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Arboricultural Impact Assessment

& Method Statement (to BS:5837 2012)

For

91 Savernake Road, London

NW3 2LG

Prepared for: Valeria Pensabene

Report written by: **Trevor Heaps** BSc, MICFor, M.Arbor.A.

Date: 13th November 2017

Ref: TH 1519

Institute of Chartered Foresters

Registered Consultant

Summary

It is proposed to add an extension onto the rear of 91 Savernake Road.

The proposals are within influencing distance of the several small trees and a protected Lime tree and therefore some basic tree protection measures (in accordance with BS 5837:2012) will be employed to ensure they remain unaffected during and after development.

The relationship between the proposal and retained trees is sustainable and will not result in any unreasonable pressure to carry out inappropriate tree works.

If the proposal is implemented in accordance with the recommendations laid out in this report, neither the landscape or retained trees will be adversely affected.

This is an arboriculturally defensible scheme and there are no (arboricultural) reasons why planning consent should not be granted.

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1.0 Introduction

1.1 I am Trevor Heaps, Director of Trevor Heaps Arboricultural Consultancy Ltd. I have experience and qualifications in the field of Arboriculture. Further information is provided in Appendix 1.

1.2 Contact details:

Who	Name	Organisation	Details
Arboricultural consultant	Trevor Heaps	Trevor Heaps Arboricultural Consultancy Ltd., 168 Whitby Road, Ruislip, HA4 9DR	Tel: **07957 763 533** E-mail: trevor@trevorheaps.co.uk
Client	Valeria Pensabene		
Camden - LPA	Tree and Landscape Officer	London Borough of Camden 5 Pancras Square c/o Town Hall, Judd Street London WC1H 9JE	Email Send an enquiry Website www.camden.gov.uk/planning Phone 020 7974 4444

2.0 Instruction

2.1 We are to survey all significant trees that have the potential to be affected by the proposals. We are then to prepare a report to appraise the impact of the proposals on the trees and to set out recommendations for their protection during development - in accordance with British Standard 5837:2012 '*Trees in relation to design, demolition and construction – Recommendations*' (BS5837).

3.0 Drawings provided

3.1 Indicative Tree Survey – Undated.

4.0 Report context

4.1 I visited the site on the 13th November 2017 and was accompanied by Valeria Pensabene.

4.2 The trees were surveyed from within the site at ground level. No climbed inspections were carried out and no root/soil samples were taken for analysis.

4.3 The trees were inspected based on the Visual Tree Assessment (VTA) developed by Mattheck & Breloer (The Body Language of Trees, 1994).

4.4 Tree heights, crown spreads and stem diameters were measured with a clinometer, a Disto laser measure and a diameter measuring tape respectively.

4.5 Most large shrubs or small trees (with stem diameters less than 150mm) were not surveyed because BS 5837 states that these can be transplanted or replaced.

4.6 The report is based on the information provided (i.e. site plans, proposed drawings, scales, measurements etc.) and observations during the site visit.

4.7 This report will support a planning application for development and its purpose is to assist and inform the planning process.

4.8 We were not instructed to investigate the statutory protection status of trees on or adjacent to the site (but will usually check the Council's website for any relevant information).

4.9 This report does not set out the detailed, working specifications of tree protection measures and engineering / design features, but provides enough detail to demonstrate the feasibility of the scheme in principle.

4.10 Assessing the potential influence of trees upon load-bearing soils beneath existing and proposed structures (resulting from water abstraction by trees on shrinkable soils) was not included in the brief and is not therefore considered in this report.

5.0 Statutory tree protection

5.1 I have been advised that this site is covered by a Tree Preservation Order and within a Conservation Area. The protection status of trees can change (new Tree Preservation Orders can be made, and new Conservation Areas can be designated) and so it is advisable to make further inquiries before carrying out any tree works.

6.0 Ecological constraints

6.1 The Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000) provides statutory protection to birds, bats and other species that inhabit trees. In addition to any tree matters considered in this report, these animals could impose significant constraints on the use and timing of access to the site. You are therefore advised to seek advice from an ecologist to check if any such constraints apply to this site.

7.0 The site

7.1 This semi-detached property is situated within a leafy, residential part of North London, just to the south of Hampstead Heath. The property has a south-facing rear garden.

8.0 The soil and topography

8.1 The soils at this site were determined using information provided by the British Geological Survey and observations during the site visit.

8.2 The site is flat.

8.3 The soil depth is deep, and the soil texture is clay-to-silt. The soil parent material is Prequaternary Marine / Estuarine Sand and Silt.

8.4 The soil has the potential of becoming compacted (which is harmful to tree roots).

9.0 Arboricultural Impact Assessment (AIA) and Tree Protection Methods

9.1 7 trees/shrubs were assessed. Further information is provided in Appendix 2 and explanatory notes are provided in Appendix 3.

9.2 Table 1 lists the impacts that the proposal will have on the subject trees. The various impacts are discussed in more detail below; this information should be read in conjunction with the supporting Tree Protection Plan (TPP).

Table 1: Potential impacts on trees due to development

The impacts on trees due to this development	Category A trees affected	Category B trees affected	Category C trees affected
Soil compaction around retained trees		T1	T2, 3, 4, 6, 7
Underground services		T1	

9.3 Background information

9.3.1 No trees need to be removed to facilitate construction; however, the Holly (T4) is growing very close to the brick boundary wall and has contributed to its collapse. This tree may need to be removed in the future to allow a new boundary wall to be constructed. The removal of this Holly is exempt from the normal application procedure because it is causing an actionable nuisance.

Photo 1. Holly (T4) in the centre (causing wall damage); Ceanothus (S3) to its left; and sapling Ash (T2) to the left of the Ceanothus.

9.4 Soil compaction around retained trees

9.4.1 Soil compaction is harmful to tree roots because it reduces gaseous exchange and the availability of water and nutrients.

9.4.2 The soil around the rear garden trees has the potential of becoming compacted (due to various construction-related activities such as storage or materials and the use of heavy machinery).

9.4.3 To minimise soil compaction, the trees will be separated from the working area by protective fencing.

9.4.4 The hard surfaces around / beneath the Wisteria will be left in situ during construction.

9.5 Underground services

9.5.1 Subject to planning consent being obtained, the underground services will either utilise existing service routes, or will be located outside the RPAs of trees shown retained.

9.5.2 If existing services within RPAs require upgrading, care shall be taken to minimise disturbance and where practicable, trenchless techniques employed; only as a last resort should open excavations be considered. Where existing services within RPAs are deemed not satisfactory for any further use they should be left in situ rather than being excavated or removed.

