SAVILLS

WAITROSE
SOUTHAM ROAD
BANBURY

Arboricultural Method Statement

April 2016
8912_AMS.001

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CONTENTS

APPENDICES

1 INTRODUCTION

1.1 Background

1.1.1 Aspect Arboriculture has been instructed by Savills to prepare an Arboricultural Method Statement (hereafter the AMS) to inform development of Waitrose, Southam Road, Banbury.

1.1.2 Outline permission for the development has been granted subject to conditions (ref. 15/00831/F). Condition no. 10 includes the requirement for a scheme to demonstrate the protection of retained trees during the development works on site. This arboricultural method statement and tree protection plan has been prepared in direct response to this request.

1.1.3 The confident protection of retained trees will be achieved through the use of the appended Tree Protection Plan (Appendix A) and Construction Works Auditing Schedule (Appendix B) alongside other supporting documents included within Appendices C, D & E.

1.2 Scope

1.2.1 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 Limitations

1.3.1 This document has been prepared in respect to development works at Waitrose, Southam Road, Banbury to facilitate the proposed development. It 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 a limited period of 12 months from the date of survey. 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 To prevent avoidable damage to retained trees or erroneous tree loss, a scaled A1 copy of the TPP accompanied by a copy of this document will be provided to the site manager. This will ensure they are able to:

- Identify retained trees;
- Identify the correct locations for tree protection barriers and ground protection;
- Identify features of the site that must be prepared/installed under an arboricultural watching brief;
- Request attendance of the project arboriculturist 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 Construction Works Auditing Schedule (Appendix B).

2.2 Tree Removals

2.2.1 Trees detailed for removal are identical to those scheduled within our Arboricultural Impact Assessment, submitted previously (ref – 8912_AIA.001 Rev A). In summary, trees to be removed to comprise 35no individual trees, 6no. groups of trees, 4no. hedgerows, and the partial removal of one further group of trees. The trees for removal are detailed within Table 1 overleaf.

2.2.2 Felling works should be timed to avoid the main nesting season for birds between 1st March and 31st August. 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.

2.2.3 This work should be undertaken in accordance with the principles within BS3998:2010 and by a competent tree contractor to ensure that cuts are performed correctly, and positioned so as to avoid damage/harm to surrounding retained trees.

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

Table 1. Tree Removals by Category

Category B	Category C
T7 – Small Leaf Lime	T5 – Spindle
T23, T24 – Maple spp.	T8, T9 – Large Leaf Lime
T26 – Weeping Willow	T16, T20 – Lombardy Poplar
T27, T35 – Grey Poplar	T19, T21, T37 – Norway Maple
T44 – Silver Birch	T22 – Himalayan Birch
G3 – Mixed species	T25 – Maple spp.
Sections of G6 including 8no. trees	T28, T29, T33, T34 – Grey Poplar
G8 – Hybrid Black Poplar	T30, T31 – Crab Apple
G9 – Lombardy Poplar	T32 – Common Ash
	T36 – Crack Willow
	T38, T39 – Lime
	T40 – Leyland Cypress
	T41 – Rowan
	T42 – Alder
	T43, T51 – Silver Birch
	T48 – Poplar
	T49 – Weeping Aspen
	T50 – Field Maple
	G5 – Silver Birch
	G7, G13 – Mixed species
	H1, H4 – Mixed species
	H2, H3 - Beech

2.3 Protective Barriers

2.3.1 To safeguard the retained tree cover from damage during development, it will be necessary to protect the trees using tree protection barriers. The location for the barriers has been informed by the retained trees' RPA's and their canopy extents. Default tree protection barriers' locations are illustrated within Appendix A with a bold blue line.

2.3.2 The default barrier specification is required for direct tree protection and is to be of the specification provided in BS5837:2012 (shown below). It is essential that this is erected prior to occupation of the site for demolition related purposes.

2.3.3 The project arboriculturist will inspect tree protection barriers and provide written confirmation to Cherwell District Council's arboricultural officer on completion. The **site** manager will be responsible for arranging attendance of the project arboriculturist to monitor barriers at appropriate intervals for the duration of the development; issues will be resolved on site and reported to CDC's arboricultural officer by the project arboriculturist.

Plate.1 Default Protective Barrier Specification

2.3.4 The temporary relocation of protective barriers is required to provide access for supervised excavation works to install both proposed vehicular accesses within the RPA's of T5, G10. The barriers will also need to be relocated to facilitate installation of the above soil access road within the RPAs of T45, T46 & T47, and a proposed footpath within the RPA of G6.

2.3.5 Following the above works, the barriers are to be reinstated to the secondary position (illustrated within Appendix A with a dotted yellow line). The **site manager** will be responsible for coordinating arboricultural attendance to oversee any alterations to barrier positions to safeguard intermediate RPA's.

The Demolition Works Auditing Schedule (Appendix B) will be used as a record to show that barriers have been correctly sited.

