E P BARRUS LIMITED

Launton Road, Bicester

ARBORICULTURAL METHOD STATEMENT

8569_AMS.001 REV B
JULY 2013

CONTENTS

APPENDICES

1 INTRODUCTION

1.1 Background

1.1.1 Aspect Arboriculture has been instructed to prepare an Arboricultural Method Statement (hereafter the AMS) to inform development works at land off Launton Road, Bicester.

1.2 Scope

1.2.1 This AMS has been prepared in direct response to 3no. Conditions issued under application number 12/01651/F concerning arboriculture. Collectively, Condition nos. 7, 8 and 9 require the preparation of an Arboricultural Method Statement and supporting Tree Protection Drawing relating to the extension of an existing car park. Pursuant to these Conditions, the explicit purpose of this document 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 It is our understanding that this work will be submitted to, and approved by, Cherwell District Council prior to the commencement of any development works on site. Once approved, the works should be implemented as specified and maintained to the LPA's reasonable satisfaction until completion of the development.

1.2.3 This work relies upon the detail of a tree survey informed by BS 5837:2012 'Trees in Relation to Design, Demolition and Construction' (refer to Appendix A).

1.3 Limitations

1.1.1 This work relates to arboriculture therefore reliance should not be given to comments made in respect of other disciplines i.e. Landscape and structural engineering, without first referencing an appropriate expert.

1.1.2 This assessment has been prepared in respect of proposed development 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 therefore 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.

1.1.3 There are no known statutory Constraints relating to arboriculture, i.e. conservation area Status or Tree Preservation Order.

2 ESSENTIAL WORK

2.1 Tree Protection Plan

2.1.1 Our assessment of the proposed development in relation to the existing trees is presented as a Tree Protection Plan (refer to Appendix B). This assessment is based on the finalised scheme of development.

2.1.2 The TPP identifies: A) those trees that it is necessary to remove in order to implement development, B) precautions and protective measures to be adopted during construction, and C) any feature of the proposed development that should be managed to prevent the potential loss of, or damage to, retained trees.

2.1.3 Our assessment is informed by RPA offsets, tree location, size, future requirement and root morphology in relation to the development. The tolerance of the trees to disturbance based on species, age, condition and the presence of surrounding trees and built structures is also considered. Lastly the quality and value of the trees is taken in to account.

2.2 Tree Removals Required to Implement the Development

In order to implement the scheme it will be necessary to advocate the removal of 12no. individual trees set within a planted belt. Note that all 12no. are deciduous broadleaved amenity plantings considered to be of only low arboricultural quality and of a nature considered readily replaceable.

Refer to Tree nos.: 15 Ash; 16 & 17 Norway Maple; 18 Ash; 22 Hornbeam; 27-30 Ash; 31 &32 Norway Maple; 39 Ash.

With the exception of T18 and T39, all of the above trees were shown removed as part of the original application for development. Due to final detailed amendments to the layout, T18 and T39 represent 2no. additional trees to be considered at planning.

2.3 Category ‘U’ tree removals:

2.3.1 These trees were identified during the original application. They remain to be of such reduced physiological and structural condition, that their early loss (and subsequent collapse) is anticipated in the existing context. Removal continues to be advised, irrespective of any implications associated with the proposed layout.

Refer to tree nos. 7 and 12 Ash; and 33 Norway Maple

2.4 Access Facilitation

2.4.1 It will be necessary to provide pedestrian clearance over proposed car parking along the new southwest – northeast edge to the car park; vertical canopy clearance along the internal edge will need to increase by circa 500mm. This will be achieved through the shortening of secondary branches where possible. These works will not approach the limit of 15 percent loss of the live crown height of any worked tree as specified within BS3998:2010, and should be undertaken by a component tree contactor.

Note that tree numbers 41-49 have been previously recommended for a re-pollard at 12m. These works are required as an indirect result of the proposals but are not necessary to implement the development. A re-pollard is recommended to address existing structural shortfalls and to ensure the longevity of the current high-level screen between maintenance intervals. These works should be timed to coincide with the tree removal work detailed in 2.2.

