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Arboricultural Report

BS 5837:2012 Tree Survey, Arboricultural Impact Assessment,
Method Statement & Tree Protection Plan

Land at:

Cabbagefield Row, off Swanmore Road, Leigh Park

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Validation Statement for Local Planning Authority (LPA) Registration

This report is intended to be submitted to the Havant Borough Council in support of a planning application. For LPA validation purposes, this report contains the following information:

- A full tree survey compliant to the requirements of BS5837:2012 "Trees in relation to design, demolition and construction - Recommendations", undertaken by a competent and qualified arboriculturist.
- A suitably scaled plan with north point showing the site boundaries and the tree survey information.
- An assessment of the impacts of the proposed development on the existing trees, including recommendations of which trees should be removed/retained.
- An Arboricultural Method Statement and Tree Protection Plan showing the measures to be taken to ensure the retained trees are fully accounted for in the planning and execution of the proposed development.

1. INTRODUCTION

1.1 **Instruction:** I am instructed by Portsmouth City Council to survey trees that could affect or be affected by the proposed development on land off Swanmore Road, Leigh Park. This report, in compliance with BS5837:2012 "Trees in relation to design, demolition and construction - Recommendations" (herein referred to as BS5837) is required to accompany the submission of a detailed planning application for residential development within the site. My instruction is to prepare the following:

- A schedule of the relevant trees and all tree data as required by BS5837.
- A Tree Survey Plan (TSP), Constraints Plan (TCP) & Tree Protection Plan (TPP)
- An Arboricultural Impact Assessment (AIA) and Method Statement (AMS)

1.2 **Information provided:** Drawings AS/AL/0721 TSP, TCP and TPP are derived from the following drawings which were supplied to me by PDP Architecture LLP:

- 19230 *Topographic Survey* in DWG format.
- 28079-PD111 *Rev. D Site Layout Plan* in DWG and PDF format.

The topographical survey shows the positions of most existing trees and ground levels. Where other trees of relevance are added, they are positioned by triangulating from fixed points on the supplied plan.

1.3 **Purpose and scope of this advice:** The tree survey and report have been produced both to assist the design & construction process and to support the planning application process. It is intended to demonstrate the site's arboricultural constraints and to make recommendations regarding the impact of the proposal on the trees and vice versa. It focuses on all trees that may affect or be affected by the development proposal, whether within the site boundary or off-site.

1.4 Limitations:

1.4.1 The survey was a preliminary assessment undertaken from ground level, and limited by boundaries, vegetation and other features on site. Observations have been made solely for the purposes of assessment relevant to the planning process, and the report is not a condition survey or safety inspection. Binoculars, sounding mallet and probe have been used to aid tree assessment; no invasive or non-invasive internal decay detection equipment have been used in assessing the trees.

1.4.2 The recommendations and conclusions in this report relate only to the conditions found on site at the time of the inspection, as trees are dynamic organisms whose health and condition can change rapidly. The findings are valid for a period of 12 months from the date of report providing the site remains as it stands at present. Any significant changes to the site which may affect the trees (such as building works, changes in levels, hydrology etc.) would require a re-assessment of the trees.

1.4.3 This report is intended for use solely by the above client and their agent if applicable, and not for the benefit of any third party. Any person who is not directly involved with this site shall not have any rights under or in connection with it. All rights in this

report are reserved. No part of it may be reproduced in any form without the written consent of Woodside Tree Consultancy.

- 1.5 **Ecological Constraints:** The Wildlife and Countryside Act 1981 and amendments made within and subsequent to the Countryside and Rights of Way Act 2000 provides statutory protection to bats, birds and other species that inhabit or use trees. The protection afforded to such species could impose significant constraints on the use of a particular site, as well as restrict the timing of any works that may be necessary. Any such restrictions would be in addition to arboricultural constraints in this report.
- 1.6 **Status of the trees:** Having searched the HBC "My Maps" webpage on 19th July 2021, it shows that there are **no** Tree Preservation Orders (TPO) or Conservation Areas (CA) affecting the site or any trees considered within this report.

2. SITE VISIT AND TREE SURVEY

- 2.1 **Site visit:** I visited the site on 13th July 2021, with the weather at the time of survey being sunny and which in no way hindered my ability to view the trees satisfactorily. All observations were made from accessible points at ground level, with all measurements except stem diameter being estimated unless otherwise indicated in the Tree Survey Schedule and Notes.
- 2.2 **Site Description:** The site is a large parcel of former grassland which has been largely unmanaged in recent years, now dominated by dense impenetrable scrub and patches of rough grassland. It is surrounded to the N, E & W by established tree cover including large woodland edge trees set back from the dense scrub. Tree cover also covers the roadside boundary to the S with several pedestrian openings into the site from Swanmore Road. The site covered within this survey measures approximately 7.5ha as shown in Figure 1.