2.4 Supervised Excavation

2.4.1 There are 2no. areas within the proposed re-development where it will be necessary to excavate the footings for proposed vehicular accesses within the RPAs of retained trees, these areas are illustrated within Appendix A with an orange hatch and are:

- The northern proposed access within the RPA of T4, and;
- The southern proposed access within the RPA of G10.

2.3.2 The excavations for the vehicular accesses will need to be manually excavated under arboricultural supervision to a depth of c.600mm and subsequently any excavations are to be carried out under arboricultural supervision using an excavator working from outside of the RPA.

2.4.2 During supervised excavations within the RPAs, the following procedure will be adopted:

a) The breaking up and clearance of the existing soils must be undertaken under arboricultural supervision

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

c) 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.

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

e) 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.

f) 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. 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.

g) Any 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.

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

i) Should any issues be raised during supervision then the arboriculturist should inform the developer and LPA's arboricultural officer immediately, indicating the nature of the problem and recommendations for action required.

j) 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 arboriculturist.

k) Written confirmation of the works being undertaken to a satisfactory standard will be provided to the Site Manager and Arboricultural Officer by the supervising arboriculturist.

The Construction Works Auditing Schedule (Appendix B) will be signed on completion of the works detailed above.

2.5 No-Dig Construction

2.5.1 There are 2no. sections within the application area where it will be necessary to install hard surfaces on an above soil basis within RPAs. In summary these areas are:

- A section of the proposed access to the service yard located to the north of T45 – T47, and;
- A section of the proposed footpath within the western RPA of G6.

3.4.2 The above areas of hard surface must be constructed on an above soil basis to eliminate the requirement for excavation within the RPA. These areas are illustrated in Appendix A with a blue hatch.

3.4.3 The proposed areas of hard surfacing to construct the access to the service yard as illustrated within Appendix A will utilise a sub-base consisting of a minimum of 150mm Standard Cell CellWeb, and the proposed footpath will utilise a minimum of 75mm Standard Cell CellWeb. A non-invasive retaining edge will be used as described in section 2.5.6.

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

2.5.4 Installation of CellWeb® will adopt the following procedure:

2.5.5 Pre-commencement

a. The supervising arboriculturist will brief the site manager and excavating team on the importance of preventing soil compaction, oxygen/moisture restriction and the minimisation of excavation within the RPA that may incur root severance.

b. The supervising arboriculturist shall spray-mark the extent of affected RPA on the ground prior to the commencement of works occurring within its footprint. The limit of any remaining RPA will be spray-marked for the benefit of machinery operators.

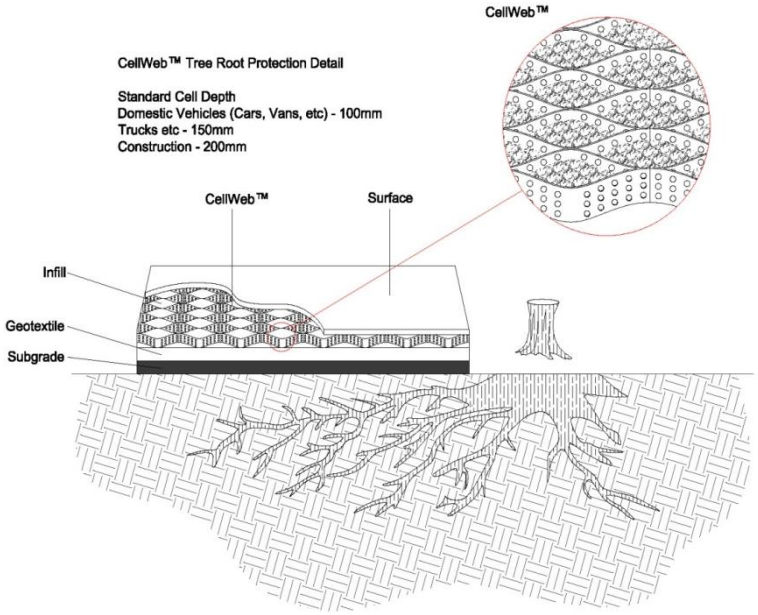
2.5.6 Installation of CellWeb

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.

The Construction Works Auditing Schedule (Appendix B) will be signed on completion of the works detailed above.

2.6 **Proposed Order of Works**

a) Pre-commencement site meeting between the project arboriculturist, site manager, tree contractor and CDC's arboricultural officer. Supervision of works inspection and monitoring requirements will be identified/agreed.

b) Necessary tree removals as illustrated within Appendix A to be carried out prior to installation of tree protection barriers and commencement of construction works.

c) Tree protection barriers to be installed following removals, and prior to arrival of construction related plant, machinery and materials on site. Barrier positions to be set-out by the project arboriculturist 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 site manager will assume responsibility for arranging attendance of project arboriculturist to oversee relocation of barriers and works within RPAs as detailed with the auditing schedule (Appendix B)

f) The site manager will assume responsibility for arranging attendance of the project arboriculturist 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).

