



Arboricultural Consultancy
Holmwood Farm Grange Horsham Road North Holmwood Dorking Surrey RH5 4JR
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**Tree Survey
Arboricultural Impact Assessment
Arboricultural Method Statement**

Relating to:

University of Reading - HLS, Maths and IT Buildings

Produced for:

University of Reading

Prepared by:

Challice Consulting Ltd.
Mr. David Challice
Dip. Arb. (RFS), F. Arbor. A, MICFor
Chartered Arboriculturist

Date:

5th June 2025

Our Ref:

AR5691

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INTRODUCTION

1.0 Frequently Used Key Terms and Abbreviations

Tree Preservation Order	TPO
Arboricultural Method Statement	AMS
British Standard 5837:2012 – Recommendations for Trees in Relation to Design, Demolition and Construction	BS 5837
British Standard 3998:2010 - Recommendations for Tree Work	BS 3998
Root Protection Area/Root Protection Areas	RPA/RPAs
Local Planning Authority	LPA
Cellular Confinement System	CCS

2.0 The Proposal

- 2.1 Installation of a standby generator to serve the HLS, Maths and IT departments. To include concrete slab base and fenced enclosure.

3.0 Instructions and Purpose

- 3.1 This report has been commissioned by the University of Reading to;
- Visit site and survey the trees in accordance with British Standard (BS 5837) 5837:2012 - Trees in Relation to Design, Demolition and Construction- Recommendations.
 - Make suggestions to decrease the arboricultural impact of the proposed scheme on the retained trees during the design process.
 - Detail the arboricultural impact of the proposed project.
 - Prepare a tree work schedule to BS 3998:2010 - Recommendations for Tree Work.
 - Develop a tree protection strategy for the duration of the development including any demolition works.
- 3.2 Provision of the above information is designed to address the requirements of the LPA in terms of the arboricultural information necessary to register and determine the planning application.

4.0 Scope

- 4.1 In surveying the trees to the requirements of BS 5837, trees on and immediately adjacent to the site with a stem diameter over 75mm have been included. Large shrubs and hedges have been included where these are considered to be of significant amenity value. These are particularly important where they provide boundary screening. For clarity and ease of data interpretation, large shrubs have been classified as trees.

- 4.2 A full hazard assessment of Norway Maple T1 (including the assessment of decay or defects and their impact), has not been undertaken as this is considered beyond the scope of this report. Any obvious hazards and defects have been identified in the Tree Survey Schedule and appropriate works recommended for immediate action.
- 4.3 It is the Client or their representative's responsibility to review the contents of this report to ensure it meets their requirements before it is sent to the LPA.

5.0 Documents Supplied/Used

Document	Obtained From	Format/Ref.
Existing and proposed layout plans	TVS	Dwg.
Topographical Survey	TVS	Dwg.

6.0 Site Details

- 6.1 The site is comprised of an area used for amenity adjacent to the existing substation.
- 6.2 There are no significant inclines in any direction that would affect the recommendations in this report.
- 6.3 The site is within the administrative jurisdiction of Wokingham Borough Council.
- 6.4 I have not been instructed to ascertain the protection status of any of the trees on or near the site.

TREE SURVEY

7.0 Survey Method

- 7.1 The site and Norway Maple T1 was inspected on 17th April 2025.

- 7.2 The subject tree was inspected from ground level and no climbing inspection was undertaken.
- 7.3 The stem diameter was measured using a diameter tape at 1.5m from ground level unless stated in the Tree Survey Schedule at **Appendix 1**. The location of the subject tree has originated from the drawings supplied by the Client unless otherwise stated in the Tree Survey Schedule.

8.0 Tree Details

- 8.1 The total number of records is as follows:
Individual Trees (T): 1
Tree Groups (G): 0
- 8.2 The subject tree's details and proposed works are presented in the Tree Survey Schedule with Recommended Tree Works at **Appendix 1** and tree position is shown on the Tree Protection Plan at **Appendix 2**.
- 8.3 The quality and value of the tree stock has been broken down by BS 5837 quality grade. The grading system can be summarised as follows:
A Grade – trees of high quality and value with a life expectancy of more than 40 years
B Grade – trees of moderate quality and value, with a life expectancy of more than 20 years
C Grade – trees of low quality and value, with a life expectancy of more than 10 years
U Grade – trees usually for removal (unless otherwise stated), with a life expectancy of less than 10 years

Quality and Value of Existing Tree Stock

Total No. Trees (1)	A Grade	B Grade	C Grade	U Grade
No. of Trees	1	0	0	0

- 8.4 The RPA of Norway Maple T1 is included in the Tree Survey Schedule with reference to Table 1 of BS 5837. The RPA is the area, measured in m², which is calculated in accordance with the BS 5837 using the stem

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diameter of the tree. This should provide Norway Maple T1 with sufficient rooting environment to survive the proposed development.

