

FELPHAM WEST SUSSEX PHASE 4 & 5 REPLAN

ARBORICULTURAL IMPACT ASSESSMENT & METHOD STATEMENT

ACD
ENVIRONMENTAL

Ecology
Archaeology
Arboriculture
Landscape Architecture



BARRATT
HOMES

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1. Executive Summary

- 1.1. ACD was supplied with existing tree data and instructed to assess the subject layout, advise on tree removals and retention, and draft proposals for tree protection during construction in line with recommendations of the British Standard.
- 1.2. This application is for a re-plan of an extant planning consent granted by Arun District Council, ref: FP/224/11 and is for a number of residential units, the layout of which can be seen on the appended Tree Protection Plan.
- 1.3. Trees to be removed are mainly limited to low quality trees that have a limited life and current landscape value. Some of which are covered by a TPO. Any loss that may be felt as a result of their removal will be more than mitigated through the new planting proposed for the site. It must be noted that the majority of the trees to be removed are of category U and would be removed, regardless of any development, as good arboricultural practice.
- 1.4. Some site supervision will be required during the installation of no-dig surfacing, and remediation/installation for a road near to trees.
- 1.5. The arboricultural method statement and tree protection plan include details of all tree protection measures required.
- 1.6. The fencing 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. Barratt David Wilson instructed ACD Environmental in March 2015 to prepare the following impact assessment and method statement.
- 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: SITE LAYOUT 29 - 2016 RANGE and tree survey data from *tree:fabrik* ref: tf 1007/TS/100, dated February 2015.
- 2.5. The controlling authority is Arun District Council, who can be contacted at: Arun District Council, Civic Centre, Planning Services, Maltravers Road, Littlehampton, BN17 5LF, Tel: 01243 863141.
- 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. Arboricultural Impact Assessment

3.1. Overview of proposed development

3.1.1. The existing site is to be developed with a number of residential dwellings, the layout of which can be seen on the appended Tree Protection Plan.

3.2. Planning context

3.2.1. **Tree Preservation Orders/Conservation Area:** TPO F/1/07 covers some trees on the site. TPO reference numbers can be found on the plan next to the tree number.

3.2.2. **Previous planning applications and consents:** There is an extant consent for the site, planning ref: FP/224/11.

3.3. Trees proposed for removal

3.3.1. The trees proposed for removal and cutting back can be found at appendix 2.

3.3.2. In summary these comprise:

- Category B: 1
- Category C: 5 trees and 6 groups (or elements thereof)
- Category U: 13

3.3.3. All the category C trees listed for removal are of low quality and value and have only limited wider landscape significance with a limited life expectancy. It is noted that some of these trees are covered by the TPO, but given the holistic redevelopment of the entire area, this must be considered acceptable, especially given their low British Standard rating.

3.3.4. The removal of T51, the category B oak, will be more mitigated through the new planting proposed for the site. All remaining moderate to high quality trees are to be retained.

3.3.5. Of the trees listed, the category U trees are in such a poor condition that they are to be removed as good arboricultural practice regardless of any development.

3.4. Demolition, site clearance & archaeology

3.4.1. 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.

3.4.2. No special demolition procedures need be observed on this site, other than respecting the tree protection fencing.

3.5. Construction within RPAs

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

3.5.2. The construction of the garages for plots 61-64 & 69, the corner of plot 87 encroaches slightly into the RPAs of adjacent trees. This encroachment is considered marginal and will not be to the detriment of the trees. Therefore special construction measures or adjustment of the plans are NOT required.

3.5.3. The corner of plot 67 encroaches slightly into the RPAs of adjacent trees. This encroachment is considered marginal and will not be to the detriment of the trees. Therefore special construction measures or adjustment of the plans are NOT required.

3.5.4. The adopted design must be approved for use by the project arboriculturist, detailed in the arboricultural method statement, and installed under their supervision

3.6. Access and working room within RPAs

3.6.1. Space is required for scaffold erection and working room within the RPA of Tx. Access is required across the RPA of Tx. 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.

3.6.2. However, given the operational issues with implementing ground protection, an alternative solution is proposed, in that the protection areas is extended contiguous to the RPA². We are comfortable with this approach and that it will not be deleterious to the health of the tree. Nonetheless, should the Council wish to see the installation of ground protection, this can be enforced by a suitable worded planning condition.

3.7. Permanent hard surfaces within RPAs

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

3.7.2. The vehicular surface in front of plots 100 & 101, and the cycle-path that runs through the site, will require no-dig surfacing to avoid damage to underlying roots.

3.7.3. The main road runs past two oak trees T24 & 25 (and T20 which is outside the red-line for this application). The levels for this road have already been submitted and approved under the drainage and slab level element of the application. Conditions on site (July 2016) are that the road profile has already been constructed using traditional methods (soil fill). To minimise impact upon the trees, it is proposed to remove the soil, ameliorate the soil and install a sub-base for the road that comprises a cellular confinement system (CCS), thus allowing the road to be installed above using adoptable

² Section 5.3a). *BS5837:2012 Trees in relation to design, demolition and construction- Recommendations*, London: British Standards Institute.

methods, but minimising compaction on the underlying ground. This is detailed in the method statement section of this document.

3.8. Protection fencing

3.8.1. 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.

3.9. Services

3.9.1. 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.

4. Arboricultural Method Statement

TO BE READ IN CONJUNCTION WITH THE APPENDED TREE PROTECTION PLAN REF: BDWS19795-03B

4.1. Phasing of operations & site supervision

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

Operation	Present	Notes
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
3 Protection barriers erected	Fencing contractor	See Tree Protection Plan for position and type of barriers
4 Supervised remediation and construction of new road close to T24 & 25 (&20)	ACD, groundwork contractor, site manager	See section 4.10 of method statement
5 No-dig path installation	ACD, groundwork contractor, site manager	See section 4.9 of method statement
6 Removal of protection barriers and landscape work	ACD, landscape contractor, site manager	See section 4.7 of method statement

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

4.1.3. 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.