9.5.3 If incursions into RPAs are unavoidable, any new installation will comply with the methods and guidelines detailed in the National Joint Utilities Group publication NJUG 10, Guidelines for the Planning, Installation, and Maintenance of Utility Services in Proximity to Trees (April 1995).

9.5.4 If necessary, the locations of service routes will be approved by the arboricultural consultant and shown on a revised Tree Protection Plan.

10.0 Conclusions

10.2 The rear garden trees will be protected in accordance with current British standards and guidance. To this end, a site-specific AMS and TPP have been provided. These are found in Section 12 and Appendix 10 respectively.

10.3 Provided the recommendations laid out in this report are followed, the proposal will not affect the retained trees / shrubs or the arboreal character of the local area.

10.4 The trees do not cause any significant conflicts in terms of construction activities, nor will any significant issues of post-development pressure be likely to emerge that could not be managed with routine, minor tree maintenance.

11.0 The Arboricultural Method Statement (AMS)

11.1 Effective tree protection relies on following a logical sequence of events and arboricultural supervision. This AMS lays down the methodology for all construction works that may influence significant trees and recommendations for arboricultural supervision are provided in Section 13.

11.2 It is essential that this AMS is observed and adhered. Therefore, a copy of this AMS must be issued to the building contractor to be integrated into their work schedule and must also be permanently made available on-site for the duration of development.

11.3 This AMS should be read in conjunction with the supporting Tree Protection Plan (TPP), which is found in Appendix 10.

11.4 At this site, operations are to occur in the following sequence:

1. Carry out tree work operations specified in the tree data schedule (Appendix 2). All tree works are to be carried out by a competent and experienced arborist to current British Standards (see Appendix 5.9 for assistance finding a suitable arborist).

2. Erect protective fencing along the position(s) shown by the solid red line/s on the TPP (see Appendix 4.2 for further details).

3. Commence construction

4. Remove tree protection when all construction activity has ended.

5. Carry out tree planting and any other landscaping works (see Appendix 4.8 for further details).

12.0 Arboricultural supervision

12.1 If appropriate, a qualified arboriculturalist will provide on-going supervision during construction. The occasions when supervision is required are outlined in Table 2. If the LPA wish to see further supervision, this matter can be dealt with by amending the report or by condition.

Table 2: Indicative arboricultural supervision requirements

Supervision details	Required (Y / N)	When	Details	Nature	Signed off (by Council)
Pre-commencement site meeting	**N**	Prior to any site activity	To ensure that the contractors are fully briefed and understand the requirements of the AMS and TPP. A site supervisor will be appointed to take responsibility for tree protection and of reporting any damage to trees or deviation from the AMS to the project arboriculturist.	Informal and open discussions. Induction form signed by attendees	
Meeting with tree contractors	**N**	Prior to protective measures being installed	To ensure work instructions are clear and understood. To highlight any important / protected trees.	Informal meeting. No follow up required (unless requested)	
Protective measure(s) check	**N**	After protective measures installed, but prior to any site activity	To ensure that the protective measures are fit-for-purposed and correctly positioned.	A site monitoring report will be prepared and forwarded to LPA arb officer	
On-going supervision	**N**	During construction (no less than every 8 weeks)	To supervise key stages of works near trees and/or to ensure that the protective measures have not been moved and continue to be fit-for-purpose.	A site monitoring report will be prepared and forwarded to LPA arb officer	
Meeting with landscape contractors	**N**	After construction	To provide advice on tree / shrub selection	Informal meeting. No follow up required (unless requested)	
Other					

12.2 A site inspection record (see Appendix 9) will be prepared after each visit; it will state the condition of tree protection measures and outline any necessary remedial action and timescales. All site monitoring reports will be forwarded to the LPA arboricultural officer within 5 working days of the visit.

13.0 Signature

This report represents a true and factual account of the potential arboricultural impacts, and recommended protective measures, at the subject property.

Signed

.....

Trevor Heaps

Chartered Arboriculturist

BSc (Hons), MArborA, MICFor

Dated

13th November 2017

Appendix 1 - Professional résumé

I am Trevor Heaps, director of Trevor Heaps Arboricultural Consultancy Ltd. I am a Chartered Arboriculturist, a Professional Member of the Arboricultural Association (AA) and hold a First-Class Honours Degree in Arboriculture.

Professional training

- Arboriculture and Bats: Scoping Surveys for Arborists (BCT & AA) – October 2017
- Tree Science (AA) – June 2016
- OPM (Oak Processionary Moth) Training (FC) – May 2016
- Visual Tree Assessment (Arboricultural Association) - October 2015
- Trees and the Law (Dr Charles Mynors) - June 2015
- Mortgage (Home Buyers) Report Writing (LANTRA / CAS) - February 2015
- Tree Preservation Orders - effective application (LANTRA / CAS) - November 2014
- Professional Tree Inspection 3-day course (LANTRA / AA) - July 2014
- Arboricultural Consultancy Course (AA) - May 2014
- Further down the subsidence trail 1-day course (AA) - April 2013
- Getting to grips with subsidence 1-day course (AA) - November 2012

AA – Arboricultural Asscociation

BCT – Bat Conservation Trust

CAS – Consulting Arborist Society

FC – Forestry Commission

Appendix 2 - Tree data schedule

Ref	Name	Age	DBH (mm)	Hgt. (m)	Can. hgt. (m)	Can N (m)	Can E (m)	Can S (m)	Can W (m)	Physio cond.	Struct cond.	Life Exp.	Ret. Cat.	Comments	Rec's (proposed works are highlighted)
T1	Tilia X europaea (Common Lime)	M	410,400	15	3	4	4	4	4	Normal	Fair	40+	B1	Lapsed pollard (originally pollarded at about 3-4m and then 9m) that has been managed by crown reductions. There is the potential for decay to have formed beneath the old pollard points. Ivy covered. Damaging both nearby walls. Epicormic growth	Remove epicormic growth and ivy from main stem to enable tree to be checked for defects
T2	Fraxinus excelsior (Ash)	Y	70	5	2	1.5	1.5	1.5	1.5	Normal	Normal	40+	RC	Small, self-seeded Ash tree (which is a quick-growing, large-growing species of tree). Negligible amenity value. So that the tree doesn't grow and interfere with the protected Lime, it should be removed (and is less than 75mm in diameter and so consent not required).	No works required at present
S3	Ceanothus (Californian Lilac)	EM	110	5	1.5	2	2	2	2	Fair	Normal	40+	RC	Mature, sparse shrub of no significance. Negligible amenity value.	No works required at present
T4	Ilex aquifolium (Holly)	EM	145	5	1.5	2	2	2	2	Fair	Normal	40+	RC	Sparse Holly growing close to boundary. Roots have caused damaged to boundary wall (which has collapsed) Negligible amenity value.	No works required at present (but future removal exempt due to wall damage)
S5	Wisteria (Wisteria)	M	100	5	2	0.5	0.5	0.5	0.5	Fair	Poor	10+	C2	Wisteria growing through brick boundary wall. No reason to remove as part of scheme and no reason why it won't survive works being carried out around it; however, its life expectancy may be limited by its unusual growing conditions. if required, removal would be exempt due to wall damage.	No works required at present
T6	Chamaecyparis lawsoniana (Lawson Cypress)	EM	150	6	1.5	1.5	1.5	1.5	1.5	Normal	Normal	40+	RC	One of a pair of Cypresses. Has the potential to grow very large, very quickly. Negligible amenity value. The tree should be removed so that they don't suppress the Lime or dominate the rear garden.	No works required at present
T7	Chamaecyparis lawsoniana (Lawson Cypress)	EM	200	6	1.5	1.5	1.5	1.5	1.5	Normal	Normal	40+	RC	One of a pair of Cypresses. Has the potential to grow very large, very quickly. Negligible amenity value. The tree should be removed so that they don't suppress the Lime or dominate the rear garden.	No works required at present