ARBORICULTURAL IMPACT ASSESSMENT

9.0 Introduction to Arboricultural Impact Assessment

9.1 This section comprises an assessment of the impact the proposed works detailed in Section 2 above have on trees. It considers the arboricultural impact and how this may be mitigated.

10.0 Tree Removal and Retention

10.1 The proposed scheme provides for the retention and protection of Norway Maple T1.

11.0 Tree Pruning Works

11.1 Minor tree pruning is recommended for good arboricultural practice and to ensure reasonable clearance from the proposed construction. The pruning described in the Tree Survey Schedule with Recommended Tree Works at **Appendix 1** will not adversely affect the tree's vitality or its contribution to local amenity.

12.0 Incursions into Root Protection Areas

12.1 The table below summarises the significant incursion into the RPA of Norway Maple T1. The 'Action' column details how the incursion has been mitigated and why it is considered acceptable. Incursions may be fully invasive (where specialist methods are not used and some root loss is considered acceptable) or low invasive (where specialist methods are used to minimise damage to or loss of roots). Full details of how the works will be carried out without causing damage to the subject tree is given in the AMS.

Summary of Incursions into RPAs

Tree No.	Type of Incursion	Incursion % and Impact	Action
Norway Maple T1	Low invasive	9% and low	A permeable low invasive surface will be installed on top of the existing soil level under direct arboricultural supervision to limit root disturbance to an acceptable level (see Appendix 5)

- 12.2 No new underground services are to be installed within the RPA of Norway Maple T1.

13.0 Proximity Issues and Shading

- 13.1 The shade pattern for the subject tree has not been plotted as this is not a constraint to this type of development.
- 13.2 The juxtaposition between the subject tree and the proposed development is in accordance with Section 5.3 of the BS 5837 and should not lead to future pressure to heavily prune or remove this tree for the following reasons:
1. Tree pruning has been recommended to provide adequate separation between the proposed development and the subject tree.
 2. Any future tree pruning works are unlikely to be over and above those generally accepted as good arboricultural practice in an urban environment.

14.0 Summary of Arboricultural Impact

- 14.1 In summary, the arboricultural impact of the proposed scheme is minor as no trees are to be removed as a result of the development and minimal pruning is required to enable construction works to be completed.

- 14.2 The specified tree pruning complies with both BS 3998 and BS 5837 standards and aligns with common practices in urban environments.
- 14.3 Subject tree Norway Maple T1 can be afforded an appropriate degree of protection in accordance with the BS 5837 as detailed in the AMS.
- 14.4 I have assessed the impact of the proposed development and it is considered to be in line with the recommendations set out in British Standard 5837.

ARBORICULTURAL METHOD STATEMENT

15.0 Introduction to Arboricultural Method Statement

- 15.1 To safeguard the subject tree (both above and below ground parts) during the development works and preserve the soil structure of areas which could be allocated for new planting, it will be necessary to implement tree protection measures as outlined below.
- 15.2 The basic principle is that a construction exclusion zone will be formed inside the tree protective fencing which is to be maintained for the duration of the construction works.
- 15.3 A copy of this AMS shall be maintained on site at all times and made available to all site personnel.
- 15.4 All site personnel shall be made aware of the key impact of this AMS and be given an arboricultural induction by the Site Manager. An Induction Form is attached at **Appendix 4**. A copy of the Induction Form will be signed by all site personnel to confirm that they have understood the issues involved.
- 15.5 As of 2005, Local Planning Authorities have powers to serve **Temporary Stop Notices** if agreed tree protection measures are not carried out. Adhering to this AMS will ensure that such costly and time consuming action is avoided.