4.2. Construction exclusions zone

4.2.1. 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.

4.2.2. 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.

4.2.3. 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.

4.2.4. 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.

4.2.5. 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.

4.2.6. 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.

4.3. Tree protection barriers

4.3.1. 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

4.3.2. 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

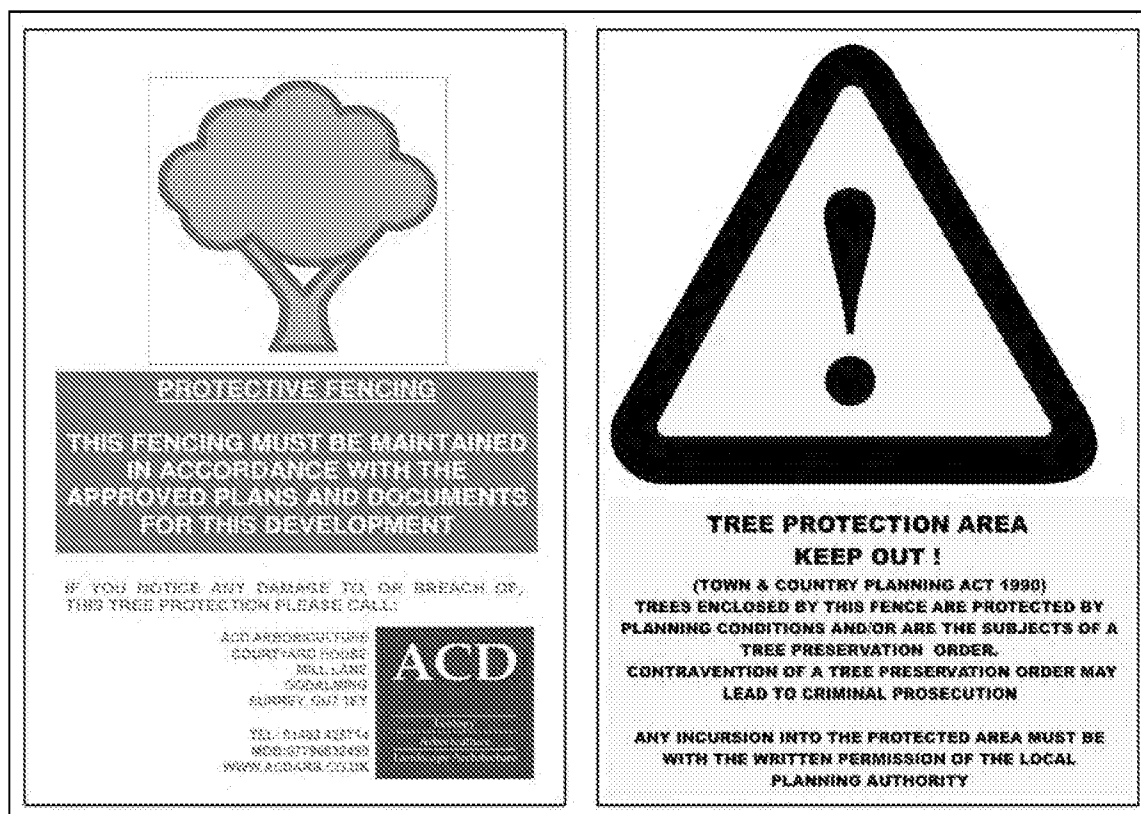
4.3.3. Once erected, all barriers will be regarded as sacrosanct, and will not be removed or altered without prior recommendation by the project arboriculturist and approval of the local planning authority.

4.3.4. 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.

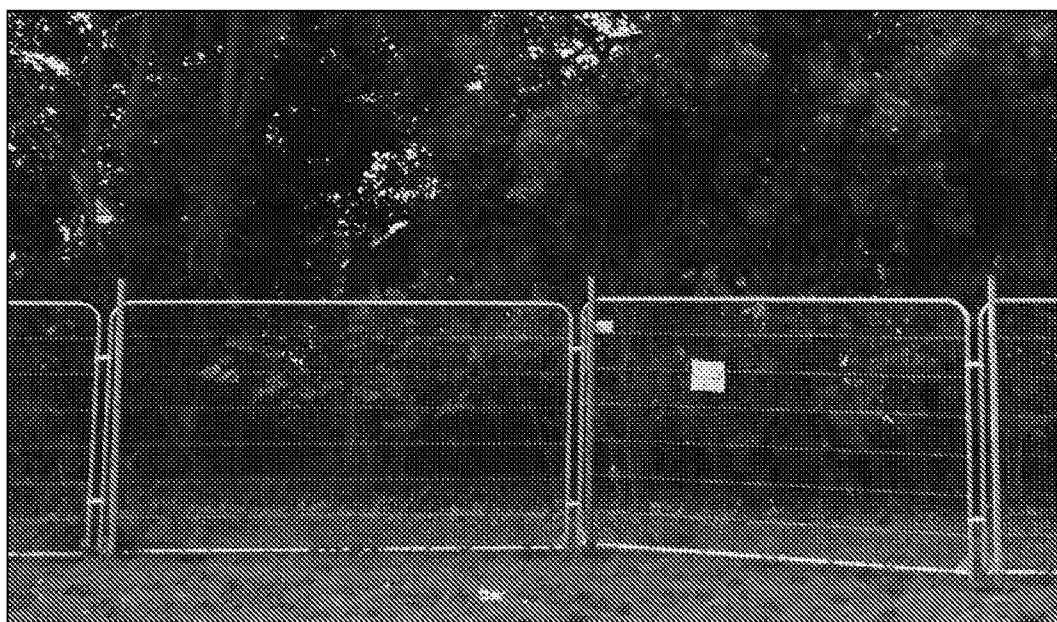
4.3.5. The images below are alternative barrier designs that have been successfully used on site and that ACD are happy to support if a variation from the default style is required. If such a variation is necessary, the approval of the project arboriculturist will be obtained prior to any implementation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

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

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



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



Weld-mesh panels on scaffold uprights



Weld-mesh panels on wooden posts



Chain-link on angle-iron uprights

4.4. Ground protection

4.4.1. If required, ground protection is to be installed as follows. 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.