Appendix 3 - Tree data schedule explanatory notes

This section explains the terms used in the **Tree data schedule** (Appendix 2).

Ref: Each item of vegetation has its own unique number prefixed by a letter such that:

T1=Tree **S2**=Shrub or stump **G3**=Group **H4**=Hedge **W5**=Woodland

Species: Latin (and common names in brackets) are given.

Age:

- **Y - Young** - Usually less than 10 years' old
- **SM - Semi-mature** - Significant future growth to be expected, both in height and crown spread (typically below 30% of life expectancy)
- **EM - Early-mature** - Full height almost attained. Significant growth may be expected in terms of crown spread (typically 30-60% of life expectancy)
- **M - Mature** - Full height attained. Crown spread will increase but growth increments will be slight (typically 60% or more of life expectancy)
- **V - Veteran** - A level of maturity whereby significant management may be required to keep the tree in a safe condition
- **OM – Over-mature** - As for veteran except management is not considered worthwhile

DBH (mm): Stem diameter, measured in mm, taken at 1.5m above ground level where possible.

Hgt. (m): Height: Measured from ground level to the top of the crown in metres.

Can Hgt. (m): Crown height: Measured from ground level to the lowest tips of the main crown begins in metres. Where the crown is unbalanced it is measured on the side deemed to be most relevant. This is usually the side facing the area of anticipated development.

Can N, S, E, W: - Canopy extents
Approximate radial crown spread measured to the four cardinal points (for individual trees only)

Physio cond.: Indicates the physiological condition of the tree as one of the following categories:

- **Normal** - Healthy tree with no symptoms of significant disease
- **Fair** - Tree with early signs of disease, small defects, decreased life expectancy, or evidence of less-than-average vigour for the species
- **Poor** - Significant disease present, limited life expectancy, or with very low vigour for the species and evidence of physiological stress
- **Very poor** - Tree is in advanced stages of physiological failure and is dying
- **Dead** - No leaves or signs of life

Struct cond.: Indicates the structural condition of the tree as one of the following categories:

- **Normal** - No significant structural defects noted
- **Fair** - Some structural defects noted but remedial action not required at present
- **Poor** - Significant defects noted resulting in a tree that requires regular monitoring or remedial action
- **Very poor** - Major defects noted that compromise the safety of the tree. Remedial works or tree removal is likely to be required.
- **Dead** - No leaves or signs of life

Life Exp.: The estimated number of years before the tree may require removal (<10), (10 – 20), (20 – 40), or (40+).

Ret. Cat.: - Retention category: BS5837:2012 Category where:

- **U = Trees unsuitable for retention**. Trees in such a condition that cannot realistically be retained as living trees in the context of the current land use for longer than 10 years. These trees are shown on the tree plans with red centres.

- **A = Trees of high quality**. Trees of high quality with an estimated remaining life expectancy of at least 40 years. These trees are shown on the tree plans with green centres.

- **B = Trees of moderate quality**. Trees of moderate quality with an estimated remaining life expectancy of at least 20 years. These trees are shown on the tree plans with blue centres.

- **C = Trees of low quality.** Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150mm. These trees are shown on the tree plans with grey centres.

Trees of notable quality are graded as Category A or Category B. These trees are sometimes divided further into sub-categories:

- Sub-category 1 is allocated where it has been assessed that the tree has mainly arboricultural qualities.
- Sub-category 2 is allocated where it is assessed that the tree has mainly landscape qualities.
- Subcategory 3 is allocated where it is assessed that the tree has mainly cultural qualities, including conservation.

Trees may be allocated more than one sub-category. All sub-categories carry equal weight, with for example an A3 tree being of the same importance and priority as an A1 tree.

Comments: Tree form and pruning history are also recorded along with an account of any significant defects.

Rec's - Recommendations: Usually based on any defects observed and intended to ensure that the tree is in an acceptable condition.

Appendix 4 – Specifications for tree protective measures

4.1 Ground Protection

4.1.1 The following is based on an extract from British Standard 5837:2012 - Trees in relation to design, demolition and construction– Recommendations.

4.1.2 Temporary ground protection should be able to support any traffic entering or using the site without being distorted or causing compaction of underlying soil and might comprise one of the following:

a) for pedestrian-movements only, a single thickness of scaffold boards placed either on top of a driven scaffold frame, to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100 mm depth of woodchip), laid onto a geotextile membrane;

b) for pedestrian-operated plant up to a gross weight of 2 t, proprietary, inter-linked ground protection boards placed on top of a compression-resistant layer (e.g. 150 mm depth of woodchip), laid onto a geotextile membrane;