2.7 **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 response to condition no. 10 of the outline planning permission (Ref: 15/00831/F) for development at Waitrose, Southam Road, Banbury. It has been informed by guidance provided in BS5837:2012 including an arboricultural survey of the site's existing trees (carried out in March 2015).

3.2 Pursuant to the instruction, this document and its supporting work (Appendices A - E) identifies all features of the development that must be managed to facilitate confident tree retention during the demolition process.

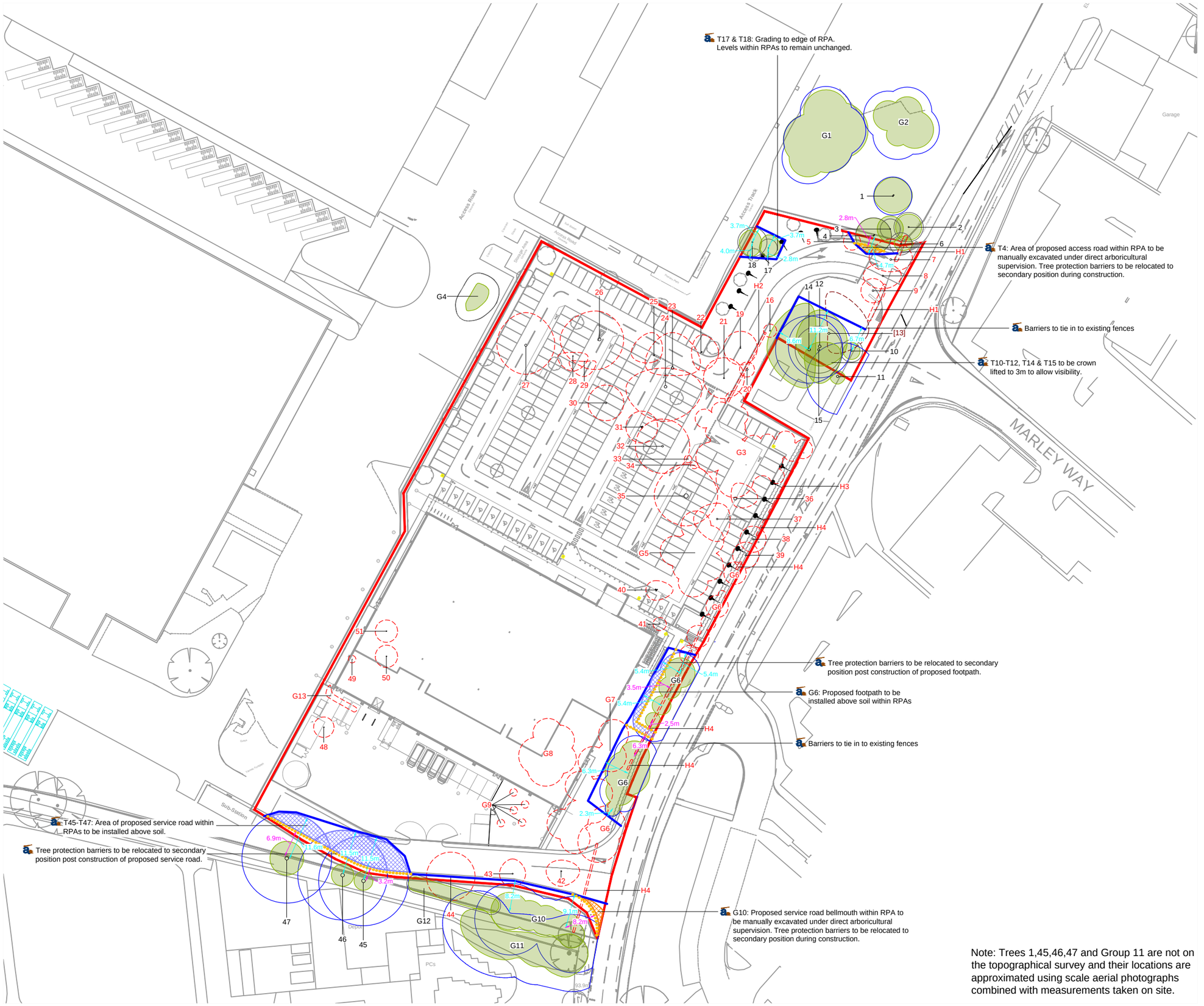
3.3 To ensure confident tree retention; aspects of the development, including siting of tree protection barriers, and specified excavation works will be supervised and audited by the project arboriculturist; the outcome of these works will be reported to CDC's arboricultural officer on completion. These 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 construction works can be undertaken without incurring harm to retained trees and tree groups.

