


RPS

**LAND PARCEL D, KINGSMERE,
BICESTER**

**ARBORICULTURAL METHOD
STATEMENT**

141003701DISC

10th November 2014

Our Ref: JSL2277_775

RPS

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JSL2277_702 & 703 &703

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1 INTRODUCTION

- 1.1 RPS was instructed by Persimmon Homes in October 2014 to prepare an Arboricultural Method Statement and Tree Protection Plan in respect of redevelopment proposals for land parcel D, Kingsmere, Bicester.
- 1.2 The Arboricultural Method Statement and Tree Protection Plan have been produced following a Tree Survey and Arboricultural Impact Assessment carried out by RPS in January 2014. All documents have been produced in accordance with the requirements set out in BS5837: 2012 'Trees in relation to design, demolition and construction – Recommendations'.
- 1.3 This report has been produced in response to planning application (ref: 14/00221/REM), condition 11, from Cherwell District Council Council which respectively states:

"Prior to the commencement of the development hereby approved, an Arboricultural Method Statement (AMS), undertaken in accordance with BS:5837:2012 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

Reason - To ensure the continued health of retained trees/hedges and to ensure that they are not adversely affected by the construction works, in the interests of the visual amenity of the area, to ensure the integration of the development into the existing landscape and to comply with Policy C28 of the adopted Cherwell Local Plan and Government guidance contained within the National Planning Policy Framework."

- 1.4 The purpose of the report is to:
- Specify measures for the protection of trees throughout development of the site and identify any necessary predevelopment tree works. Provide additional arboricultural information and advice in relation to the protection of trees throughout the development of the site.
 - Methods of construction / implementation within RPA of retained existing trees
 - Provide a Tree Protection Plan to detail the proposed protective measures to be taken in respect of the trees during development of the site.
- 1.5 The Tree Protection Plans JSL2277_702 & 703 & 703 identifies the following:
- Trees to be retained;
 - Trees and vegetation to be removed;
 - Alignment and design of protective fence;
 - Root Protection Area (RPA) of trees;
 - Methods of construction / implementation within RPA of retained existing trees

1.6 This report has been prepared by David Cox, a Professional Member of the Arboricultural Association and Chartered Landscape Architect of RPS.

2 SITE INFORMATION

- 2.1 The site under consideration is a land parcel as part of the wider Kingsmere urban extension, Bicester. The trees surveyed largely exist within a small copse central to the land.
- 2.2 The site is located at Ordnance Survey Grid Reference SP567222.
- 2.3 The site is bound to the north by modern residential housing which is accessed via Middleton Stoney Road and to the east by open fields (which will likely form part of the wider urban extension development). The western boundary is formed by an area of residential housing. The site has access points for pedestrians off a series of footpaths located to the north of the copse.
- 2.4 The site currently comprises of rough ground, with some areas of scrubby bramble growth. Within the northern part of the land a mature copse exists, this principally includes Horse Chestnut.

3 APPRAISAL AND RECOMMENDATIONS

Introduction

- 3.1 Trees have finite energy reserves, developed each year throughout the growing season, which are utilised for biological processes such as growth and defence against pests or diseases throughout the following year.
- 3.2 Any development in proximity to trees has the potential to cause harm to those trees unless control measures are identified and acted upon; as such it is essential to consider the relationship between the proposed development and the retained trees to identify what precautions are necessary, proportionate and appropriate.
- 3.3 Development has the potential to impact upon the above ground and below ground parts of trees. Construction activities have the potential to disturb the root system and damage tree canopies and the during construction phase the trees must be monitored and carefully managed in accordance with the checklist in the appendix of this document.
- 3.4 Whilst some damage that can occur, such as physical damage to the trees stems and branches from machinery movements, is clearly visible the impact from other aspects of work common on development sites which can have a significant effect upon the continued health of trees are not always immediately evident.
- 3.5 Damage that is not immediately evident but which can cause long term harm to retained trees includes things such as damage to the soil structure by compaction causing root damage and levels changes altering the water table and affecting moisture availability.
- 3.6 To minimise the potential for harm to occur to retained trees all works should be carried out with regard to the Tree Protection Measures detailed within this report.
- 3.7 In general it can be seen that, by adopting appropriate methods of working, precautionary and protective measures, significant harm to retained trees can be avoided.
- 3.8 In particular the establishment of a Construction Exclusion Zone (CEZ) by erection of Tree Protection Fencing will minimise the potential for harm to occur to retained trees.

Brief Description of Proposed Development

- 3.9 The proposed development of the site consists of new residential housing including private gardens, shared parking courts and public highways and footpaths. The scheme includes a number of open space areas and linear 'green corridors' extend north and south of the development.

Tree Removal

- 3.10 The proposed development will not directly require the removal of any trees on the site.

Arboricultural Implications

- 3.11 To ensure that the trees selected for retention can be successfully integrated within the proposed development the following factors have been considered.

Existing Canopy Spreads

- 3.12 Where the Root Protection Areas for retained trees do not extend to the edge of existing canopy spreads it is possible that those parts of the trees extending beyond the RPA fencing may sustain damage during construction.

Root Protection Areas

- 3.13 The Root Protection Areas for each tree surveyed have been determined in accordance with BS5837:2012 Table 2.
- 3.14 Initial Root Protection Areas for the trees have been plotted onto the Tree Protection Plans (Appendix 2) as circles, with the tree located centrally, extending to encompass the area of ground, and thus the rootable soil volume, required for protection.

4 TREE WORKS

Standard of Work

- 4.1 No significant works are required to realise the development. However, where required all tree works should be carried out in accordance with BS3998:2010 and latest arboricultural best practice and be undertaken by suitably qualified, competent and insured arboricultural contractors.

Timing of Works

- 4.2 All tree works shall be completed prior to commencement of any construction works on the site.
- 4.3 All works shall be timed to have regard to the phenological cycles of protected species that are associated with trees; notably birds and bats.