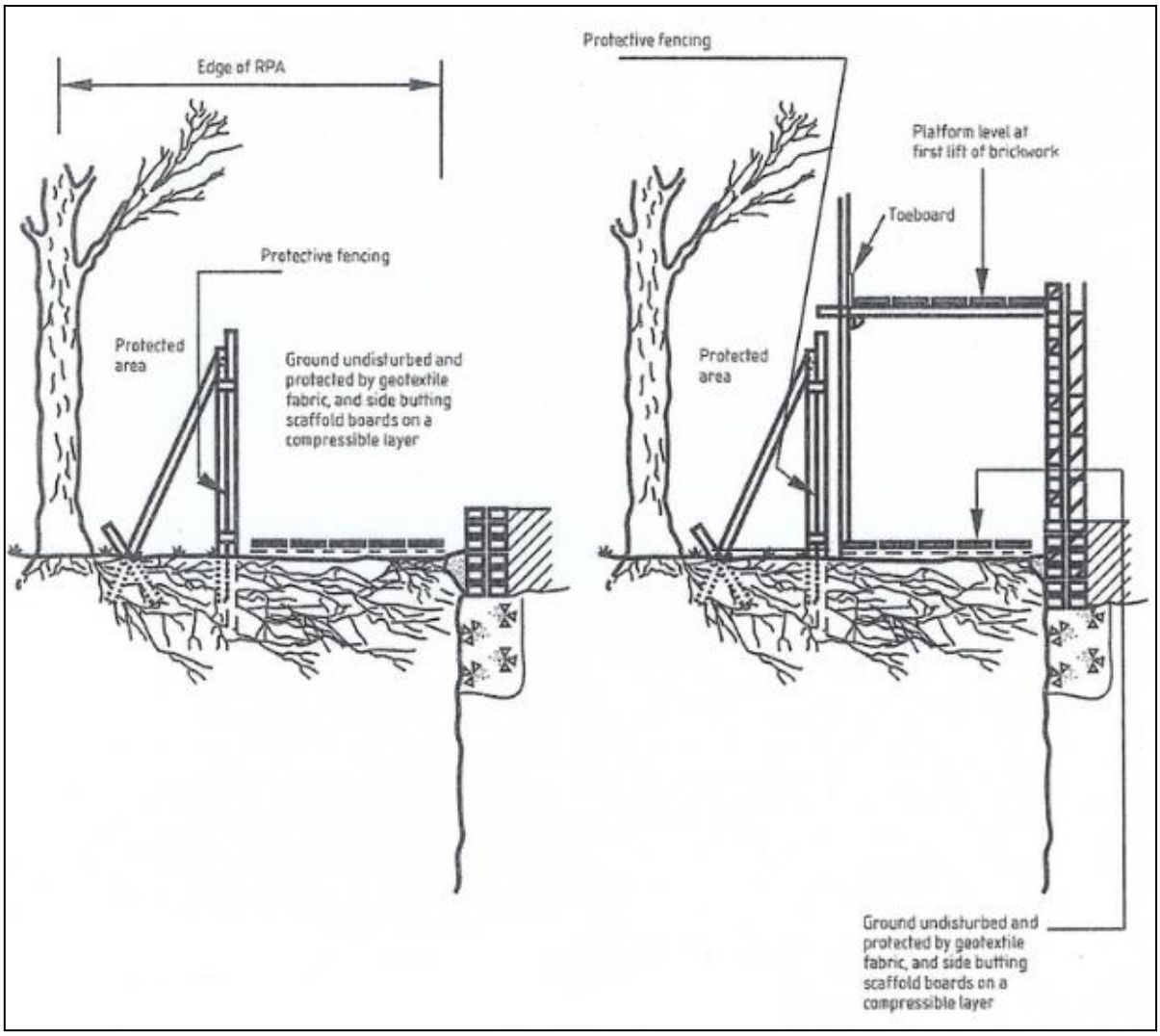
c) for wheeled or tracked construction traffic exceeding 2 t gross weight, an alternative system (e.g. proprietary systems or pre-cast reinforced concrete slabs) to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.

4.1.3 The location and design of the temporary ground protection is shown on the tree protection plan and detailed within the arboricultural method statement.

4.1.4 In all cases, the objective should be to avoid compaction of the soil, which can arise from the single passage of a heavy vehicle, especially in wet conditions, so that tree root functions remain unimpaired.

4.1.5 All ground protection is to be maintained in good order so it is fit for purpose throughout development. The ground protection will not be altered in any way, or prematurely removed without prior consent of the project arboriculturist or the LPA arboricultural officer.

Figure 1: An example of ground protection on work areas within a RPA (BS 5837:2005)