2.5 Felling

2.5.1 Trees will only be felled in one piece where there is no significant risk to people, property, adjacent trees or protected species. Guide ropes are to be used where appropriate to ensure that trees or branches fall away from buildings, equipment, other trees and understory shrubs. No trees to be retained shall be used for anchorage or winching purposes, and trees to be felled that are adjacent to, or that lie within a continuous canopy of retained trees will be removed with particular care.

2.5.2 Where necessary, trees should be dismantled and removed in sections (using rigging equipment where appropriate) rather than felled from the ground to prevent damage to equipment, vehicles and canopies of other trees.

2.5.3 No part of any tree shall fall outside the boundaries of the premises unless prior agreement has been reached with the landowner, and the client informed of this in advance.

2.6 Stump Treatment:

2.6.1 All stumps will not be pulled or excavated from the ground as a precaution against damaging the root networks of adjacent retained trees.

2.6.2 These stumps will be ground out to a depth of 100mm or as close as conditions allow using a purpose-built machine (without incurring ground compaction). 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). All operations shall be carefully carried out to avoid damage to roots of neighbouring trees and the surrounding ground surface.

2.7 General Points Relating to Tree Works

2.7.1 Prior to undertaking felling works, it is recommended that the project arboriculturalist spray-marks affected trees to be removed with a red flash.

2.7.2 Felling works should be timed to avoid the main nesting season for birds between 1st March and 31st August 2013 / 2014. If scheduled within this period it is recommended that an ecologist is 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.

2.7.3 Where dead branches pose an unacceptable risk to the public (or to property) they are to be entirely removed. Care will be taken to not cause injury to live bark or sapwood which could lead to further dysfunction and colonisation by decay fungi.

2.7.4 All felling, pollarding and pruning work will be undertaken in accordance with BS 3998: 2010 by a competent tree contractor. The Tree Contractor will be responsible for the positioning of final cuts, also as per BS3998:2010.

2.8 Protective Barriers

To ensure integration of retained trees, it will be necessary to protect their above ground structures and underlying rooting environment from damage during construction. The use of barriers will reasonably prevent: impact damage from construction plant, root tearing, root and soil compaction and soil contamination.

2.8.1 The default barrier specification for this development will be that shown in appendix C; barrier positions are illustrated in appendix B with an allowance of 500mm for working room adjacent to proposed kerb edges. *The project arboriculturalist will be present during the setting-out of protective barriers.*

2.8.2 Barriers must be erected before any material or machinery arrives on the site, before any stripping of soil/existing hard surfaces commences and before construction begins. Once erected, the area tree-side of the barrier should be treated as sacrosanct and will not be disturbed, used for storage or altered.

2.8.3 Once erected, the area tree-side of any barrier should be treated as sacrosanct and should not be disturbed unless under direct arboricultural supervision. This can be enforced by regular checks undertaken by the project arboriculturist.

2.9 No-dig construction within RPAs

Refer to Tree nos.: 19 and 20 Sycamore; 38 Ash; 41-49 Lombardy Poplar.

2.9.1 It is necessary to permit limited areas of proposed hard surfacing within both RPAs. These areas are illustrated in appendix B and are required to accommodate the installation of proposed car parking.

2.9.2 Unless managed, these features all have the potential to compromise the RPA through soil compaction, oxygen/moisture restriction and the likely requirement for root severance.

2.9.3 In order to justify these incursions it is essential that the new hard surface is constructed above soil. Within this area the sub-base will consist of Cellweb© utilising 75mm Standard Cell, and will be overlain with a porous asphalt wearing course i.e. TarmacDry©. A non-invasive retaining edge will be used tree side of the hard surface as opposed to the installation of kerb sets which may otherwise incur excavation and associated disturbance within the RPA i.e. root severance.

No dig construction will require the direct supervision of an arboriculturalist experienced in the installation of a Cellweb© (refer to further detail provided in appendix H).

Installation will adopt the following procedure:

2.9.4 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. If protective barriers need to be temporarily repositioned to facilitate working room, the area of exposed RPA will be protected by ground boards overlain on compressible material i.e. 100mm of woodchip.

c. 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.