Figure 1. Aerial view showing the site included within this survey (Google 2021)

- 2.3 **Data Collection:** Each tree (above 75mm stem diameter) was assessed, as included in the Tree Survey Schedule (Appendix 1) and tree survey plan (Appendix 4). They were allocated one of four categories (A, B, C or U) in line with BS5837 recommendations (see Appendix 3) as well as having the following information collected:
- Species, Height (m) and stem diameter (mm)
 - Average crown spread to the 4 cardinal points (m), average canopy clearance (m)

- Height and orientation of first significant branch
- Life stage, Condition & Preliminary management recommendations
- Remaining safe useful life expectancy, Root Protection Area calculations

2.4 Root Protection Areas:

- 2.4.1 In accordance with section 4.6 of BS5837, the stem diameter measurements have been used to calculate the Root Protection Area (RPA), both in terms of radial distance from the tree and as an area in m². The RPA is the area that should ideally remain free from disturbance by adjacent construction works, as it is deemed to be the minimum area around a tree required to maintain sufficient rooting volume to sustain the tree's vitality. Therefore the adequate protection of the roots and soil structure in this area must be treated as a priority.
- 2.4.2 The calculated extent of the RPA is used to identify any design constraints within the site, and is visually represented on the Tree Constraints Plan (TCP, Appendix 5). The TCP shows the above-ground constraints (*i.e.* the branch spread and relevant shading), and the below-ground constraints (the anticipated extent of significant root spread depicted as the calculated RPAs).
- 2.4.3 Using the proposed site layout and the TCP, the necessary protective measures have been identified within a Tree Protection Plan (Appendix 6). Further details relating to tree protection are given in Section 4 below.
- 2.5 **Tree survey:** A total of three individual trees, two groups and three woodland boundaries were surveyed and assessed for their suitability for retention. Please refer to appendices 1 & 4 for details of their identity, location and assessment. Please also refer to the Tree Survey Schedule Notes (Appendix 2) and BS5837 Cascade Chart (Appendix 3) for full details of the assessment criteria.

3. ARBORICULTURAL IMPACT ASSESSMENT

- 3.1 **General observations:** There were no significant trees located within the site; all main tree cover was located around the boundaries, with larger surveyed trees predominantly being along the E, W and S boundaries. The interior of the proposed development area covering the S half of the site currently consists of dense impenetrable bramble scrub and self-set ash, sycamore, willow and silver birch growth; all of which will need to be cleared to facilitate development.
- 3.2 **Below ground constraints (Root Protection Areas):**
- 3.2.1 This section deals with tree roots, which can easily be overlooked during construction operations due to being hidden and often their importance, and that of the soil around them, is not fully understood. It is essential that the roots remain undamaged during the site preparation and construction phases, as they provide the structural stability as well as transporting water and nutrients throughout the tree. Crucially they cannot perform their functions effectively if the soil structure around them is also damaged, which is why the RPA must be adequately protected.

3.2.2 The TCP visually represents the required RPA for each tree as a magenta circle centred on each tree stem. It is quite possible, depending on soil conditions and tree species characteristics, that roots will extend beyond this zone, hence this area should be carefully protected during the planning and execution of any site works.

3.2.3 The current layout proposal as shown on the TCP will have very limited impacts upon the retained boundary trees, with most hard surfacing and all dwellings located outside all RPAs. There will be several instances where new hard surfacing for roads and footpaths encroach into the RPAs of trees within W1, W3 and G1, as well as fractionally into the RPAs of T1-2. In all cases the overlaps will be minor but the scheme should account for such conflicts by ensuring that new surfacing within the RPAs of retained trees is constructed in accordance with BS5837.

3.2.4 As highlighted on the TPP, the new surfacing should be of a porous nature, and constructed using a three-dimensional cellular confinement system suitable for vehicular use where relevant to prevent soil compaction and potential root damage. All new hard surfacing within any of the RPAs should be installed using a no-dig method. This includes avoiding any excavation into the soil to achieve desired levels, other than the removal (using hand tools only) of existing surface vegetation/turf layer. Appendix 7 gives a visual example of this type of construction method as suitable for vehicle use.

3.2.5 To ensure that the RPAs of all retained trees are adequately protected from other potentially damaging actions such as storage of materials/plant, changes in levels etc., the full extent of the RPAs not covered by existing hard surfacing should have protective fencing and/or temporary ground protection erected in line with BS5837 for the duration of works. Section 4 provides further detail in this respect. Additionally, the planning for any additional underground services should take into account the TCP to avoid any damage to the tree roots.

3.3 **Above ground constraints (branch spread & shading):**

3.3.1 Trees in close proximity to buildings can pose some constraints, both real and perceived. Actual constraints occur where branches can conflict with new elevations, either now or in future. For this reason newly planted trees as well as younger existing trees need to be fully accounted for in the design and layout planning. Other significant constraints that are often overlooked include shading, leaf litter and damage from falling branches. However it should also be remembered that some shading can be desirable to reduce glare and provide comfort during hot weather.

3.3.2 The TCP shows that the latest layout has taken full account of the constraints posed by above-ground issues, with all properties and their private amenity spaces being located well away from any retained canopy spread. The tree cover will partially overhang the public footpaths and roadside verges in several places along the E, W & S boundaries, however this is very limited in extent and in most cases existing crown clearances are sufficient. Where minor pruning is required to crown lift overhang of paths/roads this must be undertaken as described in section 3.5. In all cases it is considered that the surrounding tree cover can reasonably be managed in future with minor pruning as required to maintain ample clearance without detrimental impacts on the health or amenity of the trees.