Tree Protection Fencing

- 4.4 The protective fencing is to be erected in accordance with the locations set out in a Tree Protection Plan in advance of any works.
- 4.5 The extent of tree protection fencing is shown on the attached plan JSL2277_702 & 703
- 4.6 Once the protective fencing is in place it must remain in situ throughout the course of the development until the completion of development.
- 4.7 Copies of the Tree Protection Plan shall be placed in the site office for reference by all site staff.
- 4.8 The Tree Protection Fence will be constructed using the heras 151 steadfast system. The system is a series of linked fence panels supported by concrete block feet. The panels will be secured to each other using at least two heraslock anti-tamper couplers, installed so that they can only be removed from inside the fence, and diagonal bracing of the structure would be achieved through the use of the heras steadfast strut secured using ground pins so that it is compliant with the guidance detailed within BS5387:2012 at 6.2.2.3.
- 4.9 Further details of the proposed fencing system to be utilised are shown within the brochure attached at Appendix 1.
- 4.10 Signs detailing the purpose of the protective fencing shall be attached to the fencing at 10m intervals. Such signs should be weatherproof and shall be substantially in the form of the specimen provided at Appendix 5. Signs must be replaced as necessary should they be removed or become illegible.
- 4.11 Following erection of the protective fencing and prior to commencement of the development it is recommended that an inspection of the site, by either the Council's Tree Officer or the Arboricultural Consultant, is arranged to confirm fencing has been installed in accordance with the Tree Protection Plan and any relevant conditions that may be attached to a grant of planning consent for the development.

Ground Protection

- 4.12 In addition to the erection of protective fencing consideration should be given to ground protection measures.
- 4.13 The ground protection measures must be installed prior to bringing any machinery or equipment on to the site in this area.

5 TREE PROTECTION MEASURES

Construction Exclusion Zone

- 5.1 The Construction Exclusion Zone (CEZ) as defined by the protective fence line shall be regarded as sacrosanct, and the protective fencing shall not be moved or taken down at any time.
- 5.2 Within the Construction Exclusion Zone there must be No mechanical digging or scraping, No alteration to existing ground levels including soil stripping, No earthworks, No handling or discharge of any chemical substance, concrete washings or of any fuels.
- 5.3 Furthermore vehicular or pedestrian access and the storage of any materials is prohibited within the Construction Exclusion Zone.
- 5.4 Additionally no materials that may contaminate the soil such as concrete mixings, diesel oil and vehicle washings shall be discharged within 10m of the stem of any tree and no fires shall be lit within 10m of the maximum extent of a trees crown.

Site Compounds and Materials Stores

- 5.5 Activities related to the establishment of a temporary site compound have the potential to impact upon retained trees by various means. In particular the storage and mixing of chemicals and materials such as concrete can have a damaging effect on tree health if precautions are not taken.
- 5.6 To prevent harm occurring to trees provision for materials storage, site offices, deliveries and other related activities should be made available in areas away from retained trees.
- 5.7 This area is indicated on the Tree Protection Plan JSL2277_702 & 703 & 703.

Monitoring

- 5.8 Following erection of the protective fencing and prior to commencement of the development an inspection of the site, by either the Council's Tree Officer or the Arboricultural Consultant, should be arranged to confirm fencing has been installed in accordance with the Tree Protection Plan and any relevant conditions that may be attached to a grant of planning consent for the development.
- 5.9 Further monitoring visits shall be carried out following implementation of the works on site, ideally on at least a bimonthly basis.

Reporting

- 5.10 Should any arboricultural issues become apparent during the works the site manager should immediately contact the Arboricultural Consultant or the Council's Tree Officer for advice upon how to proceed.

6 ARBORICULTURAL CHECKLIST

Ref	Work Activity	Schedule of Works	Refer	Recommendations
General site works and tree related operations				
01	Pre-start site meeting	Pre-start site meeting with LPA tree officer, site manager, client representative and arboriculture consultant to agree scope of any works, where required.		
02	Protect trees to be retained	Barriers should be fit for the purpose of excluding construction activity, and should remain rigid and complete. Barriers are to be located in accordance with RPS Tree Protection Plans.	BS 5837:2012 Trees in relation to design, demolition and construction: Figure 2 & 3 RPS Tree Removal and Protection Plan JSL2277_702 & 703	Ongoing monitoring by appointed person
03	Protective fencing to be inspected by LPA (if required)	CA to give LPA at least 2 working days notice of the erection of the temporary protective fencing.		Appointed person to contact LPA prior to completion of fencing.
04	Maintain the temporary protective fencing	CA to ensure the temporary protective fencing is maintained throughout the entire construction period and record any breach of the tree protection.	BS 5837:2012 Trees in relation to design, demolition and construction Fig.2 & 3 RPS Tree Removal and Protection Plan JSL2277_702 & 703	Appointed person responsible for arboricultural protection measures shall monitor fencing bimonthly , recording details
Specific tree and construction works				
05	Works within the Root Protection Area (RPA) <u>Trial trenches</u>	Adopt hand dig methods for completion of exploratory trenches to avoid damage to roots. Complete trial trenches prior to reducing ground levels for the construction of the Adoptable road. Any roots greater than 25mm diameter shall be reviewed by an arboriculturalist prior to tasking further works and/or root pruning. Where limited root pruning is unavoidable it	Arboricultural Association Standard Conditions Of Contract And Specifications For Tree Works (2008) Edition BS 3998:2010 Tree Work APN 12 'Through the Trees to Development' RPS Tree Protection Plan JSL2277_702 &	All tree work should be carried out by a suitably tree qualified tree surgeon, preferably an Arboricultural Association approved contractor.