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16.0 Pre-Commencement Meeting

- 16.1 A pre-commencement site meeting, involving representatives from the Development Company, the Arboricultural Consultant and the LPA Tree Officer will be held to ensure that all aspects of the tree protection process are understood and agreed. A record of the meeting will be communicated to all parties by the Arboricultural Consultant within five days of the meeting.
- 16.2 Attendance at a pre-commencement site meeting and for any site supervision (see Section 27.0) is chargeable at the standard hourly rate as stated in the terms and conditions attached to the quotation for this report.

17.0 General Site Precautions

- 17.1 The following points will be observed at all times:
- o No fires will be lit on site during the construction or demolition phases.
 - o No access will be permitted inside the tree protective fencing.
 - o No materials, equipment or debris will be stored within the tree protective fencing.
 - o Notice boards, telephone cables or other services will not be attached to any part of Norway Maple T1.
 - o Materials which will contaminate the soil (e.g. diesel oil and vehicle washings) will not be permitted to migrate into the RPA of Norway Maple T1.
 - o A dedicated mixing and cleaning area will be set up to prevent concrete, cement and cleaning residue leaching into the RPA of Norway Maple T1 (see Tree Protection Plan for specification).
 - o Site cranes are to be automatically programmed to avoid loads striking the crown, stem and branches of Norway Maple T1.
 - o Scaffolding will be erected outside the RPA of Norway Maple T1 or on top of the ground protection if specified.
 - o Site and lorry mounted cranes are to be automatically programmed (or a banksman will be present) to avoid loads striking the crown, stem and branches of Norway Maple T1.
 - o All vehicle movements associated with the site (including skips) will be supervised by the on-site Arboricultural Liaison. This will ensure

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that the crown or roots of Norway Maple T1 are not damaged during movement, loading or unloading and soil damage and soil compaction does not occur.

- o All cement/toxic materials are to be stored inside the site and not in the RPA of Norway Maple T1.

18.0 Tree Works

- 18.1 All tree works will be carried out in accordance with BS 3998:2010 'Recommendations for Tree Work' (as amended) and to current arboricultural best practice. Tree works will be carried out by a suitably qualified and experienced Arboricultural Contractor holding the necessary insurance cover. This contractor should carry out the relevant site specific risk assessments and record such information prior to commencement of tasks and work in accordance with current health and safety standards, practices and legislation. A list of such contractors is available from the Arboricultural Association at www.trees.org.uk.
- 18.2 The subject tree may be protected by virtue of being within a Conservation Area or covered by a TPO. Submission of this AMS in connection with a planning application should be construed as a formal application to carry out those works specified in the Tree Survey Schedule with Recommended Tree Works at **Appendix 1**. It is recommended that this matter be clarified by the Client in writing with the LPA prior to any works commencing.
- 18.3 If additional pruning of the subject tree is required to facilitate the proposed works or access for machinery/plant, the Arboricultural Consultant will be contacted to advise on appropriate works and liaise with the LPA as necessary.

19.0 Tree Protective Fencing

- 19.1 Tree protective fencing is used to ensure that the RPA of Norway Maple T1 is safeguarded. These measures may also be employed to protect areas of ground for new landscaping.

- 19.2 The positioning and specification of the fencing is shown in **Appendix 2**. In this case, the default specification of BS 5837 consisting of **fixed Heras** fencing would be effective.
- 19.3 The protective fencing will remain in position for the duration of the development, including the removal of any existing structures. Clear signs will be attached to the fencing once erected – suggested wording will be **‘Construction Exclusion Zone No Access’**.

20.0 Ground Protection

- 20.1 A provision has been made to install ground protection between the edge of the proposed development and the tree protective fencing. This provides adequate working space to permit the safe and practical completion of construction works whilst protecting the rooting environment of Norway Maple T1. In this instance (and unless agreed otherwise by the Tree Officer) the proprietary trackway system for traffic over 2 tonnes will be the default specification (position and specification shown in **Appendix 2**). The ground protection will remain in place for the duration of the development, including the removal of any existing structures.
- 20.2 The area shown for low invasive surfacing should be protected before development commences with heavy duty (40mm thick) track mats to prevent root damage. The track mats should be applied after the surface has been completed to avoid the need for re-laying.

