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Arboricultural
Method Statement

West End Cottage, West End

Location: **West End Cottage, Swaythling Road, West End, Southampton, SO18 3HT**

Survey Date: **3rd December 2024**

Surveyor: **Kevin Cloud**

Planning reference: **F/23/96419**

Report reference number: **AMS-KC/WESTENDCOTT/001**

Report date: **December 2024**

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Summary

I have been instructed by Alan Philips of Jaytrend Limited, 5 Holmesland Drive, Botley, Hampshire SO30 2SH to provide arboricultural consultancy to discharge relevant tree related conditions[1] attached to planning consent for development at West End Cottage, West End.

Development proposal is new dwelling.
The report relates only to planning consent F/23/96419 dated 8th February 2024.

Following a site tree survey, I have provided the information requested in line with the guiding principles of *British Standard 5837:2012 Trees in relation to design, demolition and construction*[2].

The report below comprises the following elements, together with associated relevant appendices:

- Arboricultural method statement (AMS).
- Tree protection plan (TPP).

The arboricultural method statement (AMS) and Tree Protection Plan (TPP). information should be submitted to the local planning authority arboricultural officer for approval.

The details provided shall be adhered to throughout the development of the site with arboricultural input being sought as required by section 14.

Kevin Cloud BSc Hons, Tech Cert Arbor A, F Arbor A
Arboricultural Association Registered Consultant RC174
Director and Principal Arboricultural Consultant

[1] See figure 1, page 3 in main body of report.
[2] Hereafter referred to as BS5837.

1. Instructions and Purpose of report

1.1 I am instructed by Alan Philips, Jaytrend Limited, 5 Holmesland Drive, Botley, Hampshire SO30 2SH to survey trees that could be affected by approved development at West End Cottage, West End and prepare an Arboricultural Method Statement (AMS) and associated Tree Protection Plan (TPP) to discharge relevant conditions listed below.

Figure 1. details of planning conditions relevant to arboriculture

Planning reference: **F/23/96419** Date of consent: **8.2.24**	
Condition number	Details
4	*No excavation, demolition or development related works shall take place on site until an arboricultural method statement and a tree protection plan, as per British Standard 5837:2012 (Trees in Relation to Design, Demolition and Construction – Recommendations), are submitted and approved by the LPA. The approved documents must be adhered to in full, and may only be modified subject to written agreement from the LPA.*

1.2 The purpose of an AMS is to provide information "*appropriate to the proposals in order to demonstrate that operation on site can be undertaken with minimal risk of adverse impact on trees to be retained"*[3]. This report addresses the conditions attached to consent and where applicable provides relevant detail as outlined at paragraph 6.1.2 of BS5837. The local planning authority should use the report as the basis for discharging the tree related planning conditions listed above or engaging in further discussions towards that end. Any use outside the planning context is not intended or authorised.

2. Document disclosure

2.1 I have been provided with the following plans and documents:

- Planning consent: F/23/96419
- Proposed site layout: AL Architecture and Design November 2023

2.2 I understand that supplied plans are based on an accurate land survey. This report and associated plans presumes accuracy of the land survey supplied. No responsibility for accuracy can be guaranteed by the author of this document.

[3] *BS5837.*

3. Soil Assessment

3.1 I have not been supplied with detailed site soil analysis. A site-specific soil assessment may inform decisions relating to root protection area (RPAs), tree protection, new planting design and foundation design to take account of retained, removed and new trees. When such information becomes available results should be circulated to the project arboricultural consultant and design team.

4. Legal Constraints

4.1 Trees may be protected by statutory tree protection[4]. I have checked and confirm that, at the time of writing, the trees identified in this report are not subject of a Tree Preservation Order or within a conservation area.

4.2 A felling licence is required[5] for any tree removals, although some exemptions apply such as orchard trees or those in a garden, churchyard or public open space[6].

4.3 Trees may contain wildlife protected by law[7]. This places a duty upon landowners to ensure best practice is followed, or an appropriate license issued, prior to any work commencing which may affect bats, nesting birds, reptiles or dormice. These could impose constraints on the use and timing of access to the site in addition to any of the tree matters considered in this report.

5. Tree Survey

5.1 I visited the site on 3rd December 2024 and carried out a ground based, visual survey of the trees following guidance contained in BS5837. The survey was restricted to views available within the site and the neighbouring area. Survey data is provided at appendix one.

6. Tree constraints

6.1 Tree survey data was used to provide constraints information on the TPP, based on locations of retained trees. Tree crowns and root spread have been considered, with construction methods agreed, as necessary, to mitigate potential impact to retained trees.

6.2 Root protection areas (RPAs) have been calculated[8] and plotted[9] on relevant plans[10] shown as a circle around each retained tree. As noted in BS5837, RPAs may, with arboricultural judgement, be adjusted to indicate the estimated likely spread of roots. RPAs dictate the location of protection barriers which form the Construction Exclusion Zone (CEZ) and also determine the position of any ground protection measures.

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[4] *Town & Country Planning Act (Tree Preservation)(England) Regulations 2012/Town & Country Planning Act 1990 (as amended)*
[5] *Forestry Act (1967)*
[6] See *Tree felling Getting permission - updated 2023*
[7] *Wildlife and Countryside Act 1981* and *The Conservation of Habitats and Species Regulations 2017*.
[8] See guidance at section 4.6 of BS5837:2012.
[9] See paragraph 4.6.2 of BS5837:2012.
[10] Tree Constraints Plan (TCP) and tree protection plan (TPP) as relevant depending on client instruction.

7. Limitations

7.1 The trees identified in the tree survey are those upon which development of the land may have potential impact in line with guidance in BS5837[11].

7.2 This assessment concerns arboricultural aspects only. No inspection has been made of the soil structure. No digging or other detailed investigation was carried out. Identification of fungi is made on a visual basis only. No account has been taken of the effects of any tree, or its removal, directly or indirectly on any building or structure relating to the possibility of subsidence or heave.

7.3 Trees are dynamic self-optimising organisms that grow in reaction and stimulus to their immediate surroundings and influence of wider environmental conditions. Consequently, tree health and condition will inevitably change over time. Therefore any comments made in this report can only be considered valid for two years.

7.4 This report does not account for effects of extreme climate and weather, vandalism, changes in the natural and/or built environment around the tree after the date of this report, nor any damage whether physical, chemical or otherwise.

7.5 Any plans, tables, figures or attachments whether within this document, appendices or supplied as associated drawings are illustrative, and based on layout drawings, topographical surveys or other information provided. Therefore, all scaled measurements should be checked against the original design documents.

7.6 Any plans, tables, figures or attachments whether within this document, appendices or supplied as associated drawings should only be used for dealing with the tree protection issues and all other uses are prohibited, unless authorised by Technical Arboriculture Limited.

7.7 Height measurements are approximations and have not been calculated using a clinometer. Where the canopy extends over an adjacent property, or where the under storey is very dense, the canopy spread has been estimated.