- 3.3.3 The positioning of large mature tree cover around the site gives the potential for some shading conflict. Therefore, current BS5837 shading constraints are shown on the TCP. However, the latest layout has taken full account of this constraint and it is clear that shading from all tree cover will be limited to the peripheral roads/parking spaces, verges and footpaths. There are no instances where tree shading will impact upon dwellings or their private garden space. It is therefore concluded that this layout fully meets BS5837 recommendations in respect of above-ground arboricultural constraints.
- 3.4 **Trees to be retained:**
- 3.4.1 Existing tree cover around the boundaries of this site will be retained as shown on the TCP. Access to the development site during preparation and construction phases must be managed to protect retained trees. Sufficient space will be available on site for construction plant and materials away from any RPAs, however if any conflicts are foreseen then other arrangements must be made with the LPA.
- 3.4.2 Tree protection on development sites is of paramount importance if trees are to be retained successfully. The stress caused by development near existing trees can, if provision for adequate protection is not made, be a significant strain leading to severe damage and even death. It is important to note that although trees will appear healthy during and on completion of a development, the full effects of below ground damage may not become apparent for another five years or more.
- 3.5 **Tree works:** Aside from the required and recommended removals (see 3.6 below), some facilitation works will be required to achieve vertical clearances for some overhanging boundary trees. Works to crown lift trees to 5m above ground level where low hanging canopy growth may interfere with pedestrian and/or vehicular access will not adversely impact the health and amenity value of these hitherto unmanaged trees. Other recommendations include the removal of overhanging deadwood, decayed limbs, remedial works to storm damaged trees, and to sever dense ivy and remove scrub/debris where tree condition is obscured to allow for clearer future tree inspections. These works will improve the health and safety of the trees in proximity to future residential use of the site, and are regarded as being of sound arboricultural practice. All tree work should be carried out by competent and insured arboricultural contractors in accordance with BS3998:2010.
- 3.6 **Tree removal:** T3 as well as several trees within G1 (all either low suitability for retention, or unsuitable due to poor condition) would be removed due to their very poor condition and/or to facilitate new vehicular site and emergency access (trees shown dashed on TCP with red stem colour). Several other small self-set trees within the site and alongside the W boundary would also be removed, with those unsuitable for retention due to poor condition being shown dashed red on the TCP. All internal self-set tree growth and associated internal scrub development would be cleared to facilitate the development. None of these trees are high quality specimens and should not be considered as a constraint on the proposal. In order to mitigate these losses, a suitable landscaping scheme would provide an opportunity to replace the trees with a greater number of better quality specimens located throughout the site. Thereby contributing to a net enhancement of amenity value in the longer term.

4. ARBORICULTURAL METHOD STATEMENT

4.1 **Tree Works:** All required works as detailed above, should be carried out prior to commencement of construction works.

4.2 **Protective fencing in accordance with BS5837:**

4.2.1 Before the commencement of any construction works on site, protective fencing shall be erected to the positioning shown on the TPP. These shall be erected and maintained in position to clearly define the 'Construction Exclusion Zone' around retained trees. The positioning of the protective fencing will then be agreed by the LPA and adhered to throughout the project.

4.2.2 The extent of protective fencing seeks to encompass as much of the unsurfaced RPAs of adjacent trees as possible, whilst providing required access. Vertical barriers must be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place around retained trees. In most cases fencing should consist of a scaffold framework, well braced to resist impacts, with vertical tubes spaced a maximum of 3 metre intervals. An alternative but robust specification is also given in Appendix 8 of this report and on the TPP.

4.2.3 Signs shall be affixed to the fencing to inform on-site contractors of the importance of the fencing barriers (Appendix 9). Examples are also provided on the TPP.

4.2.4 The RPAs enclosed within tree protective fencing should be treated as sacrosanct and the following guidelines should be adhered to at all times:

- NO mechanised excavations
- NO movement of construction traffic or parking of vehicles
- NO excavation by any means without arboricultural site supervision
- NO lowering or raising of levels (except removal of grass sward/surface layer, using hand tools)
- NO storage of building materials, excavated soil, chemicals or fuels
- NO fires to be lit in close proximity to trees

4.2.5 Fences must only be removed following agreement of the Local Authority or project arboriculturist to confirm on-site construction activity has been completed.

4.3 **Temporary ground protection:**

4.3.1 The positioning of protective fencing will be adequate to protect the exposed RPAs of most trees adjacent to the development works within existing unsurfaced ground. However in several areas the protective fencing is required to be set back slightly within the RPAs to enable access and construction of pathways and roadsides. As this ground is currently unsurfaced, there is a requirement for temporary ground protection to be installed over these small areas until such time as the new hard surfacing is constructed. These areas are highlighted on the TPP as magenta shading.

4.3.2 Where temporary ground protection is indicated on the TPP, the system must be fit for purpose and capable of supporting the expected loads to avoid rutting, compaction and damage to the soil structure; in accordance with BS5837. The system

will need to support the weight of construction vehicles, and examples of such systems using interlocking ground mats are given at Appendix 10, as well as being shown on the TPP.

