAs, 6) Soil contamination.
- 2.8. Indirect impact can come from changes to the site hydrology, future pressure to prune or fell, failure of trees exposed by removal of neighbouring trees, and other environmental changes which can take several years to manifest.
- 2.9. The RPA for each tree represents a minimum area in m² that should be left undisturbed around each retained tree. This is initially represented by a circle but is often adjusted to account for constraints to root growth within the site (primarily highways and buildings). It is therefore important to ensure the protection of trees both above and below ground. Recommendations are provided in the British Standard as to the protection of existing trees before, during and after development. This is achieved by ensuring the tree protection plan and arboricultural method statement are implemented before any commencement on site.

¹ BS5837:2012 *Trees in relation to design, demolition and construction- Recommendations*, London: British Standards Institute

3. Scope and Method of Survey

- 3.1. The survey schedule can be found at Appendix 2.
- 3.2. The survey has been carried out following the recommendations of The British Standard and the trees are assessed objectively and without reference to any site layout proposals. Categories are based on each tree's health and condition, together with an assessment of its life expectancy if its surroundings were to be unchanged.
- 3.3. No discussions took place between the surveyor and any other party.
- 3.4. The reference numbers of surveyed trees and groups of trees are shown on the tree reference plan, which is appended to this report and based on the supplied survey drawing. The prefix G has been used to indicate a group of trees, and H for hedges. Stem locations within groups may be estimated, and indicative of canopy only.
- 3.5. The tree survey was carried out from ground level only, with the aid of binoculars as necessary, following the VTA tree assessment method².
- 3.6. Where trees are located on neighbouring land an estimated appraisal has been made of their quality and dimensions. All estimated dimensions are noted in the schedule comments.
- 3.7. Where stems or branches are obscured by ivy or other materials a full assessment of those parts will not be possible.
- 3.8. Tree heights were measured with a clinometer, or estimated in relation to those measured with the clinometer. If individual tree heights are of particular concern, for example in shading calculations, then they are measured using a clinometer.
- 3.9. Trunk diameters were measured or, where inaccessible, estimated. Single stemmed trees are measured at 1.5m above ground level.
- 3.10. Tree canopies, where markedly asymmetrical, were measured (or estimated by pacing) in four directions using a laser measure. Symmetrical canopies are measured in one direction only, with dimensions in the remaining directions assumed to be similar. For the canopies of groups of trees, the maximum radius for each compass point is measured (more complicated groups will have further notes taken and an accurate representation will be shown on the plan).

² Mattheck, C. & Breloer, H., 1998. *The Body Language of Trees: A Handbook for Failure Analysis*. London: H.M.S.O.

4. Trees and Site Overview

- 4.1. For individual details of the subject trees see the survey at appendix 2.
- 4.2. The site is a residential property set in an informal garden. The area surveyed can be seen ringed in blue on the aerial photograph below:



- 4.3. No soil assessment was carried out at the time of survey. According to <http://magic.defra.gov.uk>, the soil on site is expected to be: slightly acid, loamy and clayey soil with impeded drainage.
- 4.4. One individual tree is category B, the off-site Horse Chestnut. Category B is for trees that might be included in the high category, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and minor storm damage).
- 4.5. There are three individual trees that are category C. Either due to their low inherent value due to low overall physiological vigour, or structural faults, or their diameter is less than 150mm at 1.5m above ground level.
- 4.6. In terms of the category C trees and groups of trees, the boundary vegetation has landscape value as group features and are a constraint to any development of the site notwithstanding their individual category. The individual trees making up groups are in most cases less than 150mm in diameter. They are therefore category C in accordance with BS5837:2012. However the group value of the trees should be recognised in terms of their wider landscape significance.

- 4.7. T3 is dead and is therefore category U.
- 4.8. The below ground constraints posed by the trees are represented by Root Protection Areas (RPAs) and shown on the Tree Reference Plan. The RPA of a tree is calculated as advised by the British Standard. For a tree growing in an apparently unconstrained rooting environment a circular RPA is shown. When constraints to root growth appear to be present the RPA is adjusted to reflect the likely root growth pattern.
- 4.9. The following photograph provides a good indication of the current conditions on site:



T1 Horse Chestnut outside property frontage.

5. Arboricultural Impact Assessment

5.1. Overview of proposed development

5.1.1. The existing house is to be demolished and replaced with two properties.

5.2. Planning context

5.2.1. **Tree Preservation Orders/Conservation Area:** There are no Tree Preservation Orders (TPOs) present on any trees on, or adjacent to the site, nor is the site within a Conservation Area.

5.2.2. **Previous planning applications and consents:** There is a current planning application in place ref.: 150172.

5.3. Trees proposed for removal & surgery

5.3.1. The following trees are proposed for removal:

No.	Name	BS Cat
T2	Lawson Cypress (<i>Chamaecyparis lawsoniana</i>)	C
T3	Prissard Plum (<i>Prunus cerasifera</i> 'Prissardii')	U
T5	Norway Maple (<i>Acer platanoides</i>)	C

5.3.2. In relation to the conception and design of development proposals, BS5837:2012 section 5.1.1 states: The constraints imposed by trees, both above and below ground should inform the site layout design, although it is recognised that the competing needs of development mean that trees are only one factor requiring consideration. Certain trees are of such importance and sensitivity as to be major constraints on development or to justify its substantial modification. However, care should be taken to avoid misplaced tree retention; attempts to retain too many or unsuitable trees on a site can result in excessive pressure on the trees during demolition or construction work, or post-completion demands for their removal.

5.3.1. It is therefore deemed acceptable to remove the trees listed and, as part of the detailed landscape design for the scheme, include suitable and sustainable replacements as and where appropriate. This will more than mitigate any loss that may be felt from tree removals, by providing robust long-term tree cover in keeping with the proposal and surrounding properties.

5.3.2. Of the trees listed, T3 is to be removed as good arboricultural practice regardless of any development.

5.4. Demolition & site clearance

5.4.1. To ensure damage does not occur to trees highlighted for retention, tree protection fencing must be erected before ANY plant/vehicles entering site whatsoever. This should be subject to a pre-commencement site meeting between the developer, their project arboriculturist and a representative from the Local Authority.

5.4.2. The existing hard features at the property frontage are to be removed to allow construction of the drive. This work must be carried out under the supervision of the project arboriculturist, as per the appropriate section of the method statement to ensure no underlying roots are damaged. Fencing must then be erected (as shown on the TPP) to protect the newly exposed ground.