8. Arboricultural Implications Assessment (AIA) Summary

8.1 The site has planning consent. A full and detailed arboricultural impact appraisal (AIA) is therefore not required.

8.2 Figure three below shows a summary of potential impacts to trees sufficient to guide the AMS.

[11] See paragraph 4.2.4 (b) of BS5837:2012.

Figure 3. Summary of potential impact to trees.

RETAINED TREES: Potential damage by disturbance to RPA	Tree No	BS Cat
Demolition Requirement for careful demolition techniques to prevent damage to RPAs and above ground parts of retained trees.	nil	
Hard surfacing Installation requires a suitable no dig solution (cellular confinement system or similar) to prevent root damage.	T001 T004	B2 C2
Foundation design Where built form is to encroach into the RPAs a suitable engineered foundation design will be required.	nil	
Construction activity – working space requirements Areas of RPA requiring suitable ground protection.	nil	
Construction activity – encroachment into RPA Minor encroachment into plotted RPA to install site features.	nil	
Construction – low impact development Areas where small, low impact structures (i.e. bin or cycle stores) are proposed within RPAs.	nil	
RPA correction RPA adjusted to reflect arborist's professional opinion of prevailing root spread. Adjustment noted on tree survey and protection plan and justified in AIA.	nil	

RETAINED TREES: Pruning	Tree No	BS Cat
Access pruning Minor crown lifting or pruning required to facilitate and/or improve site access or to install site features.	nil	
Ecological considerations (see note below) Retention as veteran tree or habitat feature. NOTE: Ecological considerations refer to arboricultural features only, where trees or tree features are considered noteworthy in relation to their potential to provide habitat or ecological benefit. Assessment is preliminary and client should refer to project ecologist for full ecological site appraisal.	nil	
Recommended pre-development arboricultural work Refer to tree survey schedule at appendix one.		

TREES TO BE REMOVED: Proposed tree loss	Tree No	BS Cat
Trees not viable for retention or poor grade trees Trees not considered a constraint to development[12]	G001	U
Trees lost to development footprint Built form.	nil	
Trees lost to development footprint Car park and access requirements.	nil	
Trees lost to construction activity Demolition.	nil	
Trees lost to construction activity Working requirements.	nil	

TREES TO BE REMOVED: Potential tree loss	Tree No	BS Cat
None anticipated.		

9. Arboricultural Method Statement

9.1 The purpose of an arboricultural method statement is to "*demonstrate that operations can be undertaken with minimal risk of adverse impact on trees to be retained*"[13]. The following sections set out site management and tree protection details that must be implemented to ensure successful tree retention.

10. Tree Protection Plan (TPP)

10.1 Trees are plotted on the latest revision of the TPP (supplied separately) which should be displayed prominently on site for all staff to see. The TPP is a composite drawing derived from the information provided. It shows existing site features in grey, with proposed changes overlayed in maroon. This allows the relationship between the two to be clearly seen and analysis of the implications of the proposed site changes to be undertaken. The TPP has also been annotated to show protection measures and mitigation, incursions and activities within RPAs. Trees to be removed are shown with a red dashed crown outline. The TPP also highlights the location and type of protection measures or mitigative approaches.

11. Arboricultural site monitoring and discharge of planning conditions

11.1 BS5837:2012 states that "*wherever trees on or adjacent to a site have been identified within the tree protection plan for protective measures, there should be an auditable system of arboricultural site monitoring. This should extend to arboricultural*

[12] BS Category U or C
[13] BS5827:2012 paragraph 6.1.1.

supervision whenever construction and development activity is to take place within or adjacent to the RPA".

11.2 Tree protection cannot be reliably implemented without arboricultural input. Similarly arboricultural planning conditions cannot be reliably or effectively discharged without supervision by an arboricultural consultant.

11.3 Supervisory actions must be confirmed by formal letters/emails circulated to all relevant parties, including the local planning authority arboricultural officer. Records of each site visit will accumulate to provide proof of compliance and allow conditions to be discharged as the development progresses. An arboricultural consultant must be instructed, before any work begins on site, to comply with the supervision requirements set out in this document.

12. Phasing of arboricultural input

12.1 The following phasing is governed by operational constraints and may be subject to change or amendment. The project arborist must be notified of any proposed changes to this schedule:

Phase one - Pre-Development

- Pre-commencement site meeting attended by the arboricultural officer, project arboricultural consultant, client (or representative) and the construction site manager.
- Tree removals, pruning and remedial work.
- Tree protection measures installed.
- Site inspection by project arboricultural consultant.

Phase two – Development

- Phase 2 is subject to monthly site monitoring visits by project arboricultural consultant.
- Site accessible to construction traffic.
- Site compound/WC/materials.
- Groundworks and services – aspects within or adjacent to the RPA will require attendance by project arboricultural consultant.
- Development.
- Low impact surfacing installed – aspects within or adjacent to the RPA will require attendance by project arboricultural consultant.
- Completion of development.

Phase three – Post development

- Removal of protective fencing.
- Landscape operatives briefed by project arboricultural consultant.
- Hard and soft landscaping.
- Boundary treatments.

12.2 Arboricultural monitoring involves a site visit and completion of a standard form which is copied to both client and local planning authority arboricultural officer. The monitoring visit ensures that approved tree protection measures are continually adhered to. If remedial work or alterations are required to protective measures these can be agreed and actioned promptly.

12.3 Arboricultural supervision is to be carried out at all crucial stages of the development process to ensure that detailed tasks are carried out to the approved methodology. Such supervision shall occur during:

- demolition of existing buildings, surfaces or structures within/adjacent to RPAs.
- Hand excavations for boundary treatment posts.
- Any incursion into RPAs or CEZs for whatever reason.

12.4 Supervision will require the project arboricultural consultant to be present throughout the task, to ensure all arboricultural objectives are met. If the task is to take a long time, the arboricultural consultant may, at their discretion, reduce supervision to telephone contact between the site foreman and the arboricultural consultant.

12.5 The arboricultural officer will have free access to the site and pass any recommendations directly to the project arboricultural consultant.

12.6 Remedial tree works and any site clearance will be carried out prior to the erection of any tree protection fencing; however, it may be expedient to mark out the extent of root protection areas and protective measures to aid any site clearance or pruning work.

13. Protecting trees from demolition and construction activity

13.1 The RPA protects a functional minimum of tree root mass to ensure trees survive the construction process. RPAs allow for the creation of construction exclusion zones (CEZs) from which access is prohibited for the duration of a project.

13.2 Some trees on the site may be subject to statutory protection by TPO or location within a conservation area. Damaging such trees is a criminal offence and contrary to any tree related planning condition imposed with planning consent. Breach of planning consent could lead to the issue of a stop notice; breach of statutory protection could result in heavy fines.

13.3 It is the responsibility of everyone engaged in the construction process to respect tree protection measures and observe necessary precautions within and adjacent to them. If in any doubt when working close to trees – consult the site manager who will contact the project arboricultural consultant.

<u>Restrictions within construction exclusion zones (CEZs)</u>

13.4 Inside the area of protective 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 arboricultural consultant.
- **No** lowering of levels for any purpose (except removal of grass sward with hand tools).
- **No** storage of plant, equipment or materials.
- **No** fire lighting.
- **No** handling, discharge or spillage of any chemical substance including cement washings.
- **No** action likely to cause localised water logging.

