



PHASE 2, LONGFORD PARK BODICOTE

Arboricultural Method Statement

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1 INTRODUCTION

1.1 Background

1.1.1 Aspect Arboriculture has been instructed by a consortium of house builders (Barratt Homes, Bovis Homes and Taylor Wimpey) to prepare an Arboricultural Method Statement (hereafter the AMS) to inform Phase 2 residential development works at land northeast of the A4260 Oxford Road, Bodicote, Banbury.

1.1.2 Outline planning consent for development at the site has been granted subject to conditions attached to an approved Reserved Matters Application (dated 20th September 2013); of these conditions, one relates to arboriculture. Condition No.12 requires the provision of an Arboricultural Method Statement to demonstrate the protection of retained trees during site preparation and construction.

1.1.3 Cited under application no.05/.1337/OUT, condition no. 12 reads:

Prior to the commencement of any development hereby approved, an Arboricultural Method Statement (AMS), undertaken in accordance with BS5837:2012 and all subsequent amendments and revisions shall be submitted to and approved in writing by the Local Planning Authority. Thereafter, all works on site shall be carried out in accordance with the approved AMS.

1.2 Scope

1.2.1 This AMS has been prepared in direct response to Condition no. 12. The explicit purpose of this document therefore, is to ensure the confident protection of the site's retained trees where there is potential for foreseeable harm, or damage to occur during construction works.

1.2.2 This will be achieved through the use of the appended Tree Protection Plan (Appendix A) and Works Auditing Schedule (Appendix B) alongside other supporting documents included within appendices C - E.

1.2.3 It is our understanding that this work will be submitted to, and approved by Cherwell District Council (hereafter the CDC) prior to the commencement of any development works on site. Once approved, the works should be implemented as specified and maintained to CDC's reasonable satisfaction until completion of the development.

- 1.2.4 Subject to its approval, compliance with this document will be required in the interest of the visual amenity of the area, to ensure integration of the approved development within the existing landscape and to comply with the Policy 28 of the adopted Cherwell Local Plan.

1.3 **Limitations**

- 1.3.1 This work relies upon the detail of a tree survey prepared by Aspect during May and June 2013. In the context of proposed development, the survey was informed by BS 5837:2012 'Trees in Relation to Design, Demolition and Construction'. A copy of the survey is appended to the rear of this document (refer to appendix A and C).
- 1.3.2 This work relates to arboriculture therefore reliance should not be given to comments made in respect of other disciplines i.e. civil engineering or construction phasing, without first referencing an appropriate expert.
- 1.3.3 This document has been prepared in respect of proposed construction and should not be interpreted as a report on tree health and safety. Reasonable effort has been made to identify visible defects whilst undertaking the tree survey, however trees are prone to natural failure without warning; no guarantee can be made as to the absolute safety of any of the trees surveyed. Aspect's opinion of tree condition and structural potential is valid for limited period of 12 months from the date of issue. Validity is assumed in the absence of inclement weather and no change to the trees existing context.

2 ESSENTIAL WORK

2.1 Tree Protection Plan

2.1.1 *The tree protection drawing provided in appendix A will be relied upon during construction works. It should be read in conjunction with the entirety of this document.*

2.1.2 A scaled A1 copy of the TPP accompanied by a copy of this document will be provided to the site manager in order that s/he will be able to:

- Identify retained trees;
- Identify the correct locations for tree protection barriers;
- Identify features of the site that must be prepared/installed under an arboricultural watching brief;
- Co-ordinate attendance of the project arboriculturalist on site for site monitoring and to provide advice in case of any emerging issue;
- Demonstrate compliance with the Council's consent for development by completing the Works Auditing Schedule (Appendix B).

2.2 Tree Removals Required to Implement the Development

2.2.1 Tree removals necessary to implement the development, shall be restricted to:

A total of 54m across four separate areas of G27 (Hawthorn, Elder, English Oak, Sycamore, Field Maple, Haze and Ash); a total of 51m across two separate areas of G11 (Ash, Blackthorn Elm, Hawthorn and Field Maple).

2.2.2 A pre-commencement site meeting will include the spray marking of the sections of **G27** and **G11** for removal by the project arboriculturalist. The presence of the appointed tree contractor will therefore be essential during this process to safeguard against erroneous felling.

2.2.3 Clearance within **G27** and **G11** will not be undertaken to the detriment of adjacent retained sections, i.e. not by the use of an excavator. It will instead be undertaken in accordance with BS 3998:2010 by a competent tree contractor, and timed to coincide with pruning across the remainder of the site boundaries (refer to 2.4).

2.2.4 Felling works should be timed to avoid the main nesting season for birds between 1st March and 31st August 2015. If scheduled within this period an ecologist must be present to advise on any necessary protective measures, and on hand to confirm that tree works are not likely to cause disturbance to nesting birds.