4.4.2. 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 (if required)
- 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

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

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

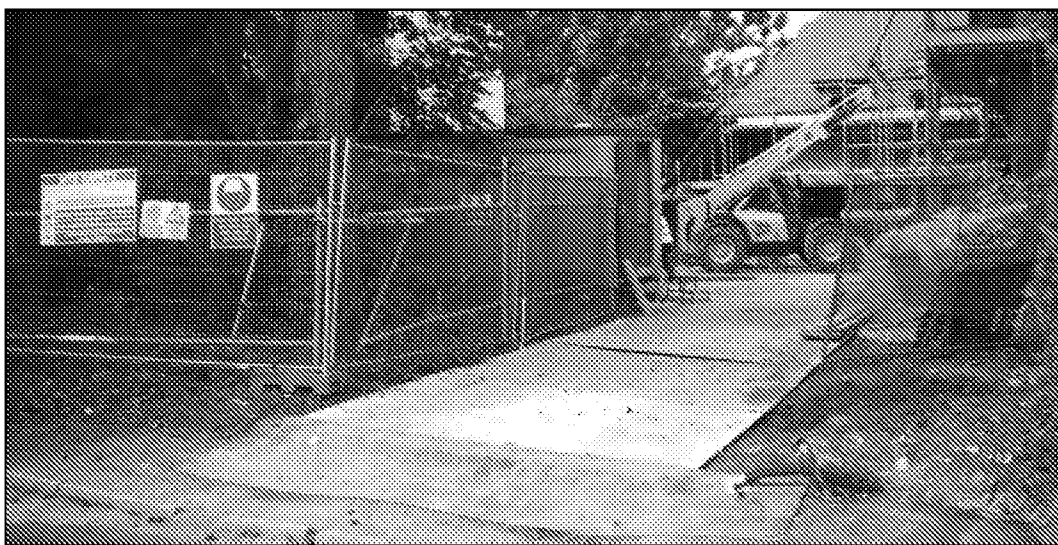
4.4.5. A single thickness of boarding laid on the soil surface will provide sufficient protection for pedestrian loads. However, for wheeled or tracked construction traffic movements within the RPA, ground protection will involve the use of temporary cellular confinement systems, reinforced concrete 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.

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

4.4.7. 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

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

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

4.5.2. 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.

4.5.3. 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.

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

4.6. Tree surgery and removal

4.6.1. All trees to be removed are indicated on the TPP, and listed at appendix 2.

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

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

4.6.4. 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.

4.6.5. 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.

4.6.6. 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.

4.7. Soft landscaping

4.7.1. 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

4.7.2. 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

4.7.3. 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.

4.7.4. 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.

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

4.8. Installation of underground services

4.8.1. 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.

4.8.2. Where underground apparatus is to pass within the RPA, detailed plans showing the proposed routeing 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:

4.8.3. 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.

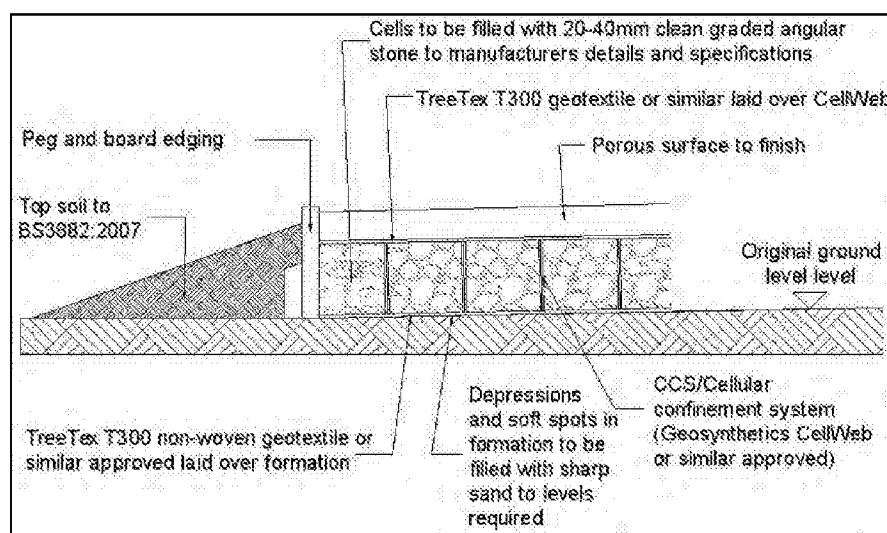
4.8.4. The method of excavation above, for trenching within RPAs, is using air excavation. This tool utilises compressed air to remove soil from around tree roots causing minimal damage and can be run off a typical site compressor. ACD can provide details of contractors supplying air excavation services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

4.8.5. 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.

4.8.6. 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.

4.9. Installation of no-dig surface

4.9.1. To ensure that tree roots, within the ground under this proposed surface, continue to survive during and after construction a cellular system such a CellWeb⁷ of 75-200mm depth is to be used.