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

- A 10-metre separation distance shall be observed between any tree and substances injurious to tree health, including fuels, oil and bitumen, cement (including cement washings), builders sand, concrete mixing and other noxious chemicals.
- No fire shall be lit such that flames come within five metres of tree foliage; this should be taken to mean a fire separation distance of 20 metres from any tree's canopy.

Tree protection barriers

13.6 The TPP shows the alignment of tree protection barriers. Barriers shall be installed prior to any of the following taking place:

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

13.7 It is advised that, to ensure accuracy and avoid future fencing adjustments (which should be carried out under supervision), the barriers are set out by a surveyor with all node points being marked clearly on site for fencing contractor to work to. The TPP shows the RPA radius in metres next to each retained tree after the words RPA (e.g. RPA6.2m). This is the minimum distance from the stem of each tree, within which the tree should be subject to protective measures and/or special engineering measures to ensure successful retention.

13.8 If, on completion of installation of protective measures, sections of the RPA are still exposed/uncovered or still open to construction access, immediate contact should be

made with the project arboricultural consultant to ensure corrective measures are made.

13.9 Once erected, all barriers will be regarded as sacrosanct and will not be removed or altered without prior consultation with the project arboricultural consultant and/or approval of the local planning authority.

13.10 BS5837 states that barriers should "*be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place around the retained tree(s). Barriers should be maintained to ensure that they remain rigid and complete*".

13.11 In line with BS5837:2012 "*the default specification should consist of a vertical and horizontal scaffold framework, well braced to resist impacts, as illustrated in figure 2 [figure 2 BS5837:2012 is shown at appendix three of this report]. The vertical tubes should be spaced at a maximum interval of 3m and driven securely into the ground. Onto this framework, welded mesh panels should be securely fixed. Care should be exercised when locating vertical poles to avoid underground services and, in the case of bracing poles, also to avoid contact with structural roots. If the presence of underground services precludes the use of driven poles, an alternative specification should be prepared, in conjunction with the project arboricultural consultant that provides an equal level of protection. Such alternatives could include the attachment of the panels to a free-standing scaffold support framework*".

13.12 "*Where the site circumstances and associated risk of damaging incursion into the RPA do not necessitate the default level of protection, an alternative specification should be prepared by the project arboricultural consultant and, where relevant, agreed by the local planning authority. For example, 2m tall, welded mesh panels on rubber or concrete feet might provide an adequate level of protection from cars, vans, pedestrians and manually operated plant. In such cases the fence panels should be joined together using a minimum of two anti-tamper couplers, installed so they can only be removed from inside the fence. The distance between the couplers should be at least one metre and should be uniform throughout the fence. The panels should be supported on the inner side by stabilizer struts, which should normally be attached to a base plate secured with ground pins (figure 3a)* [figure 3a is shown at appendix three of this report]*. Where the fencing is to be erected on retained hard surfacing or it is otherwise unfeasible to use ground pins, the stabilizer struts should be mounted on a block tray (figure 3b)".*

13.13 It may be feasible to use temporary site office buildings as components of the tree protection barriers, provided these can be installed and removed without detrimental impact upon retained trees or their rooting environment.

13.14 Once the exclusion zone has been protected by barriers and/or ground protection, construction activity may commence. All weather notices should be attached to the barriers. A template of an appropriate notice is provided at appendix four of this report.

Ground protection

13.15 Where construction working space or temporary construction access is required, this should be facilitated by a set-back in the alignment of tree protection barriers as shown on the TPP.

13.16 RPAs must be covered with ground protection until there is no further risk of damage from demolition and/or construction activity.

13.17 Existing hard surfacing that is not proposed for re-use as part of the final site layout should be retained to act as temporary ground protection during construction, rather than removed during demolition.

13.18 Where the set-back would expose unmade ground to construction damage, new temporary ground protection should be installed.

13.19 New temporary ground protection should be capable of supporting the construction traffic entering the area onto which it is to be laid in accordance with BS5837:2012. Typically ground protection might comprise one of the following:

- Pedestrian movements – scaffold boards placed either on top of a driven scaffold frame to form a suspended walkway; or on top of a compression resistant layer of 100mm depth of woodchip, laid onto a geotextile membrane;
- Plant (pedestrian operated up to 2 t gross weight) – proprietary, inter linked ground protection boards placed upon a compression resistant layer of 150 mm depth of woodchip, laid onto a geotextile membrane;
- Construction traffic (wheeled or tracked exceeding 2 t gross weight) – an alternative system (e.g. proprietary systems or precast reinforced concrete slabs) to an engineering specification designed in conjunction with the project arboricultural consultant, to accommodate the expected loading.

13.20 In all cases, the objective should be to avoid compaction, which can arise from a single passage of a vehicle, to ensure unimpaired root function.

14. Avoiding damage to trees

14.1 Care shall be taken when planning site operations in proximity to retained trees to ensure that wide or tall loads, or plant with booms, jibs and counterweights and static or mobile cranes can operate without coming into contact with retained trees. Such contact could result in serious injury which may make a tree's safe retention impossible.

14.2 Consequently, any transit or traverse of plant, in proximity of trees, shall be conducted under the supervision of a banksman to ensure that adequate clearance from trees is always maintained.

14.3 In some circumstances it may not be possible to achieve this without access facilitation pruning. Such pruning shall be kept to the utmost minimum required to

facilitate development and shall be carried out in strict accordance with the guidance set out in the relevant section of this report entitled "Tree Surgery" (see below).

14.4 Under no circumstances shall construction personnel undertake tree pruning operations.

15. Tree Surgery

15.1 Tree work proposals based on preliminary inspection are set out in the tree schedule within the appendices.

15.2 All permitted or approved tree work must be carried out in accordance with *British Standard 3998:2010 Tree work – Recommendations*.

15.3 Work should be carried out by suitably qualified and experienced professional tree surgeons. For safety and insurance reasons under no circumstances should site personnel undertake any tree pruning operations.

15.4 Trees may contain wildlife protected by law[14]. This places a duty upon landowners to ensure best practice is followed, or an appropriate license issued, prior to any work commencing which may affect bats, nesting birds, reptiles or dormice. These could impose constraints on the use and timing of access to the site in addition to any of the tree matters considered in this report. Failure to act appropriately may lead to enforcement action and/or prosecution under the respective act. If further advice is required, particularly if bats are discovered during tree work, contact should be made immediately with the project arboricultural consultant.

15.5 The contractor shall seek consent from the project arboricultural consultant for the chosen tree surgeon to be used. Proof of experience, including knowledge and understanding of *Arboricultural Association Guidance Note one – Bats in the context of tree work operations* (as updated), and appropriate levels of insurance provision will be required, prior to approval to commence tree works. All work shall be undertaken at the appropriate time and with the consent of the site agent who shall approve a programme of work.

15.6 The stumps of any trees removed from within the construction exclusion zone or RPAs of retained trees will be either cut flush to ground level and left in situ or ground out using a stump grinder. At no time shall tree roots be removed by winch or any other mechanical means.