The Works Auditing Schedule (appendix B) shall be signed on completion of tree removals.

2.3 Stump Treatment

2.3.1 As a precaution against damaging root networks of retained trees/hedgerows (**G27**, **G11** and **T13** English Oak), the stumps arising from the cleared section **G27** and **G11** will be ground-out to a depth of 100mm or as close as conditions allow using a purpose-built machine (without incurring ground compaction).

2.3.2 Within the root protection area of **T13**, tree stumps within the building footprint of the pumping station are also to be ground-out following the procedure as described in section 2.3.1 and under the supervision of the project arboriculturalist. **Tree stumps located outside the building footprint of the pumping station and within the root protection area of T13 will be left in situ.**

2.3.3 Stumps may be ground deeper at the discretion of the contractor (the contractor is also responsible for ensuring that there are no underground services in the area).

The Works Auditing Schedule (appendix B) shall be signed on completion of stump removal within the root protection area of T13.

2.4 Access Facilitation Pruning

2.4.1 It will be necessary to reduce the crown spread of hedgerow **G11** to c.1m along a 42m stretch of the internal north eastern edge to accommodate the proposed link road. The entire internal crown spread (approx. 142m) of **G36** will also require a reduction to accommodate the proposed footpath. This can be achieved by the use of a tractor mounted flail as per previous management.

2.5 Protective Barriers

- 2.5.1 Tree protection barriers shall be erected as shown in appendix A following the removal of the necessary sections of **G11** and **G27** (refer to section 2.2) and pruning of **G11** (refer to section 2.4).
- 2.5.2 The default barrier specifications for this development will consist of the default BS 5837:2012 specification adjacent to trees (shown as barrier type A below) and a revised specification with the absence of 45° braces for hedgerows and areas of reduced activity (barrier type B below). It is essential that this is erected prior to occupation of the site for construction related purposes
- 2.5.3 Hedgerow barriers will be secured with the use of pinned rubber feet and a driven 100x100mm timber posts on every second panel as shown below (barrier type B).

Figure1. Protective Barriers: Tree and Hedgerow Specifications for this Development



The use of mixed barrier specifications has been agreed with CDC's Arboricultural Officer (pers.comms September 2013).

- 2.5.4 The project arboriculturalist will inspect tree protection barriers and provide written confirmation to CDC's arboricultural officer on completion. This will be informed by RPA radius identified during the tree survey and as illustrated within appendix A.

- 2.5.5 Secondary siting of tree protection barriers around tree no. **T13** is required for the above soil construction of the pumping station and installation of proposed fencing. The **site manager** will be responsible for coordinating arboricultural attendance on site to oversee this activity to ensure that barriers are sited correctly.
- 2.5.6 The **project arboriculturalist** will be responsible for monitoring barriers at 4 week intervals for the duration of construction; issues will be resolved on site and reported to CDC's arboricultural officer by the project arboriculturist.

The Works Auditing Schedule (appendix B) will be used as a record to show that barriers have been correctly sited and only altered where agreed as part of this condition.

2.6 **No-dig Construction**

- 2.6.1 The area of the proposed pumping station and section of hard surface occurring within the root protection area of tree no. **T13** will be constructed above soil. It is essential that this is achieved through the installation of no-dig surfacing to prevent soil compaction, oxygen/moisture restriction and the need for any excavation within RPAs that may incur root severance. These areas are illustrated in appendix A with a blue hatch.
- 2.6.2 The proposed footprint of the pumping station within the root protection area of tree no. **T13** will be founded on a concrete slab laid above soil. A non-invasive retaining edge will be used as opposed to the installation of concrete sets which may otherwise incur excavation and associated disturbance within the RPA i.e. root severance.
- 2.6.3 The proposed area of hard surface car park within the root protection area of tree no. **T13** will utilise a sub-base consisting of a minimum of 100mm Standard Cell for car parking. A non-invasive retaining edge will be used as described in section 2.6.2.

No dig construction will require the direct supervision of an arboriculturalist experienced in the installation of CellWeb® (refer to further detail provided in appendix E).