- 4.3.3 The soil beneath any protection system must remain undisturbed and protected with a porous geotextile membrane to prevent possible soil contamination. If necessary, sand or woodchip should be laid on the fabric to infill any depressions and provide an even surface.
- 4.3.4 The ground protection measures shall be installed before commencement of any construction activity and before the arrival of plant machinery or materials. It shall remain in place until new surfacing is installed.
- 4.4 **Avoiding above-ground tree damage:** Care shall be taken when planning site operations in proximity to retained trees to ensure that any wide or tall loads, or plant with booms, jibs and counterweights can operate without coming into contact with retained trees. Such contact can result in serious damage to trees.
- 4.5 **Site access, contractors car parking, site huts and storage:** The site will be accessed via the proposed new entrance road. All contractor's vehicles must be parked either off-site, or in designated locations within the site outside of any unsurfaced RPAs. No vehicles, materials, spoil, plant, site huts or welfare facilities shall be located on unsurfaced ground within the RPA of any retained trees. Protective fencing is shown to be installed around the boundaries to the N of the development zone to protect trees from these conflicts should the area be used for storage etc. during the development phase.
- 4.6 **Installation of underground services within RPAs:**
 - 4.6.1 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 a tree. For this reason particular care will be taken in the routeing and methods of installing underground services. First and foremost all service trenches (utilities, telecoms, drains etc.) should run as far from trees as possible, ideally being outside of RPAs. If any services need to run through any RPA, extreme care will be required in order to avoid damage to tree roots. Services should then be kept together and arboriculturally sensitive methods of excavation used.
 - 4.6.2 Where installation within the RPA is unavoidable, the protocol within the relevant National Joint Utilities Group publication (section 4.1.3 of NJUG Vol.4) should be used to decide the most appropriate method. In summary, this sets out that acceptable techniques in order of preference are; A) trenchless, B) hand-dug broken trench, C) hand-dug continuous trench. If trenchless methods such as thrust boring are to be used, an entry and retrieval pit at either end must be dug; these should be outside the RPA. Where hand-dug options are agreed, any roots must be dealt with as described in section 4.6.3. Where possible, backfilled material around services must not be heavily compacted; specific advice is provided in 4.1.5 of the NJUG guidance.
 - 4.6.3 For this site details of subterranean services are not yet available, but the planning for these services should take into account the TCP to minimise any impacts to tree

roots around the periphery of the site. Detailed plans showing the proposed routing and methods should be drawn up, with the approach being firstly approved by the LPA. Where any excavations within RPAs are necessary, the following BS5837 guidelines must be followed:

- Any required excavations within an RPA shall be subject to on-site arboricultural supervision.
- Exposed roots should not be severed unless absolutely necessary, with roots located to the edges of excavations being retained if possible and redirected back into surrounding soil.
- Exposed roots must immediately be wrapped or covered to prevent desiccation and to protect them from rapid temperature changes. Any wrapping should be removed prior to backfilling, which is to take place as soon as possible.
- Roots smaller than 25mm diameter may be pruned back, making a clean cut with a suitable sharp tool (e.g. bypass secateurs or handsaw), except where they occur in clumps.
- Roots occurring in clumps or of 25mm diameter and over are to be severed only following consultation with an arboriculturist.
- Prior to backfilling, retained roots are to be surrounded with topsoil or sharp sand (builders' sand must not be used), or other loose inert granular fill.
- Soils or other suitable material are then to be replaced. This material should be free of contaminants and other foreign objects potentially injurious to tree roots and approved by the project Arboriculturist.

4.7 **New hard surfacing and/or landscaping within RPAs:**

4.7.1 As discussed in section 3.2.3-4 and shown on the TPP, the RPAs of several trees around the boundaries will marginally overlap the proposed footpaths and roadside parking spaces. The design proposals should account for these conflicts by ensuring that the surfacing in those areas will be porous and constructed using a no-dig three-dimensional cellular confinement system, in accordance with BS5837 to prevent future ground compaction damage to the root system. As previously highlighted this includes avoiding any excavation into the soil to achieve desired levels, other than the removal (using hand tools only) of the turf layer and other surface vegetation to achieve a stable and level working surface.

4.7.2 New hard surfacing within any RPA should be permeable and gas porous. Paving slabs and block paving are available with built-in infiltration spaces between the slabs or blocks. These are ideal, though they should be laid dry jointed on a sharp sand foundation to allow air and moisture to penetrate to the rooting area.

4.7.3 Bitumen paving can consist of porous or impermeable material. As the pores in tarmac paving will become blocked, the use of the material will be limited in extent to no more than 20% of any RPA.

4.8 **Soft landscaping within RPAs:** Where any soft landscaping is planned within RPAs, then the following guidance must be followed:

- Ground preparation will be carried out sensitively to ensure root damage is minimised. At no time is any heavy plant to be used within the RPA. Turf may be removed using a mechanical turf stripper or by hand.
- At no time shall a rotovator be used within any RPA to prepare the soil. Any levelling will be done 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 arboriculturist.
- New plants to be planted individually to minimise disturbance (no trench planting).
- No works will be carried out within any RPAs if the soil moisture is of a level likely to allow compaction to occur.

4.9 **Arboricultural supervision:** Any works undertaken within RPAs should be supervised by an arboriculturist.

5. CONCLUSIONS

5.1 The design proposals for the development on land at Cabbagefield Row, off Swanmore Road, Leigh Park have been assessed in accordance with BS5837:2012. It is my opinion that the trees identified for retention can be afforded due respect and provided with adequate protection, to ensure their safe and healthy retention during and following the development.

5.2 As long as an appropriate scheme of tree protection is followed, as proposed in this document and the accompanying TPP, I believe that all trees proposed for retention can be retained without undue stress on their long-term health. Contractors working on site should be briefed regarding the importance of tree protection and adhering to all points within this document and the TPP. Those working on site should have access to these documents at all times.