5.5. Construction within RPAs

5.5.1. The construction of all buildings is proposed outside the RPAs of retained trees.

5.6. Access and working room within RPAs

5.6.1. Space is required for scaffold erection and working room within the RPA of T1. Following the recommendations of 6.2.3 of the British Standard, ground protection will be employed to retain the underlying soil structure and avoid detriment to roots. This must be installed as per the method statement, and signed off by the project arboriculturist prior to the start of any work.

5.6.2. The area to be protected is on the south western side of the RPA of T1, next to plot 2 and can be seen on the tree protection plan. There is a hollow in this area of the garden that will need to be filled to allow a suitable drive way to be installed. The area between the house and the drive will be soft landscaping and should therefore be built up with good quality topsoil. This area will then need to be protected with suitable ground protection. Refer to method statement for methodology.

5.7. Permanent hard surfaces within RPAs

5.7.1. In section 7.4 of the British Standard, permanent hard surfacing within the RPAs of retained trees is addressed, and recommendations made.

5.7.2. In the case of T1, the off-site Horse Chestnut, the drive for plot 1 crosses through its RPA on the south western side. To avoid root damage, various design criteria must be met, ensuring that a no-dig approach is taken, limiting the impact on the trees. Any design must be approved for use by the project arboriculturist. A proposed section is appended to this report.

5.7.3. The levels will need to be raised to 600mm above existing ground level. This is achievable by building up layers of cellular confinement system, individually installed. Detailed methodology is provided within the accompanying method statement.

5.8. Protection fencing

5.8.1. Figure 2 of the British Standard recommends a standard fencing design for tree protection. This is a weld mesh panel design, mounted upon a well-braced scaffold framework. This is perfectly adequate for this site and all the retained trees can be suitably protected by its erection before any works start on site whatsoever.

5.9. Shade and future pressure to prune

5.9.1. The resulting proposed layout is both sustainable and results in juxtapositions between trees and buildings which will not bring future requests for excessive pruning and/or tree removal.

5.10. Services

5.10.1. Full details of the service and utility provisions for the site remain to be finalised. However, there is adequate space for utility trenches to access the site whilst avoiding RPAs and exclusion zones.

5.10.2. It is fundamental to tree protection that infrastructure design is sensitively approached, as trenching close to trees may damage roots and affect tree health and stability. Details of services have not been provided at the time of writing. The Tree Protection Plan, showing the constraints posed by retained trees will be passed to the infrastructure engineers to inform their design, ensuring that all services avoid areas of potential conflict. As per Figure 1 of the British Standard, once further details become available as part of the detailed/technical design for the site, the TPP and AMS may need to be revised to incorporate service details for inclusion in the tender documentation.

6. Arboricultural Method Statement

TO BE READ IN CONJUNCTION WITH THE APPENDED TREE PROTECTION PLAN REF: PRI19866-03

6.1. Phasing of operations & site supervision

6.1.1. The tree protection and other arboriculturally related works must be carried out in the following order:

Phase		Operation	Present	Notes
Preliminary	1	Pre-start meeting	ACD, site manager, groundwork, foreman, demolition foreman	To 'sign-off' protection prior to any plant activity, demolition & groundworks on site
	2	Tree removals & surgery	Tree contractor	See Tree Protection Plan for trees to be removed
Demolition	3	Removal of hard feature near T1	ACD, demolition staff, site manager	Supervised by project arboriculturist. See section 6.11 of method statement
	4	Protection barriers erected	Fencing contractor	See Tree Protection Plan for position and type of barriers
Construction	5	No-dig drive installation	ACD, groundwork contractor, site manager	Groundwork staff to receive toolbox-talk from project arboriculturist. See also section 6.11 of method statement
	6	Removal of protection barriers and landscape work	ACD, landscape contractor, site manager	See section 6.7 of method statement

6.1.2. Supervision is required should any unplanned access and/or work be required in the construction exclusion zone.

6.1.3. Supervision will require the arboriculturist to be present throughout the task, to ensure all the arboricultural objectives are met. If the task is to take a long period of time, provided the arboriculturist is satisfied, and after an initial 'tool-box talk', the supervision may be reduced to telephone contact between the site foreman/contractor and arboriculturist.

6.2. Construction exclusions zone

6.2.1. Barriers and/or ground protection must be used to protect all retained trees before any machinery or materials are brought onto the site, and before any demolition, development or stripping of soil commences.

6.2.2. Where all activity can be excluded from the RPA, vertical barriers must be erected to create the construction exclusion zone (CEZ). The default position of which is shown on the appended Tree Protection Plan.

6.2.3. Where, due to site constraints, construction activity cannot be fully or permanently excluded from all, or part of a tree's RPA, appropriate ground protection can be installed.

6.2.4. It is the responsibility of everyone engaged in the construction process to respect the tree protection measures and observe the necessary precautions within and adjacent to them.

6.2.5. Inside the exclusion zone, the following shall apply:

- No mechanical excavation whatsoever.
- No excavation by any other means without arboricultural site supervision.
- No hand digging without a written method statement having first been approved by the project arboriculturist.
- No lowering of levels for any purpose (except removal of grass sward using hand tools).
- No storage of plant or materials.
- No storage or handling of any chemical including cement washings.
- No vehicular access.
- No fire lighting.

6.2.6. In addition to the above, further precautions are necessary adjacent to trees:

- No substances injurious to tree health, including fuels, oil, bitumen, cement (including cement washings), builders sand, concrete mixing and other chemicals shall be stored or used within or directly adjacent to the protection area of retained trees.
- No fire shall be lit such that flames come within 5m of tree foliage.

6.3. Tree protection barriers

6.3.1. The construction exclusion zone will be protected as per the appended tree protection plan that shows the default alignment of the tree protection barriers, to be installed prior to any of the following taking place:

- Archaeology
- Demolition
- Plant and material delivery
- Soil stripping
- Utility installation
- Construction works
- Landscaping

6.3.2. Stages for installation of barriers:

- 1) Hand clearance of any vegetation to allow clear working access.
- 2) Setting out of node points
- 3) Barriers erected
- 4) Site meeting with project arboriculturist to 'sign-off' tree protection fencing.
- 5) Site accessible to demolition/construction traffic

6.3.3. Once erected, all barriers will be regarded as sacrosanct, and will not be removed or altered without prior recommendation by the project arboriculturist and approval of the local planning authority.

6.3.4. The default barrier construction is suitable for areas of high intensity development, and shall comprise of interlocking weld-mesh panels, well braced to resist impacts by attachment to a scaffold framework that is set firmly into the ground. A detailed specification can be found on the TPP.