APPENDICES

APPENDIX A

TREE PROTECTION PLAN (8912 TPP 02)



1:1000 @ A3

0m 10m 20m 40m

KEY:

- Site Boundary
- 15 Tree Numbers
- Tree Canopies
- [8] Category 'U' Trees
- Category 'B' RPA
- Category 'C' RPA
- 7 Trees to be Removed
- Manual Excavation
- Above Soil Surfacing
- Tree Protection Barrier
- Tree Protection Barrier (2nd Position)
- 4.2m Minimum Barrier Distance From Trunk (Start Position)
- 4.2m Minimum Barrier Distance From Trunk (2nd Position)

Cited from Google Earth

REV	DATE	NOTE	Drawn	Chk'd

REVISIONS

aspect arboriculture

TITLE

Waitrose
Southam Road, Banbury
Tree Protection Plan

CLIENT

Savills

SCALE	DATE	DRAWN
1:1000 @ A3	APR 2016	GW

DRAWING NUMBER	REVISION
8912 TPP 02	

Based on layout ref: 41334-6000-F

Note: Trees 1,45,46,47 and Group 11 are not on the topographical survey and their locations are approximated using scale aerial photographs combined with measurements taken on site.

APPENDIX B

CONSTRUCTION WORKS AUDITING SCHEDULE

Construction Works Auditing Schedule

This schedule will be completed as evidence that works have been undertaken as per the approved methodology.

Works Requiring Auditing	Tree No.	Date Undertaken	Date Reported to LPA
Stage 1. Pre-commencement meeting identifying tree removals and tree protection barrier locations as specified within 8912_AMS.001 and illustrated on drawing no. 8912 TPP 02	As drawn	……	……
Stage 2. Inspection of Tree protection barriers prior to commencement of construction works by LPA arboricultural officer/project arboriculturist	As drawn	……	……
Stage 3. Arboricultural supervision of any excavation within RPAs including relocation of tree protection barriers as specified within 8912_AMS.001 and illustrated on drawing no. 8912 TPP 02.	T4 G10	…… ……	…… ……
Stage 4. Arboricultural supervision of installation of above soil surfacing within RPAs including relocation of tree protection barriers as specified within 8912_AMS.001 and illustrated on drawing no. 8912 TPP 02	T45 T46 T47 G6	…… …… …… ……	…… …… …… ……
Monitoring of installed tree protection barriers and ground boarding as illustrated on drawing no. 8912 TPP 02	As drawn	……	……

APPENDIX C

TREE SURVEY SCHEDULE (8912 TS 01 REV A)

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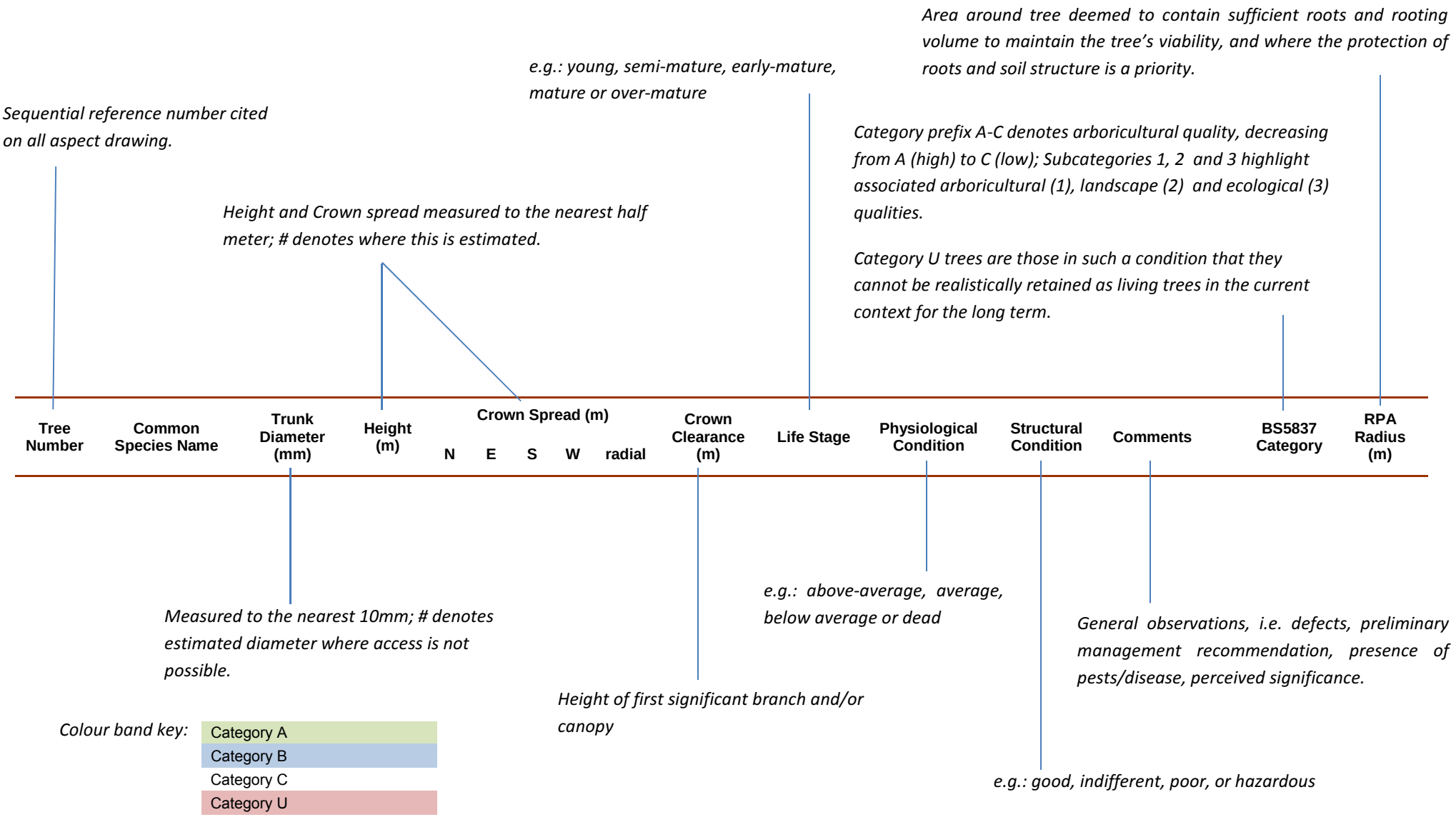
BS 5837:2012 Tree Schedule: Waitrose,
Southam Road, Banbury