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20th July 2021

Appendix 1 - BS5837: 2012 Tree Survey Schedule

Tree No.	Species	Height (m)	Stem Diameters (mm)									Branch Spread (m)				Crown Clearance (m)	Height & direction of 1st signif. limb	Age Class	Physiological Condition	Structural Condition	Preliminary Management Recommendations	Est. Remaining Contribution (yrs)	BS5837 Category Rating	Root Protection Radius (m)	RPA (m²)
			Single Stem	2-5 stems					5+ stems		N	E	S	W											
				Stem 1	stem 2	stem 3	stem 4	stem 5	Mean Dia.	No. Stems															
1	Oak	20	1050									10	6	8	6	2	4s	M	F	Large tree, ivy, deadwood (dwd), epicormic shoots, asymmetrical crown.	Remove dwd as necessary.	20-40	B2	12.6	498.8
2	Oak	20	1180									12	7	10	10	2	6r	M	G	V lge spreading specimen, some dwd & torn limbs.	Remove dwd as necessary.	40>	A2	14.16	629.9
3	Ash	16		450	450	550	600	#				10	6	10	8	6	2s	M	P	Large tree with 3 main stems, all with significant dieback & decay, numerous limb failures, tree in very poor condition.	Fell.	<10	U	-	-
G1	Oak & ash (roadside boundary)	av. 14	Various as shown on TSP									Various as per TSP				av. 4	av.6	SM-M	F	Roadside trees, variable quality as shown on TCP. Several trees poor, many with decay, dieback and large amounts of dwd. Inspection limited by dense undergrowth and ivy.	Remove dwd, ivy & decayed limbs. Ash at E end & another adjacent to T1 should be felled due to severe dieback & decay. Clear debris/ivy to allow access for full safety inspections.	10-20	C1	Various as shown on TCP	
G2	Oak, ash, pine, poplar	av. 15	Various as shown on TSP									Various as per TSP				av. 5	av.6	SM	F	Line of off-site tree cover along N end of E boundary, some overhanging canopies from large pine trees. Unlikely to be affected by proposals.		20-40	B2	Various as shown on TCP	
W1	Oak & ash (W boundary woodland edge)	av. 18	Various as shown on TSP									Various as per TSP				av. 3	av. 4	M	G	Woodland boundary canopy trees along W site boundary. Most are large mature specimens with overhanging canopies (some very low clearance over site), with dwd, decayed limbs, asymmetrical growth habit.	Remove overhanging dwd, decayed/damaged limbs, lift to 5m where necessary for new paths/roadsides, remove poor trees as noted on TCP, sever ivy and clear scrub/debris for full safety inspections.	40>	A2	Various as shown on TCP	
W2	Oak, ash, pine (N boundary woodland edge)	av. 14	Various as shown on TSP									Various as per TSP				av. 3	av. 3	SM-M	G	Woodland edge trees along N site boundary. Dwd and overhanging canopies but generally reasonable clearance over adj. gravel path. Unlikely to be affected by proposals.		40>	A2	Various as shown on TCP	
W3	Oak & ash (E boundary woodland edge)	av. 15	Various as shown on TSP									Various as per TSP				av. 4	av. 4	M	G	Woodland boundary canopy trees along E site boundary (set back from site fence line along woodland bank). Mature oak & ash with some overhanging canopies. Some dwd & decay.	Remove overhanging dwd, decayed limbs, lift to 5m if necessary for access, sever ivy and clear scrub/debris for full safety inspections.	40>	A2	Various as shown on TCP	

Appendix 2 - Tree Survey Explanatory Notes

- 1 **Height** describes the estimated height of the tree from ground level, to nearest 0.5m (nearest 1m where total height exceeds 10m). Where practicable a clinometer is used to aid accuracy.
- 2 **Stem diameter** is the diameter of the main stem(s) measured in millimetres (to nearest 10mm) at 1.5m above ground level in accordance with Annex C of BS 5837:2012. Stem diameter may be estimated where access is restricted or the trunk is covered in ivy. Estimated dimensions are suffixed with a hash (#).
- 3 **Branch spread** refers to the approximate crown radius in metres (rounded up to nearest 0.5m) from the centre of the trunk at the four cardinal points.
- 4 **Crown clearance** is the average height in metres (to nearest 0.5m) of crown clearance above adjacent ground level. Where access is restricted this may be estimated.
- 5 **Height & direction of first limb** in metres above ground level where relevant; section 4.4.2.5 of BS5837 states this should be recorded to fully inform on potential ground clearance issues.
- 6 **Age Class** is as follows: **Y** = young trees up to 10 years old; **SM** = semi-mature trees less than 1/3 life expectancy; **EM** = early-mature trees 1/3 to 2/3 life expectancy; **M** = mature trees over 2/3 life expectancy; **OM** = over-mature trees in decline; **V** = veteran tree possessing certain attributes relating to veteran trees.
- 7 **Physiological Condition** is either: **Good** (trees with only a few minor defects and in good overall health); **Fair** (trees with minor, but rectifiable, defects or in the early stages of stress from which it may recover); **Poor** (trees with major structural and/or physiological defects such that it is unlikely the tree will recover in the long term); **Dead** (this could also apply to trees that are dying and unlikely to recover). This part of the assessment is essentially a snapshot of the trees' general health based on its appearance, vigour, and presence of any potential symptoms of poor health.
- 8 **Structural Condition** includes consideration of a range of factors including the presence of fungal fruiting bodies, cavities, decay and damage, condition/movement of soil around the tree base, growth habit, biomechanical related defects.
- 9 **Preliminary Management Recommendations** are focused on what is relevant in terms of the proposed development, as well as any obvious major issues that need addressing. The survey is not a condition or safety inspection so should not be relied upon as such.
- 10 **Estimated Remaining Contribution** is the approximate number of years the tree will continue to make a beneficial contribution without the need for oppressive arboricultural intervention, categorised as **<10**, **10-20**, **20-40** and **>40**.
- 11 **BS Category Rating** refers to BS 5837:2012 Table 1. This relates to tree/group quality and value, where **A** are trees of high quality with an estimated remaining life expectancy of at least 40 years, **B** are trees of moderate quality with an estimated remaining life expectancy of at least 20 years, **C** are trees of lower quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150mm. Category **U** relates to 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. The sub-category refers to the value type, where **1** is mainly arboricultural, **2** is mainly landscape and **3** is mainly cultural including conservation, historic and commemorative.
- 12 **Root Protection Radius** is a radial distance measured from the trunk centre, giving the radius of an equivalent circle. It is calculated using the formulae described in paragraph 4.6.1 of BS 5837: 2012 and is indicative of the minimum rooting area that should remain undisturbed in order for a tree to be successfully retained.
- 13 **RPA area** is the minimum area in m² which should remain undisturbed (up to a maximum area equal to a circular radius of 15m).