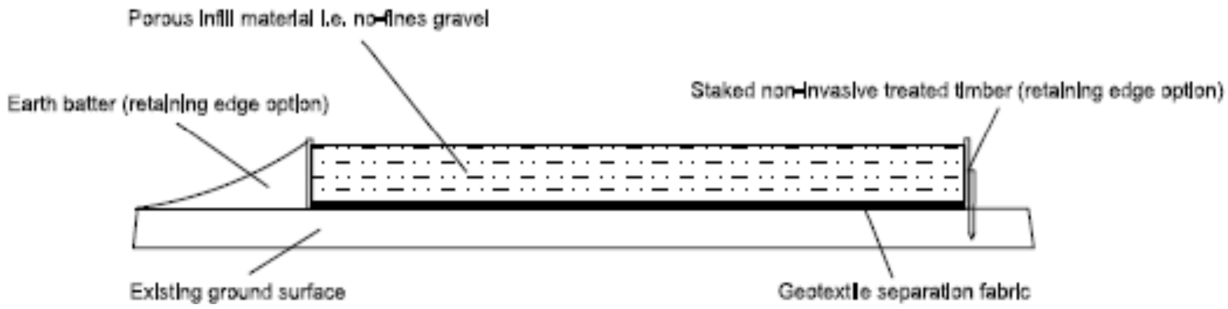
2.9.5 Installation

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 and Options for Retaining Edges.



d. Infill will consist of a no-fines gravel wearing course. Construction plant over 0.5t will not be used for the purposes of depositing the granular infill. Plant must operate within the footprint of the retaining edges over areas previously in-filled i.e. not over exposed underlay.

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

2.9.6 Post-excavation

a. Tree protection barriers are to be reinstated or repositioned on completion - whichever is within the interest of protecting RPAs. This will need to be determined by the supervising arboriculturalist.

b. Written confirmation of the works being undertaken to a satisfactory standard will be provided to the site manager and LPA by the supervising arboriculturalist.

2.10 **Supervised Excavations within RPAs**

Refer to Tree Nos.: 23 Hornbeam; 34, 35 & 37 Ash

2.10.1 It is necessary to excavate footings for kerb sets within the RPA footprint of the above trees. The radial encroachment within the RPAs means that the affected areas are not likely to influence root plates, or conflict with structural roots.

2.10.2 Excavations are anticipated to a maximum depth of 200mm occur and at a distance from trunks where it is likely that only low diameter roots will be encountered and where disturbance is considered tolerable. These works will require direct arboricultural supervision and are subject to the planned and sensitive approach detailed below:

2.10.3 Pre-commencement

a) The supervising arboriculturalist to brief the site manager and excavating team on the importance of sensitively removing the overlaying soils from within the RPA.

b) Protective barriers are to be temporarily repositioned to facilitate working room in the north of the RPA, the area of exposed RPA will be protected by ground boards overlain on compressible material i.e. 100mm of woodchip.

c) The supervising arboriculturalist to spray-mark the extent of affected RPA 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

2.10.4 During Excavation

a) The breaking up and clearance of the existing soils must be undertaken using hand-tools with arboricultural supervision.

b) Any machinery used to remove the broken-out surface will operate from outside of the RPA, or as a minimum precaution, work backwards from the exposed area of RPA.

c) During the works the protective bark of larger roots is not to be damaged.

d) Exposed roots must be covered in hessian sack or clean top soil to protect from dehydration and temperature flux. The hessian sack is to be removed prior to backfilling.

e) If necessary, roots that are less than 25mm diameter can to be pruned back, preferably to a side branch, using sharp cutting tools i.e. bypass secateurs or pruning saw.

f) No roots over 25mm are to be severed without approval of the CDC's Arboricultural Officer and the appointed onsite arboriculturalist as they may be integral to tree health and stability.

g) Exposed roots are to be surrounded with sharp sand. Builders' sand will not be used because of its' high salt content which is toxic to roots.

h) Any subsequent use of an excavator to complete excavations must occur from outside of the RPA (which will be spray-marked on the ground in advance of the works taking place). A toothless bucket will be utilised at all times.

i) A record of exposed roots will be made and accompanied by a photographic log.

j) Should any issues be raised during supervision then the arboriculturalist should inform the developer immediately, indicating the nature of the problem and recommendations for action required.