aspect arboriculture

BS5837:2012 Tree Survey: Explanation of Survey Criteria



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) N	E	S	W	radial	Crown Clearance (m)	Life Stage	Physiological Condition	Structural Condition	Comments	BS5837 Category	RPA Radius (m)
1	Silver Birch	300 310	11m	5.00					1.25	Mature	Average	Indifferent	Established ornamental planting Stem forks at 0.5m into 2 x co-dominant stems Well distributed crown Upper canopy has structure typical for species Pruning wound in lower stem Considered to be of moderate arboricultural value	B2	5.1
2	Silver Birch	315	8m					3.50	2	Mature	Below Average	Indifferent		C12	3.9
3	Sycamore	220	8m					3.50	2.25	Early mature	Below Average	Poor		C12	2.7
4	Silver Birch	240 305	9m					4.75	1.25	Mature	Average	Indifferent		C12	4.8
5	Spindle	145	3m					2.25	1	Semi-mature	Average	Indifferent		C12	1.8
6	Sycamore	260 (over ivy)	8m	2.00	3.25#	1.75	1.75		2.5	Early mature	Below Average	Poor		C12	3
7	Small Leaf Lime	455	13m	5.50	5.75#	3.25	5.75		2.25	Mature	Average	Indifferent	Established ornamental planting Maintains a central dominant leader Upper canoipy has structure typical for species Considered to be of moderate arboricultural quality and value	B12	5.4
8	Large Leaf Lime	420 (over ivy)	12m	3.50	5.00#	3.50	5.25		1.25	Mature	Average	Poor		C12	5.1
9	Large Leaf Lime	440	6m					3.25	0.5	Mature	Average	Poor		C12	5.4
10	Elm	260	6m					2.25	2.5	Mature	Below Average	Poor		C12	3
11	Lombardy Poplar	670	25+	1.50	2.00#	2.00#	2.00#		2.5	Mature	Average	Indifferent	Stem forks at 2m into 1 x dominant and 1 x sub-dominant stem Slightly suppressed to NW by adjacent trees Structure is typical for species Considered to be of moderate arboricultural value	B2	8.1
12	Grey Poplar	700	25+	9.75	7.25	5.25	6.25		2	Mature	Average	Indifferent	Fused base of stem with T15 Slight lean to E Stem forks at 3m into 2 x co-dominant stems Considered to be of moderate arboricultural value	B2	8.4
13	Grey Poplar	590	20m	11.00	10.50	4.50	0.00		2	Mature	Average	Poor	Root-plate lifting causing bulge in soil Significant lean to E Upper canopy has a structure typical for species Tree overhanging road and footpath off site Recommend removal due to significant structural defect	U	N/A
14	Grey Poplar	750 (at 1m)	20m	12.25	1.75	10.00 #	11.25		1.75	Mature	Average	Indifferent	Single bole forking at 1.5m into 3 x co-dominant stems Over-extended lateral limb but typical for species Forms cohesive canopy with surrounding trees Considered to be of moderate arboricultural value	B2	9
15	False Acacia	535	12m	2.00	5.75	9.00	3.25		1	Mature	Average	Poor		C12	6.3
16	Lombardy Poplar	330	17m					1.75	0	Mature	Average	Indifferent		C12	3.9
17	Scots Pine	200	8m	3.50	3.25	2.25	2.25		1.75	Semi-mature	Average	Indifferent		C12	2.4
18	Scots Pine	330	8m	3.25	2.50	3.75	3.50		1.75	Early mature	Average	Indifferent		C12	3.9
19	Norway Maple	230	8m					4.50	2.5	Early mature	Average	Indifferent		C12	2.7
20	Lombardy Poplar	580	20m					2.00	2	Mature	Average	Indifferent		C12	6.9
21	Norway Maple	290	10m					5.50	2	Early mature	Average	Indifferent		C12	3.6
22	Himalayan Birch	2 x 240	13m	4.75	4.75	4.75	2.50		2	Mature	Average	Indifferent		C12	4.2