Ref	Work Activity	Schedule of Works	Refer	Recommendations
		<p>should be made at a suitable place within the root system, avoiding damage to surrounding tissue. Final pruning cuts shall be made at right angles to the axis of the root. The final cut wound should be smooth and as small as possible, free from ragged torn ends.</p> <p>Where root pruning is required to roots over 25mm in diameter, works should be overseen by a suitably qualified Arboriculturalist. Any root pruning should be completed in accordance with BS 3998:2010.</p>	703	
06	<p>Works within the Root Protection Area (RPA)</p> <p><u>Road construction works (Adoptable standard) within RPA areas</u></p>	<p>Adopt the use of small plant to avoid damage to roots.</p> <p>Any roots greater than 25mm diameter shall be reviewed by an arboriculturalist prior to tasking further works and/or root pruning.</p> <p>Where limited root pruning is unavoidable it should be made at a suitable place within the root system, avoiding damage to surrounding tissue. Final pruning cuts shall be made at right angles to the axis of the root. The final cut wound should be smooth and as small as possible, free from ragged torn ends.</p>	<p>Arboricultural Association Standard Conditions Of Contract And Specifications For Tree Works (2008) Edition</p> <p>BS 3998:2010</p> <p>Tree Work APN 12 'Through the Trees to Development'</p> <p>RPS Tree Protection Plan JSL2277_702 & 703</p>	<p>Ongoing monitoring by appointed person</p> <p>All tree work should be carried out by a suitably tree qualified tree surgeon, preferably an Arboricultural Association approved contractor.</p>
07	<p>Soft landscape works within the Root Protection Area (RPA)</p>	<p>Heavy mechanical soil cultivation techniques are not to be carried out within the RPA. Any cultivation should be carried out by hand or pedestrian controlled light machinery to minimise damage to tree roots. Existing ground levels within the RPA should be maintained.</p>	<p>BS 5837:2012 Trees in relation to design, demolition and construction: Section 8</p> <p>RPS Tree Protection Plan JSL2277_702 & 703</p>	

TABLES, FIGURES & APPENDICES

TABLE

Table 1: Tree Survey Data

Tree Survey Schedule

Site Parcel ID, Bicester
 Project schedule ref: JSL2277_750
 Drawing reference: JSL2277_700 & 701
 Survey date: 09.12.13

Surveyor: DC
 Status: For information
 Revision: 1



Notes: Tag numbers located on trees differ from reference numbers listed below.

Ref. no.	Species	Height (m)	Crown spread (m)				Stem dia. (m)	Stem no. at 1.5m	Height of crown clearance (m)	Dir/ height	Age class	Structural Physiological condition	General observations Management recommendations	Estimated remaining contribution (years)	Tree Quality Category (BS5837)
			N	E	S	W									
1	Fraxinus excelsior Common Ash	13.0	9.0	8.0	9.0	7.0	0.75	1.00	2.00	S	M	Fair/Good	Old hedgerow Ash, hedge now removed. Some deadwood, snags. Large fruiting body at root flare, other dieback indications. Monitor future vigour.	+ 20	B2
2	Aesculus hippocastanum Horse Chestnut (Tag No. 1068)	20.0	7.0	6.0	3.0	5.0	0.8 0.65	2.00	5.00	N	M	Good	Central to copse, crown bias to north, Twin stem from 0.6m.	+ 40	B2
3	Aesculus hippocastanum Horse Chestnut (Tag No. 1069)	20.0	4.0	3.0	3.0	3.0	0.80	1.00	7.00	-	M	Poor/Fair	Central tree, tight columnar form. Lacking vigour.	+ 20	C2
4	Aesculus hippocastanum Horse Chestnut (Tag No. 1070)	15.0	7.0	7.0	7.0	4.0	0.95	1.00	3.50	E	M	Good	Evergreen edge of copse, broad crown, biased to east, Some deadwood.	+ 40	B2
5	Aesculus hippocastanum Horse Chestnut (Tag No. 1071)	18.0	6.0	8.0	8.0	5.0	0.5 1.2	2.00	3.00	E	M	Good	Huge bole, contoured frame, contact unions in lower scaffold. Widespread amenity. Bat potential, storm snags.	+ 40	A2
6	Aesculus hippocastanum Horse Chestnut (Tag No. 1072)	16.0	2.0	4.0	5.0	2.0	0.6 0.3	2.00	5.00	S	MA	Good	Edge of copse, twin stem from 0.5m. Heavy crown bias to south east.	+ 20	C2
7	Aesculus hippocastanum Horse Chestnut (Tag No. 1073)	20.0	6.0	7.0	10.0	10.0	1.10	1.00	3.00	S	M	Fair/Good	Huge buttress, mature chestnut, crown bias to south, Various attached deadwood snags. Some ivy.	+ 20	A2/3
8	Aesculus hippocastanum Horse Chestnut (Tag No. 1074)	15.0	4.0	4.0	5.0	4.0	0.90	1.00	3.00	-	OM	Poor	Dead or nearly dead. Edge of copse, reduce to wildlife hulk/tower. Retain insect box at 1.6m.	<5	U
9	Aesculus hippocastanum Horse Chestnut (Tag No. 1075)	20.0	7.0	7.0	8.0	7.0	0.80	1.00	3.00	S	M	Good	Maiden form, bird box.	+ 40	B2
10	Acer pseudoplatanus Sycamore	11.0	1.0	2.0	4.0	2.0	0.55	1.00	3.00	S	OM	Poor	Dead standing hulk, woodpecker/bat potential. Retain as wildlife tower. (Tag No. 1076)	<5	U
11	Aesculus hippocastanum Horse Chestnut (Tag No. 1077)	24.0	8.0	8.0	8.0	8.0	1.50	1.00	3.00	S	M	Good	Fine chestnut, huge buttress flare. Bifurcates at 2m. Storm snags at 2.5m.	+ 40	A2

Note: This survey is based on a brief visual inspection from the ground. It is not intended as a full arboricultural inspection.
 # - Indicates estimated / offsite tree

Tree Survey Schedule

Site Parcel D, Bicester
 Project schedule ref: JSL2277_750
 Drawing reference: JSL2277_700 & 701
 Survey date: 09.12.13

Surveyor: DC
 Status: For information
 Revision:



Notes: Tag numbers located on trees differ from reference numbers listed below.