2.10.5 Post-excavation

a) Roots will not be left exposed; backfilling will take place in layers and not include building debris or materials that may become injurious to tree roots.

b) Areas adjacent to roots that are to be filled with concrete will be lined with an impermeable membrane to prevent concrete leachate coming into contact with tree roots.

c) Tree protection barriers are to be reinstated or repositioned on completion - whichever is within the interest of protecting RPAs. This is to be determined by the supervising arboriculturalist.

d) Written confirmation of the works being undertaken to a satisfactory standard will be provided to the site manager and LPA by the supervising arboriculturalist.

2.11 Proposed Order of Works

a) Consent from the LPA required for all proposed tree removals.

b) Trees to be removed should be identified with a red flash by an appointed arboriculturalist (CDC Arboricultural Officer and Tree Contractor in attendance); All onsite tree works and removals should be undertaken prior to the erection of tree protection barriers.

c) All tree protection barriers must be erected prior to the arrival of construction plant, machinery and materials on site. Barrier positions to be set-out by an appointed arboriculturalist.

d) All tree protection barriers to be monitored on an agreed, regular basis once construction works commence on site;

e) Works within RPAs should be overseen by a project arboriculturalist

f) Works within RPAs and inspection of barriers to be reported on and issued to Development Arboricultural Officer and the developer.

3 CONCLUSIONS

3.1 This document has been prepared in response to Conditions 7-9 under Application No.12/01651/F.

3.1.1 This document identifies necessary tree removals and areas of the development that will need to be managed to facilitate in confident tree retention. It also identifies the need for static tree protection measures that need to be employed prior to occupation of the site for construction.

3.1.2 The current layout incurs the additional removal of Tree nos. 18 and 39, which represent a modification to the level of tree retention anticipated as part of the original consent. This additional impact has been addressed within the supporting Landscape Masterplan for the development and is considered justified from the arboricultural perspective.

3.1.3 This document must be referenced for details covering: supervised excavations within RPAs; no dig installation within RPAs, and specifications for temporary tree protection barriers.

3.1.4 The Project arboriculturalist must be present on site during the setting out of barriers and during works occurring within RPAs to ensure confident tree retention.

3.1.5 The advice within this document must be enforced through the use of an agreed monitoring schedule relating to static tree protection measures and an email procedure for recording and reporting on activities that require arboricultural supervision.

3.2 **Point Of Contact:**

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3.3 **Supporting Material:**

British Standards Institution Publication (2010), BS 3998: Recommendations for Tree Work, BSI, London

British Standards Institution Publication (2012), BS 5837: Trees in Relation to Design, Demolition and Construction, BSI, London

APPENDICES

APPENDIX A

TREE SURVEY SCHEDULE

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BS 5837:2012 Tree Schedule: Launton Road, Bicester

E P Barrus
8569: AA TS 01

Surveyed By: Mark Bisley in August 2012.

BS 5837:2012 Tree Survey Schedule

For each individually surveyed tree or group entry the following information may be provided:

1. **Tree No:** Allocated tree number (a Tree Preservation Order number may also be incorporated)
2. **Species:** Unless requested otherwise common names are shown
3. **Height:** Height of each tree/group in metres to centre of upper crown or highest point
4. **Trunk Diameter:** Usually at 1.5m from ground level. Multiple measurements provided for trees with two or more stems.
5. **Crown Spread:** Measured on compass points (e.g. N, E, S, and W). Dimensions are taken from centre of trunk to edge of canopy
6. **Crown Clearance:** Height in metres to lowest branch foliage from ground level.
7. **Life Stage:** Young, Semi-mature, Early mature, Mature, Mature, Over-mature or Veteran
8. **Physiology:** Considered to be one of the following: Average, Below average, Low, or Dead
9. **Structure:** Considered to be one of the following: Good, Moderate, Indifferent, Poor, or Hazardous
10. **Comments:** A description of general form, including presence of physical defects, disease or decay and other appropriate details based on vitality, context, and potential and overall structural integrity- purpose being to inform any need for immediate tree works.
11. **Category** (A to C and U) and **subcategory** (prefix 1-3) in accordance with the criteria below (cited BS 5837:2012, Table1:p.9)