21.0 Site Access/Hard Surfaces

- 21.1 The construction of the hardstanding within the RPA of Norway Maple T1 will occur at the initial stage of development to ensure the RPA of this tree is protected (position shown at **Appendix 2**). A CCS is to be used, the depth of which will be determined following consultation with a Structural Engineer or the supplier. Guidelines for installing low invasive hard surfaces within the RPAs of the retained trees are attached at **Appendix 5**. This will have an impact on final levels as the principle is to build up levels rather than carry out any excavation. The final surface should be protected during the development to prevent damage to the structure of the roots below and the need for re-laying. The tree protective fencing can

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be relocated under arboricultural supervision to enable this process. The final surface should be protected during the development with heavy duty (40mm thick) track mats to prevent damage and the need for re-laying.

- 21.2 The existing vehicle and pedestrian accesses into the site are suitable for ingress and egress during demolition and construction and no damage is anticipated to the root system of Norway Maple T1.

22.0 Demolition

- 22.1 There is no requirement for demolition within the RPA or crown of Norway Maple T1.

23.0 Underground Services

- 23.1 The proposed scheme can make use of existing services located inside and outside the site boundary and any new services and soakaways will be located in the adequate space outside the RPA of the subject tree.
- 23.2 The locations, specifications and installation methods of all new services will be available for review at the pre-commencement site meeting before any works start on site.

24.0 Foundations

- 24.1 The foundations for the proposed development are located largely outside the RPA of Norway Maple T1, therefore, the design and installation of specialised foundations is not required.

25.0 Hard Landscaping/Material Storage

- 25.1 There is no requirement for additional hard landscaping or hard surfacing within the RPA of Norway Maple T1.
- 25.2 The storage of all materials required to complete the construction process will be located outside the RPA of the subject tree and the line of the tree protective fencing.

- 25.3 Subject to all of the above tree protection measures being implemented, construction works may proceed without risk of damage to Norway Maple T1.

26.0 Soft Landscaping/Boundary Fencing

- 26.1 Soft landscaping will be undertaken when heavy machinery has been removed from site and tree protective fencing taken down. The following points will be observed:
- Care will be taken not to compact the soil within the RPA of Norway Maple T1 or where new tree planting is to be carried out.
 - No changes in ground levels will occur within the RPA of Norway Maple T1.
 - Unwanted vegetation will be removed manually or using contact herbicides that will not damage existing tree roots.
 - No irrigation or drainage pipes will be installed within the RPA of the subject tree.
 - If soil has been compacted in areas where planting is proposed, measures to improve soil structure (e.g. decompaction) may be necessary to facilitate successful plant establishment.
 - Where fence and gate post holes are to be installed within the RPA of Norway Maple T1, they shall be excavated by hand retaining all roots over 25mm in diameter and post holes will be lined with heavy duty Polythene to prevent the harmful cement leaching into the soil and damaging the roots of this tree.

27.0 Sequencing/Supervision, Responsibility and Incident Reporting

- 27.1 Effective tree protection relies on following a logical sequence of events and arboricultural inspection/supervision.
- 27.2 All the works detailed in this report which have the potential to affect trees will be supervised by a suitably qualified and experienced Arboricultural Consultant. Regular inspection visits will also be undertaken to ensure that tree protection measures are being adhered to. The final details of supervision and the frequency of inspection visits will be agreed with the Tree Officer at the pre-commencement meeting. The Arboricultural

Consultant will make a record of visits, which will be attached to the site copy of the AMS for inspection and communicated in writing to the LPA within five days of the site visit. An example of the Site Inspection Record is found in **Appendix 3**.

- 27.3 Daily inspection of the physical tree protection measures will be carried out by the on-site Arboricultural Liaison, who does not have to be a trained Arborist, but will be responsible for the implementation of the approved tree protection. Any deviation from the approved methodologies will need to be agreed by the Arboricultural Consultant who may need to visit site to authorise the revised tree protection measures. It is the responsibility of the Client or the Arboricultural Liaison to instruct the Arboricultural Consultant to attend site for the key events requiring supervision or monitoring. Any required modifications to the tree protection measures, building techniques or access arrangements within the crowns or RPAs of any trees will be communicated in writing to both the appointed Arboricultural Consultant and the Tree Officer before the changes occur.
- 27.4 Any damage to the stem , branches or any size roots of Norway Maple T1 will be reported immediately by email and telephone by the Arboricultural Liaison to the Arboricultural Consultant. The Arboricultural Liaison will take photographs of the damage and send these to the Arboricultural Consultant who will visit site to assess the scale of the damage and report to the LPA Tree Officer. Mitigation for the damage will be agreed with the LPA Tree Officer.