15.7 All operations shall be carried out to avoid damage to the trees undergoing tree surgery or neighbouring trees which are to be retained. No trees to be retained shall be used for anchorage or winching purposes.

[14] *Wildlife and Countryside Act 1981* and *The Conservation of Habitats and Species Regulations 2017*.

15.8 The tree surgeon shall report to the project arboricultural consultant, any defects or biological disorders which may compromise the health and future safety of the tree which are not noted on the tree survey schedule supplied to the tree surgeon at the time of commencement of tree works.

15.9 All arisings shall be removed from site, unless other provisions have been made for their disposal, and the site shall be left clean and tidy.

16. Demolition within root protection areas

16.1 Protective barriers and ground protection shall be installed as per approved TPP prior to any plant arriving on site.

16.2 Access facilitation pruning should be undertaken, as necessary, to prevent injurious contact between demolition plant and the tree(s). In some cases, working space may be provided by temporary tying back of branches. If pruning or tying is required it should have been specified in the tree schedule, if this is not the case then seek advice of the project arboricultural consultant prior to commencing demolition operations.

16.3 Sensitive demolition will occur to structures within RPAs as indicated on the tree survey and protection plan.

16.4 Demolition will be by folding buildings in on themselves (often referred to as "*top down, pull back*") with all plant and vehicles engaged in demolition work operating outside the RPA or running on ground protection suitable for the plant or vehicle employed (refer to section on ground protection).

16.5 Where a significant amount of dust builds up on foliage, this may need to be removed by spraying the tree(s) with water.

16.6 Where an existing hard surface or slab floor is to be removed, care should be taken to ensure no disturbance to tree roots that may be present beneath it. Where practicable, hand tools should be used to remove the existing surface. Should this not be possible, the initial breaking up of any surface may be carried out by low impact pneumatic tools (not breakers attached to diggers or JCBs).

16.7 Where practicable, subsequent removal of debris will be carried out by hand. Should mechanical means be required due to the size of the debris, then a small (1.5 ton) digger may be used providing that, when picking up debris, no tines/teeth from the bucket cause any damage to the underlying soil surface. Once left with manageable sized pieces, hand removal will be used. Where the digger is employed, it will only travel on the undisturbed hard surface (within RPA), clearing debris as it progresses out of the RPA.

16.8 If a larger digger is required for whatever reason to clear the area it must follow the guidance above and work only outside the RPA.

16.9 If a new hard surface is to be installed, it may be preferable to leave any existing subbase in situ, provided that it can be augmented, as required, to successfully provide the required subbase for the new surface.

16.10 If underground structures located within the RPA are, or will become, redundant it is preferable to leave these in situ rather than risk damage to roots during removal. If, for any reason, such structures must be removed then advice should be sought from the project arboricultural consultant.

16.11 No reduction in levels of the underlying soil surface will occur and at no point are any heavy machinery permitted within the RPA.

16.12 The underlying soil may be levelled by the addition of up to 100mm of good quality topsoil to BS3882:1984. Hand tools only will be used for any levelling works; this work will not disturb the underlying soil.

16.13 Arboricultural supervision must be employed during all work within the RPA.

16.14 Contamination of the soil by fuel and lubricant leaks must be avoided. If such a situation arises the project arboricultural consultant must be notified to assess the situation and to prescribe remedial measures.

17. Hard surface removal within RPAs

17.1 Tree protection measures will remain in place until work commences. When removed, all personnel to be working within the RPA are to be made aware of the extent and nature of the area.

17.2 The initial 'breaking up' of any surface may be carried out by low impact pneumatic tools (not breakers attached to diggers or JCBs, unless required due to the nature of the surface and if so, only when agreed with the supervising project arboricultural consultant), or by hand if possible.

17.3 Removal of the surface will occur in 2m strips working from undisturbed surface. This will enable any roots exposed to be covered with a good quality topsoil to avoid desiccation and the ground to be 'made good' as the operation progresses, avoiding the need for excessive travel on exposed ground.

17.4 Where practicable subsequent removal of debris will be carried out by hand. Should mechanical means be required due to the size of the debris, then a small (1.5 ton) digger may be used providing that, when picking up debris, no tines/teeth from the bucket cause any damage to the underlying soil surface. Once left with manageable sized pieces, hand removal will be used. Where the digger is employed, it will only travel on the undisturbed hard surface (within RPA), clearing debris as it progresses out of the RPA.

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

17.6 The underlying soil may be levelled by the addition of up to 100mm of good quality topsoil to BS3882:1984. Hand tools only will be used for any levelling works; this work will not disturb the underlying soil.

17.7 Should any roots over 25mm diameter have grown above the final soil level and be a hindrance to the final installation, their removal will only be carried out under arboricultural supervision and with the approval of the local planning authority.

17.8 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.

17.9 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.

18. Installation of surfacing using a cellular confinement system (CCS)

18.1 The following design criteria will need to be considered when installing new hard surfacing within the RPAs of retained trees:

18.2 In all situations:

- Maintain oxygen diffusion of 5-12% by volume through new surface to roots.
- Maintain 12-40% by volume passage of water to the roots.
- Maintain existing ground levels to avoid root damage (severance and/or asphyxiation)
- Avoid compaction by maintaining a soil structure sufficient to sustain root growth (i.e. soil bulk density below 1.4g/cc).
- Tolerant of deformation by tree roots, ideally set back 500 mm from the stem/buttress to allow for future growth and movement.
- Account should be taken of finished levels in relation to adjacent structures.

Depending on end use of surfacing:

- If the new surface is likely to be subjected to de-icing salt application, an impermeable barrier should be incorporated to prevent contamination of the root area with any runoff directed away from the RPAs of retained trees.
- Where a permeable surface is to be used for vehicle movements, a geotextile should be used at the base of construction to help prevent pollution contamination of the rooting area below.
- Where there is a risk of water logging, the design should incorporate appropriate land drainage. Any such drainage within the RPA should be designed to avoid damage to tree roots and the soil structure.

18.3 The above criteria will provide the conditions for continued tree survival and growth.

18.4 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 depths up to 100mm and 150-200mm depths are used for residential driveways, whilst greater depths may be required for the passage of the heavier vehicles such as construction traffic.

18.5 The use of a three-dimensional cellular confinement system (CCS) is an acceptable approach which aims to fulfil the above design criteria. A CCS maintains the passage of oxygen and water to root systems; avoids root loss through severance or asphyxiation and minimises the potential for soil compaction. It is achieved by using geotextile membranes and the introduction of the CCS. The CCS is laid directly onto the unchanged soil levels within the RPA of retained trees.

18.6 Retained trees must first be protected during all stages of the development, including demolition, by the erection of barriers as specified on the TPP. Installation of surfacing may require the repositioning of tree protection fencing to a secondary location as agreed with the project arboricultural consultant or as shown on the TPP.