	Arboricultural qualities (1)	**Mainly landscape qualities (2)**	**Cultural values including conservation (3)**
Category A: Trees of high quality with an estimated remaining life expectancy of c.40 years	Good examples of their species, especially if rare/unusual; or those that form principle/dominant components of groups or features	Trees, groups or woodlands of particular visual importance	Trees, groups or woodlands of significant conservation , historical, commemorative or other value i.e. veteran trees or wood-pasture
Category B: Trees of **moderate quality** with an estimated remaining life expectancy of c.20 years	Those that might be included within category A but are downgraded through remedial defects including storm damage	Trees present in numbers such that they attract a higher collective rating that they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value
Category C: Trees of **low quality** with an estimated remaining life expectancy of c.10 years	Unremarkable trees of limited merit or of such condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring any greater collective value; or trees offering only temporary or transient landscape benefits	Trees with no conservation or other cultural value
Category U: Trees in such a condition that they cannot be retained as living trees in the context of the current land use for longer than 10 years	**Reasons include:** Serious, irremediable structural defect, such that early loss is expected due to collapse, including those that will become unviable for retention after removal of other category U trees; trees that are dead or showing signs of significant, immediate and irreversible overall decline; trees infected with pathogens of significance to the health/safety of other trees nearby; low quality trees suppressing adjacent trees of better quality		

Note: This schedule in no way constitutes a health and safety survey. Where concerns for tree health and safety exist the necessary and appropriate tree inspections should be undertaken.

BS 5837:2012 Tree Schedule

Launton Road, Bicester

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TREE NO	SPECIES	HEIGHT	DIAMETER AT 1.5m or arf (mm)	CROWN SPREAD N,E,S,W	CROWN CLEARANCE	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	COMMENTS	CATEGORY
1	Ash	8m	195mm	2.25m	2m	Young	Average	Indifferent	Establishing ornamental planting; single trunk; flush cuts on stem resulting from poorly executed lift; canopy typical for the species in this context.	C 12
2-5	Silver Birch	8.5m to 10m	260mm 265mm 145mm 310mm	4m	2m	Young	Average	Indifferent	Collection of establishing ornamental plantings; single trunks; flush cuts present from poorly executed lifts; T2 has remains of broken branch cut to stem - torn bark below has been nailed back in place; some decay in stub; T5 form twin stems at 2.25m - raised ridge of occluded bark present; larger trees previously crown reduced; canopies typical for the species in this context.	C 12
6-17	Various	9m to 18m	315mm 170mm 265mm 355mm 300mm 375mm (over ivy) 410mm (over ivy) 440mm 340mm 365mm 395mm 395mm	6.25m N, 7m E, 7.75m S, 6.5m W	2m, 1m NE	Semi-mature	Average	Indifferent	Species: T6 & 9 Sycamore, T7, 8, 10, 12, 14 & 15 Ash, T11, 13, 16, 17 Norway Maple; collection of established ornamental plantings forming a common crown; drawn up/etiolated forms; mutual suppression within the collection; most canopies typical for the species in this context; light Ivy covering partially obscures bases of T11 & 12; flush cuts from poorly executed lift in past; T7 heavily suppressed and should be removed to prevent suppression of adjacent trees in future; T12 - significant dead wood in scaffold and numerous pieces stacked against stem to SW; canopy sparse with poor extension growth; no obvious signs of ill health or pathogens but obviously stressed; unlikely to continue to provide significant value for ten years so category U; pigeon nesting in lower canopy to NE; provide screen for E P Barrus but of limited value due to lift; remaining trees would need remedial works following removal of T12 due to loss of companion shelter.	C 12 / U
18	Ash	16m	385mm	8.25m	1.75m	Semi-mature	Average	Indifferent	Surface roots up to c.1.75m N; single trunk with lean to NE from ground- corrects at c.1.75m where it forms dominant SW/NE sub-dominant stems; drawn up/etiolated form due to competition with adjacent trees; canopy typical for the species in this context; minor dead wood present with one small hung up branch; provides a screen for E P Barrus but of limited value due to lift.	C 12
19-20	Sycamore	15m to 15.5m	19 345mm (SE) 19 385mm (NW) 20 335mm	3.5m NE, 7.25m SE, 4.25m SW, 4.5m NW	2m	Semi-mature	Average	Indifferent	Established ornamentals specimens; T19 - single trunk; forms dominant W/E sub-dominant stems at 1.5m; open union appears sound; T20 - single trunk with slight lean to SE; forms dominant N/E sub-dominant/subsidiary S stems at c.2m; structures and canopies mutually suppressed; provide screen for E P Barrus but of limited value due to lift.	C 12