No-dig cross-section

4.9.2. 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

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 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

4.9.3. 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 volume⁸)
- Maintain sufficient passage of water to the rooting area (12-40% by volume⁹)
- Avoid compaction by maintaining a soil structure sufficient to sustain root growth (soil bulk density below 1.4g/cc¹⁰).

4.9.4. 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.

4.9.5. 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.

⁸ Smith, R. J. (2006). *Tree Roots in the Built Environment*. HSO

⁹ Coder, D. K. (2000). *Tree Root Growth Requirements*. University of Georgia

¹⁰ Harris, C. M. (2004). *Arboriculture, Tree Management of Shade Trees and Vines*.

4.10. Remediation and installation of road by T24, 25 & 20

4.10.1. Stages for remediation and installation of the cellular confinement sub-base:

- 1) Contact project arboriculturist to hold pre-start site meeting and 'toolbox' talk before starting work
- 2) Use a digger with grading bucket sited outside the RPAs to remove existing fill back to underlying original soil level. Avoiding excavation into the underlying soil.
- 3) Use a Terravent machine to ameliorate the root zone at a 1m matrix. Include biostimulant with treatment.
- 4) Install 150mm good quality topsoil over treated area(s).
- 5) 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.
- 6) Lay the 300mm deep cellular system over the Geotextile, which is secured fully open under tension during the infill process with steel staples or wooden pegs.
- 7) 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.
- 8) Repeat 5-7 two more times to give three layers and a lift of 900mm.
- 9) Cover with a non-woven Geotextile (such as TreeTex T300).
- 10) Install adoptable road makeup

4.11. Installation of boundary fencing within protected areas

4.11.1. 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.

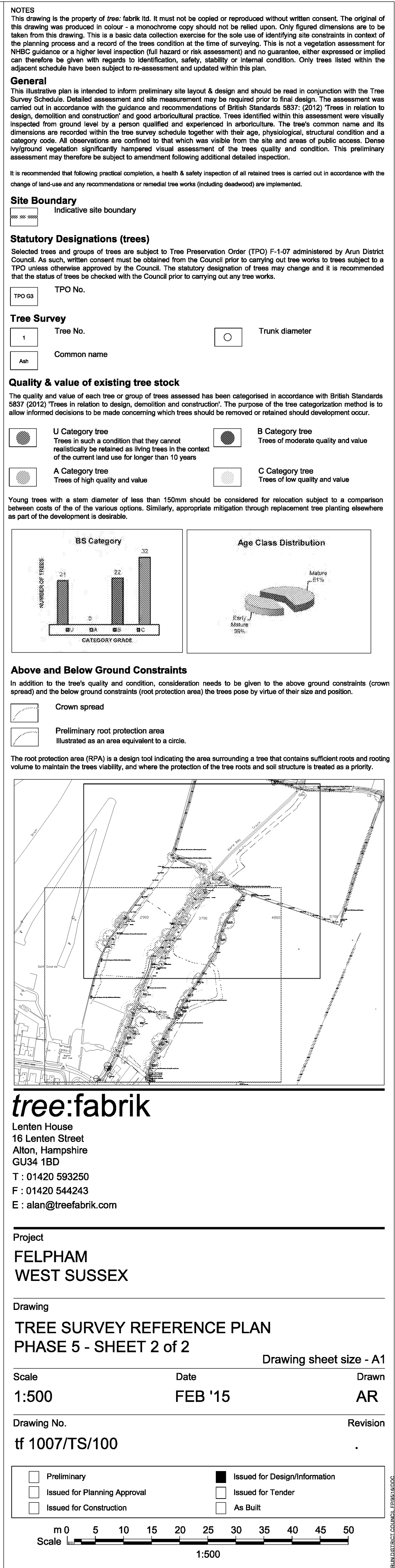
Mark Welby Tech Cert (ArborA), Dip Arb (RFS), FArborA
Director
18th March 2015