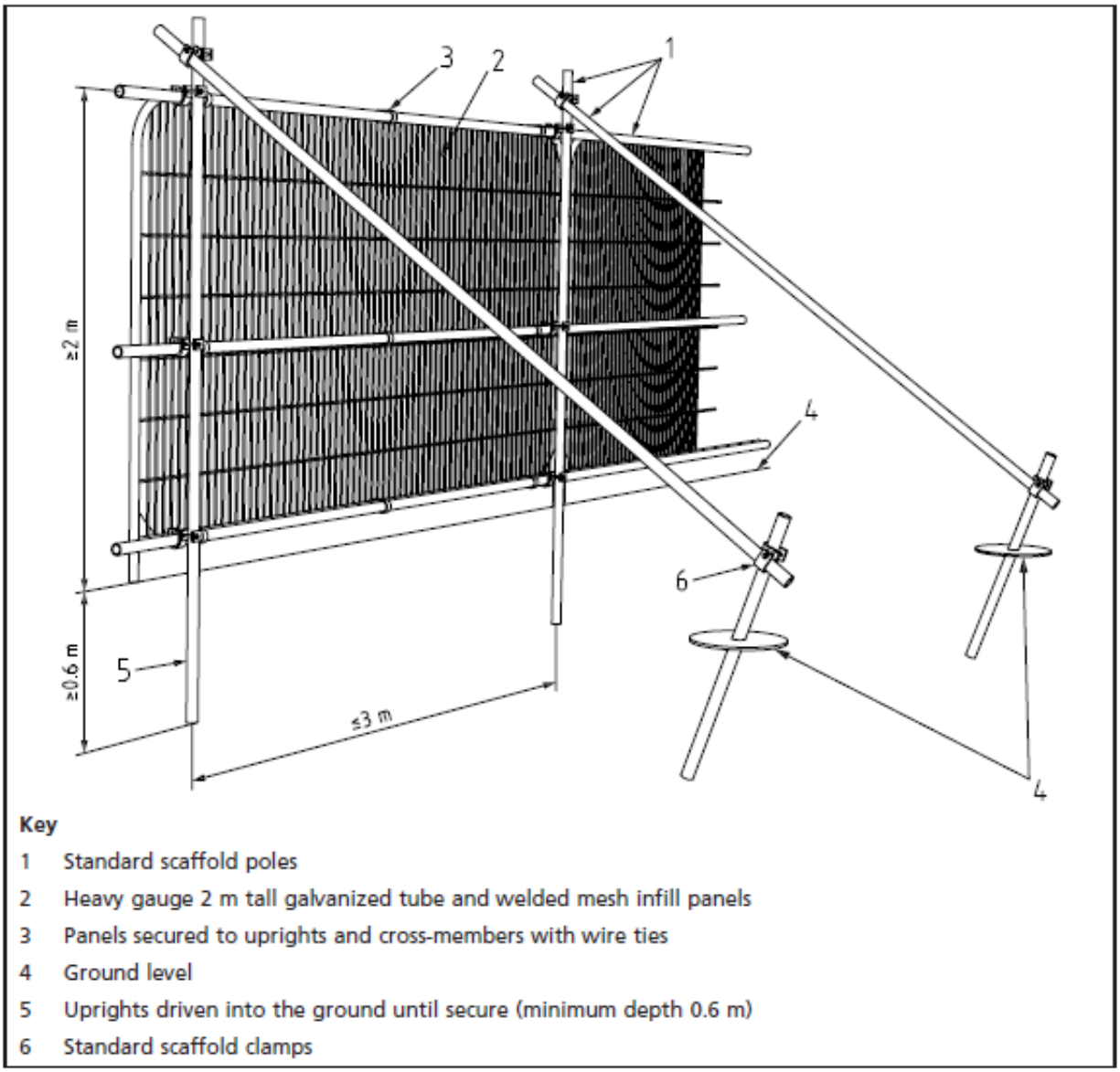


4.2 Protective fencing

4.2.1 The following is based on an extract from British Standard 5837:2012 - Trees in relation to design, demolition and construction– Recommendations.

4.2.2 The framework support (shown in Figure 2 and photo 1) is the usual method of support for 'Heras' fencing. Some variation can be employed if site conditions are appropriate; i.e. support by wooden posts (75mm x 75mm x 2.75m) dug or concreted into the ground (dry mix concrete contained within a plastic bag), or if there is no pressure for access, a lighter form of netting on stakes.

Figure 2: Default specification for protective barrier (BS 5837:2012)



Key

1 Standard scaffold poles
2 Heavy gauge 2 m 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 0.6 m)
6 Standard scaffold clamps

Photo 1: A worked example of the default specification for protective barrier (BS 5837:2012)

4.2.3 Durable, all-weather signs are to be attached to the fencing (an example sign is provided in Appendix 6). This shall be printed, laminated and attached at regular intervals along the fencing.

4.2.4 Once erected, the protective fencing is to be regarded as sacrosanct and there is to be no access into the area protected by it (the construction exclusion zone / CEZ).

4.2.5 The protective fencing is to be maintained in good order so it is fit for purpose throughout the construction process. The fencing will not be altered in any way, or prematurely removed without prior consent of the project arboriculturist and/or (if necessary) the LPA arboricultural officer.

4.2.6 Where specified in the AMS, the tree stem/s shall be boxed off with wooden ply boards (or similar). This will help avoid any direct damage to tree stems from passing machinery (see photo 2).

Photo 2: Tree stems protected by wooden boxing

4.3 Excavations within or close to the Root Protection Areas (RPAs) of retained trees

4.3.1 To minimise root damage during construction, the following guidance shall be followed:

4.3.2 The RPAs of affected trees will be marked on the ground with biodegradable marker paint.

4.3.3 The affected area(s) closest to the retained tree(s) will be excavated using hand tools such as a fork, spade, trowel, stiff brush or an air spade. All spoil from the above process shall be removed from site using a wheelbarrow.

4.3.4 If, on inspection of the hand-dug area(s), no roots are present, mechanical excavation may be possible if a banksman is supervising the excavation.

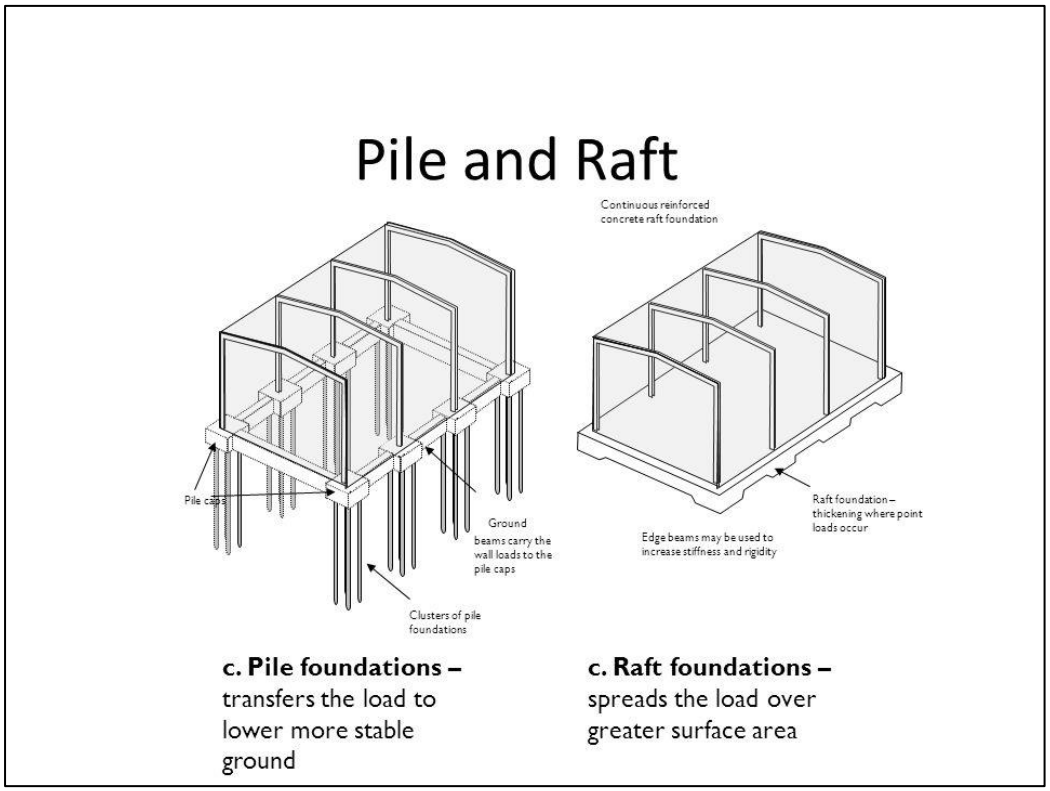
4.3.5 If roots below 25mm in diameter are uncovered, they will be severed cleanly back to a suitable growth point with sharp secateurs or a sharp pull saw. If roots over 25mm in diameter are unearthed, they will be bent / relocated as best as possible. If not practical, they will be severed cleanly back to a suitable growth point with sharp secateurs or a sharp pull saw.

4.3.6 On completion of the works described in 4.2.5, the exposed soil will be covered with damp hessian (to maintain soil moisture and protect any retained roots from desiccation).