6.3.5. The images below are alternative barrier designs that have been successfully used on site and that ACD are happy to support if a variation from the default style is required. If such a variation is necessary, the approval of the project arboriculturist will be obtained prior to any implementation on site.

6.3.6. Once barriers and/or ground protection have protected the exclusion zone, construction work can commence.

6.3.7. All weather notices should be erected on the barriers (for example see figure below).



Tree protection sign (download from www.acdarb.co.uk)



Weld-mesh panels on scaffold uprights



Weld-mesh panels on wooden posts



Chain-link on angle-iron uprights

6.4. Ground protection

6.4.1. Ground protection is to be installed in the location shown on TPP. It must be capable of supporting the expected loads and avoiding rutting, compaction and damage to the soil: as advised in section 6.2.3 of the British Standard.

6.4.2. Stages for ground protection installation:

- 1) No plant machinery to be used in the area of ground protection for whatever reason
- 2) Discuss procedure with project arboriculturist
- 3) Dismantle primary TPF and re-erect in secondary location as shown on TPP.
- 4) Any shrubs, saplings or trees to be removed, are to be cut, or ground out to just below ground level rather than grubbed or winched out, which can damage roots of retained trees.
- 5) Lay woven geotextile over existing ground surface by hand
- 6) Cover the area with compressible layer, woodchip for example, using hand tools only
- 7) Cover compressible layer with side butting scaffold boards or plywood boards
- 8) Confirm surface is acceptable for use with project arboriculturist
- 9) Area ready for construction access

6.4.3. Any scaffolding required within the area will be erected with the uprights placed on spreader boards.

6.4.4. The boarding will be left in place until the construction works are finished.

6.4.5. A single thickness of boarding laid on the soil surface will provide sufficient protection for pedestrian loads. However, for wheeled or tracked construction traffic movements within the RPA, ground protection will involve the use of temporary cellular confinement systems, reinforced concrete slabs or track-board systems details of which are to be specified by the project engineer and approved for use by the project arboriculturist and local authority before construction commences.

6.4.6. Track-boards can be sourced from Trakmats Europe Ltd, 0845 6435388, www.trakmatseurope.com, or groundguards.com

6.4.7. There is to be no-excavation within ground protection area whatsoever. This includes installation of services and associated utilities.



Scaffold board pedestrian ground protection



Vehicular ground protection trackway

6.5. Site storage, parking, welfare facilities, etc.

6.5.1. The site will require provision for; site storage, contractor parking, welfare facilities, temporary services/drainage, material drop off points, etc.

6.5.2. It is acceptable to place site cabins and walkways within the CEZ provided they are installed sensitively:

- Cabins must be placed on sleepers (or similar) to spread the load, avoiding point loading and associated soil compaction.
- The delivery of cabins should ensure that any unloading via 'hi-ab' crane can be carried out without impact on the crowns of retained trees.
- Walkways, if required, should be installed as per the ground protection specification.
- Any utilities for site compounds must be run above ground. For example, WC foul pipes/drainage and temporary electrical connections.

6.5.3. It is imperative that if cabins and walkways are installed, that fencing is erected to limit access to the protected areas. If amendments are made, the project arboriculturist should sign off the proposals prior to their implementation.

6.5.4. Contractor parking and storage areas should be sited outside the CEZ.

6.6. Tree surgery and removal

6.6.1. All trees to be removed are indicated on the TPP.

6.6.2. If any further surgery work is proposed, details will be submitted to, and approved by, the council, before being carried out.

6.6.3. All work will be carried out in accordance with BS3998³ industry best practice and in line with any works already agreed with the council.

6.6.4. The tree surgeon shall ideally be chosen from The Arboricultural Association's Approved Contractor list. All work shall be undertaken at the appropriate time and with the consent and approval of the site agent.

6.6.5. The statutory protection^{4 5} will be adhered to. If further advice is required, particularly if bats are discovered during tree work, it will be obtained from Natural England or other competent persons and recommendations adhered to.

³ BS3998:2010- *Recommendations for Tree Work*. London: British Standards Institute

⁴ *Wildlife and Countryside Act*. (1981) London: HMSO.

⁵ *Countryside and Rights of Way Act*. (2000) London: HMSO.

6.6.6. The stumps of any trees removed from within the Construction Exclusion Zone or the RPAs of retained trees will be either cut flush to ground level and left in situ or ground out using a stump grinder. They will not be winched out.

6.6.7. All operations shall be carefully carried out to avoid damage to the trees being treated or neighbouring trees. No trees to be retained shall be used for anchorage or winching purposes.

6.7. Soft landscaping

6.7.1. All landscaping and associated ground preparation within exclusion zones will be carried out sensitively to ensure root damage is mitigated as much as is practicable. At no time is any heavy plant to be used within any protected area. Removal of existing vegetation will be carried out by hand. Turf may be removed using a mechanical turf stripper or with hand tools.

Turfing

6.7.2. Stages for turfing gardens and open spaces:

- 1) No plant/machinery to be used in the area for whatever reason.
- 2) Remove TPF to allow access to area.
- 3) Re-erect TPF to secondary location (if required and shown on plan).
- 4) Do not reduce any high spots or excavate in any way.
- 5) Existing poor quality turf may be removed with a turf stripper.
- 6) Use good quality top-soil to level any low-lying areas and hollows, and provide a fine tilth to lay turf on. This imported soil must not result in a level increase of more than 100mm in any area.
- 7) Import turves by hand in wheelbarrow.
- 8) Lay turves.

Planting

6.7.3. Should the soil be compacted or have a poor structure that may hinder the development of any new planting, soil decompaction techniques may be used upon consultation with the project arboriculturist.

6.7.4. Stages for planting within tree protection areas:

- 1) No plant machinery to be used in the area for whatever reason.
- 2) Remove TPF to allow access to area.
- 3) Re-erect TPF to secondary location (if required and shown on plan).
- 4) Remove existing vegetation by hand, turf may be removed using a mechanical turf stripper.
- 5) Do not reduce any high spots or excavate in any way.
- 6) Import good quality top-soil by hand (with wheelbarrow) into area.
- 7) Level to a depth of no more than 100mm with hand tools.
- 8) Dig individual planting pits for each plant by hand (including hedging which must not be trench planted).
- 9) Any mulch should also be imported and spread by hand.

6.7.5. No works will be carried out within any protected areas if the soil moisture is of a level likely to allow compaction to occur.