2.6.4 Installation of CellWeb®/concrete slab will adopt the following procedure:

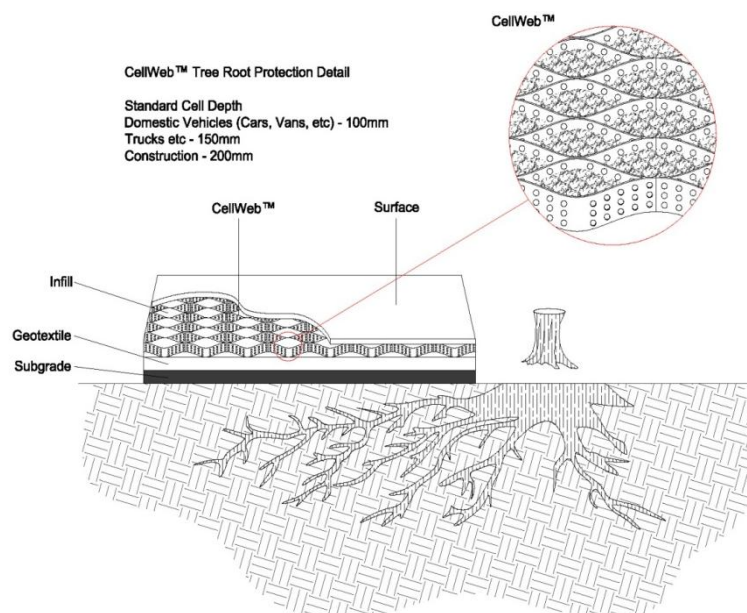
2.6.5 Pre-commencement

- a. The supervising arboriculturalist will brief the site manager and excavating team on the importance of preventing soil compaction, oxygen/moisture restriction and the need for any excavation within RPAs that may incur root severance.
- b. The supervising arboriculturalist shall spray-mark the extent of affected RPAs on the ground prior to the commencement of works occurring within their footprint. The limit of any remaining RPA will be spray-marked for the benefit of machinery operators. A photograph of the spray-marked RPA limit and extent of affected area will be taken.

2.6.6 Installation of CellWeb®

- a. To prevent migration of the infill material and future loss of structural integrity, the area requiring no-dig surfacing must be covered with a porous geotextile underlay. This is to occur *before* installation of the cellular confinement system.
- b. The cellular confinement system will be staked and expanded across the affected area then cut to size.
- c. The edges are to be retained with non-invasive timber boards pinned with an earth batter or wooden stakes.

Figure1: No-Dig Section



- d. Infill will consist of no-fines gravel. A pedestrian dumper under 0.5t* will be used for the purposes of depositing the granular infill as this can operate within the footprint of the retaining edges. Any plant will only track over areas previously in-filled i.e. not over exposed underlay.

**i.e. the ¼ tonne Altrad Belle BMD 300, which has a working width of less than 800mm and load capacity of 300kg.*

- e. It is essential that the new wearing course is of a permeable nature and installed under arboricultural supervision.

2.6.1 If installed correctly, it is our opinion that these features will not compromise the potential of tree no. **T13** therefore enable retention.

2.7 Supervised Excavation

2.7.1 A fence is proposed surrounding the pumping station. Where this fence is located within the RPA of T13, the post holes are to be dug by hand under arboricultural supervision, following the procedure within clause 7.2 of BS5837:2012, and lined with an impermeable membrane to prevent concrete leachates from entering the soil.

2.8 Proposed Order of Works

- a) Pre-commencement site meeting between the project arboriculturalist, site manager, tree contractor and CDC's Arboricultural Officer. Tree works, inspection and monitoring requirements will be identified/agreed.
- b) Tree removals as illustrated within appendix A to be carried out prior installation of tree protection barriers and construction works beginning on site.
- c) All tree protection barriers to be installed post clearance works and prior to arrival of plant, machinery and materials on site. Barrier positions to be inspected by the project arboriculturalist and as detailed within this document.
- d) CDC's Arboricultural Officer shall be informed of the proposed commencement date as soon as practicable prior to that date to allow inspection of protection measures.

- e) The project arboriculturist will assume responsibility for the monitoring of barriers on a monthly basis for the duration of works. Erection of barriers and monitoring is included within the auditing schedule (appendix B).

2.9 Site Manager's point of contact for arboricultural input:

Dr Richard Curtis or Mr James Bardey (Aspect Arboriculture)

Telephone: 01295 276066

Email: Richard.curtis@aspect-arbor.com james.bardey@aspect-arbor.com

3 CONCLUSIONS

- 3.1 This document has been prepared in direct response to Condition 12 of an Outline Consent for development granted under application no.05/.1337/OUT. It has been informed by guidance provided in BS5837:2012, including an arboricultural survey and procedures to ensure the integration of the proposed development within the existing landscape.
- 3.2 Pursuant to Condition 12, this document and its supporting work (Appendices A - E), this document and its supporting work identifies all necessary tree removals, pruning and areas of the development that must be managed to facilitate in confident tree retention.
- 3.3 To ensure confident tree retention; aspects of the development, including tree removals, inspection and secondary siting of tree protection barriers, installation of above soil surfacing and manual excavation will be supervised and audited by the project arboriculturist; the outcome of these works will be reported to CDC's Arboricultural Officer on completion. These areas are specified within the checklist for auditing of works (appendix B).
- 3.4 It is Aspect's opinion that, subject to strict adherence to this document, the development can be implemented without incurring harm to retained trees and tree groups.