TREE NO	SPECIES	HEIGHT	DIAMETER AT 1.5m or arf (mm)	CROWN SPREAD N,E,S,W	CROWN CLEARANCE	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	COMMENTS	CATEGORY
21-23	Hornbeam	9m to 10m	21 210mm W 21 95mm S 21 95mm E 22 245mm S 22 255mm N 23 265mm	5m	2m	Young	Average	Indifferent	Collection of three establishing ornamental plantings forming an understorey for more established specimens; slightly suppressed by large trees; add significant density to screen.	C 12
24	Ash	12m	250mm	5.25m	2m	Semi-mature	Average	Indifferent	Established ornamental planting; drawn up/etiolated form due to adjacent specimens; canopy typical for the species in this context; provides a screen for E P Barrus but of limited value due to lift.	C 12
25	Sycamore	12m	390mm	6m	2m	Semi-mature	Average	Indifferent	Establishing ornamental planting; single trunk; flush cuts present from poorly executed lift; drawn up/etiolated form due to adjacent trees; canopy typical for the species in this context; provides a screen for E P Barrus but of limited value due to lift.	C 12
26	Ash	13m	355mm	5.5m, 6.75m NW	2m	Semi-mature	Average	Indifferent	Established ornamental planting; flush cuts present from poorly executed lift; forms multiple stems at c.2.25m; suppressed form NE/SE by adjacent more established trees; provides a screen for E P Barrus but of limited value due to lift.	C 12
27-30	Ash	16m to 17.5m	505mm 415mm 305mm 525mm	7.5m	3m	Early mature	Average	Indifferent	Collection of four established ornamental plantings in linear formation; single trunks; mutually suppressed; canopies typical for the species in this context; some dead wood present; provide screen for E P Barrus but of limited value due to lift.	C 12
31-32	Norway Maple	17m to 15.5m	615mm to 610mm	8m N, 10m E, 10.5m SE, 9m S, 7.25m W	1.75m, 2.5m W	Early mature	Average	Indifferent	Two established ornamental plantings; single trunks; bases partially obscured by Ivy; some flush cuts due to poorly executed lifts; mutually suppressed but 32 more so; canopies appear typical for the species in this context; provide screen for E P Barrus but of limited value due to lift.	C 12
33	Norway Maple	16m	495mm	0.5m, 10m S	5m	Semi-mature	Average	Poor	Established ornamental planting; large limbs removed in lower canopy to E; large pieces of dead wood remain in scaffold; canopy forms mainly to S; suppressing better quality specimens to SW; unlikely to be of long term potential.	U