6.8. Installation of underground services

6.8.1. Mechanical trenching for the installation of underground apparatus and drainage severs any roots present and can change the local soil hydrology in a way that adversely affects the health of the tree. For this reason, particular care should be taken in the routing and methods of installation of all underground apparatus. Wherever possible, apparatus should be routed outside RPAs. Where this is not possible, it is preferable to keep apparatus together in common ducts. Inspection chambers should be sited outside the RPA.

6.8.2. Where underground apparatus is to pass within the RPA, detailed plans showing the proposed routing should be drawn up in conjunction with the project arboriculturist. In such cases, trenchless insertion methods should be used: Microtunnelling, Surface-launched directional drilling, Pipe ramming or Impact moling (see BS5837:2012 Table 3), with entry and retrieval pits being sited outside the RPA. Provided that roots can be retained and protected, excavation using hand-held tools might be acceptable for shallow service runs. If this is the case, the following methodology must be followed:

6.8.3. Stages for installing services by hand within tree protection areas:

No plant machinery to be used in the area for whatever reason

- 1) Contact project arboriculturist to hold pre-start site meeting and 'toolbox' talk before starting work.
- 2) Remove just enough tree protection fencing to allow access to area and facilitate trenching.
- 3) Remove any surface vegetation or existing hard surfaces using hand tools.
- 4) Using an air-pick excavate the trench, keeping to minimum dimensions required.
- 5) Roots occurring in clumps of 25 mm diameter and over are encountered they will be retained, and kept damp by covering with hessian (re-wetted as required). If required, these should be severed only following consultation with an arboriculturist; as such roots might be essential to the tree's health and stability.
- 6) Feed in services.
- 7) Back fill trench with 200-300mm depth of excavated soil, or a mixture of excavated and imported top-soil to BS3882 (BSI, 2007), firming down with heels.
- 8) Repeat step 7 until trench is filled.
- 9) Re-erect tree protection fencing as per approved plan.

6.8.4. The method of excavation above, for trenching within RPAs, is using air excavation. This tool utilises compressed air to remove soil from around tree roots causing minimal damage and can be run off a typical site compressor. ACD can provide details of contractors supplying air excavation services if required.

6.8.5. Alternatively trenchless technology, such as thrust boring can be used in some instances and is particularly effective as it can pass directly under the tree, at a depth which is likely to avoid almost all impact on roots of the subject tree. As no access/thrust

pits will be located within the RPAs of the subject trees, the need for arboricultural supervision is limited.

6.8.6. Reference can be made to NJUG Vol 4⁶ for guidance, but any approach must be approved by the project arboriculturist and brought to the attention of the local authority tree officer.

6.9. Demolition close to trees

6.9.1. All TPF to be installed as per approved Tree Protection Plan prior to any plant arriving on site.

6.9.2. Sensitive demolition will occur under supervision from the project arboriculturist

6.9.3. Stages for demolition within tree protection areas:

- 1) No plant machinery to be sited on any exposed rooting area
- 2) Dismantle any fencing to allow work to proceed
- 3) Buildings to be folded in on themselves
- 4) Removal debris by hand or with plant machinery not located on any exposed rooting area.
- 5) Floor to be broken up with hand held breaker and pieces removed by hand. Slab floor can be lifted carefully by machinery if appropriate
- 6) Underlying ground levels to be retained. No excavation to occur
- 7) Any exposed roots and surrounding newly exposed areas to be covered with up to 100mm of topsoil, from elsewhere on site, or imported top-soil to BS3882⁷. Soil may be placed in area by plant but must be spread by hand.
- 8) Tree protection fencing to be erected in final position as shown on plan

6.9.4. No reduction in levels of the underlying soil surface will occur.

6.9.5. At no point are any heavy machinery permitted within the RPA.

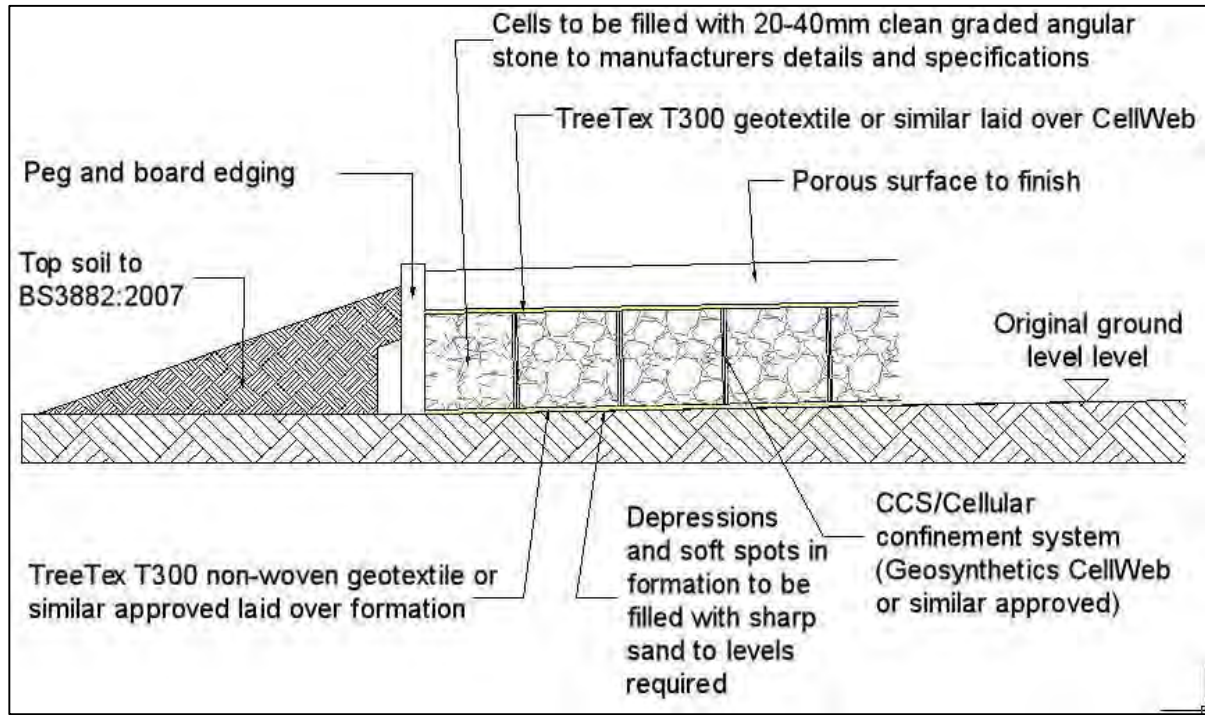
6.9.6. Contamination of the soil by fuel and lubricant leaks must be avoided at all cost. If such a situation arises the project arboriculturist must be notified to assess the situation and prescribe remedial measures.