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

18.8 Ideally surfacing should be installed between May and October when the ground is driest and least prone to compaction. The approved wearing course is to be laid over the CCS. Where surfacing within the RPA covers more than 20% of the RPA, or is wider than 3m, a specially engineered low impact surface will need to be designed that permits infiltration of moisture and gaseous diffusion (pervious).

18.9 The CCS produces a composite mattress, with high flexural stiffness and load support capabilities. The angular infill material engages with the CCS in such a manner as to prevent significant soil compaction and rutting.

18.10 The use of a non-woven geotextile beneath the cellular mattress acts as a separation/filtration layer. The CCS should be filled with 20-40mm no-fines stone. This operation will be carried out avoiding the use of heavy machinery within the exposed RPA of retained trees. Once filled, the perforated cellular wall structure provides mechanical interlock for infill materials, increasing the sheer strength while allowing lateral and vertical draining and gaseous exchange.

18.11 The system will be used as a permanent base for a wearing course and/or a temporary site access for root protection. The minimum thickness available for CCS material is 75mm and is available up to 300mm thickness; the material required is dependent on the load bearing capacity of the final surface. A structural engineer should design all engineering solutions for surfaces.

18.12 A pre commencement site meeting with the appointed demolition and/or ground works contractor, site manager, project arboricultural consultant, tree officer and appointed engineering consultant, will agree the stages and specification for the installation of the surfacing. The project arboricultural consultant will supervise any works within the RPAs of retained trees.

18.13 Stages for installation of surfacing;

- **Stage 1** - Erection of tree protection fencing as per TPP.
- **Stage 2** - Remove existing vegetation by using a specific herbicide (as advised by a specialist) or manually remove with hand tools only. Shrubs, saplings or trees, agreed for removal and located within the RPAs of retained trees, are to be cut to or just below ground level, rather than grubbed or ground out which can damage roots of retained trees.
- **Stage 3** - Remove existing hard surfaces. Machinery, operating on existing surfaces or outside the RPAs and tree canopies could, under arboricultural supervision, be used to carefully remove existing wearing surfaces, however hand tools are preferable and should be used if possible. The subbase of existing surfaces or foundations should be left in situ where possible to avoid unnecessary root disturbance and provide a base for new surfacing (refer to relevant sections on removal of hard surfaces/demolition).
- **Stage 4** - Install the non-woven geotextile directly over soil grade level (levelled where necessary by the infill of no fines gravel, washed aggregate or structural soil) and fix in place.
- **Stage 5** - Lay the CCS over the geotextile. Secure CCS open under tension with steel staples or wooden pegs in readiness for infill.
- **Stage 6** - Install curbs and edgings directly on top of existing soil level. For light structures a treated peg and board may be acceptable. For more substantial structures, railway sleepers, haunched concrete with road pins, drilled curb stones, gabions or cast in situ curbs will be appropriate.
- **Stage 7** - Fill the CCS ensuring any plant/machinery work only on already filled areas. Typical infill consists of 20-40mm no fines angular granular material. Infill shall remain un-compacted.
- **Stage 8** - Install surfacing options:

  Small block paving

  - Lay second geotextile separation layer over the infilled CCS.
  - Lay a sharp sand bedding layer to recommended depth.
  - Place block pavers as per manufacturers' instructions.

  Washed gravel

  - Lay second geotextile separation layer over the infilled CCS.
  - Place pea shingle/gravel to required depth

18.14 Further details, specifications and typical cross sections for CCS are contained in appendix seven of this report (courtesy of Geosynthetics).

19. Installation of underground services

19.1 Although every effort has been made to ensure that routing of services does not encroach into RPAs, if installation within RPAs is required the project arboricultural consultant and local authority must be notified prior to any tree protection barrier removal and the following details adhered to.

19.2 Trenching for the installation of underground services severs any roots present and may change the local soil hydrology in a way that adversely affects the health of trees. For this reason, particular care will be taken in the routing and methods of installing underground apparatus. Wherever possible, apparatus should be kept together in common ducts and tree and root sensitive methods of excavation used. At all times where services are to pass within the RPA, detailed plans showing the proposed routing will be drawn up in conjunction with the project arboricultural consultant. Such plans will also show the levels and access space needed for installing the services.

19.3 Various trenchless solutions are available and selection and use will depend upon a variety of factors including soil type, underlying strata and type of apparatus to be installed. BS5837:2012 provides summary data on trenchless solutions for differing utility apparatus installation requirements. An extract of the summary is shown in figure four below. Technical Arboriculture Limited publishes the information as useful guidance to availability of the techniques stated and accepts no responsibility for the data. The type of technique employed shall be the decision of the client. In all cases entry and retrieval pits shall be sited outside the plotted RPAs of retained trees.

19.4 For smaller operations, the preferred method for trenching within RPAs is excavation using an 'air-spade' or similar. This tool utilises compressed air to remove soil from around tree roots causing minimal damage.

19.5 Reference can be made to *National Joint Utilities Group Volume 4* (formerly referred to as NJUG 10) for guidance, but any approach must be approved by the project arboricultural consultant and brought to the attention of the local authority tree officer.

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Figure 4. services in RPAs – suggested methodologies (after BS5837:2012)

Method	Accuracy	Bore dia.[A] mm	MSL m	Applications	Not suitable for:
Micro tunnelling	<20mm	100-300	40	Gravity-fall pipes, deep apparatus, watercourse/roadway under crossings.	Low cost projects due to relative expense.
Surface launched directional drilling	≈100mm	25 to 1200	150	Pressure pipes, cables including fibre optic.	Gravity-fall pipes e.g. drains and sewers.[B]
Pipe ramming	≈150mm	150 to 2000	70	Any large bore pipes and ducts.	Rocky and heavily obstructed soils.
Impact moling [C]	≈50mm [D]	30 to 180 [E]	40	Gas, water and cable connections, e.g. from street to property.	situations requiring accuracy over distances >5m.

Key
MSL = Maximum subterranean length

Notes
(A) Dependent on strata encountered.
(B) Pit launched directional drilling can be used for gravity fall pipe up to 20m subterranean length.
(C) Impact moling (also known as thrust bore) generally requires soft, cohesive soils.
(D) Substantial inverse relationship between accuracy and distance
(E) Figures given relate to a single pass: up to 300mm bore achievable with multiple passes.

20. Soft landscaping RPAs

20.1 Ground preparation 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 the RPA. Removal of existing vegetation will be carried out by hand; turf may be removed using a mechanical turf stripper or by hand.

20.2 At no time shall a rotavator be used within any RPA to prepare the soil. Any levelling will be done by hand with the use of hand tools. Should the soil be compacted or have a poor structure which may hinder the development of any new planting, soil decompaction techniques may be used upon consultation with the project arboricultural consultant.