Appendix 3 - BS5837 Cascade Chart for Tree Categorisation

Category & definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention				
Category U Trees in such a condition that they cannot realistically be retained as living trees in the context of current land use for >10yrs	- 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; - Trees that are dead or showing signs of significant, immediate and irreversible decline; - Trees infected with significant pathogens affecting health or safety, or very low quality trees suppressing trees of better quality. <i>NOTE: these trees can have existing or potential conservation value making retention desirable</i>			DARK RED
	1 Mainly arboricultural qualities	2 Mainly landscape qualities	3 Mainly cultural values, including conservation	
Trees to be considered for retention				
Category A Trees of high quality with an estimated remaining life expectancy of >40yrs	Particularly good examples of their species, esp. if rare or unusual. Those that are essential components of groups or formal or semi-formal arboricultural features (e.g. principal avenue trees)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features.	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture).	LIGHT GREEN
Category B Trees of moderate quality with an estimated remaining life expectancy of >20yrs	Trees that might be included in category A but are downgraded because of impaired condition such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit 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. Trees occurring as collectives but situated so as to make little visual contribution to the area.	Trees with material conservation or other cultural value.	MID BLUE
Category C Trees of low quality with an estimated remaining life expectancy of >10 years, or young trees with a stem diameter <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 landscape benefits.	Trees with no material conservation or other cultural value.	GREY



Appendix 4 - Tree Survey Plan

(please see attached plan - drawing no. AS/AL/0721 TSP)



Appendix 5 - Tree Constraints Plan

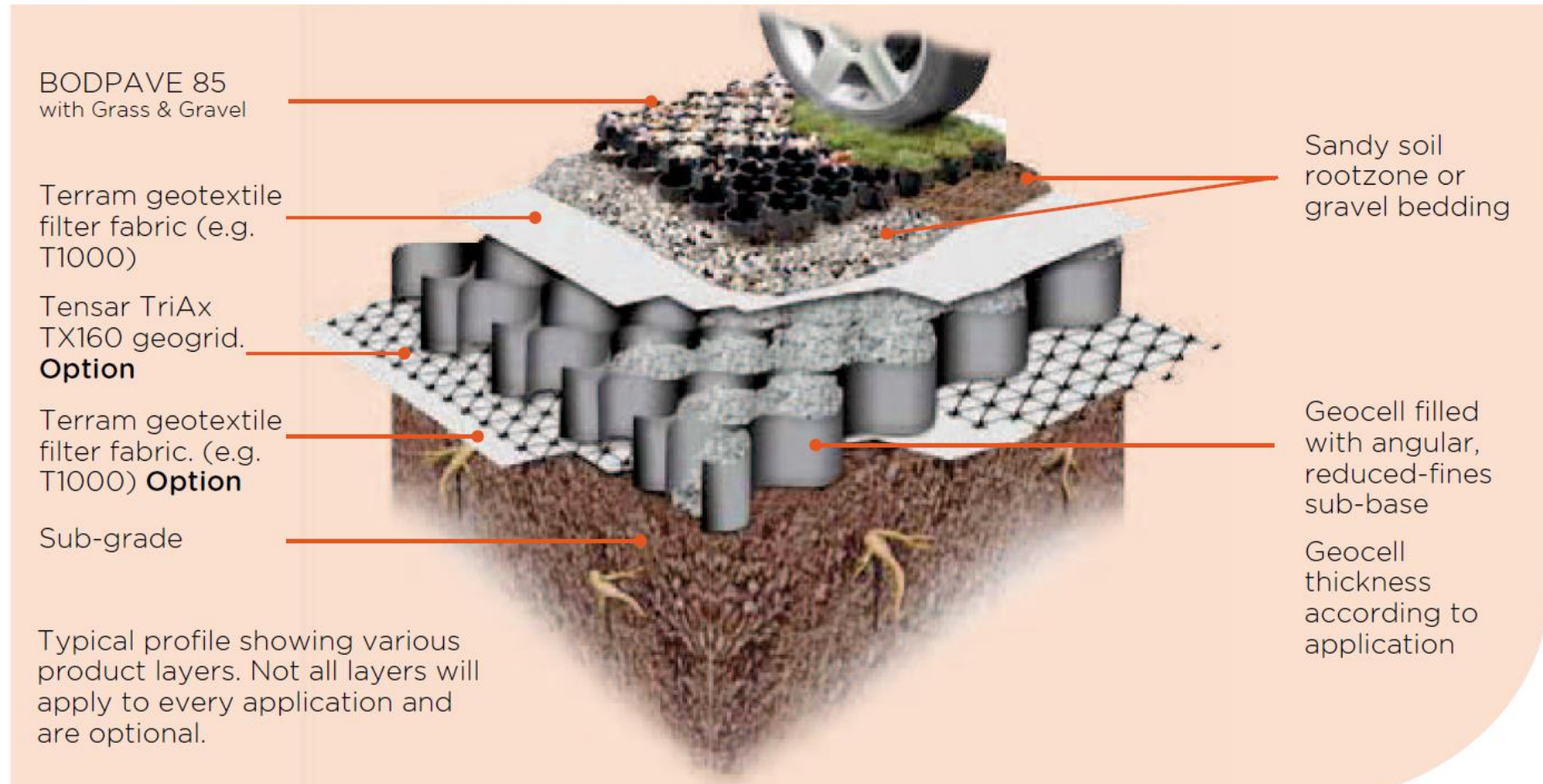
(please see attached plan - drawing no. AS/AL/0721 TCP)