⁶ National Joint Utilities Group. (2010). *Volume 4: NJUG Guidelines For The Planning, Installation And Maintenance Of Utility Apparatus In Proximity To Trees (Issue 2) – Operatives Handbook*. NJUG.

⁷ BS3882:2007- *Specification for topsoil and requirements for use*. London: British Standards Institute.

6.10. Installation of no-dig surface

6.10.1. To ensure that tree roots, within the ground under this proposed surface, continue to survive during and after construction a cellular system such a CellWeb⁸ of 75-200mm depth is to be used.



No-dig cross-section

6.10.2. Stages for Installation of the cellular confinement surface:

- 1) Contact project arboriculturist to hold pre-start site meeting and 'toolbox' talk before starting work
- 2) Dismantle TPF and re-erect in secondary location as shown on TPP
- 3) Remove existing vegetation by using a specific herbicide (as advised by a specialist) or manual removal with hand tools only. Agreed removal of shrubs, saplings or trees, within the protected areas of retained trees are to be cut, or ground out to just below ground level rather than grubbed or winched out, which can damage roots of retained trees.
- 4) Retain all original ground levels after vegetation removal. No excavation whatsoever.
- 5) Remove any existing hard surfaces (paving, tarmac etc.) Hand tools should be used if possible. If machinery is required for this operation, it must be used only on existing surfaces or outside the protection areas and tree canopies (approval from project arboriculturist must be sought before using machinery). The sub base of

⁸ Geosynthetics Ltd, 01455 617139, www.geosyn.co.uk

existing surfaces or foundations should be left in situ where possible to avoid unnecessary root disturbance and provide a base for the new surface.

- 6) Install a non-woven Geotextile (such as TreeTex T300) directly over soil grade level (levelled where necessary, by non-compacted washed sand) and fix in place.
- 7) Lay the cellular system over the Geotextile, which is secured open under tension during the infill process with steel staples or wooden pegs.
- 8) Install kerbs and edgings directly on top of existing soil grade level. For light structures, a treated peg and board may be acceptable. For more substantial structures, railway sleepers, haunched concrete with road pins, drilled kerbstones, gabions or cast in situ kerbs will be appropriate.
- 9) Fill the cellular system ensuring any machinery works only on already filled areas. Typical infill consists of no fines angular granular material 20-40mm, which will remain un-compacted.
- 10) Cover with a non-woven Geotextile (such as TreeTex T300).
- 11) Install porous wearing surface.
 - Small Block Paving
 - Washed Gravel
 - Porous Asphalt

6.10.3. Any variation to the above specification must meet the following design criteria for low-invasive surfaces to provide the conditions for continued tree survival and growth:

- Maintain oxygen diffusion through new surface to rooting area (5-12% by volume⁹)
- Maintain sufficient passage of water to the rooting area (12-40% by volume¹⁰)
- Avoid compaction by maintaining a soil structure sufficient to sustain root growth (soil bulk density below 1.4g/cc¹¹).

6.10.4. Site analysis of the soil type and its structural characteristics will be required prior to determining the specific depth of products to be adopted for example, footpaths normally require a depth of 75mm and, 100mm to 200mm depths are used for residential driveways, while greater depths may be required for the passage of heavier traffic such as for construction access and delivery vehicles.

6.10.5. If ground levels are to be raised more than 150mm this should be achieved by the use of a granular material, which does not inhibit vertical gaseous diffusion. For example: no-fines gravel, washed aggregate, structural soil (min. 20% sand content) or cobbles.

⁹ Smith, R. J. (2006). *Tree Roots in the Built Environment*. HSO

¹⁰ Coder, D. K. (2000). *Tree Root Growth Requirements*. University of Georgia

¹¹ Harris, C. M. (2004). *Arboriculture, Tree Management of Shade Trees and Vines*.

6.11. Hard landscape removal

6.11.1. No hard landscape removal within RPAs will occur without arboricultural supervision.

6.11.2. Stages for hard surface removal within tree protection areas:

- 1) No plant machinery to be sited on any exposed rooting area
- 2) Contact project arboriculturist to hold pre-start site meeting and 'toolbox' talk before starting work
- 3) Dismantle fencing as required to access area
- 4) Plant machinery to run only on existing hard surfaces with consent from arboriculturist
- 5) Surfaces are to be removed by hand (paving etc.)
- 6) Where any sub base is not likely to contain roots, and only on approval from project arboriculturist, it may also be carefully removed.
- 7) Underlying ground levels to be retained. No excavation to occur
- 8) Any exposed roots and surrounding newly exposed areas to be covered with up to 100mm of topsoil, from elsewhere on site, or imported top-soil to BS3882¹² Soil may be placed in area by plant but must be spread by hand.
- 9) Tree protection fencing to be erected in final position as shown on plan

6.11.3. If the area around the retained trees is to be left following the removal of the existing hard surface, before a new hard surface is laid or soft landscaping implemented, then the line of protective fencing MUST be correctly re-established immediately the hard surface removal work has been completed.

6.11.4. If, for whatever reason there is a delay before the area is left exposed prior to awaiting a new surface, then a temporary surface must be implemented or the area fenced off.

¹² BS3882:2007- *Specification for topsoil and requirements for use*. London: British Standards Institute.

6.12. Installation of boundary fencing within protected areas

6.12.1. Stages for installing wooden fence posts:

No plant machinery to be used in the area for whatever reason

- 1) Contact project arboriculturist to hold pre-start site meeting and 'toolbox' talk before starting work.
- 2) Remove TPF to allow access to area.
- 3) Dig postholes using hand tools, avoiding damage to the protective bark covering larger roots. Roots smaller than 25mm diameter may be pruned back using either secateurs or a hand saw, leaving a clean cut.
- 4) Damage or severance of roots above 25mm diameter must be avoided. If roots of this size are discovered, the hole should be relocated. If there are a large number of such roots it may be necessary to relocate the hole by half a fence panels length and adjust the fence panels accordingly.
- 5) Line hole with non-porous lining, for example durable polythene bag.
- 6) Insert post and fill post-hole with concrete to just below ground level.
- 7) Trim polythene to ground level and fill with clean topsoil.