20.3 New plants will be planted individually to minimise root disturbance (e.g. 'no trench' planting).

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

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21. Bibliography

21.1 This arboricultural report is based on the following primary technical references:

- British Standards Limited. 2012. B*S 5837:2012: Trees in relation to design, demolition, and construction – Recommendations.*
- British Standards Limited. 2010. *BS3998:2010: Tree work - Recommendations.* British Standards Institute, London.
- National Joint Utilities Group. 2007. *Volume 4, Issue 2: Guidelines for the planning, installation, and maintenance of utility apparatus in proximity to trees.*
- Lonsdale, D. 2000. *Hazards from trees. A general guide.* Forestry Commission, Edinburgh.
- The National Tree Safety Group. 2011. *Common sense risk management of trees. Guidance on trees and public safety on the UK for owners, managers and advisers*. Forestry Commission, Edinburgh.
- Watson, G. 2013. *Tree pests and diseases. An arborist's field guide.* The Arboricultural Association, Cheltenham.
- Watson, G. and Green, T. 2011. *Fungi on trees. An arborist's field guide.* The Arboricultural Association, Cheltenham.
- Wilson. P. 2013. *A-Z of tree terms. A companion to British arboriculture*. Ethelberga House, Kent.

Appendix one - Tree survey and classification

These tree survey notes have been guided by the recommendations of BS5837 and define the criteria for pre-development tree surveys.

Tree Number (No)
Numbers relate to those marked on the Tree Constraints Plan and Tree Protection Plan drawings. Where specifically instructed small durable numbered metal tags have been applied to each tree surveyed.

Common Name
Species of tree listed by common name.

Height (Hgt)
Height assessments are estimated in metres. Where accurate heights become a critical issue it will be necessary to return to site, as a separately commissioned exercise, to collect accurate measurements with the aid of optical instruments.

Stem Dia.
Measurement of tree stem(s) in accordance with annex C of *BS5837:2012*. In the case of multiple stems, the measurement quoted is that resulting from the appropriate calculation in line with annex C.

Branch Spread
Radial crown spread assessments are estimated in metres from the centre of the trunk / group to each of the four primary points of the compass (**N**orth, **E**ast, **S**outh, **W**est) in order to achieve a representation of the crown shape which will be recorded on the accompanying tree protection plan.

These provide a general guide to the outline of a tree / group crown but **do not constitute** tape measured dimensions. These would only be undertaken as part of a separately commissioned exercise where precise dimensions are critical to the project.

HAG
Existing height above ground level of canopy, in metres.

Life stage
An assessment of age class is made in terms of site specific maturity as part of the surrounding landscape, taking into account overall shape and form in that setting and is recorded thus:

Y = Young EM = Early mature
M = Mature OM = Over mature
V = Veteran

Phys Cond
An assessment of a tree / group's overall physiological condition is recorded as:

Good / Fair / Poor / Dead

Struct Cond
An assessment of a tree / group's overall structural condition is recorded as:

Good / Fair / Poor

Rem Con
Estimated remaining contribution in years (yrs) (<10, 10+, 20+ 40+)

Cat
British Standard category grading (U or A to C) - see guidance extracted from *BS5837:2012* on following page.

RPA
Root protection area based on *BS5837:2012* calculations and stated as **Radius** in metres (**m**) and **Area** in square metres (**m²**).

Condition comments
Data on the structural condition of the tree / group is provided, as appropriate, to give an indication of the visual appearance and any significant health and safety issues.

Management recommendations
As per *British Standard 3998:2010 Tree Work – Recommendations*

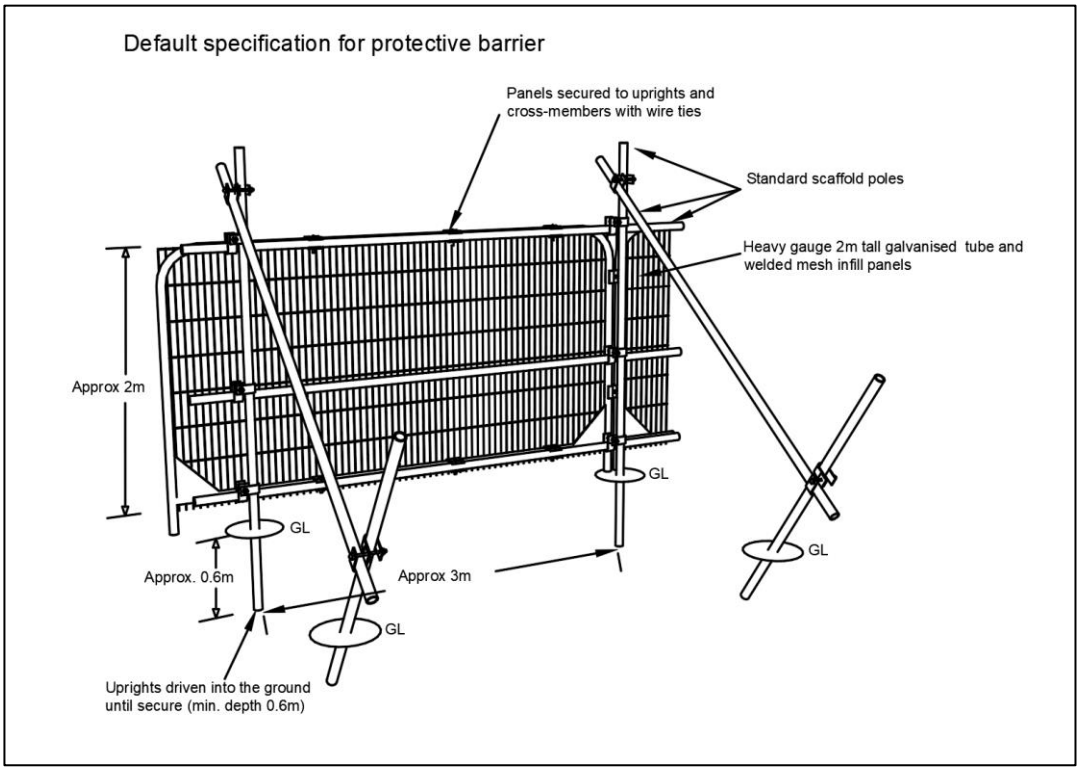
Unless otherwise stated:
All measurements are in metres (m) or millimetres (mm).
All heights are stated above ground level (AGL) of tree stem.
All distances are from base of tree.
Cardinal points are abbreviated e.g. SW = South West
All trees – crown lift to 4m over site as required for construction access

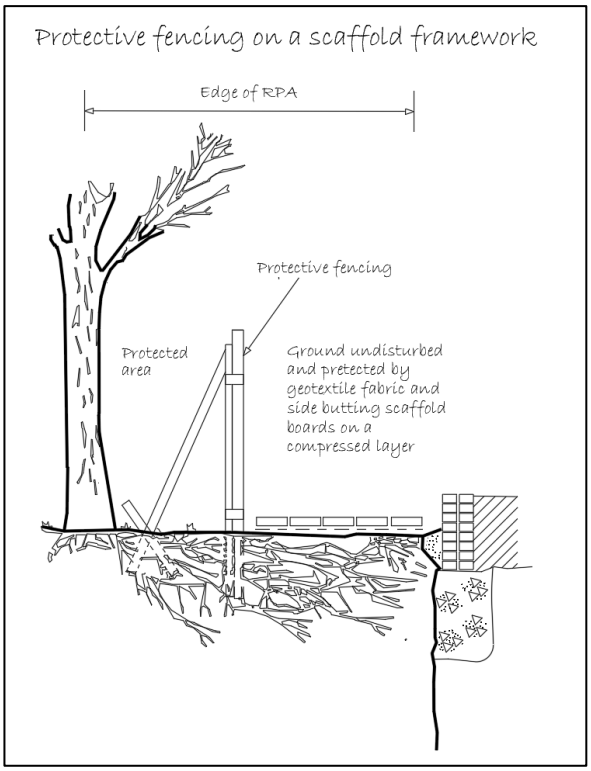
Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention				
Category U Those in such condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	• Trees 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 Note: Category U trees can have existing or potential conservation value which it might be desirable to preserve.			**Red**
Trees to be considered for retention				
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 mainly cultural values, including conservation**	
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).	**Green**
Category B **Trees of moderate quality** with an estimated remaining life expectancy of at least 20 years.	Trees that might be included in 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 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 benefits.	**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 very limited conservation or other cultural benefits.	**Grey**