Tree Number	Common Species Name	Trunk Diameter (mm)	Height (m)	Crown Spread (m) N	E	S	W	radial	Crown Clearance (m)	Life Stage	Physiological Condition	Structural Condition	Comments	BS5837 Category	RPA Radius (m)
23	Maple spp.	700	18m	9.50	7.25	2.00	7.00		1.5	Mature	Average	Indifferent	Established ornamental planting Stem forks at 1.25m into 2 x co-dominant stems Slight lean to NE Forms cohesive canopy with T24 Considered to be of moderate arboricultural quality and value	B12	8.4
24	Maple spp.	750 (at 0.5m)	18m	5.00	9.75	9.25	10.50		1	Mature	Average	Indifferent	Stem forks at 1m into 2 x co-dominant stems with tight union/included bark Upper canopy has structure typical for species Minor bark damage in primary limb to E at 1.5m Considered to be of moderate arboricultural value	B2	9
25	Maple spp.	280	7m	6.00	2.00	1.75	6.00		2.75	Early mature	Below Average	Poor		C12	3.3
26	Weeping Willow	780 (at 1m)	14m	7.50	6.50	8.00#	10.50		0	Mature	Average	Poor	Established ornamental planting Stem forks at 2.5m into 1 x dominant and 1 x sub-dominant stems Well distributed crown but heavy and conjested internal structure Poorly pruned to N crown Considered to be of moderate arboricultural value	B2	9.3
27	Grey Poplar	635	20m	8.75	7.75	7.75	7.75		1.5	Mature	Below Average	Indifferent	Established ornamental planting Surface roots to N around stream Some large sections of deadwood throughout crown Maintains a central dominant stem Structure is typical for species Considered to be of moderate arboricultural value	B2	7.5
28	Grey Poplar	200#	7m	1.00	4.00	4.00	4.00		0	Semi-mature	Average	Poor		C12	2.4
29	Goat Willow	2 x 80#	5m	0.00	3.00	4.00	4.00		0	Semi-mature	Average	Poor		C12	1.5
30	Crab Apple	450#	6m					4.75	1.25	Mature	Average	Indifferent		C12	5.4
31	Crab Apple	4 x 180 av.#	6m					4.25	1	Mature	Average	Poor		C12	4.2
32	Common Ash	500#	13m					7.25	1	Mature	Average	Indifferent		C12	6
33	Grey Poplar	150	6m					1.00	0	Young	Average	Indifferent		C12	1.8
34	Grey Poplar	80	5m					1.00	0	Young	Average	Indifferent		C12	0.9
35	Grey Poplar	1120 (at 1m)	25m	8.50#	8.50	8.00	8.50		2	Mature	Average	Poor	Exposed surface roots to N/E with damage/decay Epicormic growth forming from surface roots Stem forks at 1.25m into 3 x co-dominant stems with poor union Upper canopy has structure typical for species with well distributed crown Considered to be of moderate arboricultural value	B2	13.5
36	Crack Willow	800#	7m	4.00	6.00	2.00	1.00		0	Over-mature	Below Average	Poor		C12	9.6
37	Norway Maple	365		4.25	3.50	6.00	6.25		1	Mature	Average	Poor		C12	4.5
38	Lime	370	5m					3.50	0.5	Mature	Average	Poor		C12	4.5
39	Lime	360	6m					3.50	1	Mature	Average	Poor		C12	4.2
40	Leyland Cypress	4 x 220 av.	9m	2.50	4.50	2.75	2.75		0	Mature	Average	Poor		C12	5.4
41	Rowan	2 x 70 av.	3m					1.75	1.5	Young	Average	Poor		C12	1.2
42	Alder	295	11m	3.00	5.00	4.00	4.00		2	Mature	Average	Poor		C12	3.6
43	Silver Birch	295	10m	4.00	3.50	3.50	3.50		1.5	Mature	Average	Indifferent		C12	3.6