BS 5837:2012 Tree Schedule

Launton Road, Bicester

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TREE NO	SPECIES	HEIGHT	DIAMETER AT 1.5m or arf (mm)	CROWN SPREAD N,E,S,W	CROWN CLEARANCE	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	COMMENTS	CATEGORY
34	Ash	18m	530mm	10m N, 6m E, 4.5m S, 10m W	3m	Semi-mature	Average	Indifferent	Established ornamental specimen; single upright trunk; heavily suppressed from S/E by adjacent trees; canopy typical for the species in this context; provides a screen for E P Barrus but of limited value due to lift; would need crown reduction if T33 removed due to loss of companion shelter.	C 12
35	Ash	17m	450mm	3m N, 3.25m E, 8.5m S, 4.25m W	4m	Semi-mature	Average	Poor	Established ornamental planting; single upright trunk; drawn up/etiolated form; suppressed from NE/W by adjacent trees; provides a screen for E P Barrus but of limited value due to lift.	C 12
36	Norway Maple	13m	480mm	6.75m, 4m SE	3m	Semi-mature	Average	Indifferent	Established ornamental planting; single trunk; base partially obscured by Ivy; suppressed from SE by adjacent trees; canopy typical for the species in this context; adds density to the screen for E P Barrus but of limited value due to lift.	C 12
37-39	Ash	18m 18m 18m	37 450mm 38 255mm W 38 240mm E 39 420mm	7m N, 3.5m E, 8.5m S, 7.5m W	3m N, 6m E, 1.5m S, 1.5m W	Early mature	Average	Indifferent	Established ornamental specimens; drawn up/etiolated forms; canopies heavily suppressed by adjacent trees; likely dependant upon companion shelter of T40; provide screen for E P Barrus but of limited value due to lift.	C 12
40	Ash	19m	550mm	7.5m N, 10.25m E, 8.5m S, 5.5m W	4m, 1.75m E	Semi-mature	Average	Indifferent	Established ornamental specimen; single upright trunk; forms co-dominant N/S stems with W sub-dominant/subsidiary E at c.5m; unable to inspect union; slightly suppressed by adjacent trees; canopy typical for the species in this context; average dead wood present; one of the more significant contributors to the screen for E P Barrus but of limited value due to lift.	C 12
41-49	Lombardy Poplar	22m to 25m	1040mm 610mm 615mm 675mm 580mm 700mm 585mm 660mm 1045mm (over ivy)	7m	3m	Over-Mature	Average	Poor	Collection of established ornamental specimens in linear formation along access road; single trunks; base of T49 obscured by Ivy; T43, 46 - 48 develop multiple stems below 2.5m; appear to have been reduced in the past with three heights for previous reductions visible; large pieces of dead wood present above last reduction at 12m; large tear outs visible especially in T49 closest to Launton Rd - large old wound at 6m leaving gap in centre of canopy; no obvious signs of ill health or pathogens; unlikely to be of long term potential; limited visibility due to alignment and other plantings along Launton Rd; provides short length of screen.	C 12
50	Holm Oak	2.25m	75mm	1.5m	0m	Young	Average	Moderate	Establishing ornamental planting; stake and ties still present.	C 12

APPENDIX B

TREE PROTECTION PLAN (8569 TPP)

0m 5m 10m 20m

KEY:

- ⌀ 15 — Trees Numbers
- Tree Canopies
- [8] — Category 'U' Trees
- Category 'C' RPA
- 7 — Trees to be Removed
- Tree Protection Fencing
- Above Soil Surfacing
- Supervised Excavation

Note
If tree protection barriers need to be temporarily removed during installation, a supervising arboriculturist must be in attendance.

REV	DATE	NOTE	Drawn	Chk'd

REVISIONS

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TITLE
Launton Road, Bicester
Tree Protection Plan

CLIENT
E.P. Barrus Ltd.