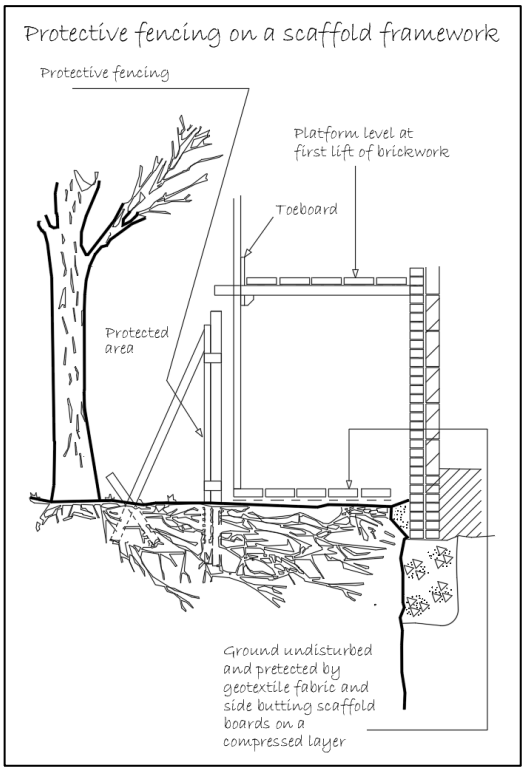
Tree Survey Schedule

Tree No	Common name	Hgt m	Stem Dia m	Branch Spread m	HAG m	Life stage	Phys Cond	Struct Cond	Rem Con Yrs	Cat	RPA Radius (m)	RPA Area (m^2)
G001	Ash	12	0.17	5 N 5 E 5 S 5 W	4m	Mature	Fair	Fair	9	U		
	Condition Comments Offsite. Poorly formed. Growing into and pushing over boundary fence.						**Management Recommendations** Remove approx 4 stems to facilitate reinstatement/repair of boundary fence.					
T001	Oak	18	0.48	4.5 N 4.5 E 7 S 5 W	3m	Mature	Good	Fair	20	B2	5.7m	102
	Condition Comments Offsite adjacent to footway and road. Deadwood.						**Management Recommendations** No work required at time of survey.					
T002	Ash	14	0.4	4.5 N 6.5 E 6 S 1 W	4m	Mature	Fair	Fair	10	C2	4.8m	72
	Condition Comments Offsite. Crown dieback. Deadwood. Branch snap. Possible ADB.						**Management Recommendations** No work required at time of survey. Monitor advance of ADB.					
T003	Ash	14	0.4	4 N 4 E 4 S 4 W	3m	Mature	Fair	Fair	10	C2	4.8m	72
	Condition Comments Offsite. Thinning crown. Possible ADB. Deadwood.						**Management Recommendations** No work required at time of survey. Monitor onset of ADB.					
T004	Ash	14	0.5	5 N 5 E 5 S 5 W	3m	Mature	Fair	Fair	10	C2	6m	113
	Condition Comments Offsite. Crown dieback. Deadwood. Branch snap. Possible ADB.						**Management Recommendations** No work required at time of survey. Monitor advance of ADB.					

Appendix two – Tree protection details




Protective fencing on a scaffold framework
Edge of RPA
Protective fencing
Protected area
Ground undisturbed and pretected by geotextile fabric and side butting scaffold boards on a compressed layer


Protective fencing on a scaffold framework
Protective fencing
Platform level at first lift of brickwork
Toeboard
Protected area
Ground undisturbed and pretected by geotextile fabric and side butting scaffold boards on a compressed layer

Appendix three - Site notices and additional information

Sites Notices on Fencing
Pre-printed laminated waterproof signs A3 in size should be fixed securely to fencing panels on each enclosure at 9 metre minimum intervals. A combination of both types of sign is most effective.