4.4 Non-invasive foundation designs

4.4.1 To minimise root disturbance, pile and beam (or similar non-invasive foundations) will be used (see 4.4.8) and the following guidance shall be followed: A useful example diagram (by Professor Chris Gorse & Ian Dickinson) is provided below (Figure 3).

Figure 3: A good example of commonly-used non-invasive foundations.



4.4.2 The RPA of the affected tree(s) will be marked on the ground with biodegradable marker paint.

4.4.3 A cable avoidance tool (C.A.T.) will then be used to check for underground cables. All underground cables will be marked with a biodegradable marker paint (using a different colour to the one used to mark the RPA).

4.4.4 Working off either suitable ground protection or an existing hard surface (see 4.1), the locations for the piles (i.e. between roots) will be determined by hand, using tools such as a fork, spade, trowel, stiff brush or an air spade. If working off a moveable existing hard surface such as paving slabs or block paving, a small number of individual slabs will be removed to facilitate this exploratory process. If working off a concrete surface, a pneumatic drill can be used to break through to the soft surface below. All spoil from the above process will be removed from site using a wheelbarrow.

4.4.5 If roots below 25mm in diameter are uncovered, they can be severed cleanly back to a suitable growth point with sharp secateurs or a sharp pull saw. If roots over 25mm in diameter are uncovered, they will be bent / relocated as best as possible. If this is not possible, then the process (from 4.4.4) will be repeated.

4.4.6 After the location of the piles are determined, the pile holes will be as small as is practically possible and the piling rig shall be situated on top of either suitable ground protection or a pre-existing hard surface (see 4.1).

4.4.7 The beam (or lintel) can now be fixed to the top of the piles and construction of the main structure can begin. The lowest part of the proposed extension / floor-base will sit on top of the highest level of the trees' RPAs (i.e. there will no alteration of ground levels).

4.4.8 If required, engineering methods can be used to direct moisture to the underlying tree roots.

4.4.9 The final foundation specification is a matter for a structural engineer.

4.5 Demolition of existing buildings

4.5.1 Any existing buildings to be removed, that are within or close to the RPA of retained trees, shall be demolished using the 'top down, pull back' method. This must proceed in a manner pulling the structure back into itself, working away from the retained tree(s).

4.5.2 Any machinery used during the demolition and clearance of existing buildings must work from a position outside of the RPAs of any retained trees; or situated on suitable ground protection (see 4.1).

4.5.3 To avoid unnecessary root disturbance, the foundations of demolished buildings within in the RPAs of retained tree(s) shall either be left in place, or broken up by hand (using tools such as a fork, spade, trowel, stiff brush or an air spade) under arboricultural supervision.

4.6 Removal of existing hard surfaces / rubble

4.6.1 Working off either existing hard surfaces or supplementary ground protection (see 4.1), machinery can be used to carefully peel back and remove existing tarmac or concrete. Other surfaces, such as rubble or block paving, will be removed by hand. Sub-bases can be removed if they are not likely to contain roots (this must be approved by the arboricultural consultant). Underlying (soft) ground levels must be retained and will not be excavated.

4.6.2 All newly exposed soil and exposed roots will be covered with damp hessian or 100 mm of topsoil.

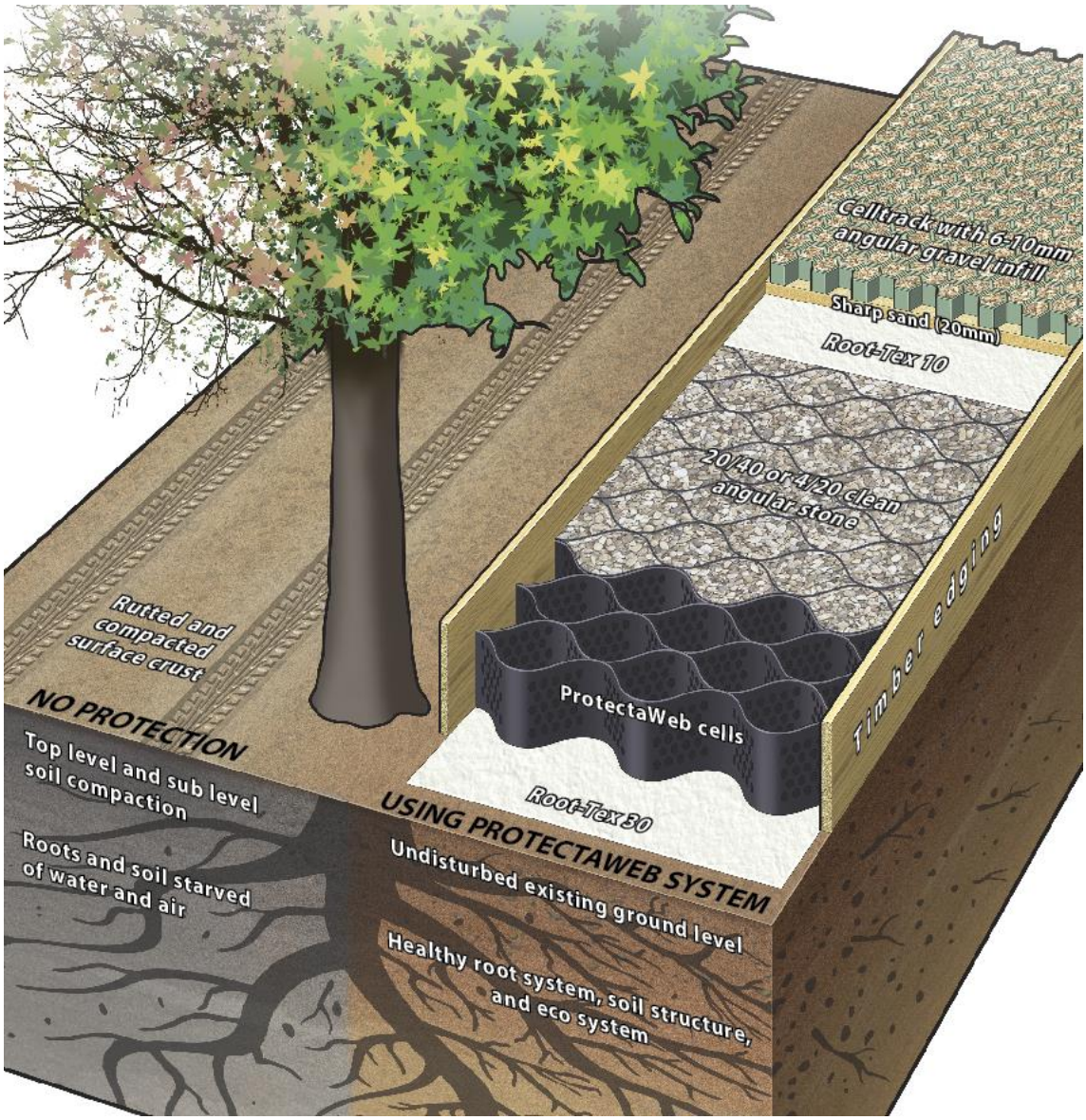
4.6.3 Machinery can be used to move the topsoil close to the exposed area, but the topsoil itself will be spread by hand.