Sequencing and Supervision

Stage	Action/Task	Personnel Responsible
1.	Issue arboricultural report to site manager	Client/Developer
2.	Give the Arboricultural Consultant (AC) and the Local Authority Tree Officer at least a week's notice of pre-commencement meeting	Client/Developer
3.	Arboricultural induction and appointment of the Arboricultural Liaison	Site Manager
4.	Carry out tree works (the Client is to establish tree ownership and protection status in writing before any tree works are carried out)	Site Manager
5.	Install all tree protective measures	Site Manager
6.	Pre-commencement meeting to review the service plan and the installed tree protection measures	AC, Tree Officer, Client and Site Manager
7.	Install base for low invasive hard surfacing within the RPA of Norway Maple T1 or protect with ground protection	AC to supervise
8.	Construct foundations	Site Manager
9.	Install underground services	AC to supervise
10.	Erect scaffolding and carry out construction (including hard landscaping)	Site Manager
11.	Remove machinery/plant	Site Manager
12.	Remove all tree protective measures	Site Manager
13.	Carry out soft landscaping, tree planting and erect boundary fencing	Site Manager to brief landscaping company on site and supervise

28.0 Amendments

28.1 Issues sometimes arise on development sites which require amendments to the previously agreed tree protection details. Any amendments to this AMS will be discussed with the Arboricultural Consultant and approved in writing by the LPA prior to being implemented. Copies of paperwork relating to any amendments shall be attached to the site copy of the AMS to provide a definitive record of what has been agreed.

Appendix 1

Tree Survey Schedule with Recommended Tree Works



Site: University of Reading - HLS, Maths and IT Buildings
Our Ref: AR5691
Surveyor: Mr. David Challice
Date Surveyed: 17/04/2025

BS Cat	No. Records
A	1
B	0
C	0
U	0
Total 1	

No.	Species	Measurements	BS Cat	RPA	Tree Observations	Tree Assessments	Recommendations
T1	Norway maple	Height (m): 14 Stem Diam(mm): 390 Spread (m): 5N, 6E, 5S, 5W Crown Clearance (m): 2 Lowest Branch (m): 2(S) Life Stage: Early Mature Useful Life: 40+ Years	A2	Radius: 4.7m. Area: 69 sq m.	Surface rooting is visible above the grass by 3m from the stem. A tree with high amenity value with only insignificant defects and would be a candidate for a Tree Preservation Order.	Growth Vitality: Good Structural Condition: Good Landscape Contribution: Very High RPA circular.	Cut back the northern part of the crown by approximately 2m and crown lift to approximately 5m over the proposed generator compound.

Key for the Tree Survey Schedule with Recommended Tree Works

- **No.** refers to the tree reference number and the prefix of **T** (single tree), **G** (tree or shrub group), **H** (hedge) or **W** (woodland).
- **Species** refers to the tree's common name.
- **Measurements** include: **Height** describes the height of the tree measured in meters (m) from ground level. **Stem Diam(mm)** is the diameter of the stem measured in millimeters at 1.5m from ground level unless otherwise stated. The stem diameter may be estimated (#) where access is restricted or an average (avg) taken for groups or multi-stemmed trees with more than five stems. The number of stems is also indicated. **Spread** refers to the crown radius in meters from the stem centre and can be labelled as the four compass points of N, E, S, W unless symmetrical. **Crown Clearance** refers to the lowest point of the crown height in meters above ground level, lowest branch is the height of the first significant branch and the cardinal point to which it is growing. **Lowest Branch**. **Life Stage**. **Useful Life** is the tree's estimated remaining contribution in years.
- **BS Cat** refers to British Standard 5837:2012 Table 1 and refers to tree/group quality and value. **A** (high), **B** (moderate), **C** (low) or **U** (remove if within site ownership or control). The sub-category is the number next to the BS Cat and refers to the retention criteria values where 1 is Arboricultural, 2 is Landscape and 3 is Cultural including Conservational, Historic and/or Commemorative.
- **RPA** is the radial root protection distance measured in meters from the trunk centre and the root protection area in square meters. The RPA will be modified to account for site features such as hard surfacing and building foundations where necessary.
- **Tree Observations** provide additional information where it is necessary.
- **Tree Assessments** include: **Growth Vitality** - Good, Fair, Poor or Dead. **Structural Condition** - Good, Fair, Poor or Hazardous. **Landscape Contribution** - Very High, High, Moderate or Low. **RPA** may be modified to account for site features or circular.
- **Recommendations** details the reason why the tree works have been specified and the timescale (from the survey date) that the tree works should be completed.