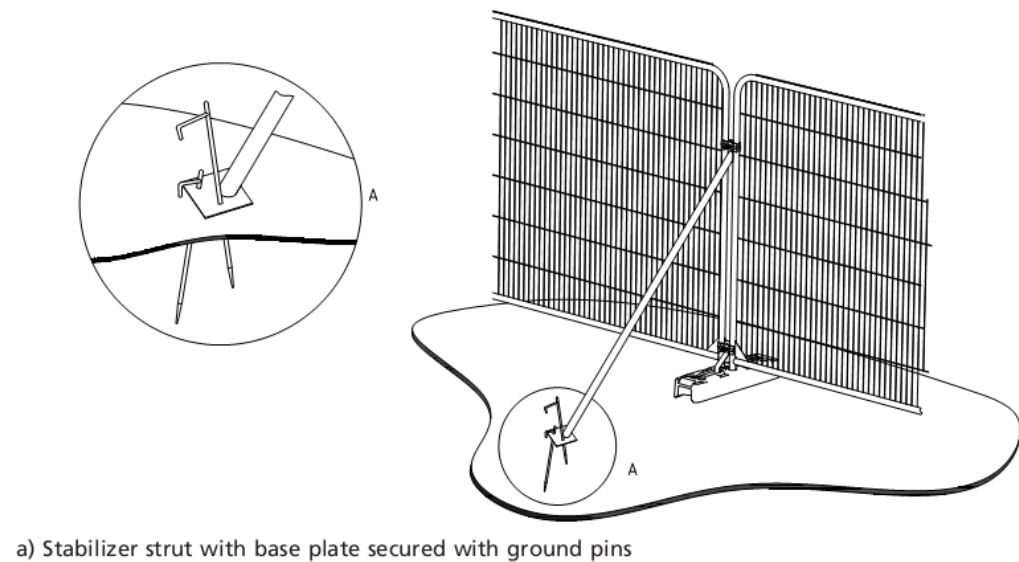
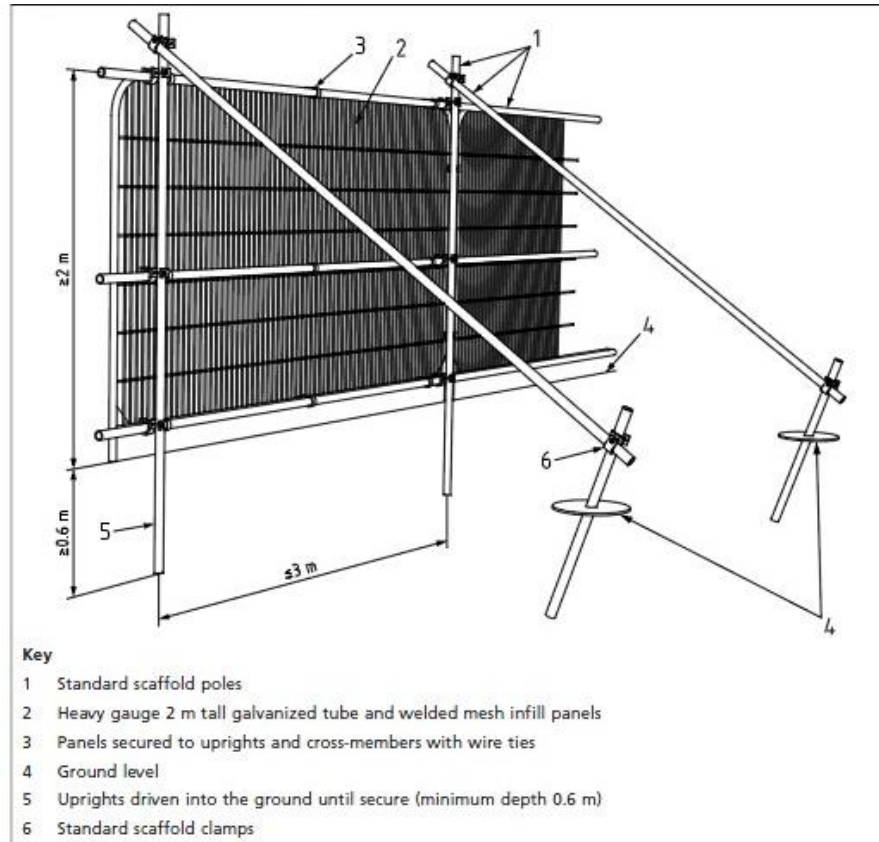
Appendix 6 - Tree Protection Plan