4.6.4 Machinery will not be sited on any exposed rooting area / RPA.

4.7 Principles of no-dig surface installation

4.7.1 The no-dig construction principles are outlined below and the areas to which they apply are shown on the TPP (shaded with orange honeycomb). A useful example diagram (by Protectoweb) is provided below (Figure 4).

Figure 4: A good example of the principles of a no-dig surface.



4.7.2 The surface vegetation will be treated with a suitable systemic herbicide (by a trained operative).

4.7.3 The treated vegetation and existing turf layer will be removed (using hand tools).

4.7.4 Any localised depressions will be filled in with sharp sand (not builders' sand, which has a high salt content) to create an even surface profile. The area will not be 'rolled' or consolidated in any way.

4.7.5 Timber edging boards (or similar) will be installed along the perimeter of the no-dig area. The fixing posts and pegs for the edging boards will be installed carefully to avoid damaging to tree roots.

4.7.6 A layer of geotextile fabric will be laid across the no-dig area, overlapping adjacent rolls by a minimum of 150mm (it may be necessary to lightly pin the geotextile in place until the overlying layers are installed).

4.7.7 The Three-Dimensional Cellular Confinement System (TDCCS) will be opened, laid and pinned in place between the edging boards (it may be necessary to cut the TDCCS to size using a sharp knife or it can be left uncut and folded up against the edgings if preferred).

4.7.8 The system is available in 5 depths for varying traffic loadings, but each site should have a specific design detailed to ensure the correct depth of product is used. However, unless the existing ground conditions are very soft then the following can apply:

- **50mm deep for Pedestrians and Cycleways, non-vehicular traffic**
- **75mm deep for Pedestrians, Cycleways and vehicles (up to 1.5 tons)**
- **100mm deep for Cars, 4 x Wheel Drives, Vans etc. (up to 6 tons)**
- **150mm deep for Fire Trucks, Removal Vehicles and Dust Carts (up to 20 tons)**
- **200mm deep for construction vehicles, cranes etc. (40 tons and above)**

4.7.9 The TDCCS will be pinned in place using steel fixing pins to keep it open and fully expanded position whilst the cells are being filled and to stop the structure from being pushed up by migrating aggregate during the filling process. The fixing pins will be driven in so that they are just touching the top of the cells but do not compress the fabric.

4.7.10 The TDCCS will be filled with clean, open-graded angular aggregate, normally in the particle size range of 5mm - 45mm, working toward the tree(s) from the furthest point away and using the filled sections as a platform.

4.7.11 A light vibratory compaction plate (whacker) will be used to settle the stone into the cells and the permeable surface will then be installed on top of the filled, cellular confinement system.

4.7.12 If the proportion of RPA covered by a no-dig surface is greater than 20%, the wearing surface must be permeable.

4.8 Soft landscaping within or close to the Root Protection Areas (RPAs) of retained trees

4.8.1 The following precautions are necessary to avoid damage to trees (where activities are to take place within their RPAs):

- Ground levels will not be changed;
- Soil must be of good quality and free of contaminants and other foreign objects potentially injurious to tree roots. The topsoil must satisfy the requirements of BS3882:200;
- No heavy machinery will be operated within the RPAs of retained trees during the installation of soft landscaping;
- Unwanted vegetation shall be removed manually or by using systemic herbicide that will not damage tree roots;
- No fuels or chemicals shall be used or stored within these areas; and
- No irrigation or drainage pipes shall be installed within the RPAs

4.9 New hard surfaces within the Root Protection Areas (RPAs) of retained trees

4.9.1 In some situations, floating concrete rafts constructed directly onto the soil surface may be acceptable for both pedestrian and vehicular access, but the design must not include any strip-dug supports.

4.9.2 If concrete is poured directly, precautions must be taken to ensure that no toxic fluids can contaminate the adjacent soil by firstly laying a geo-textile membrane.

4.9.3 Alternatively, elevated paths supported on low-impact frames or post supports allows a decking surface to cross sensitive areas. Where paths are installed very close to trunks, provision must be made for distortion from future root growth by selecting flexible components for the supporting frame and surfacing.

4.10 New parking areas within the RPA of retained trees (where no-dig construction is not required or justified)

4.10.1 (a) Working off suitable ground protection (see Appendix 4.1), the existing hard surface shall be removed by hand.

Or

4.10.1 (b) Working off suitable ground protection (see Appendix 4.1), the existing vegetation shall be treated with a suitable systemic herbicide (by a trained operative). When the vegetation has died off, the turf layer (usually about 5cm deep) will be removed (using hand tools).

4.10.2 Working with the new, bare surface, any localised depressions will be filled in with sharp sand (not builders' sand, which has a high salt content) to create an even surface profile. The area will not be 'rolled' or consolidated in any way.

4.10.4 Once the even surface profile has been formed, the load spreading construction is installed on top (without compaction). In principle, the load spreading formation will normally be cellular and filled with crushed stone, although the detail may vary with different products. Suitable surface finishes include washed gravel, permeable tarmac or block paviours set on a sand base.

4.10.5 Conventional kerb edges (set in concrete-filled trenches) is likely to result in damage to roots and should be avoided. Edge retention in RPAs must be designed to avoid any significant excavation into existing soil levels (BS 5837, 7.4.3) and there are several approaches that are fit for this purpose. For block paviours, the use of pre-formed edging secured by metal pins is effective and can be reinforced by concrete supports if there is no excavation into the soil. Railway sleepers pinned in place or wooden boards are two options, depending on the expected loading of the surfacing. A permeable soil fill can then be used to batter the grade back down to the existing soil level.

4.11 Small sheds, car ports and bikes stores and bin stores

4.11.1 Light structures do not normally require substantial foundations and can be designed to have permeable bases. Ideally, their bases should be of a no-dig, load-spreading construction set directly on to the soil surface.