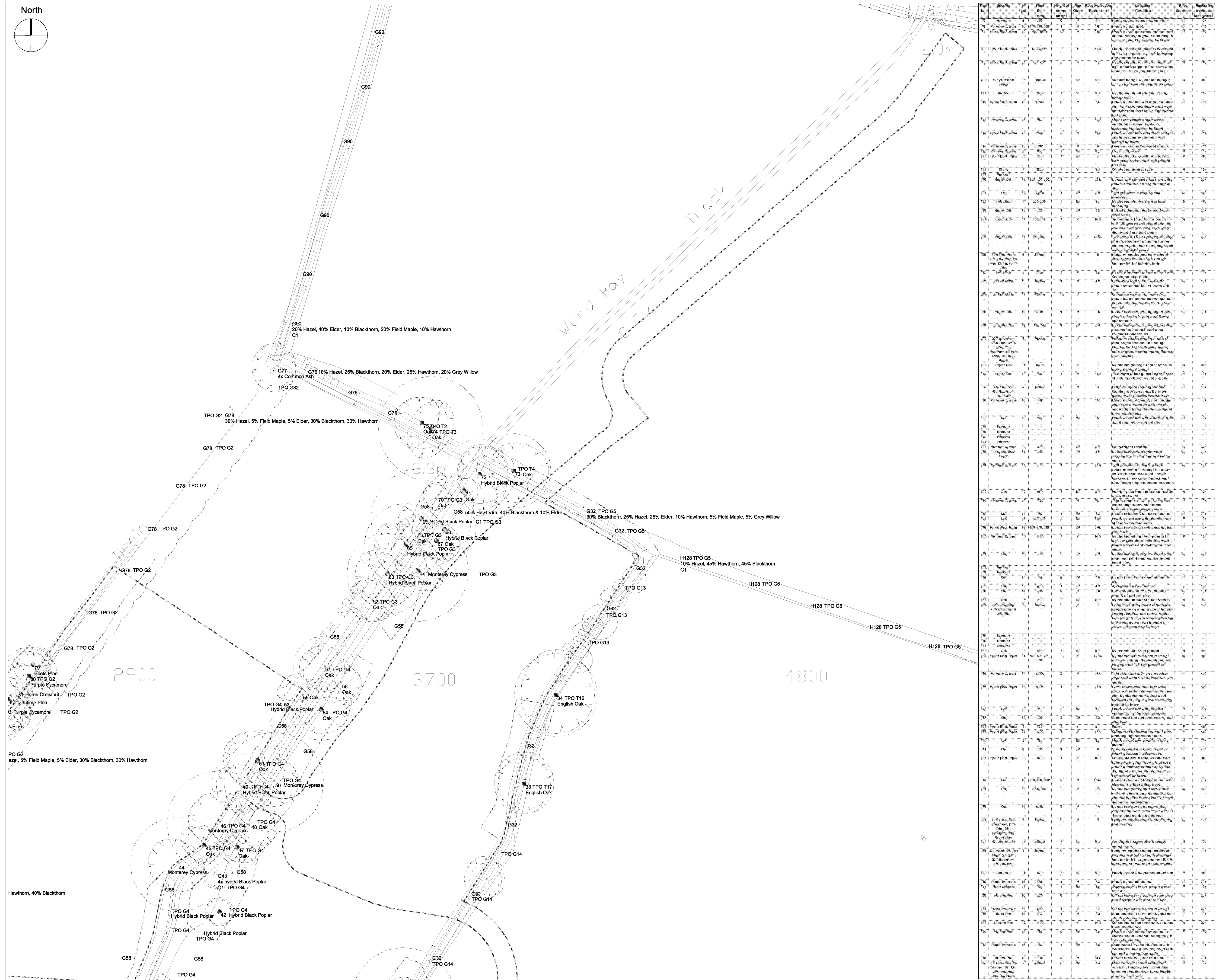
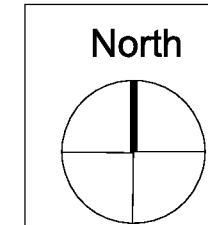


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Appendix 1: *tree:fabric* Tree Survey Reference Plan





NOTES

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General

This illustrative plan is intended to inform preliminary site layout & design and should be read in conjunction with the Tree Survey Schedule. Detailed assessment and site measurement may be required prior to final design. The assessment was carried out in accordance with the guidance and recommendations of British Standards 5837: (2012) 'Trees in relation to design, demolition and construction' and good arboricultural practice. Trees identified within this assessment were visually inspected from ground level by a person qualified and experienced in arboriculture. The tree's common name and its size class were recorded. The condition of each tree was assessed according to BS5837: (2012) structural condition and category code. All observations are confined to that which was visible from the site and areas of public access. Dense ivy/ground vegetation significantly hampered visual assessment of the trees quality and condition. This preliminary assessment may therefore be subject to amendment following additional detailed inspection.

It is recommended that following practical completion, a health & safety inspection of all retained trees is carried out in accordance with the change of land-use and any recommendations or remedial tree works (including deadwood) are implemented.

Site Boundary

 Indicative site boundary



Statutory Designations (trees)

Selected trees and groups of trees are subject to Tree Preservation Order (TPO) F-1-07 administered by Arun District Council. As such, written consent must be obtained from the Council prior to carrying out tree works to trees subject to a TPO unless otherwise approved by the Council. The statutory designation of trees may change and it is recommended that the status of trees be checked with the Council prior to carrying out any tree works.

TPO No.

Tree Survey

Tree No. Trunk diameter

Common name

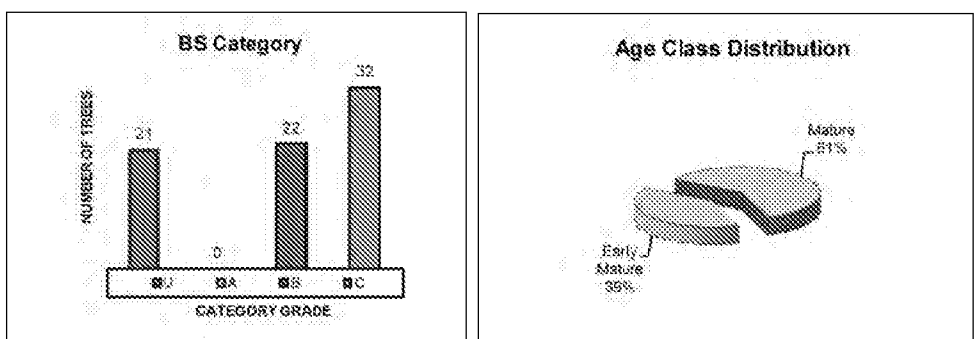
Quality & value of existing tree stock

The quality and value of each tree or group of trees assessed has been categorised in accordance with British Standards BS3837 (2012) 'Trees in relation to design, demolition and construction'. The purpose of the tree categorization method is to allow informed decisions to be made concerning which trees should be removed or retained should development occur.