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Appendix 1: Tree Categories Explained

BS5837:2012 Table 1 -Cascade chart for tree quality assessment			
Category and definition		Criteria (including subcategories where appropriate)	
Trees unsuitable for retention (see Note)			
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years		*Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. 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 <i>NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.</i>	
	1 Mainly arboricultural qualities	2 Mainly landscape qualities	3 Mainly cultural values, including conservation
Trees to be considered for retention			
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
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years		Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	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
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		Trees with material conservation or other cultural value	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

Appendix 2: Tree Survey Schedule

CLIENT: Boyes Developments
SITE: 99 St Peter's Avenue, Caversham, RG4 7DP
DATE: April 2015

SURVEYOR: C Price TechArborA

TAGGED? No

Tree Survey Schedule

No.	Name	Ht (crown)	Dia (stems)	Canopy spread N E S W				Life stage	ERC	Comments & preliminary recommendations	BS Cat
T1	Horse Chestnut (Aesculus hippocastanum)	17 (3)	680 (1)	7	8	7	7	M	20+	Street tree with good landscape value.	B2
T2	Lawson Cypress (Chamaecyparis lawsoniana)	11 (2)	260 (1)	2	2	2	2	EM	10+	Tree of little quality or value.	C2
T3	Cherry Plum (Prunus cerasifera)	6 (2)	600 (1)	3	3	3	3	OM	<10	Dead.	U
T4	Sawara Cypress (Chamaecyparis pisifera)	10 (1)	260 (1)	2	2	2	2	SM	10+	Limited quality and value.	C2
T5	Norway Maple (Acer platanoides)	4 (2)	100 (1)	1	1	1	1	SM	10+	Tree has been 'topped'. Little quality and value.	C1
H1	Lawson Cypress, Beech, Cherry Laurel (Chamaecyparis lawsoniana, Fagus sylvatica, Prunus laurocerasus)	2 (0)	-	-	-	-	-	EM	-	Effective boundary screen.	C2
H2	Cherry Laurel (Prunus laurocerasus)	2 (0)	-	-	-	-	-	SM	-	Effective boundary screen.	C2

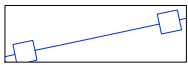
Notes: **Dia (stems):** trunk diameter in mm at 1.5m above ground level (number of stems) | **HT (crown):** Tree height (crown clearance) | **Life stage:** **Y:** Young (obviously planted within the last three years (unless as a heavy or extra-heavy standard)). **SM:** Semi mature (recently planted and yet to attain mature stature; up to 25% of attainable age.). **EM:** Early mature (almost full height, crown still developing and seed bearing; up to 50% of attainable age.). **M:** Mature (full height, crown spread, seed bearing; over 50% of attainable age.). **OM:** Over mature (full size, die-back, small leaf size, poor growth extension.). | **FSB:** First significant branch (& compass bearing) | **ERC:** Expected remaining contribution in years- <10, 10+, 20+, 40+ (assuming that there will be no physical changes to its immediate environment.) | **BS Category:** Refer to appendix 1 of this report or BS5837:2012 Table 1 for detailed descriptions.

Appendix 3: Tree Protection Plan

PRI19866-03

WHY TREE PROTECTION IS NEEDED

- 1) **Soil compaction kills roots**- caused by plant movement and storage of materials within protected areas .
- 2) **Trenching severs roots**- many small roots grow within the top 600mm of soil. Even the removal of the top 200mm can cause damage.
- 3) **Soil pollution kills roots**- Dripping fuel storage or cement washings can contaminate the soil resulting in root death.
- 4) **Raising & lowering levels kills roots**- the soil used to increase levels can compact the underlying soil (see point 1). Lowering levels will remove roots causing damage to the tree.
- 5) **Bark and branch damage**- bark removal and branch damage can allow disease and fungi into the tree.
- The impact of any of the above can take years to show**- trees can have huge reserves of food and water.



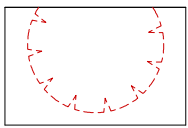
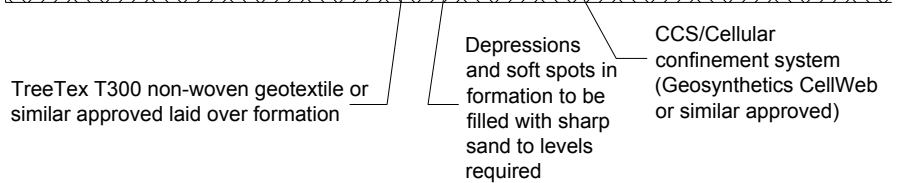
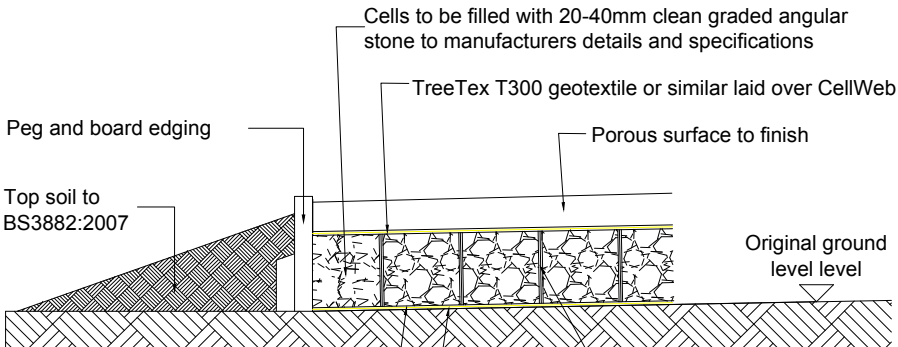
TEMPORARY FENCING

The fencing is used to protect areas of special detail. It is to be installed with the main tree protection fence and is only to be removed when the detail is installed as per the method statement & under the supervision of the project arboriculturist. It shall be weld-mesh panels on boots, secured to the ground with road pins (or similar).

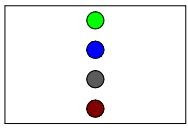


NO-DIG SURFACE

Cellular confinement system (CCS) to be used to create this area of hard surface, above the existing ground level. Topsoil to be retained. Depth of CCS to be 50-75mm for pedestrian surfaces and 100-200 for vehicular surfaces. Surface to be porous to approved details and specifications. To be installed under arboricultural supervision. **All specifications subject to engineering design.**



TREE TO BE REMOVED



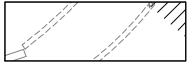
- A CATEGORY TREE
- B CATEGORY TREE
- C CATEGORY TREE
- U CATEGORY TREE



ROOT PROTECTION AREA (RPA) FOR RETAINED TREES



INDICATIVE SERVICE ROUTE AVOIDING PROTECTION AREAS



EXISTING SITE LAYOUT



PROPOSED SITE LAYOUT

RESTRICTIONS WITHIN TREE PROTECTION AREAS

Inside the exclusion area of the fencing, the following shall apply:

- No mechanical excavation whatsoever
 - No excavation by any other means without arboricultural site supervision
 - No hand digging without a written method statement having first been approved by the project arboriculturist.
 - No lowering of levels for any purpose (except removal of grass sward using hand tools)
 - No storage of plant or materials
 - No storage or handling of any chemical including cement washings
 - No vehicular access
 - No fire lighting
- In addition to the above, further precautions are necessary adjacent to trees:
- No substances injurious to tree health, including fuels, oil, bitumen, cement (including cement washings), builders sand, concrete mixing and other chemicals shall be stored or used within or directly adjacent to the protection areas of retained trees
 - No fire shall be lit such that flames come within 5m of tree foliage.