CONSTRUCTION EXCLUSION ZONE

KEEP CLEAR OF TREES

NO ACCESS

NO STORAGE OR OPERATIONS WITHIN FENCED OFF AREAS

NO DIGGING OR TRENCHING

NO STORAGE OF PLANT OR MATERIALS

NO VEHICLE ACCESS

NO FIRE LIGHTING

NO CHEMICAL HANDLING

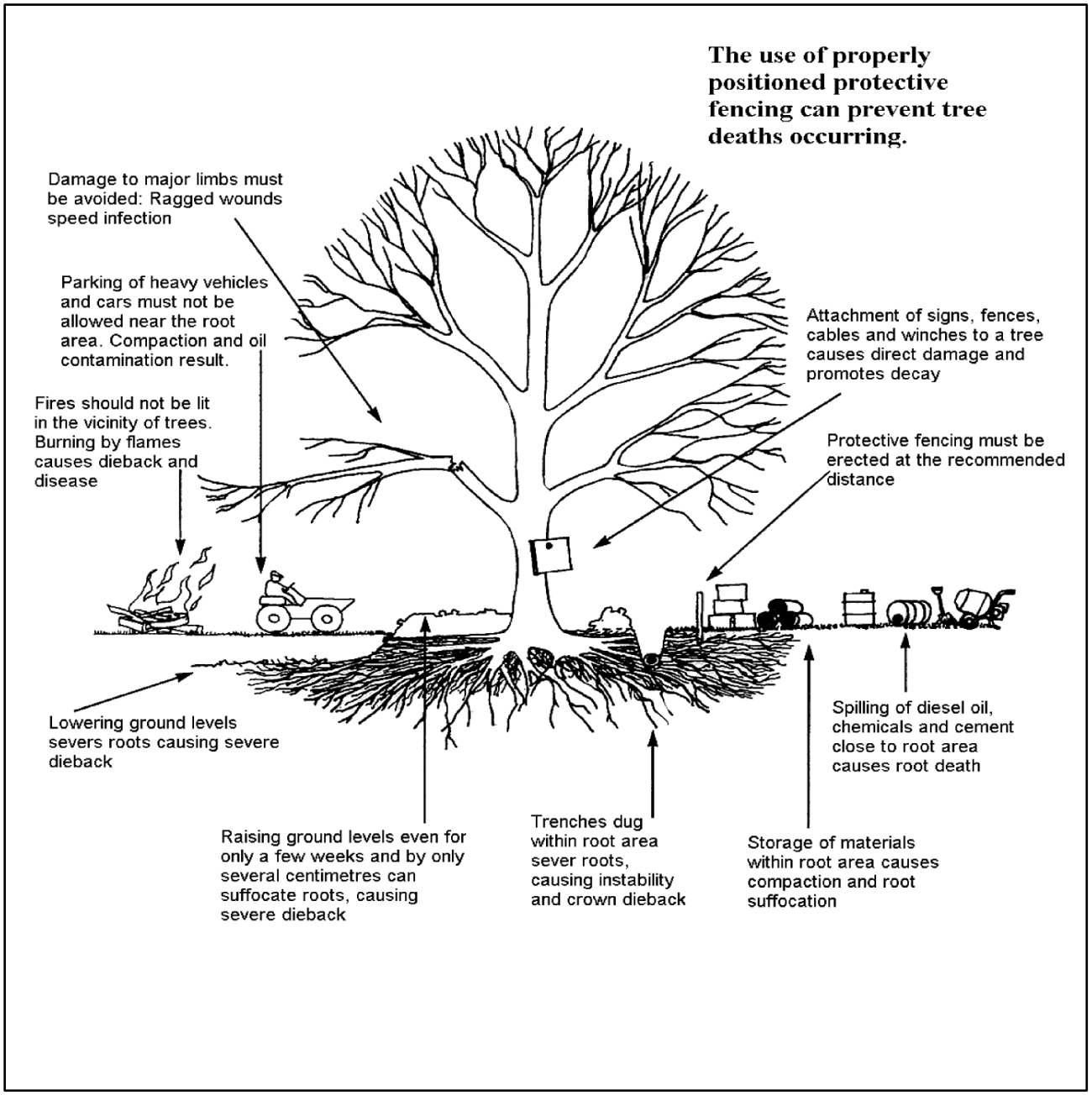
TREE PROTECTION AREA
KEEP OUT!

TREES ENCLOSED BY THIS FENCE ARE PROTECTED BY PLANNING CONDITIONS AND/OR ARE THE SUBJECT OF ATREE PRESERVATION ORDER. CONTRAVENTION OF A TREE PRESERVATION ORDER, MAY LEAD TO CRIMINAL PROSECUTION THIS FENCING MUST NOT BE REMOVED WITHOUT PERMISSION FROM THE TREE AND LANDSCAPE OFFICER

Construction and trees
Why is fencing erected around trees?

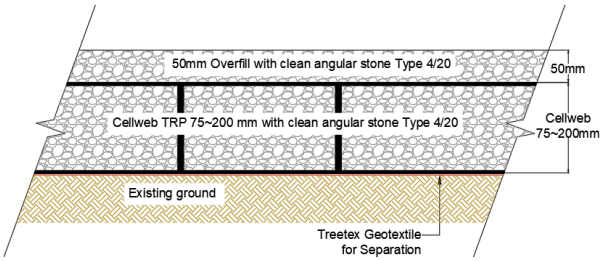
1. The major cause of damage to trees on construction sites is soil compaction.
2. Roots use spaces between soil particles to obtain oxygen, water and nutrients.
3. Heavy plant and machinery compresses (compacts) the soil, squashing out the air spaces and preventing root function.
4. A compacted soil structure will stay compacted.
5. Consequently, the tree suffers and will show signs of branch die-back.
6. Symptoms such as die-back may take several years to appear.
7. Soil compaction over roots can be prevented by maintaining a fenced exclusion zone over the tree roots.
8. The exclusion zone distance is calculated using British Standard 5837.
9. Protective fencing is installed at the calculated distance.
10. Protective fencing is a condition of planning approval, if it is removed or repositioned the construction firm is in breach of a condition and may be subjected to legal action.

Common causes of tree death

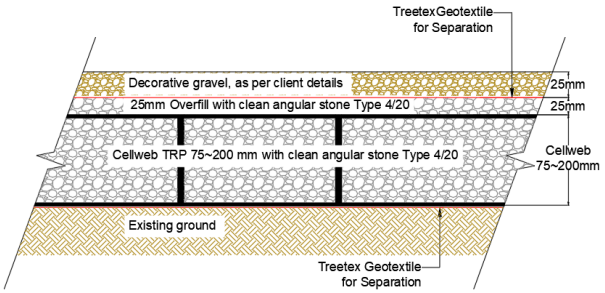


Low impact surfacing – cellular confinement system (CCS)
Illustrative cross sections:

Parking bay with decorative gravel wearing course

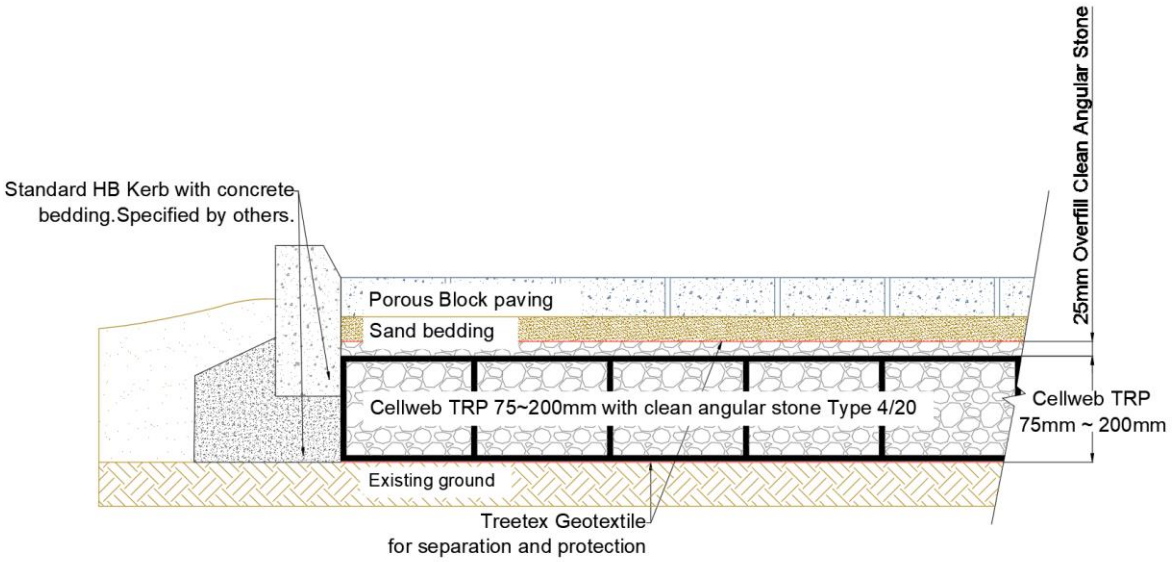


Note: Subbase could be required depending on the existing ground CBR % and the type of traffic on the surface.



Note: Subbase could be required depending on the existing ground CBR % and the type of traffic on the surface.

Parking bay with block paving wearing course



Note: Subbase could be required depending on the existing ground CBR % and the type of traffic on the surface.

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