Tree Number	Common Species Name	Trunk Diameter (mm)	Height (m)	Crown Spread (m) N	E	S	W	radial	Crown Clearance (m)	Life Stage	Physiological Condition	Structural Condition	Comments	BS5837 Category	RPA Radius (m)
44	Silver Birch	400	13m					6.50	2	Mature	Average	Indifferent	Minor decay pocket at base Maintains a central dominant stem Structure is typical for species 1 x secondary limb failure W crown at 4m Considered to be of moderate arboricultural quality and value	B12	4.8
45	Lombardy Poplar	1000#	25m+					2.50	2	Mature	Average	Indifferent	Offsite Structure is typical for species Considered to be of moderate arboricultural quality and value	B12	12
46	Lombardy Poplar	1000#	25m+					3.00	2	Mature	Average	Indifferent	Offsite Structure is typical for species Considered to be of moderate arboricultural quality and value	B12	12
47	Lombardy Poplar	1000#	25m+					4.50	3	Mature	Average	Indifferent	Offsite Structure is typical for species Considered to be of moderate arboricultural quality and value	B12	12
48	Poplar	180	5m					2.75	1	Semi-mature	Average	Indifferent		C12	2.1
49	Weeping Aspen	80#	2m					1.00	0	Semi-mature	Average	Indifferent		C12	0.9
50	Field Maple	170	4m					3.00	1.5	Early mature	Average	Indifferent		C12	2.1
51	Silver Birch	215	8m					3.00	0.5	Early mature	Average	Indifferent		C12	2.4
G1	Grey Poplar	570 max	21m					10.50	0.25 (tips) 2.00 (limb)	Mature	Average	Poor to Indifferent	5 no. trees froming a cohesive canopy Significant lean in stem in E trees Considered to be of moderate arboricultural value as a collective	B2	6.9
G2	Weeping Willow	560 max	15m					9.50	0 (tips) 2.00 (limb)	Early mature to Mature	Average	Indifferent	4 no. trees froming a cohesive canopy Considered to be of moderate arboricultural value as a collective	B2	6.6
G3	Lombardy Poplar Norway Maple Field Maple Sweet Chestnut Lime Sycamore	450 480 max	22m max					2.00 av. (Poplars) 6.00 max (Sycamore)	1.5 av.	Semi-mature to Mature	Poor to Average	Indifferent	Established ornamental plantings forming cohesive canopy in parts Predominantly Poplar Considered to be of moderate arboricultural value as a collective	B2	5.4 5.7 max
G4	Willow Prunus spp. Ornamental shrubs Holly	500 max#	5m max					3.25	0	Mature	Average	Indifferent	Crack Willow pollarded at 2.75m Shrub understory	C12	6
G5	Silver Birch	360 max	11m max					4.00 av	2.5 av	Early mature to Mature	Average	Indifferent	Established ornamental plantings Largest specimen has pruning wound with decay at 1.5m up stem	C12	4.2
G6	Lime	450 max	12m max					5.5 max 5.00 av	2 av. 1 min.	Mature	Average	Indifferent	15 no. trees Established row bordering E of site Structures are typical for species Considered to be of moderate arboricultural quality and value	B12	5.4
G7	Sycamore Silver Birch Rowan	290 max	10m max					4.00 max	2 av.	Early mature to Mature	Poor to Average	Poor to Indifferent	Predominantly poorly established ornamental plantings Suppressed by surrounding larger trees	C12	3.6