Ref. no.	Species	Height (m)	Crown spread (m)				Stem dia. (m)	Stem no. at 1.5m	Height of crown clearance (m)	Dir/height	Age class	Structural Physiological condition	General observations Management recommendations	Estimated remaining contribution (years)	Tree Quality Category (BS5837)
			N	E	S	W									
12	Acer pseudoplatanus Sycamore (Tag No. 1078)	18.0	2.0	2.0	4.0	4.0	0.47	1.00	4.50	S	MA	Good	Edge of copse, crown bias to south west.	+ 40	C2
13	Aesculus hippocastanum Horse Chestnut (Tag No. 1079)	20.0	7.0	7.0	4.0	7.0	0.5 0.85	2.00	4.00	N	M	Good	Central to copse, tri stem with contact wood in lower frame. Bat box, some occluding lower wounds.	+ 40	B2
14	Aesculus hippocastanum Horse Chestnut (Tag No. 1080)	20.0	9.0	6.0	4.0	7.0	0.6 x 3	3.00	1.50	N	M	Good	Northern edge of copses in stem from 0.5m. Contact wood throughout. Ivy clad.	+ 40	B2
15	Acer pseudoplatanus Sycamore (Tag No. 1081)	17.0	3.0	4.0	8.0	3.0	0.3 0.5	2.00	3.50	S	MA	Fair/Good	Twin stem from 1.6m, squirrel damage. Some deadwood snags.	+ 40	C2
16	Acer pseudoplatanus Sycamore (Tag No. 1082)	17.0	3.0	4.0	8.0	3.0	0.55	1.00	5.00	-	MA	Fair	Close pairing, both trees suffering from squirrel damage. Some ivy/deadwood.	+ 20	C2
17	Acer pseudoplatanus Sycamore (Tag No. 1083)	17.0	3.0	4.0	8.0	3.0	0.35	1.00	5.00	S	MA	Poor/Fair	Close pairing, both trees suffering from squirrel damage. Some ivy/deadwood.	+ 10	C2
18	Acer pseudoplatanus Sycamore (Tag No. 1084)	16.0	2.0	2.0	5.0	5.0	0.50	1.00	4.00	S	OM	Poor	Dead standing tree, reduce to wildlife tower.	< 5	U
19	Aesculus hippocastanum Horse Chestnut (Tag No. 1085)	20.0	4.0	4.0	6.0	4.0	0.35 0.4 0.5	3.00	2.00	-	M	Good	Tri stem from 0.6m, tight/contact forks.	+ 40	B2
20	Aesculus hippocastanum Horse Chestnut (Tag No. 1086)	20.0	7.0	8.0	8.0	8.0	0.35 0.9	2.00	2.00	N	M	Good	Fine chestnut central to copse, bat box.	+ 40	A2
21	Aesculus hippocastanum Horse Chestnut (Tag No. 1087)	25.0	12.0	8.0	8.0	8.0	1.10	1.00	2.00	N	M	Good	Fine chestnut on northern side of copse. Widespread amenity.	+ 40	A2
22	Aesculus hippocastanum Horse Chestnut (Tag No. 1088)	18.0	12.0	2.0	4.0	2.0	0.55	1.00	1.50	N	M	Fair	Northern edge of copse, long hazard beam to north, monitor.	+ 20	C2

Note: This survey is based on a brief visual inspection from the ground. It is not intended as a full arboricultural inspection.
 # - Indicates estimated / offsite tree

Tree Survey Schedule

Site: Parcel D, Bicester
 Project schedule ref: JSL2277_750
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 Survey date: 09.12.13

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Ref. no.	Species	Height (m)	Crown spread (m)				Stem dia. (m)	Stem no. at 1.5m	Height of crown clearance (m)	Dir/height	Age class	Structural Physiological condition	General observations Management recommendations	Estimated remaining contribution (years)	Tree Quality Category (BS5837)
			N	E	S	W									
23	Aesculus hippocastanum Horse Chestnut (Tag No. 1089)	22.0	7.0	4.0	6.0	8.0	0.6 X 3	3.00	2.00	W	M	Good	Tri stem from ground level, western edge of copse.	+ 40	B2
24	Aesculus hippocastanum Horse Chestnut (Tag No. 1090)	22.0	10.0	6.0	4.0	8.0	1.05	1.00	1.00	NW	M	Good	Fine chestnut, few pruning stubs. Widespread amenity, bird box.	+ 40	A2
25	Aesculus hippocastanum Horse Chestnut (Tag No. 1091)	24.0	6.5	6.5	6.5	6.5	1.05	1.00	2.00	N	M	Fair/Good	Towering chestnut, huge storm wound to north at 2.5m, hollow wound including internal decay-monitor.	+ 20	A2
W1	Aesculus hippocastanum, Acer pseudoplatanus, Ligustrum ovalifolium, Ulmus procera, Sambucus nigra, Fraxinus excelsior, Crataegus monogyna	20.0	See plan				-	-	-	-	M	Good	Principally chestnut copse, recent management resulting in various deadwood piles, bat/bird boxes and wildlife towers. Most larger individuals surveyed separately. Potential to plant other forest species such as Hazel, Oak, Field Maple.	+ 40	A2/3
H1	Crataegus monogyna, Rosa canina, Fraxinus excelsior	2.0	See plan				-	-	-	-	M	Fair	Mixed field hege, sparse cover, managed to 2m high.	+ 40	C2/3

Note: This survey is based on a brief visual inspection from the ground. It is not intended as a full arboricultural inspection.
 # - Indicates estimated / offsite tree

FIGURE 1

Tree Protection Plans

JSL2277_702 & 703 &703

APPENDIX

Appendix 1 - Root Protection Area Fencing Details

Protective Fencing Specifications

Since trees are living organisms which interact with their immediate environment any changes made to their surroundings may have a bearing on that trees future. Developing a site will undoubtedly place any trees within close proximity under some level of stress, which could predispose them to infection.

The most effective way of offering protection is by erecting protective barriers set at a distance from the tree stem using the methods given within BS 5837: 2012 Trees in Relation to Construction. Barriers should be braced and constructed to resist impacts; see figures below for barrier specifications.

Barriers should be erected before any works commence on site with the exception of recommended tree work. Areas of retained and future structure planting should be similarly protected.

All personnel should be made aware of the protected areas and instructed to keep them free of materials, waste and excess soil. Soil disturbance should be prohibited and travel of any kind, including foot traffic should also be excluded within the root protection area (RPA) unless previously agreed and adequate ground protection has been installed. Where foot traffic is agreed within the RPA, single thickness scaffold boards laid over a compressible material on a geotextile, or supported by scaffold should suffice. Where vehicular access through the RPA is agreed an engineer should be consulted to design adequate ground protection methods.