APPENDICES

APPENDIX A

TREE PROTECTION PLAN (8667 TPP 05)

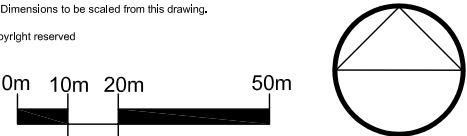


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No Dimensions to be scaled from this drawing.

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- KEY:
- Site Boundary
 - Tree Numbers
 - Tree Canopies
 - Category 'B' RPA
 - Category 'C' RPA
 - Trees to be Removed
 - Tree Protection Barrier (Default Specification - Type A)
 - Tree Protection Barrier (Secondary Specification - Type B)
 - Tree Protection Barrier (2nd Position)
 - Manual Excavation
 - Above Soil Surfacing

06	22.01.15	Updated with latest layout from architect	GW	RC
05	14.10.14	Updated with latest layout from architect	GW	RC
REV	DATE	NOTE	Drawn	Chk'd



TITLE
Phase 2, Longford Park, Banbury
Tree Protection Plan

CLIENT
Taylor Wimpey, Barratt Homes & Bovis Homes

SCALE 1:1500 @ A3	DATE JAN 2015	DRAWN GW
DRAWING NUMBER 8667 TPP 06	REVISION	

Based on Architects' drawing no. 0476-x-layout-BOVIS 1.10.2014

APPENDIX B

WORKS AUDITING SCHEDULE

Works Auditing Schedule

Works Requiring Auditing	Tree No.	Date Undertaken	Date Reported to LPA
Pre-commencement meeting identifying/spray marking tree removals and pruning works specified within 8667_AMS.002 and illustrated on drawing no. 8667 TPP 06	As drawn	G11 G27	
Inspection of installed tree protection barriers as illustrated on drawing no. 8667 TPP 06 (Monthly basis)	As drawn		
Arboricultural supervision of stump grinding within the RPA of T13 as specified within 8667_AMS.002	T13		
Arboricultural supervision of secondary siting of barriers, above soil pumping station construction and area of hard surface construction within RPA of T13 as specified within 8667_AMS.002 and illustrated on drawing no. 8667 TPP 06	T13		
Arboricultural supervision of manual excavation of fencing post holes within RPA of T13	T13		

This schedule will be completed as evidence that works have been undertaken as per the approved methodology. Copies are to be issued to the LPA's Arboricultural Officer by the Project Arboriculturalist.

APPENDIX C

TREE SURVEY SCHEDULE (8667 TS 01)

**BS 5837:2012 Tree Schedule: Phase 2,
Longford Park,
Bodicote**

BS5837:2012 Tree Survey: Explanation of Survey Criteria

Sequential reference number cited on all aspect drawing.												e.g.: young, semi-mature, early-mature, mature or over-mature		Area around tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of roots and soil structure is a priority.	
Height and Crown spread measured to the nearest half meter; # denotes where this is estimated.												Category prefix A-C denotes arboricultural quality, decreasing from A (high) to C (low); Subcategories 1, 2 and 3 highlight associated arboricultural (1), landscape (2) and ecological (3) qualities.		Category U trees are those in such a condition that they cannot be retained as living trees in the current context for	
Tree Number	Common Species Name	Trunk Diameter (mm)	Height (m)	Crown Spread (m)					Crown Clearance (m)	Life Stage	Physiological Condition	Structural Condition	Comments	BS5837 Category	RPA Radius (m)
				N	E	S	W	radial							
		Measured to the nearest 10mm; # denotes estimated diameter where access is not possible.							Height of first significant branch and/or canopy	e.g.: above-average, average, below average or dead			General observations, i.e. defects, preliminary management recommendation, presence of pests/disease, perceived significance.		
												e.g.: good, indifferent, poor, or hazardous			

The following survey should not be interpreted as a report on tree health and safety. Aspect's opinion of tree condition and structural potential is valid for a limited period of 12 months from the date of inspection. Validity is assumed in the absence of inclement weather and no change to the trees existing setting.