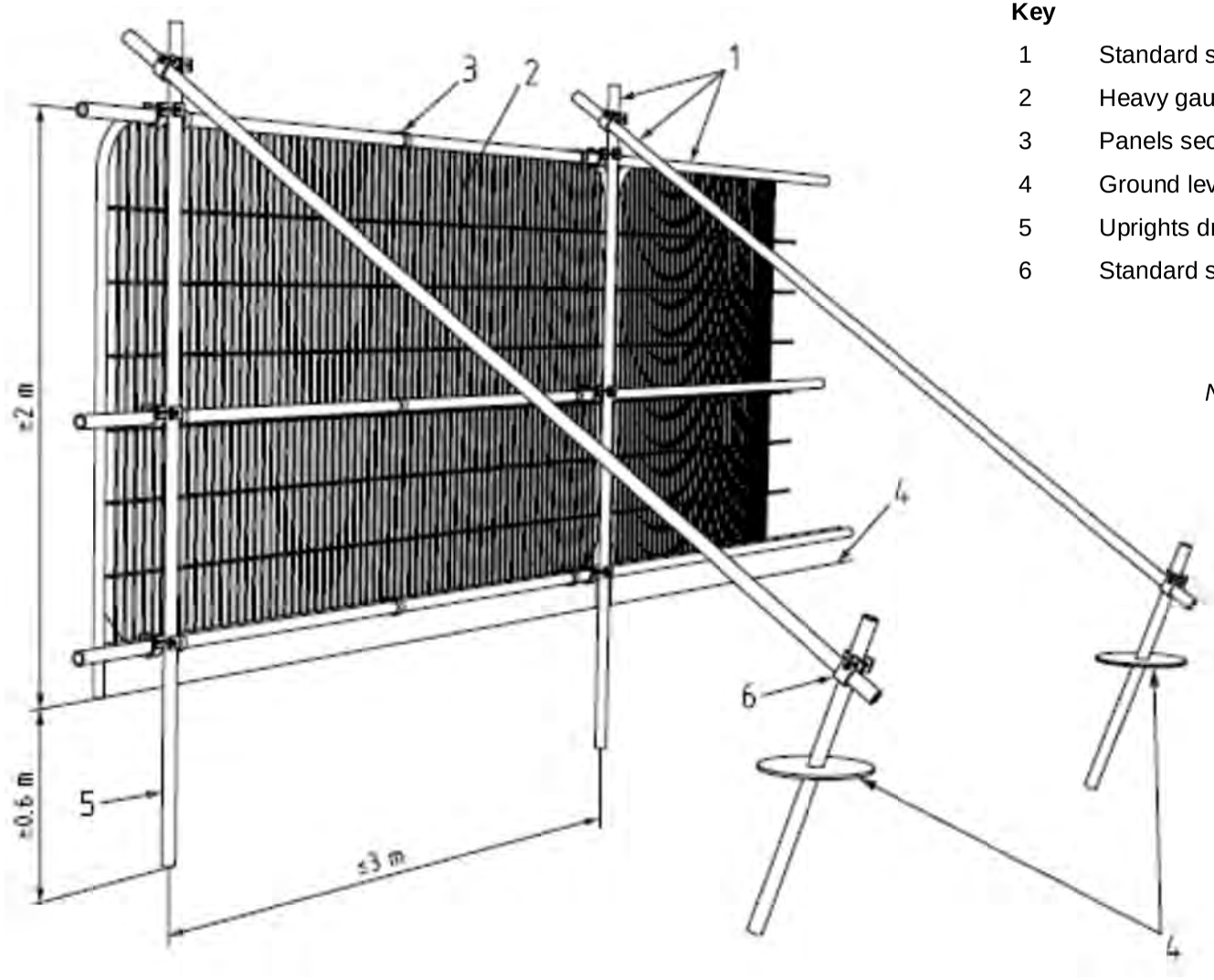
Tree Number	Common Species Name	Trunk Diameter (mm)	Height (m)	Crown Spread (m) N	E	S	W	radial	Crown Clearance (m)	Life Stage	Physiological Condition	Structural Condition	Comments	BS5837 Category	RPA Radius (m)
G8	Hybrid Black Poplar	770 max	25m+					15.5 max	2 av. 1 min.	Mature	Average	Indifferent	5 no. trees froming a cohesive canopy Maintains central leaders Internally suppressed by oneanother Structures are typical for species Considered to be of moderate arboricultural quality and value	B12	9.3
G9	Lombardy Poplar	680 max	23m max					1 av.	0.5	Mature	Average	Indifferent	Established ornamental plantings creating a formal arboricultural feauture as a collective Considered to be of moderate arboricultural value as a collective	B2	8.1
G10	Sycamore Lime Lombardy Poplar	800 max (offsite Poplar) 430, 250 (onsite Sycamore)	25m+					7.50	2.75	Mature	Average	Poor to Indifferent	3 no. Sycamore 2 no. Lime located onsite 2 no. Lombardy Poplar and 1 no. Sycamore located offsite Trees form cohesive canopy with Sycmaore being multi-stemmed from base Considered to be of moderate arboricultural value as a collective	B2	9.6 max 6
G11	Lombardy Poplar Leyland Cypress Sycamore	800 max#	25m+					2.5 av.	1 av.	Mature	Average	Indifferent	Offsite Structure is typical for species Considered to be of moderate arboricultural value as a collective	B2	9.6
G12	Elder Holly Plum	200 max	7m max					3.50 max	2.50	Mature	Average	Poor	Established shrub-like trees with Holly understory	C12	2.4
G13	Ornamental Shrubs	75 max	2m					1.00	0	Mature	Average	Indifferent		C12	0.9
H1	Hawthorn Beech	75 max	2m					0.50	0	Mature	Average	Indifferent	Maintained hedgerow	C12	0.9
H2	Beech	75 max	3m					0.25	0	Mature	Average	Indifferent	Maintained hedgerow	C12	0.9
H3	Beech	75 max	3m					0.25	0	Mature	Average	Indifferent	Maintained hedgerow	C12	0.9
H4	Beech Leyland Cypress Hawthorn Sycamore	75 max	3m					0.25	0	Mature	Average	Indifferent	Maintained hedgerow, intermittant in areas	C12	0.9

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.*

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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 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).

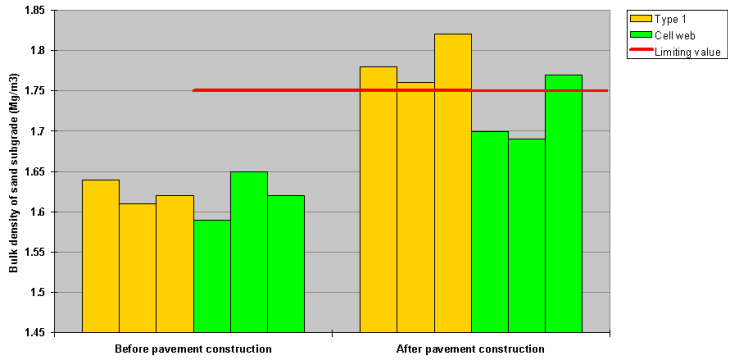

Figure 4 Comparison of soil compaction below pavements

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.

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