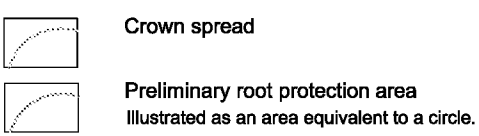
U Category tree Trees in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	B Category tree Trees of moderate quality and value
A Category tree Trees of high quality and value	C Category tree Trees of low quality and value

Young trees with a stem diameter of less than 150mm should be considered for relocation subject to a comparison between costs of the of the various options. Similarly, appropriate mitigation through replacement tree planting elsewhere

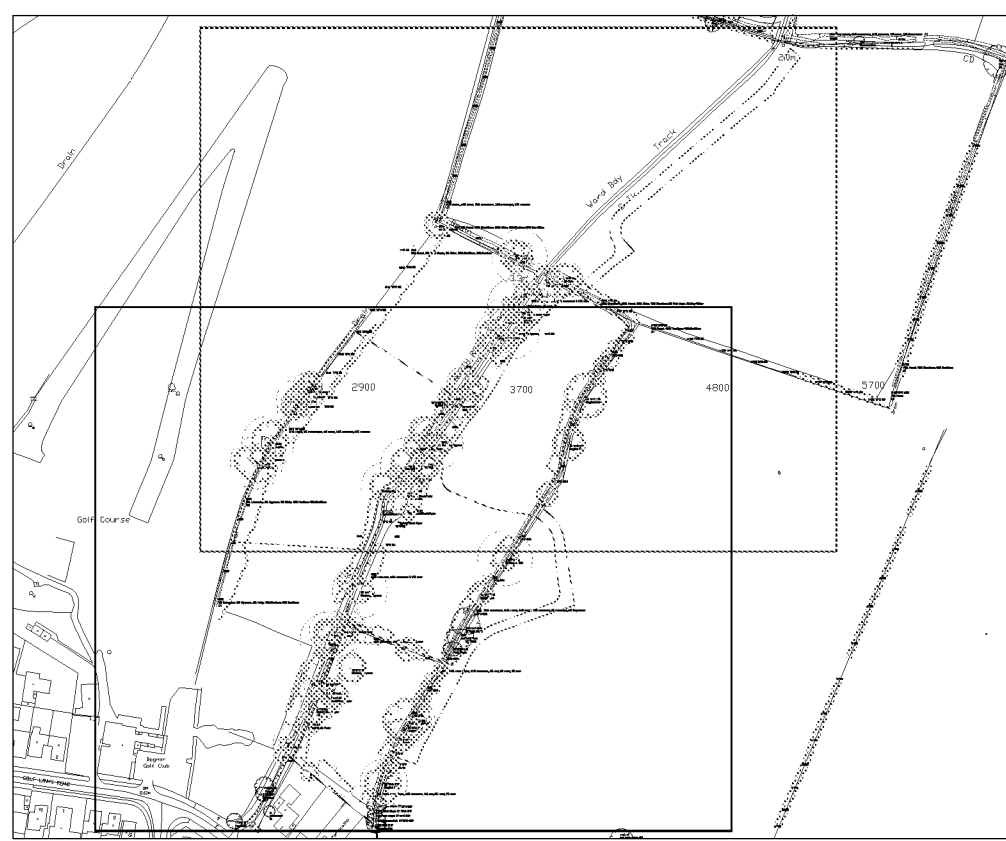


Above and Below Ground Constraints

In addition to the tree's quality and condition, consideration needs to be given to the above ground constraints (crown spread) and the below ground constraints (root protection area) the trees pose by virtue of their size and position.



The root protection area (RPA) is a design tool indicating the area surrounding a tree that contains sufficient roots and rooting volume to maintain the trees viability, and where the protection of the tree roots and soil structure is treated as a priority.



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Project

FELPHAM
WEST SUSSEX

Drawing

TREE SURVEY REFERENCE PLAN
 PHASE 5 - SHEET 1 of 2

Drawing sheet size - A1

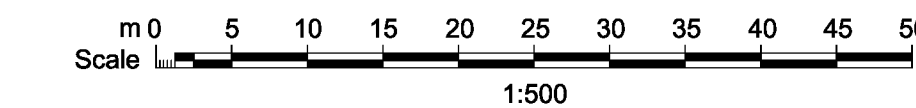
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tf 1007/TS/100

Revision

☐ Preliminary	☒ Issued for Design/Information
☐ Issued for Planning Approval	☐ Issued for Tender
☐ Issued for Construction	☐ As Built



Appendix 2: Tree Work Schedule

No.	Name	Operation	Within or outside red-line boundary	BS Cat	TPO F/1/07
51	Oak	Remove	Outside	B	G4
G35	Hawthorn, Blackthorn, Elder	Remove as much of group as necessary from within site to allow road construction	Inside	C	
G26	Field maple, ash, hawthorn, hazel, elder	Remove as much as required to allow both access points to be constructed. Also cut back to allow 3m clearance from plot 97	Inside	C	G16
16	Monterey cypress	Remove	Inside	C	G1
46	Monterey cypress	Remove	Outside	C	G4
49	Poplar	Remove	Inside	C	G4
50	Monterey cypress	Remove	Outside	C	G4
53	Poplar	Remove	Inside	C	G4
G58	Hawthorn, Blackthorn, Elder	Remove as much as necessary within site to allow construction of garage for plot 57 and back to the boundary for plot 68/69	Inside	C	
G78	30% Hazel, 5% Field Maple, 5% Elder, 30% Blackthorn, 30% Hawthorn	Cut back to western site boundary to provide useable garden spaces	Inside	C	G2
T20, T24 & T25	Oak	Crown lift over road to give 5m clearance	Inside (T24 & T25) outside (T20)	B	G16/ G17

Continued over...