(please see attached plan - drawing no. AS/AL/0721 TPP)

Appendix 7 - Example Specification for a 'No-Dig' Three-dimensional Cellular Confinement System (Terram Geocell)



Appendix 8 - Tree Protection Fencing in accordance with BS5837



Default specification for protective fencing (left) and recommended alternative specification (right)

Appendix 9 - Tree Protection Fencing Signage



Appendix 10 - Example Specifications for temporary ground protection systems, using interlocking ground mats

Ground-Guards

GreenTek

Ground protection and site access system

Ground-Guards are an "Instant Roadway" system of lightweight plastic panels, capable of taking vehicles of up to 50 tonnes weight.

Introduction The Green Tek Ground-Guards have become established as a proven alternative to the conventional method of stripping and stoning-up access roads on construction sites. By using this roadway system, ground damage and reinstatement work are minimised. This is an ideal method to use where there are tree roots under the surface as it avoids the need for excavation.

Applications The Ground-Guards site access system is designed to form temporary roads, car parks and footpaths. It is suitable for protecting grassed areas from erosion and rutting during construction projects and for the protection of tree roots where site access routes need to pass close to trees.

Green issues Ground-Guards are a very environmentally friendly product. They:

- Protect sensitive ground from erosion
- Are made from 100% recycled plastic, which is itself fully recyclable
- Provide a sustainable alternative to using up sheets of plywood for ground protection purposes

DESCRIPTION

The Ground-Guards site access system consists of virtually indestructible, lightweight plastic boards which clip together without tools to quickly form temporary roads, car parks and footpaths. They are made from 100% HDPE recycled plastic and are guaranteed unbreakable by vehicles of up to 50 tonnes.

These track mats can be easily moved around the site by just two people, without the need for a crane lorry.

Ground-Guard mats are available with a choice of different tread patterns. The "Standard" tread pattern creates a track way with a high level of traction for vehicles, whilst the "walk" pattern is designed for pedestrian walkways and event flooring.

Ground-Guards are also available with one side smooth which is ideal for trenching and utilities work as it enables the spoil to be easily backfilled into the trench afterwards.

When being used to protect tree roots, a base layer of Ground-Guard sheets should be covered by a cushioning layer of 150 mm of wood chippings. The Ground Guard



trackway is then laid over the top of this in the normal way. Dimensions: Ground-Guard mats are available in sizes ranging from 1820 mm (5') x 610 mm (2') to 2438 mm (8') x 1219 mm (4'), with a choice of different tread patterns.

SUPPLY

GreenTek both supplies and hires Ground-Guards direct to construction companies nationally.

SERVICES

Ground Guards provides technical advice to specifiers and contractors. Brochures and samples are available on request.



Ground-Guard trackways may be used with a cushion of woodchips to protect tree roots

50 mm x 50 mm x 500 mm timber stakes
200 mm x 50 mm timber rails
Geotextile membrane
Base layer of Ground-Guards
Wood chippings
Ground-Guard trackway

Greensward Engineering
GreenTek
Manor Farm
Otley Road
Adair
Leeds
LS16 7AL

Tel: +44 (0)113 267 8000
Fax: +44 (0)113 267 2222
Email: info@ground-guards.co.uk
Website:
www.ground-guards.co.uk
Contact: Phil Ellis
rps no: 21329

EuroMat® Heavy Duty Temporary Access Mat



Heavy Duty Temporary Access Mats

Supporting loads up to 80 tonnes, EuroMat® is the ultimate heavy duty man-handleable mat for temporary roadways and work areas. EuroMat® is essential for the construction, civil engineering and ground work industries.

Incredibly Tough & Flexible

Made from tough 100% recycled or virgin high density Polyethylene (HDPE), EuroMat® is the market leader for temporary access and ground protection over soft or sensitive ground. EuroMat® significantly reduces damage to heritage and eco-sensitive areas, avoiding the need for reinstatement once the project is complete.

Fast & Efficient Installation

Weighing just 35kg EuroMat® is ideal for both short and long term projects. Incorporating strategically positioned handholds, EuroMat® is man-handleable and easy to off load and deploy by a two man team.

Chevron Traction® Surface

EuroMat's chevron traction® surface comprises of a broken pattern of rugged nubs which substantially improves the grip and forward motion of plant or vehicles and reduces side way slippage, even in the most challenging weather or ground conditions. Optional hi-vis markings and cats eyes can be incorporated into EuroMat® for additional safety at night.

Logistics

Lighter in weight than conventional wood or steel alternatives, EuroMat® also offers the environmental benefit of more mats being loaded per wagon and in turn reducing transportation costs and carbon emissions.

*Compression tested at National Physical Laboratory, UK