SCALE	DATE	DRAWN
1:500 @ A3	JULY 2013	EW

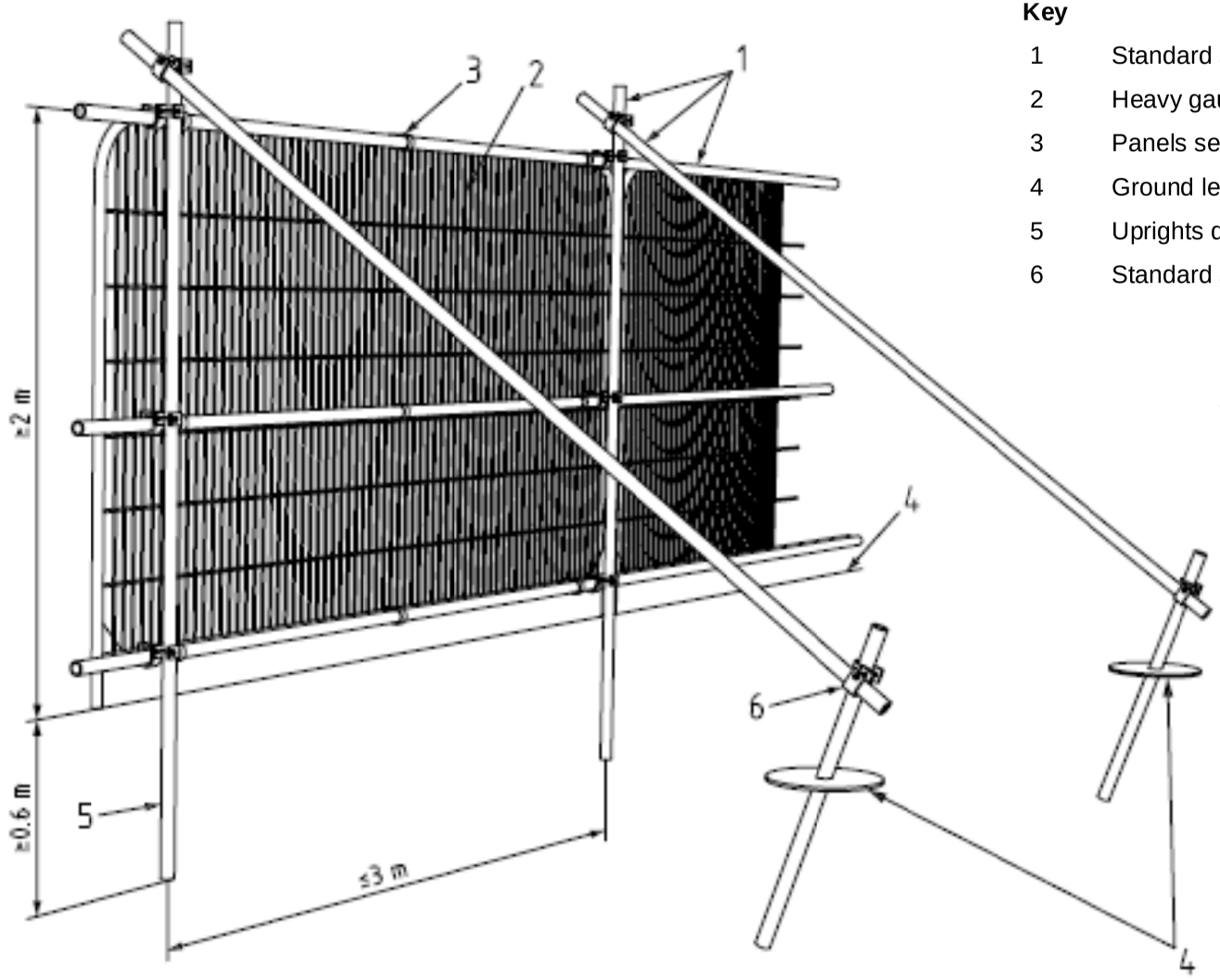
DRAWING NUMBER	REVISION
8569 TPP 01	A

APPENDIX C

TREE PROTECTION BARRIER SPEC. (BS 5837:2012)

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.*

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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**

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APPENDIX D

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).

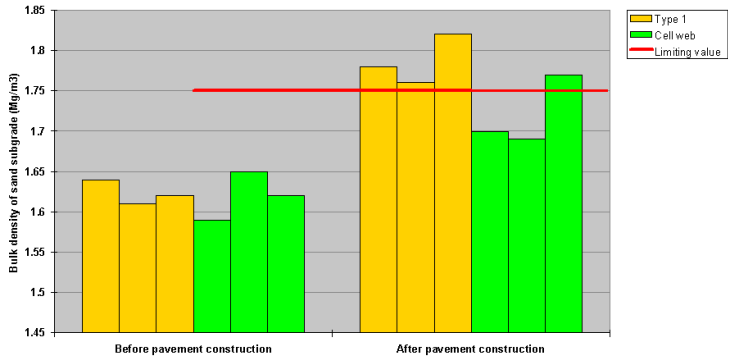

Figure 4 Comparison of soil compaction below pavements

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.

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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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