No.	Name	Operation	Within or outside red-line boundary	BS Cat	TPO F/1/07
G89	6% Laburnum, 2% Cypress, 2% Holly, 40% Hawthorn, 40% Blackthorn	Cut back to western site boundary to provide useable garden spaces	Inside	C	
G32	30% Blackthorn, 25% Hazel, 25% Elder, 10% Hawthorn, 5% Field Maple, 5% Grey Willow	Cut back to allow 3m clearance from plots 90 & 2m clearance from plot 90's garage. Also cut back to boundary within plot 87's garden and parking area	Outside/Inside	C	
12	Poplar	Remove	Outside	U	G1
13	Monterey cypress	Remove	Outside	U	
14	Poplar	Remove	Inside	U	G1
15	Elm	Remove	Outside	U	
9	Poplar	Remove	Inside	U	G1
17	Poplar	Remove	Inside	U	G1
8	Poplar	Remove	Inside	U	G1
7	Poplar	Remove	Inside	U	G1
63	Poplar	Remove	Outside	U	G3
64	Poplar	Remove	Outside	U	G4
65	Poplar	Remove	Outside	U	G5
68	Poplar	Remove	Outside	U	G6
69	Poplar	Remove	Outside	U	G7

Appendix 3: Tree Protection Plan

BDWS19795-03B

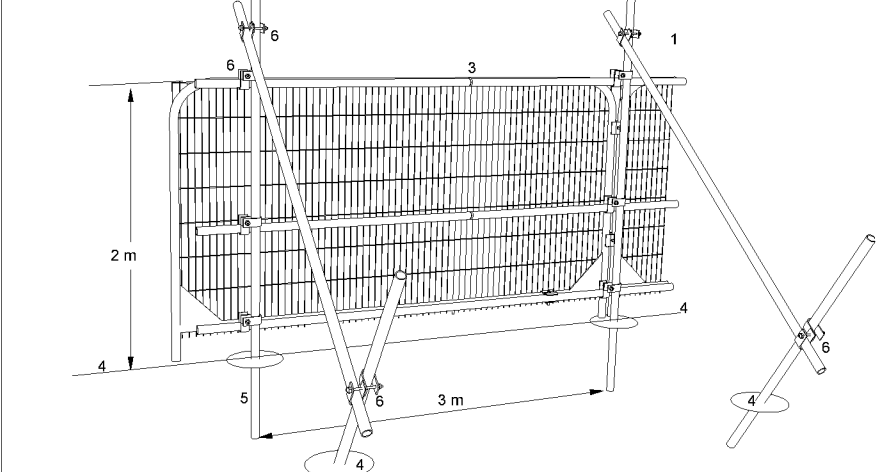
Construction Exclusion Zone

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.

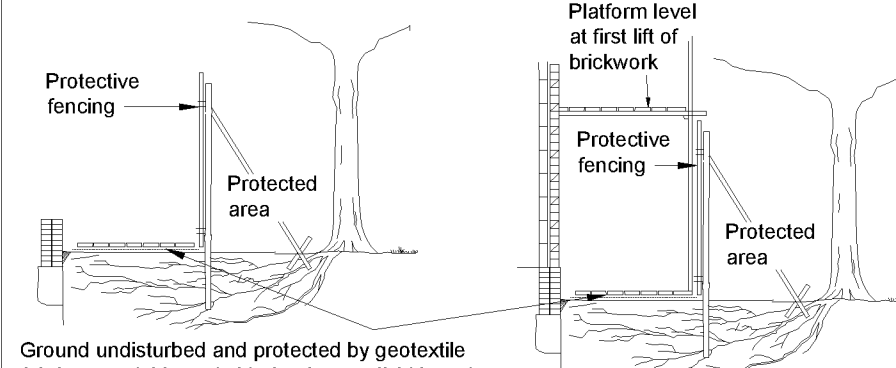
BS5837:2012 Figure 2- barrier specification



- 1 Standard scaffold poles
 - 2 Heavy gauge 2m tall galvanized tube and weld mesh infill panels
 - 3 Panels secured to uprights and cross-members with wire ties
 - 4 Ground level
 - 5 Uprights driven into the ground until secure (minimum depth 0.6m)
 - 6 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.

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



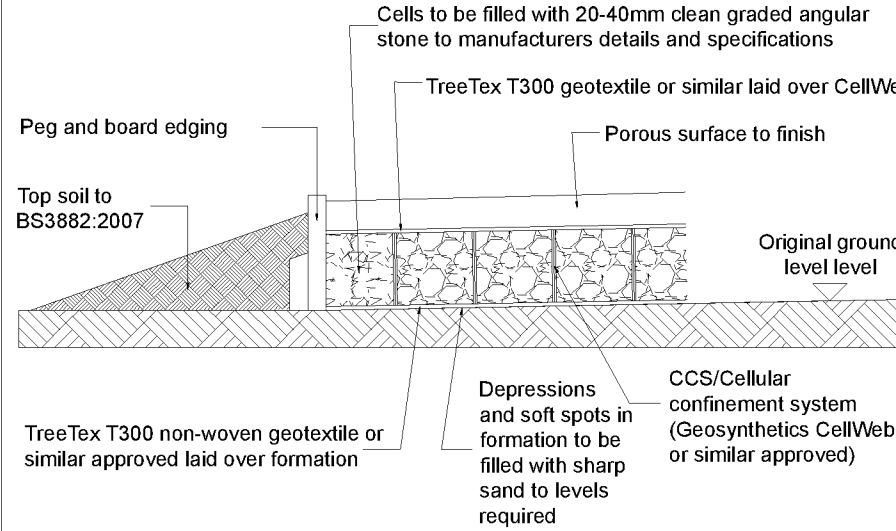
For pedestrian movements only, a single thickness of scaffold boards should be placed either on top of a driven scaffold frame, so as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100 mm depth of woodchip), laid onto a geotextile.

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.