Suggested Barrier Specification (as per BS5837: 2012)

Figure 1

Figure 2 Default specification for protective barrier

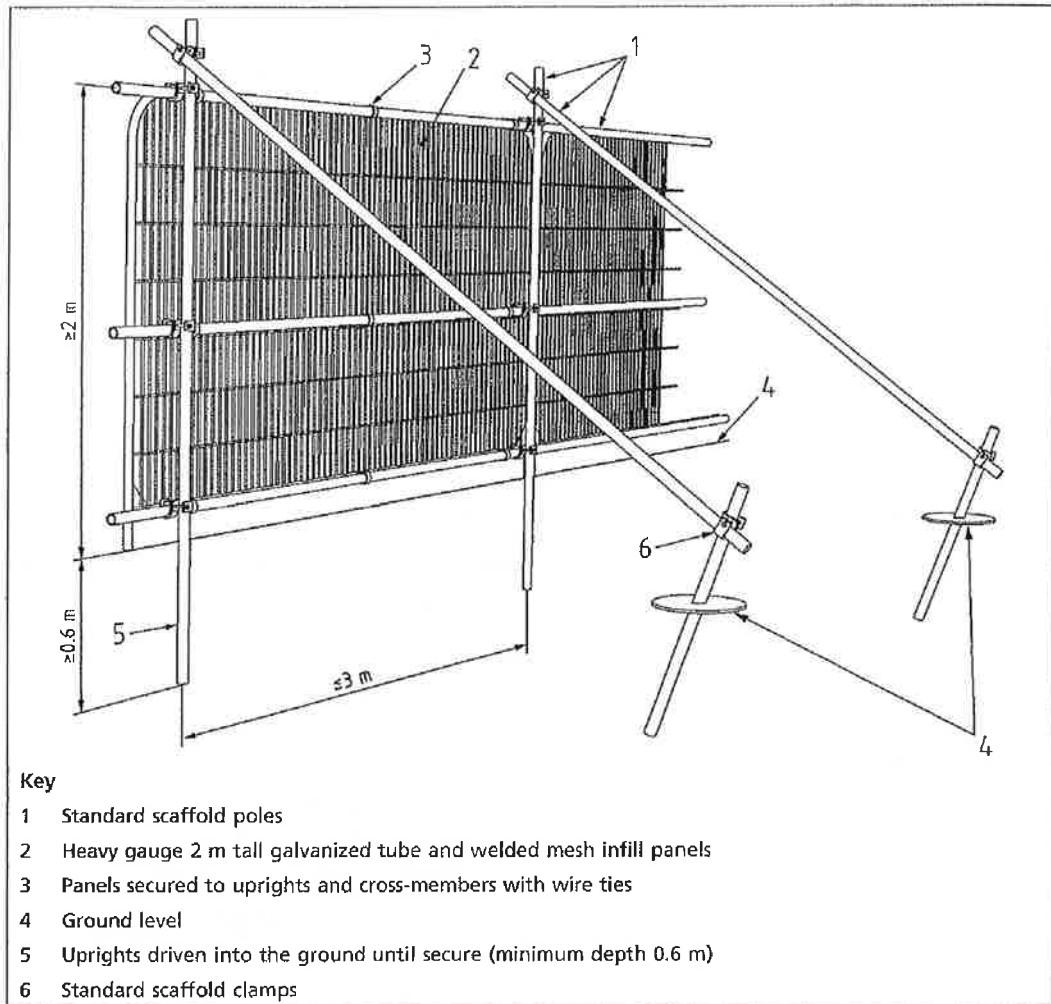
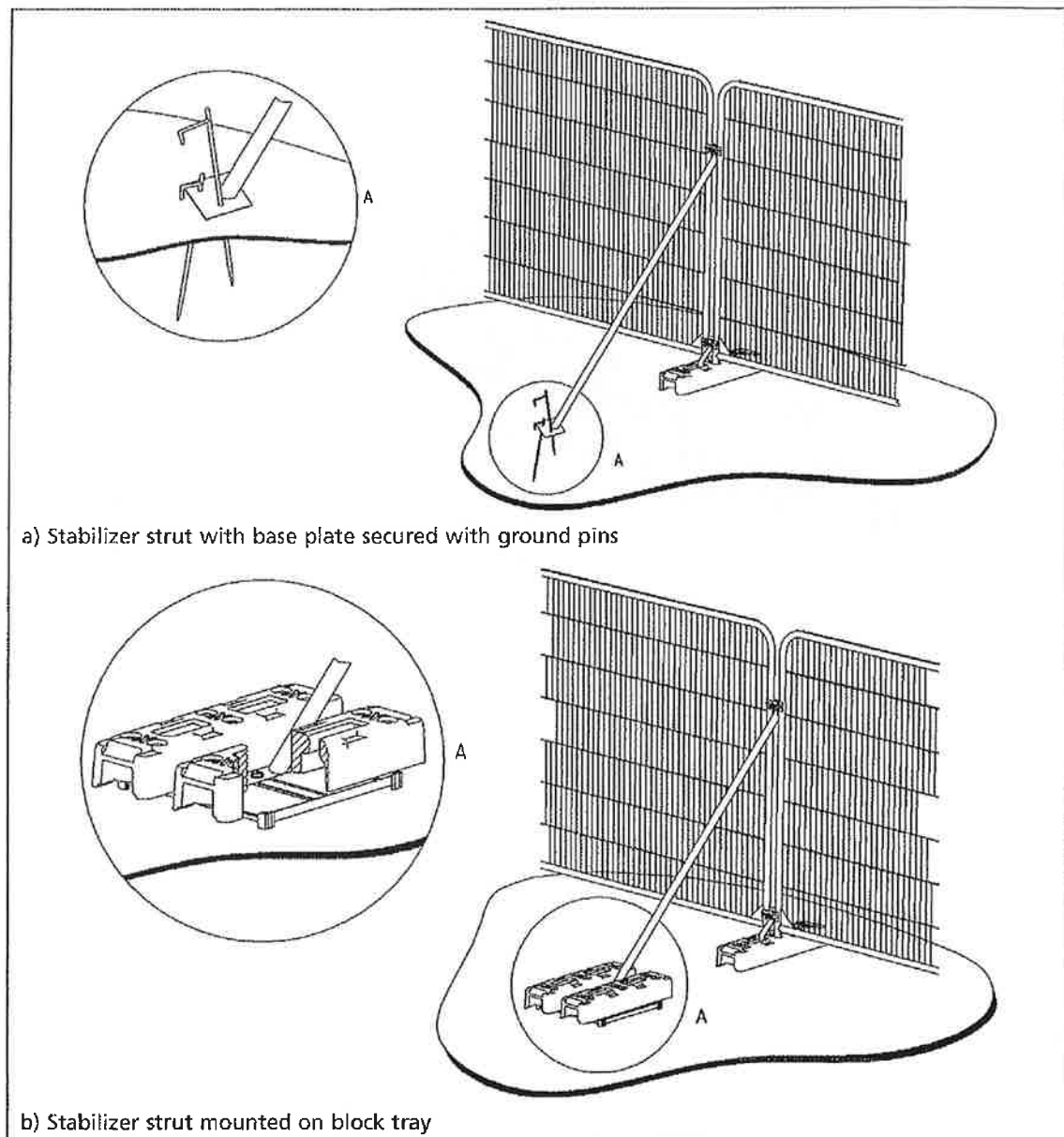