Appendix 2

Appendix 3



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(Sample) Arboricultural Site Supervision Record

Our Ref: ARxxxx

Site: xxxx

Application Number: xxxx/xxxx

Proposal: Front boundary wall, entrance gates and hard and soft landscaping.

Inspected by: Mr. David Challice

Date of Inspection: xx/xx/xxxx

Client: Mr. xxxx

Site Contact: Mr. xxxx

Local Authority: xxxx

Persons Present:

Mr. David Challice - Tree Consultant

Mr. xxxx – Landscape Architect

Tree Protective Fencing:

The tree protective fencing was installed according to the approved documentation.

Photograph of the Tree Protective Fencing



Works Within the Construction Exclusion Zone:

During the site meeting, the screw piles were installed under arboricultural supervision to discharge Condition 6 of the planning application reference xxxx/xxxx (drawing reference xxxxxx-x) for the approved boundary wall. This was undertaken as per the agreed specification to protect the roots of the off site hedge G8.

Photograph of the Screw Pile Installation within the Rooting Areas of Off Site Trees**Amendments to the Approved Arboricultural Documentation:**

There is no requirement for any amendments to the approved arboricultural documentation.

Remedial Work:

There is no requirement for any remedial tree works at this time as all the tree protective measures were installed according to the approved documentation.

General Comments:

I recommend that no further arboricultural site monitoring is required for this project. This report should be emailed by the Client to the Local Planning Authority.

Date of the Next Arboricultural Inspection:

No further arboricultural inspections are required.

Appendix 4

Induction Form for all Site Personnel:

Site Name:

- I have had explained to me by the Site Manager the key implications of the Arboricultural Method Statement relating to the development at the above site.
- I am aware that the tree protective fencing must remain in its original position and must not be moved without the approval of the appointed Arboricultural Consultant.
- I understand that certain operations must be supervised by the appointed Arboricultural Consultant and that these operations must not start until the consultant is present and has given approval.
- I confirm that I will bring any concerns about potential damage to trees to the attention of the Site Manager.
- I am aware that I must not cause damage to any of the retained trees on or adjacent to the site. Damage may be caused by direct means (i.e. physical damage caused to roots or the trunk/branches of the tree) or by indirect means (e.g. by fire or toxic materials entering the rooting environment of the tree).

Print Name:

Sign Name:

Date:

Appendix 5

Guidelines for Installing Low Invasive Surfaces



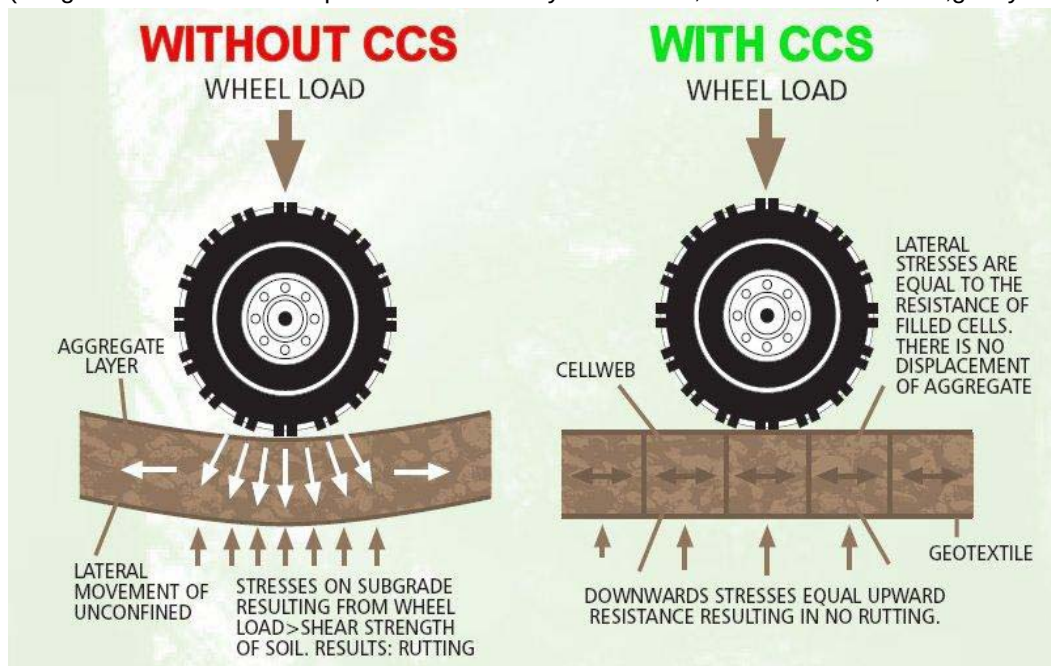
Key Terms and Abbreviations:

Root Protection Area/Root Protection Areas	RPA/RPAs
Cellular Confinement System	CCS
British Standard (BS) 5837	BS
Arboricultural Method Statement	AMS

- 1.0 Avoiding damage to tree roots, oxygen depletion and compaction of subsoil are important considerations when installing hard surfacing close to trees. An acceptable solution with minimal disturbance can be achieved with the use of a Geotextile membrane and the introduction of a CCS. This can be laid directly onto the existing soil level within the RPAs of retained trees. This low invasive CCS system prevents rutting and compaction of the subsoil.

Illustration of Stress Distribution

(Images used with the kind permission of Geosynthetics Ltd, 01455 617139, www.geosyn.co.uk)

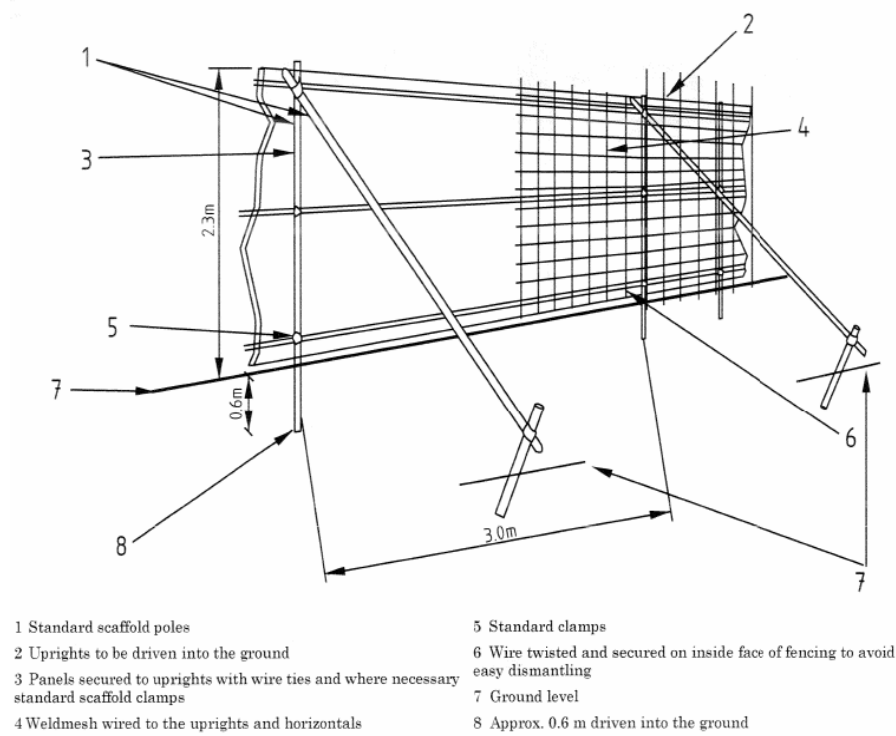


- 2.0 Retained trees must be protected first by the erection of fencing (see diagram below), then by the construction of surfaces in accordance with Sections 9 and 11 of the BS. **The tree protective fencing and surfaces within the RPAs of retained trees must be installed as per the sequencing recommended within the AMS. Hard surfaces constructed in this way can be used for construction access, storage and on-site parking and may need to be installed prior to demolition or construction.**

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Tree Protective Fencing Detail (alternative materials can be used, though all fencing is to be 'fit for purpose')