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

REMEDICATION & HIGHWAY CONSTRUCTION
The approved road levels have already been profiled using traditional methods. To reduce impact on retained trees the fill in these areas is to be removed, the soil ameliorated and a sub-base comprising a CellWeb type material installed. To be implemented as per the method statement & under the supervision of the project arboriculturist.

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.

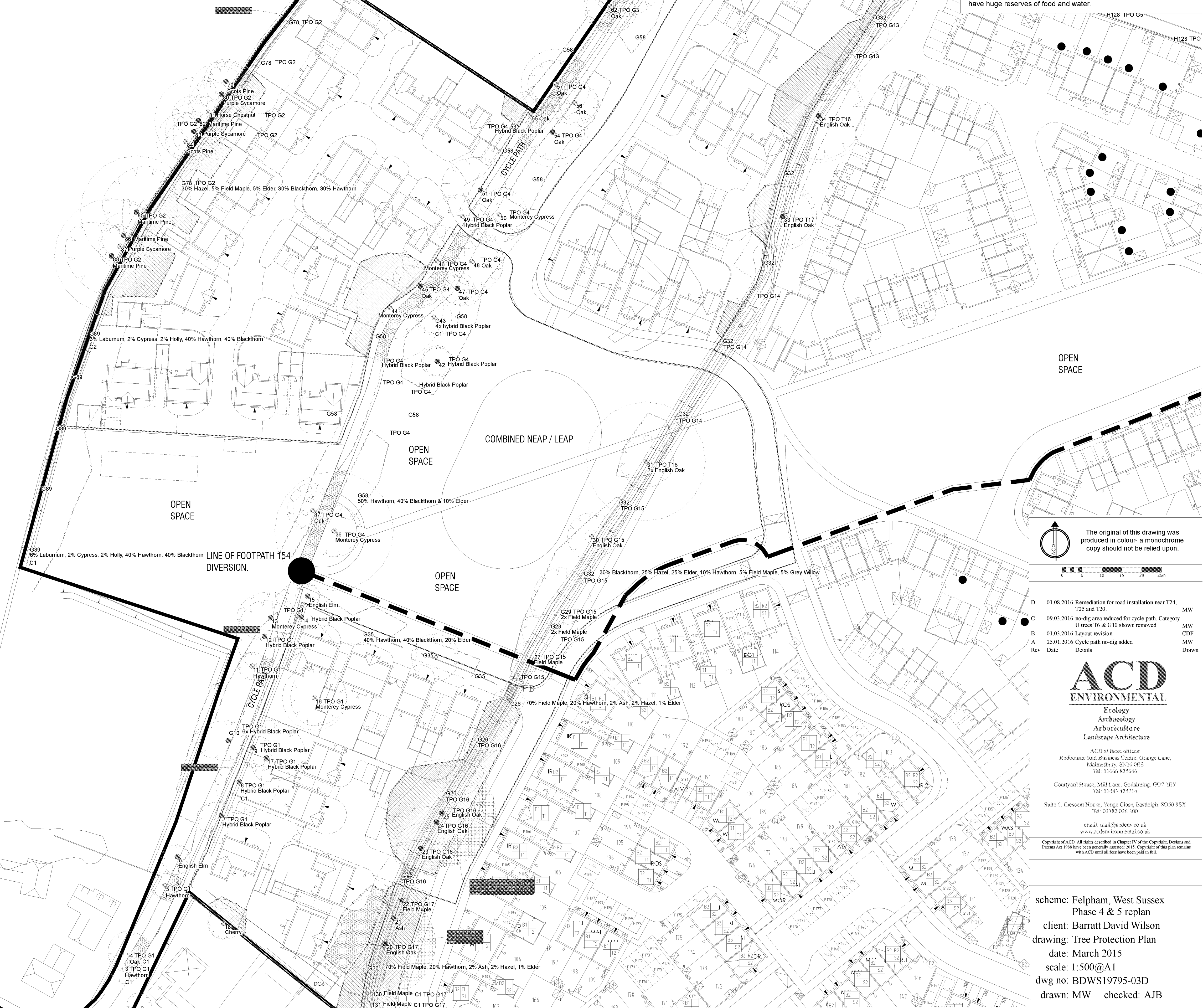
PHASING & SUPERVISION OF DEVELOPMENT

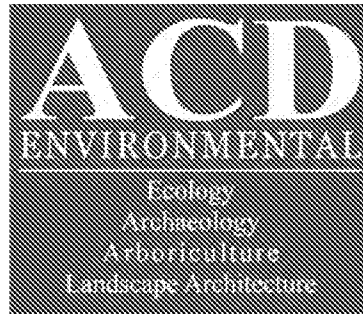
Before any work starts on site, the tree protection measures shown on this plan are to be installed and a pre-start site meeting with the project arboriculturist, groundwork contractors and site manager held.

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

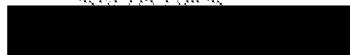
1. During the no-dig drive surfacing
2. During the remediation of soil and installation of the new road within the RPAs of T24, 25 & 26

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





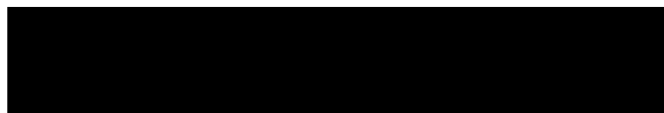
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ECOLOGICAL SURVEYS * PROTECTED SPECIES LICENSING * MITIGATION * IMPACT ASSESSMENT
ARBORICULTURAL SITE MONITORING AND SUPERVISION * ARCHAEOLOGY
LANDSCAPE & VISUAL IMPACT ASSESSMENT * LANDSCAPE AUDIT * PROJECT MANAGEMENT
EXPERT WITNESS* LANDSCAPE DESIGN & PLANNING LANDSCAPE MANAGEMENT