Tree Number	Common Species Name	Trunk Diameter (mm)	Height (m)	Crown Spread (m)					Crown Clearance (m)	Life Stage	Physiological Condition	Structural Condition	Comments	BS5837 Category	RPA Radius (m)
				N	E	S	W	radial							
13	English Oak	1260 @ 500	12m	6	6.25	7.3	6.75		3.5	Mature	Average	Good	Single stout stem Structure typical for species given context Radial dense crown Below average deadwood within crown Average level of epicormic growth Considered to be of high arboricultural quality Lower limb previously removed to Northeast.	B 12	15
67	Ash	200#	6.5m					5	3	Early Mature	Below Average	Indifferent		C 12	2.4
85	English Oak	1000	13m					6	2	Mature	Average	Moderate	Single stem Forking at approx. 5m Slightly sparse canopy Above average amount of Deadwood within canopy Structure typical for species Considered to be of moderate arboricultural quality and value	B 2	12
86	Whitebeam	160# 250#	4m					2.5	1	Early Mature	Average	Indifferent		C 12	3.6
87	Ash	200	8m					4	1.5	Early Mature	Average	Indifferent		C 12	2.4
88	Ash	300	6m					5	1.5	Early Mature	Average	Indifferent		C 12	3.6
89	Ash	250	7m					3.5	2	Early Mature	Average	Indifferent		C 12	3
90	Ash	2 x 150 1 x 180	7m					3.5	2	Early Mature	Average	Indifferent		C 12	3.3
91	Ash	300	7m					3.5	2.5	Early Mature	Average	Indifferent		C 12	3.6
92	Ash	300	7.5m					3.5	2	Early Mature	Average	Indifferent		C 12	3.6
93	Ash	240	6.5m					2.5	2	Early Mature	Average	Indifferent		C 12	3
94	Ash	300	8m					3.5	2.5	Early Mature	Average	Indifferent		C 12	3.6
95	Ash	150	7m					2.5	2	Young	Average	Indifferent		C 12	1.8
96	Ash	200 240	7.5m					3.5	2	Early Mature	Average	Indifferent		C 12	3.6
97	Ash	240	6.5m					2.5	2.5	Early Mature	Average	Indifferent		C 12	3
G10	Sycamore Elm Hawthorn Elder Field Maple White Willow Blackthorn Ash	up to 400mm	2m					2	0.5	Mature	Average	Indifferent	Previously layed field boundary hedge; maintained by flail to 2m; structure and habit typical for species given context; individuals more mature at western end of hedgerow.	C 12	Up to 4.8
G11	Ash Blackthorn Elm Hawthorn Field Maple	up to 260mm	3 - 3.75m					1.5	0.5	Mature	Average	Indifferent	Previously layed field boundary hedge; previously maintained by flail to approx 2m; structure and habit typical for species.	C 12	3
G12	Hawthorn Blackthorn Field Maple	250	5-8m					4.75	0.5	Mature	Average	Indifferent	Grown out etiolated field boundary hedgerow; individually of low arboricultural quality; likely to provide dense boundary screen.	C 12	3

Tree Number	Common Species Name	Trunk Diameter (mm)	Height (m)	Crown Spread (m)					Crown Clearance (m)	Life Stage	Physiological Condition	Structural Condition	Comments	BS5837 Category	RPA Radius (m)
				N	E	S	W	radial							
G26	Hawthorn Ash Blackthorn Field Maple	200	2-4m					1.75	0.5	Early Mature	Average	Indifferent		C 12	2.4
G27	Hawthorn Elder English Oak Sycamore Field Maple Hazel Ash	400 max	3-4m					2	0.5	Mature	Average	Indifferent		C 12	4.8
G36	Hawthorn Ash	300 av @ base	4m max					1	0.5	Mature	Average	Indifferent		C 12	3.6
G37	Hawthorn Elder Elm	400 av @ base	2m					1	0.5	Mature	Average	Indifferent		C 12	4.8