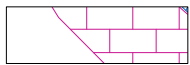
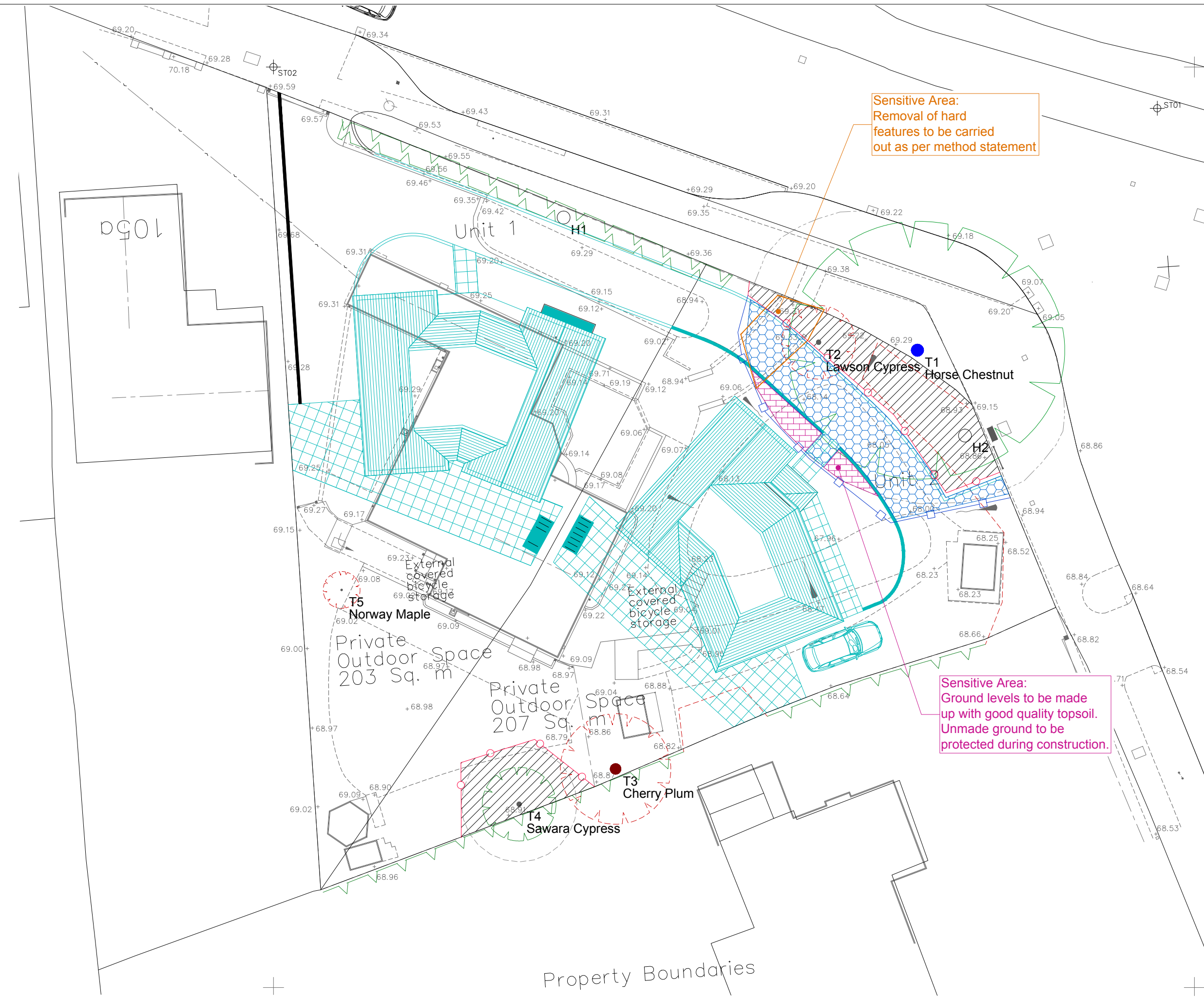
PHASING & SUPERVISION OF DEVELOPMENT

Before any work starts on site, the tree protection measures shown on this plan are to be installed and a pre-start site meeting with the project arboriculturist, groundwork contractors, site manager and LPA arboricultural officer/landscape officer held.

Additional site supervision and input from the project arboriculturist is to occur:

- During the removal of existing hard features within RPA of T1
- During the no-dig drive surfacing

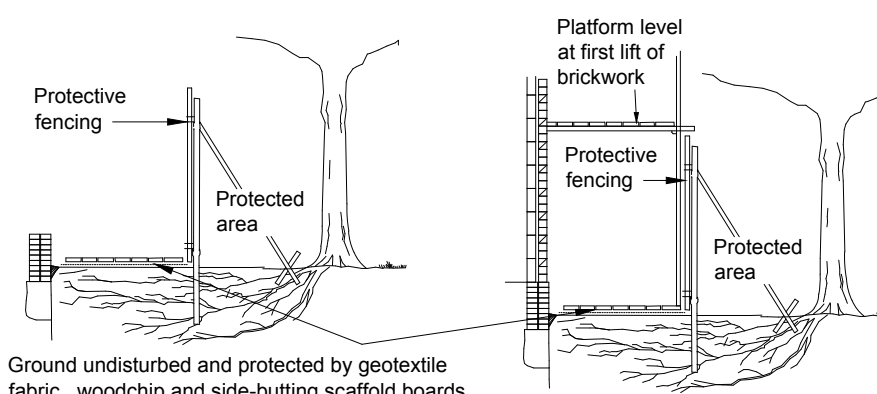
Supervision is also required should any unplanned access and/or work be required in the construction exclusion zone



Ground Protection

Where the set-back of the tree protection barrier would expose unmade ground to construction damage, new temporary ground protection should be installed as part of the implementation of physical tree protection measures prior to work starting on site.