Figure 2

Figure 3 Examples of above-ground stabilizing systems



APPENDIX

Appendix 2 - Arboricultural Glossary

Abiotic Factors - Nonliving factors of the environment, including temperature & wind.

Age-class - A general classification of the tree into either - young, semi-mature/maturing, mature, over-mature, or senescent.

Apical Bud/Shoot – The apical bud, also known as the leading shoot, is responsible for shoot extension and is dominant.

Apical Dominance – A singular, leading shoot remains dominant.

Arboreal - In connection with, or in relation to, trees.

Arboriculturalist – Person who has, through relevant education, training and experience, gained recognised qualifications and expertise in the field of trees in relation to construction.

Arboricultural Implications Assessment (AIA) – Study, undertaken by an arboriculturalist, to identify, evaluate and possibly mitigate the extent of direct and indirect impacts on existing trees that may arise as a result of the implementation of any site layout proposal.

Arboricultural Method Statement (AMS) – Methodology for the implementation of any aspect of development that has the potential to result in the loss of or damage to a tree. Note The AMS is likely to include details of an on-site tree protection monitoring regime.

Biotic factors - Living factors. For example, animals and pathogens.

Bottle Butt – Term used to describe shape of stem base, usually associated with an internal defect – refer to 'Reaction Wood' below.

Branch union/junction - The point at which a branch joins a larger stem. Can be a point of weakness, especially in certain species.

Cambium - A lateral meristem (see below) in vascular plants located just beneath the bark responsible for secondary growth, e.g. production of annual growth rings.

Canker – A clearly defined area of dead and sunken or malformed bark, caused by bacteria or fungi. Can have a bearing on structural integrity of infected limb(s) depending on size and location.

Chlorosis/Chlorotic – Abnormal yellow or yellow-green coloration of usually green leaves. Essentially a reduction of chlorophyll levels often as a result disease or nutrient deficiency.

Co-dominant stems - A growth characteristic, where two or more stems of similar size grow from the same point. Can create an inherent weakness.

Compaction - The compressing & hardening of soil around tree root systems, due to vehicular/pedestrian use etc. Loss of pore space between soil granules limits water movement and gaseous exchange, and inhibits root growth.

Competent person – Person who has training and experience relevant to the matter being addressed and an understanding of the requirements of the particular task being approached

Note 1 A competent person understands the hazards and the methods to be implemented to eliminate or reduce the risks that can arise. For example, when on site, a competent person is able to recognise at all times whether it is safe to proceed.

Note 2 A competent person is able to advise on the best means by which the recommendations of this British Standard may be implemented.

Condition – Assessment based on a visual and professional view giving consideration to many factors such as tree health, structural integrity and suitability of its position.

Construction Exclusion Zone – Area based on the RPA (in m²), identified by an arboriculturalist, to be protected by development, including demolition and construction work, by the use of barriers and/or ground protection fit for purpose to ensure the successful long-term retention of a tree.

Coppice - The method of managing trees by cutting the stems at between 1.0 inch and 1.0 foot from the ground level on a regular cycle, the cut stumps of the trees or shrubs are allowed to re-grow many new stems.

Crown spread - Gives distances between extreme limits of the crown and the stem, usually along the four compass points. Helps to show crown symmetry.

Crown Reduction – The removal of branch ends to reduce the extreme limits of a trees branch spread and height.

Crown Thin – The removal of selected branches within the crown to thin the internal branch structure.

D.B.H. - 'Diameter at Breast Height', an industry standard to gauge tree stem size and development. Within arboriculture, breast height is taken to be 1.5m above ground level.

Dieback - The reduction in crown vigour and extension growth progressing to death of distal parts; often associated with decline.

Epicormic/adventitious growth - New growth from dormant buds that can often form tenuous attachments. Although some species readily form such shoots, it can be an indication of stress.

Feathered Whip – Size of tree for planting, usually ranging from 1.25m to 2.5m in height.

Form - A general assessment of the shape and position of the tree within its' environment.

Frass – Debris such as bore dust left by wood boring insects.

Hanger – Term used to describe a branch that has become detached and is being supported by other branches. Can be a hazard to persons and property below.

Hazard Beam – After the loss of a distal part, a limb concentrates growth upwards creating adverse end weights that can render the limb susceptible to failure.

Heavy Standard – Size of tree for planting, usually above 3.5m in height.

Included bark – Growth characteristic usually caused when two or more stems/branches growing in close proximity 'fuse' together entrapping the bark from when the parts were separate in the middle, creating a structural weakness.

Meristem - The undifferentiated plant tissue from which new cells are formed, such as that at the tip of a stem or root.

Meristematic Disorder – A growth disorder caused by a disruption of the meristem (see above) from any of a number of biotic factors (see above). Manifests as growths such as 'Witches Brooms' & 'Galls'.