APPENDIX D

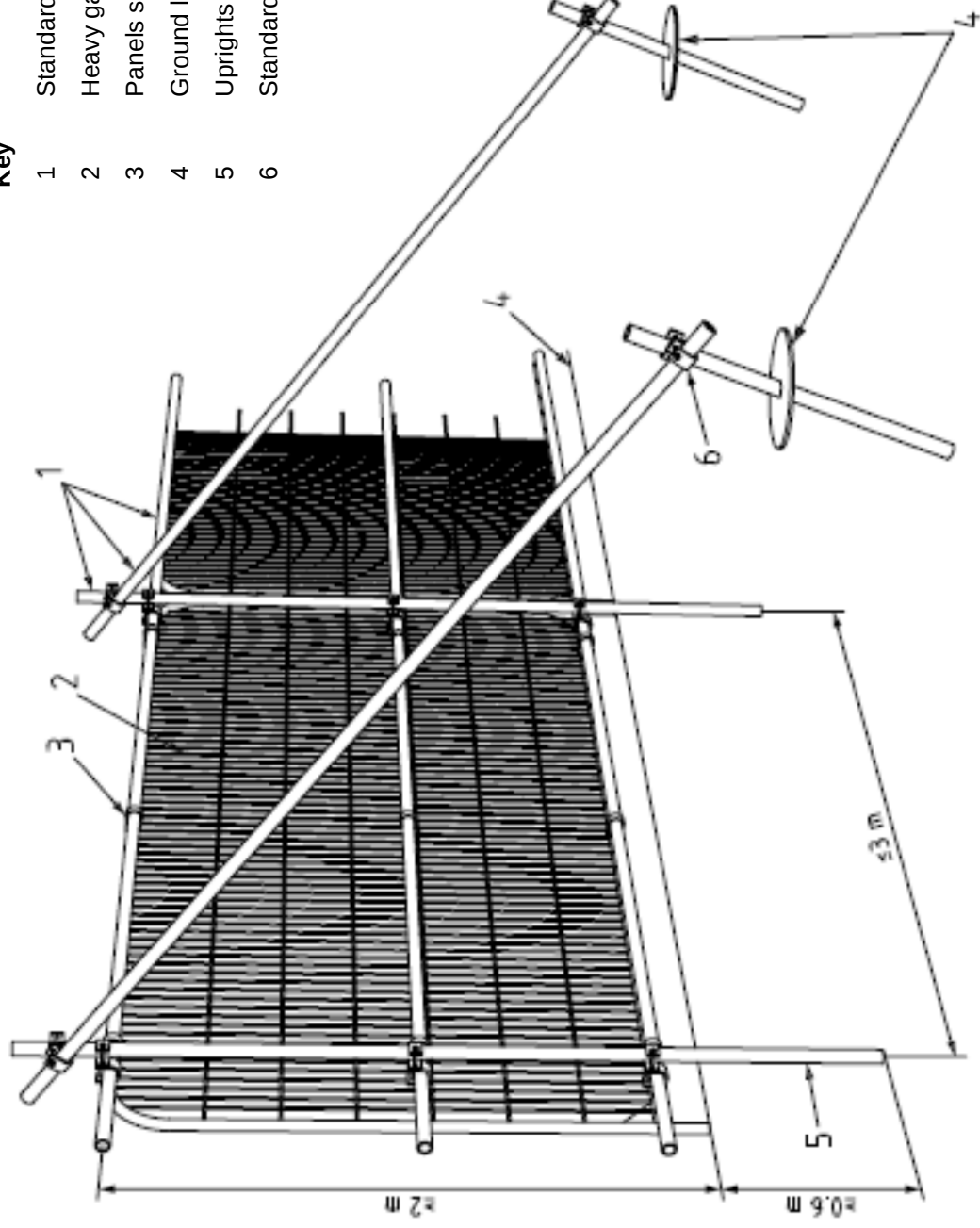
TREE PROTECTION BARRIER SPECIFICATIONS

Recommended Tree Protection Fencing Specification for this Development

(Source: BS 5837: 2012)

Key

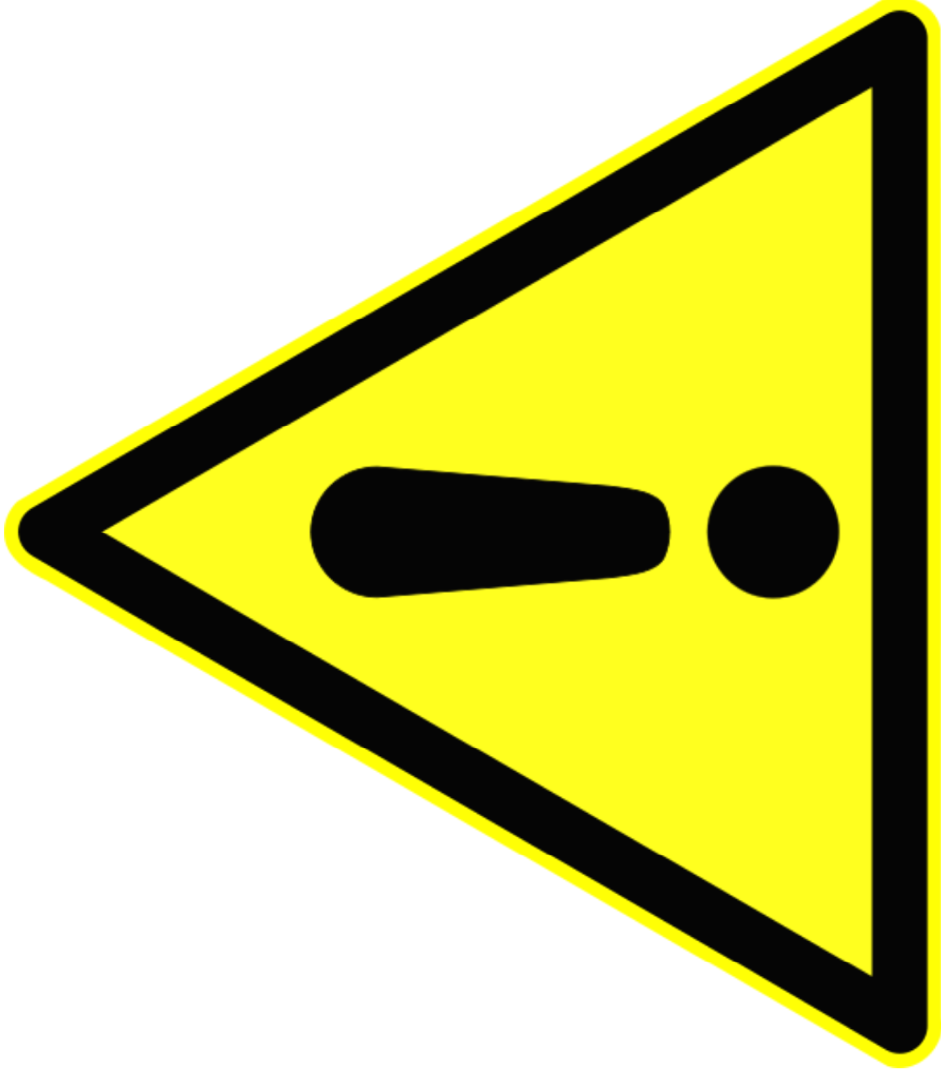
- 1 Standard scaffold poles
- 2 Heavy gauge 2m tall galvanized tube and welded mesh infill panels
- 3 Panels secured to uprights and cross-members with wire ties
- 4 Ground level
- 5 Uprights driven into the ground until secure (minimum depth 0.6m)
- 6 Standard scaffold clamps