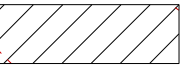
Foot traffic



For pedestrian movements only, a single thickness of scaffold boards should be placed either on top of a driven scaffold frame, so as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100 mm depth of woodchip), laid onto a geotextile.

For pedestrian operated plant up to a gross weight of 2 t, proprietary, inter-linked ground protection boards should be placed on top of a compression-resistant layer (e.g. 150 mm depth of woodchip), laid onto a geotextile.

For wheeled or tracked construction traffic exceeding 2 t gross weight, an alternative system (e.g. pre-cast reinforced concrete slabs) should be employed to an engineering specification designed in conjunction with arboricultural advice to accommodate the likely loading to which it will be subjected.



Construction Exclusion Zone

Root protection areas (RPA) of retained trees within which all construction activity is restricted.

All trees that are being retained on site must be protected by barriers and/or ground protection before any materials or machinery are brought onto the site, and before any demolition, development or stripping of soil commences. Where all activity can be excluded from the RPA, vertical barriers must be erected to create a construction exclusion zone. Where, due to site constraints, construction activity cannot be fully or permanently excluded in this manner from all or part of a tree's RPA, appropriate ground protection can be installed.

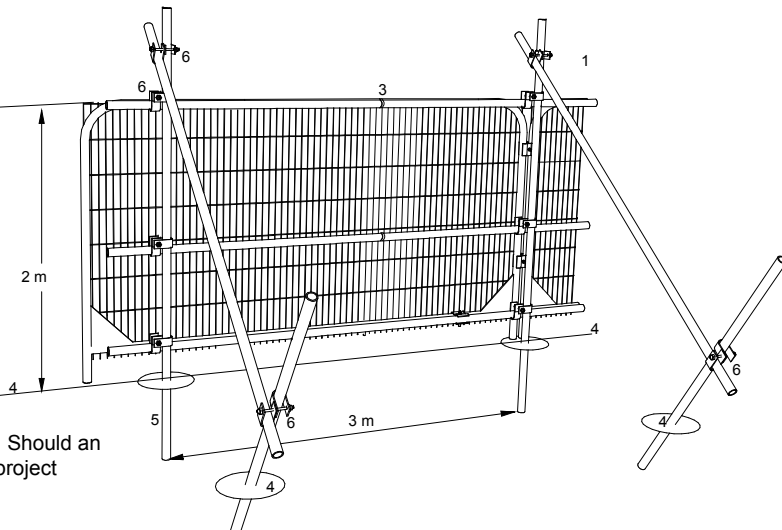


Default position for the tree protection barriers.

- Standard scaffold poles
- Heavy gauge 2m tall galvanized tube and weld mesh infill panels
- Panels secured to uprights and cross-members with wire ties
- Ground level
- Uprights driven into the ground until secure (minimum depth 0.6m)
- Standard scaffold clamps

Examples of alternative barrier designs can be found in the method statement. Should an alternative design be more viable and appropriate, it must be agreed with the project arboriculturist before its implementation.

BS5837:2012 Figure 2- barrier specification



The original of this drawing was produced in colour- a monochrome copy should not be relied upon.



Rev	Date	Details	Drawn
-----	------	---------	-------

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Landscape Architecture

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scheme: 99 St Peter's Avenue
Caversham, RG4 7DP
client: Boyes Developments
drawing: Tree Protection Plan
date: April 2015
scale: 1:200@A2
dwg no: PRI19866-03
drawn: CJP checked: MW

Appendix 4: Proposed Section for Driveway

A14009 AL (2-) 09

Boundary

Section through existing dwelling, showed on the higher part of the garden in the background of this site section

Existing House

Existing Tree

Boundary

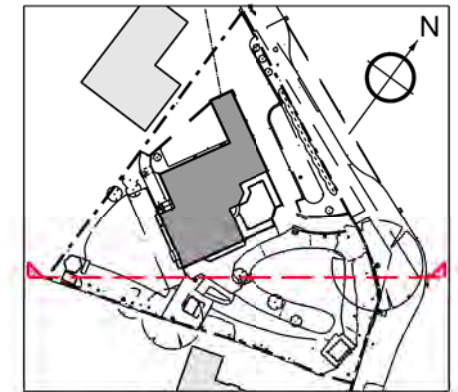
17.00m

Existing Site Section

Existing ground level of section through hollow in the lower part of the garden

Notes

All dimensions are to be checked on site. Any discrepancies are to be reported to the Architect before work commences. Figured dimensions are to be taken in preference to scaled dimensions.



Section Key Plan
Scale 1:1000

Boundary

Proposed Unit 1 in the background

External ground for Unit 2 levelled out to fill existing hollow on site

External ground level for Unit 1 unchanged from existing site

Root protection area protected from proposed driveway above with a 600mm deep cellular confinement system which uses flexible honeycomb panels filled with 40mm rocks, in accordance with Arboriculturist's Report

Unit 2

Existing Tree

Boundary

17.00m

0.60m

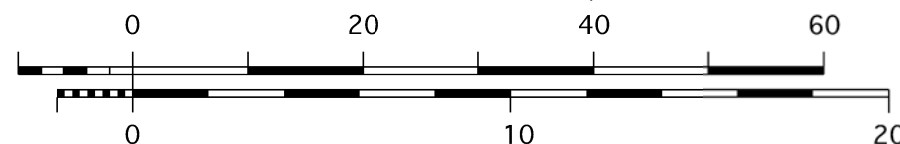
Proposed Site Section

Existing ground level of section

Extent of root protection area

Extent of root protection area

Site Sections



A3 Drawing

twd LIMITED

ARCHITECTS · CHARTERED SURVEYORS

TAYLOR WILLIAMS DALEY LIMITED

74 South Street Dorking Surrey RH4 2HD · 1A Salcott Road London SW11 6DQ

Tel: 0870 2404213 · Fax: 01306 876533 · info@taylorwilliamsdaley.co.uk

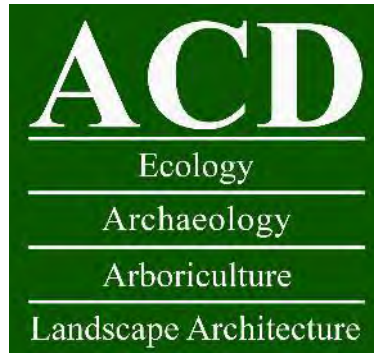
Job title 99 St Peter's Ave, Caversham, RG4 7DP

Drawing title Site Sections

Scale 1:200 at A3 Date April 2015

Drawing number
A14009 AL(2)-09

Revision



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