Necrosis/Necrotic – Death of tissues usually characterised by a blackening in colour.

Occlusion/Occluded – Normally used to describe the overgrowth of a wound. Also, immovable foreign objects in contact with a tree part can become encased or 'occluded' by the tree as it grows incrementally.

Pathogen - An agent that causes disease, especially a living microorganism such as a bacterium or fungus.

Plasticity index - The table used to calibrate the shrinkability of a clay soil.

Pollard – The removal and subsequent regular re-removal of the crown of a tree above animal browsing height. Can be an effective method of controlling the size of trees in urban areas. This is ideally begun in the trees early stages and maintained throughout its life.

Reaction wood - Essentially additional wood laid down by the tree to compensate for structural defects such as cavities.

Ring barking/Girdling – the removal of bark around the entire circumference of a stem or branch, causing the death of all distal parts.

Root Protection Area (RPA) – Layout design tool indicating the area surrounding a tree that contains sufficient rooting volume to ensure the survival of the tree, shown in plan form in m².

Saprophyte – An organism which exists on dead plant material.

Scaffold branches - The main structural branches within the crown.

Services – Any above ground and piped and/or ducted underground infrastructure including water main, electricity supply, gas supply, fibre optic utilities, telecommunications cabling, storm and foul water drainage, including temporary storage for run-off, pumping stations, interceptors and other allied buried structures.

Shrinkable clay – Clay soil which alters in volume depending on moisture content. Property sited on shrinkable clay can suffer subsidence damage due to soil desiccation; this can be due to the water uptake of nearby vegetation, including trees.

Special engineering – design of a structure with the physiological requirements of trees as the priority.

Standard – Size of tree for planting, usually ranging from 2m to 3.5m in height.

Structure – Man-made object, such as a building, carriageway, path, wall, services, and built and excavated earthworks.

Transplant – (1) size of tree for planting, usually ranges from 0.2m to 0.9m in height (2) the relocation of a tree or shrub including a given portion of the root system.

Tree Constraints Plan (TCP) – Plan prepared by an arboriculturalist for the purposes of layout design showing the RPA and representing the effect that the mature height and spread of retained trees will have on layouts through shade, dominance, etc.

Tree protection plan – scale drawing prepared by an arboriculturalist showing the finalised layout proposals, tree retention and tree and landscape protection measures detailed within the arboricultural method statement (AMS), which can be shown graphically.

U.L.E – 'Useful Life Expectancy' is an estimate based on currently known factors of the possible remaining life of the tree as an asset.

Veteran tree – Tree that, by recognised criteria, shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned.

Vigour - A general classification, as to the present and future potential growth and development of a tree. A comment regarding the health status of the tree specific to its species.

Water Demand - A generic classification of the water demand of specific species as outlined by the NHBC (National House Building Council).

Whip – Size of tree for planting, usually ranging from 1m to 1.75m in height.

APPENDIX

Appendix 3 - Hard Surface Installation Methodology

The following methodology sets out the requirements and stages in construction of new hard surfaces in relation to existing trees.

This methodology is not meant to be considered as a specification and whilst examples of products that meet the arboricultural requirements for the installation of hard surfacing adjacent to trees are given the final construction detail must be designed by a suitably qualified and experienced engineer, whilst ensuring the arboricultural requirements are met, to ensure that the finished surface is fit for purpose.

In this respect it should be noted that Geosynthetics Limited, who supply cellular confinement systems, offer a design service to develop site specific solutions.

Arboricultural Requirements

Wherever it is intended to undertake demolition or construction operations within the Root Protection Areas of trees precautions must be taken to maintain the condition and health of trees root systems.

In particular:

- Works shall be conducted in such a manner as to prevent physical damage to roots during demolition or construction, such as soil compaction or root severance.
- Provision for water and oxygen to reach the roots must be made and the soil structure must not be disturbed.
- Provision must be made for future root growth and precautions taken to ensure that such root growth does not cause unacceptable levels of damage to the finished construction.
- The soil must not be compacted and soil bulk density must be maintained at suitable levels for tree root growth and function. In this respect a soil bulk density of over 1.8g/cm³ will impede root growth and function.

To achieve the above requirements for tree root growth and function the surface shall be designed so that:

- No excavation is required for their installation; to ensure that physical root damage does not occur.
- The surface can be installed without compaction of the existing soils; thus ensuring damage to the soil structure does not occur.
- The surface is permeable; thus ensuring that oxygen and water can reach the root system and that CO₂ can diffuse vertically out of the soil as high concentrations can cause root suffocation.

There are various methods of creating such a surface however one that is commonly in use and is therefore recommended here is the use of a three dimensional cellular confinement system to provide for load suspension above the existing soil grade and reducing vertical loads on the underlying soils. One such product is CellWeb produced by Geosynthetics.

Prior to installation of any new surfacing the following factors shall be considered:

- The exact location of the area to receive the special surfacing shall be determined.
- The area should be investigated to identify any existing services.
- The area shall be fenced off with tree protection fencing until installation of the special surfacing is to take place. Such installation should generally be phased to occur following substantial completion of the development.
- The final surface shall be decided upon, the surface must be permeable and several options for final surfacing are considered in the following section.

Methodology for Surface Installation

Prior to the installation of the new surface, existing ground cover and surface vegetation should be killed using an appropriate herbicide.

Specialist advice should be sought in order to determine the most appropriate herbicide to use due to the potential for leaching through soils and the potential impacts that this will have on retained vegetation.

As an alternative or addition to herbicide treatment the existing surface vegetation may be carefully removed by using hand tools.

All dead organic matter is to be removed by hand following herbicide treatment to prevent anaerobic conditions, as a result of the decomposition of dead vegetation, occurring.

All major protrusions such as rocks shall be removed by hand and all tree or shrub stumps from removed vegetation shall be ground out to minimise ground disturbance.

The soil surface **must not** be skimmed or stripped to achieve a level surface and where necessary major hollows shall be filled using a granular fill, such as no-fines gravel, washed aggregate or cobbles, to achieve a level surface.