Notes:

- Supports are to be sited tree side of the panel front face.
- All weather notices should be attached to every fourth panel highlighting the importance of the barrier in its correct position. An example is provided overleaf which may be duplicated for use on this development.

TREE PROTECTION BARRIER



- DO NOT MOVE THIS FENCE
- NO SITE ACTIVITY TREE SIDE OF FENCE
- NO STORAGE TREE SIDE OF FENCE
- For assistance call Aspect Arboriculture:
01295 276066

APPENDIX E

TREE ROOT PROTECTION SYSTEM (CellWeb®)

Tree Root Protection Using CellWeb TRP® Geocellular Confinement System



Fact Sheet 1: Use of CellWeb TRP® in Root Protection Areas (RPA's)

Introduction

CellWeb TRP® is a cellular confinement system that confines aggregate materials and makes them stronger. This behaviour allows the depth of pavement construction to be reduced. It also minimises compaction of soils below road pavements constructed using the CellWeb TRP® tree root protection system. CellWeb TRP® is used around the world to provide cost effective road and railway construction.

Cellular confinement was developed by the US Army Corps of Engineers during the 1970s to allow construction of roads for military equipment quickly and easily using whatever local soil material was available (especially across beaches). Since then the method has been developed and it is now routinely used in road and rail construction as well as in tree root protection. There is an extensive research base that demonstrates the performance of cellular confinement and it is a method of pavement construction that is recognised by the US Federal Highways Administration.

Characteristics of CellWeb TRP®

Pokharel et al (2009) stated that about one fifth of pavement failures in the US occur due to either weak subgrades or inefficient load transfer from the sub-base. CellWeb TRP® can improve the strength of road pavement construction to deal with these problems. It is a three dimensional interconnected honeycomb of cells made from HDPE. The cells are filled with aggregate sub-base and laterally confine the material when it is loaded, thus increasing the bearing capacity of the layer. This results in a thinner layer of aggregate being required to achieve the same performance.

It also allows uncompacted open graded aggregate to be used in the sub-base construction which is a vital part of any tree root protection system.

CellWeb TRP® is available in a range of height and aspect ratios to suit different load applications.

Use of CellWeb TRP® in RPAs

The use of CellWeb TRP® tree root protection system for building roads, car parks and other vehicular pathways includes a sub-base infill material of 20mm to 40mm which does not need to be compacted. This immediately provides a layer of material that will absorb compaction energy applied to the top of materials placed over it. Compaction of soils by construction machinery does not extend to a great depth. This is the reason why earthworks materials are normally placed in thin layers because compaction only occurs in the top few hundred mm at most. With the lightweight compaction plant used on most development sites the maximum depth that compaction will extend to is between 150mm and 200mm. Thus, if an 80mm layer of asphalt is placed over a 150mm deep CellWeb TRP® system the compaction reaching the base of the construction and the natural soil will be minimal. This effect was demonstrated by Lichter and Lindsey (1994) where a trial area was trafficked by a front-end loader and only suffered significant compaction of the soil to a depth of 100mm.