- 3.0 If ground levels are to be raised by more than 100mm within RPAs, this should be achieved by the use of a granular material which does not inhibit vertical gaseous diffusion. For example; no-fines gravel, washed aggregate, or cobbles.
- 4.0 Ideally, the CCS should be installed between May and October when the ground is driest and least prone to compaction. The approved wearing course is to be laid over the CCS. Where the new surface covers in excess of 20% of the RPA or is wider than 3m within the RPA, the new surface should be constructed in such a manner as to permit infiltration of moisture and gaseous diffusion. Government guidance now recommends permeable surfacing on most construction sites for drainage reasons and this should be considered for all hard surfacing within the RPA of retained trees.
- 5.0 The use of a non-woven Geotextile beneath the cellular mattress acts as a separation/filtration layer. The CCS should be filled with **no-fines** stone in the 20-40mm range. It is important that machinery is only used on the filled CCS and that it is not allowed to compact the soil within the RPAs of trees. Once filled, the perforated cellular wall structure provides mechanical interlock for infill materials, increasing the shear strength while allowing intercellular lateral free drainage.
- 6.0 The system is used as a permanent base for a wearing course and can also be used to provide a temporary site access. CCS material is available in thicknesses from 75mm to

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300mm. The exact thickness required on a site will depend on soil type and the anticipated use of the surface. **A Structural Engineer should design all engineering solutions to surfaces and Geosynthetics offer a free design service.**

- 7.0 The entire RPAs of trees are fenced off at the outset of the project. The fencing is then re-aligned when the works are to commence to facilitate construction of the hard surface.

Stages for Installation of Low Invasive Surfaces

- Stage 1** **Erect tree protective fencing to cover entire RPAs of retained trees.**
- Stage 2** **Re-align tree protective fencing** just prior to work commencing to facilitate construction of low invasive surface. The tree protective fencing must then remain intact until all construction works are completed.
- Stage 3** **Remove surface vegetation** by using a specific herbicide (as advised by a specialist) or manually remove using hand tools. Light machinery operating from beyond the RPA and tree canopy of retained trees could, under specialist supervision, be used to carefully remove existing wearing surfaces, (the sub base of existing surfaces or foundations should be left in situ where possible). If the existing soil level is to be lowered, material is to be cleared away manually. Roots over 25mm in diameter, which are found within the construction profile, should not be severed, but be left in situ and covered immediately with soil or sharp sand to prevent desiccation.
- Stage 4** **Carry out final clearance under the canopies of retained trees.** This should be completed using hand forks (not spades) and any roots exposed should be cleanly cut and covered in soil/sharp sand immediately. Any delay to this process will require irrigation of any exposed roots and subsequent protection with dampened Hessian sacking or similar. Agreed removal of shrubs, saplings or trees, within the RPAs of retained trees should be cut to or just below ground level rather than pulled out, which can damage entwined roots.
- Stage 5** **Level out the ground if necessary** using sharp sand or topsoil (or a mixture thereof). This fills out any hollows in the ground and ensures a smooth surface for laying out of the Geotextile membrane. It is important not to use any machinery within the RPAs of the trees that could compact the soil.

Stage 6 **Install the non-woven Geotextile** directly over the soil surface and fix in place.



Stage 7 **Lay CCS out over the Geotextile membrane** and ensure edges are anchored open during the infill process with steel staples or wooden pegs.



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Stage 8 **Fill the CCS,** ensuring machinery works only on already filled areas and not the sub grade. Typical infill consists of no fines angular granular material of 20-40mm in diameter.



Stage 9 **Install kerbs and edgings** directly on top of existing soil grade level. For light structures, a treated peg and board may be acceptable. For more substantial structures, railway sleepers, drilled kerbstones or gabions, held in place with track or road pins are more suitable. Edgings can be formed using bent reinforcing sheets if required (see diagram below).



Stage 10 **Install permeable surface**

Surfacing Options

Block Paving

- Lay a second layer of Geotextile separation fabric over the infill CCS.
- Lay a sharp sand bedding layer compacted with a vibro-compaction plate to recommended depth.
- Place block paviors as per manufacturer's instructions.

Loose Gravel

- Place second layer of Geotextile separation fabric over the infill CCS.
- Place pea shingle/ gravel to required depth.

Permeable Tarmac

- Lay as per manufacturer's recommendations on top of CCS

Makeup of Final Surface

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