In some cases it may be appropriate to consider the removal of the top layers of soil by non mechanical means to achieve desired levels, establish rooting patterns and potentially provide for some embedding of the new surface into the existing ground level. Such works shall be completed using pneumatic soil excavation techniques and the works must be supervised by an Arboricultural consultant. The need for such works to occur shall be considered during the detailed design of the surface.

Following surface preparation the soil shall be covered by a permeable geotextile to prevent the cellular confinement fill from migrating into the existing soils.

The geotextile layer shall be laid with overlaps of 300mm beyond the edge of the proposed construction and shall be temporarily retained with pins, stakes or weights.

The cellular confinement system shall then be installed and fixed in position in accordance with the manufacturer's recommendations.

The cellular confinement system shall then be filled with the specified aggregate in accordance with the manufacturer's recommendations. All works involved in the filling of the system with aggregate must be completed by hand and be supervised by the site supervisor.

The infill aggregate shall then be rolled or whacked to ensure cohesion of the granular fill with the cellular confinement system.

The desired finished surface shall then be installed. This shall be permeable and gas porous. Options for the type of finished surface are:

- Washed gravel – This retains porosity unless excessively consolidated and will be particularly useful where the final surface is not level. However it may not be suitable in areas with high pedestrian and vehicular passage. If gravel is used, this shall be distributed in a 75mm layer over the exposed infill aggregate.
- Paving slabs / brick paviours – These shall be laid dry jointed on a bed of sharp sand to allow air and moisture to permeate. Specialist slabs and paviours with inbuilt infiltration holes may be used.
- Tarmacadam – This shall not be used where it will cover over 20% of a trees Root Protection Area.

Following completion of the hard surface protective fencing shall be erected around the trees until the completion of development.

APPENDIX

Appendix 4 - Design Considerations for New Planting

This section of the report is designed to provide guidance on the factors to be considered for any new tree planting that may be carried out as part of the proposed development.

All new tree planting proposals should take into consideration the future use, layout and design of the site, constraints of soil and climate, the local landscape character and the context of the local surroundings.

As trees generally form the dominant elements of the long-term landscape structure of a site careful consideration of their ultimate size, form, habit, colour, density of foliage and maintenance obligations should be given.

In addition it is important to consider a number of site specific factors regarding the proposed location of new trees. In particular it is inadvisable to plant trees at distances closer to a structure than those shown in the table below (ref: BS5837:2005 Table 3) unless special precautions have been taken. Additionally, on shrinkable soils, account should be taken of the foundation type of existing and proposed nearby structures; new planting should not compromise the structural performance of the foundation.

Minimum distance (m) between young trees or new planting and structures to avoid direct damage to a structure from future tree growth.				
Type of structure	Diameter of stem at 1.5m above ground level at maturity			
	<30cm	30-60cm	>60cm	
Drains and underground services	<1m Deep	0.5	1.5	3
	>1m Deep	-	1	2
Masonry boundary walls*	-	0.5	1	
	-	(1.0)	(2.0)	
In situ concrete paths and drives*	-	0.5	1.5	
	(0.5)	(1.0)	(2.5)	
Paths and drives with flexible surfaces or paving slabs*	-	0.5	1	
	(0.7)	(1.5)	(3.0)	
* These distances assume that some movement and minor damage might occur. Guidance on distances which will generally avoid all damage is given in brackets.				

Where planting new trees adjacent to buildings it is important to also consider the effect of shade and the likely extent and density of the trees crown when fully grown.

Where planting adjacent to roads and within car parks the siting and species selection of the trees should take into account other highway design considerations such as sight lines, lighting schemes, CCTV, underground and overhead service routes and signage. The likelihood of such features to be obstructed or damaged by future tree growth should be considered and consideration to periodic maintenance requirements made.

Trees should not be planted where they might obstruct overhead power lines or cables. In new development underground services should be ducted or otherwise protected (e.g. by the use of root barriers to reduce the risk of root intrusion into service runs) at the time of construction to enable trees to be planted nearby without conflict.

Ground works and preparation for new planting should take into account guidance contained within BS4428 – Code of practice for general landscape operations. In particular the following factors should be considered:

Drainage

New development may have an effect upon the existing drainage pattern and ground water levels of a site. Where ground water conditions are liable to such change expert advice on both drainage and tree selection should be sought.

Soil Conditions

Before any of the landscape operations listed in BS4428 are undertaken and where contamination is apparent soils in areas to be planted should be analysed for structure and content by a specialist laboratory and expert advice taken on remediation measures.

If contaminants (e.g. oil, diesel, toxic materials, heavy metals, etc) are present soils should either be removed to the full depth of new planting and new soil imported or expert advice on remediation measures should be obtained.

Where the structure of the soil is in an unsuitable condition to encourage growth remediation measures, such as the physical decompaction of soil by mechanical plant or compressed air injection, the incorporation of bulky additive materials or the installation of new drainage systems, may be required.

Surfaces around Newly Planted Trees

The settlement of soil within tree pits, which occurs gradually after planting, may cause the overlying surface to move. This may result in the partial collapse or instability of paved surfaces or the disruption of flexible surfaces. The unpaved area around new plantings should, therefore, be of an adequate size to enable surrounding paving to be retained by a conventional edging and foundation. Due allowance should be made for the future growth of stem and roots of a tree when considering the finished dimensions and the design of edge or kerb treatments of tree pits and planted areas.

Where load bearing paving is to be laid over a tree pit it should either:

- be laid when the soil has settled and the level made good; or,
- be laid on a supported foundation that spans the tree pit; or,
- incorporate a tree grille with appropriate support around the edges; or
- utilise structural soil.

In all cases any surface over a tree pit must be permeable to allow adequate moisture infiltration and gaseous exchange.

The use of specialist geo-textiles, cellular confinement systems and structural soils should be considered in the design of any tree pit.

Where there is any risk of a tree pit receiving surface water run off that may be contaminated, for example by rock salt, fuel spillages or other materials harmful to plants, paving should be designed and laid to fall away from the pit.

Maintenance of newly planted trees is of particular importance to ensure their long term survival. A detailed maintenance schedule covering the establishment period should be prepared in conjunction with the landscape design proposals and arrangements made for its implementation.

APPENDIX

Appendix 5 – Construction Exclusion Zone (CEZ) Sign