The use of CellWeb TRP® also spreads the wheel loads from traffic. There has been extensive research published on the performance of these systems from the original work by the US Army Corps of Engineers (Webster 1981) to more recent studies such as that by Emersleben and Meyer (2008).

The research shows that CellWeb TRP® acts as a stiff raft to distribute wheel loads and reduce their magnitude at the base of the construction by 30% to 36% (without any asphalt or other surfacing). Once the surface is taken into account, the pressure applied by traffic to soil below roads or pavements constructed using no-dig methods will be significantly reduced and thus compaction will also be reduced. Note, compaction is not prevented but it is reduced, thus maintaining the soil bulk density at levels that are suitable for tree root growth.

The effectiveness of the CellWeb TRP® no-dig construction in reducing soil compaction has been demonstrated in trials carried out by the Environmental Protection Group Limited. Two parking bays were constructed over a fine sand soil, one with a CellWeb TRP® cellular confinement sub-base. The parking bays were surfaced with asphalt and then used by cars for four weeks on a daily basis. It is well known that compaction of soils occurs in the first few passes of a vehicle, so the maximum adverse effects on compaction of soil below the pavement should have been achieved. In situ density tests were carried out on the sand below the pavement before and after construction (Figure 1).



Figure 1 - In situ density test prior to construction of pavement.

Tree Root Protection Using CellWeb TRP® Geocellular Confinement System

Fact Sheet 1: Use of CellWeb TRP® in Root Protection Areas (RPA's)



Figure 2 - CellWeb TRP® in construction.



Figure 3 - In situ density tests post-trafficking.

The results in Figure 4 show that compaction of the soil below the CellWeb TRP® pavement was noticeably lower than that below the normal pavement. The increase in compaction below the normal pavement is similar to the increase found on a number of construction sites by Alberty et al (1984).

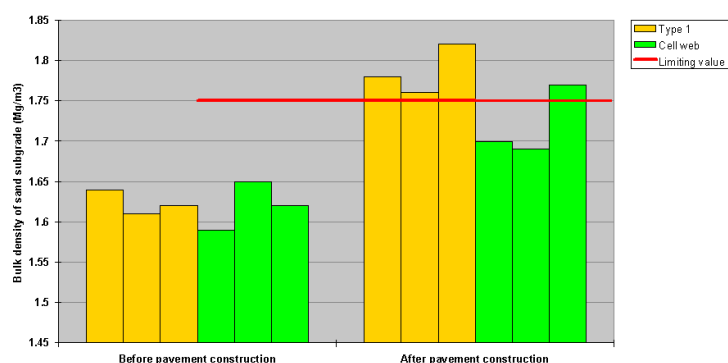


Figure 4 Comparison of soil compaction below pavements

The use of layers of uncompacted material has also been shown by others to reduce compaction of natural soil by construction plant (Lichter and Lindsay 2004). However, these were temporary layers intended to be removed after construction was finished and they are not suitable for incorporation into a permanent car park surface. Nonetheless, it does demonstrate the effectiveness of no-dig techniques using CellWeb TRP®. It is important to note that the specific properties of cellular confinement systems (eg material type, strength, welding at joints, perforations, etc) will affect how each one behaves in trials such as this. Therefore the results are only applicable to the CellWeb TRP® system.

Note: So called tree root protection systems that use Type 1 sub-base or any similar material that requires compaction will not prevent compaction of soils around the tree roots. Type 1 is also not very permeable to air and water and will limit the availability to roots. Therefore geogrid reinforced Type 1 is not suitable for tree root protection.

References

- Alberty CA, Pellet HM and Taaylor DH** (1984). Characterisation of soil compaction at construction sites and woody plant response. *Journal of Environmental Horticulture*, 2, 48-53.
- Lichter J M and Lindsay P A** (1994). The use of surface treatments for the prevention of soil compaction during site construction. *Journal of Arboriculture* 20 (4) July 1994.
- Pokharel SK, Han R, Parsons RL, Qian Y, Leshchinsky D and Halahmi I** (2009). Experimental study on bearing capacity of geocell-reinforced bases.
- Emersleben A and Meyer N** (2008) The Use of Geocells in Road constructions over Soft Soil: Vertical Stress and Falling Weight Deflectometer Measurements. EuroGeo4, Edinburgh, Scotland.
- Webster S L** (1981). Investigation of beach sand trafficability enhancement using sand-grid confinement and membrane reinforcement concepts. Geotechnical Laboratory, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi. Technical Report GL-79-20(2), February, 1981.

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The logo for Aspect Arboriculture, featuring the word "aspect" in a white, lowercase, sans-serif font. A thin, light blue diagonal line is positioned above the "p", extending from the right side of the letter "a" towards the right edge of the frame.

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