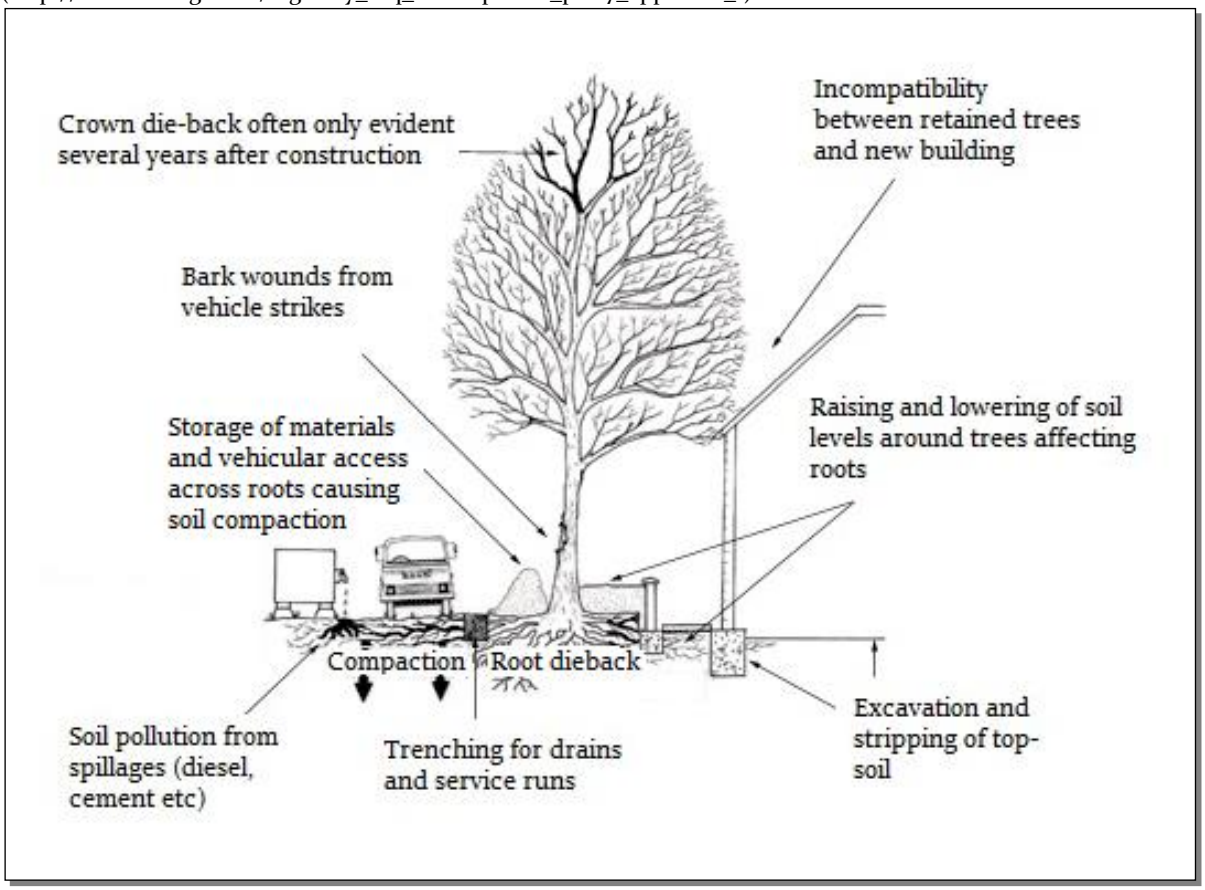
4.11.2 They require a flat base and so an undulating site will need levelling to provide a suitable surface. Excavation of any high points by up to 5cm and filling depressions with permeable fill to provide a flat base will normally be acceptable, provided no roots greater than 2.5cm in diameter need to be cut.

4.11.3 If larger roots are found, the preferred course of action would be to raise the base level of the structure by filling rather than by cutting roots. However, if this is not practical and large roots have to be cut, the situation should be discussed with the supervising arboriculturist before a final decision is made.

4.11.4 Light covering structures can be fixed onto a frame that can rise directly from the base or be fixed to supports either banged into the ground or set in carefully dig holes. Provided the supports are well spaced, i.e. greater than 1.5m apart, and of a relatively narrow diameter, i.e. not more than 15cm, it is unlikely they will cause any significant disturbance to RPAs.

Appendix 5 – General precautions and further information

Figure 4: Common problems for trees on development sites
(http://www.leics.gov.uk/highway_req_development_part7_appendix_f)



5.1 Services and drainage: Surface run-off water shall be sent to soakaways located outside the RPAs of retained tree(s). If trenching is required within the RPA of retained trees to provide routes for services, this work shall be undertaken using mole boring and / or hand digging (under arboricultural supervision).

5.2 Storage of materials: No materials or spoil are to be stored within areas protected by protective fencing and/or ground protection. The same applies for existing hard surfaces that are being used as ground protection.

5.3 Spillages: If any cement residues fall within root protection areas, it shall be swept up, bagged and removed from site – it shall not be washed away with water.

5.4 Demolition: Where any existing structures are to be demolished, they will be done so inwardly (away from root protection areas / retained soil).

5.5 Levels: There is to be no alteration of ground levels within the area protected by protective fencing and/or ground protection, unless previously specified and agreed upon. The same applies for existing hard surfaces that are being used as ground protection.

5.6 Fires: No fires are to be lit within 20 metres of the stems of retained trees.

5.7 Above ground damage to trees: Care must be taken in planning the location and operation of machinery to avoid above ground damage to trees. BS5837 (2012) Section 6.2.4.1 states '*Planning of site operations should take sufficient account of wide loads, tall loads and plant with booms, jibs and counterweights (including drilling rigs) in order that they can operate without contacting retained trees. Such contact can result in serious damage to trees and might make their safe retention impossible. Consequently, any transit or traverse of plant in proximity to trees should be conducted under the supervision of a banksman, to ensure that adequate clearance of trees is always maintained. Access facilitation pruning should be undertaken where necessary to maintain this clearance.*

5.8 Remedial works and soil improvement: Exposed soils are easily compacted resulting in loss of water and gaseous exchange; this can lead to root death (and subsequently tree death).

5.8.1 To relieve ground compaction, which may have resulted from the use of vehicles or by the storage of materials, the soils should be broken up to allow air to penetrate and for the soil structure to be restored. There are various methods to achieve this, such as: auguring the soil by hand / fork or pneumatic excavation (e.g. with an air spade); both should be combined with soil structure improvements (see 5.8.2).

5.8.2 The soil structure can be improved by incorporating a compost or mulch within the topsoil, of 75-100mm in depth. This can be spread over the surface and gently forked into the soil. If bark chip is used as mulch, NPK fertilizer should be added to counteract the nitrogen depletion of the soil. There is also the option of adding mycorrhizal fungal which may also improve root function.

5.9 Choosing an arborist: When appointing a tree works contractor, please only use properly qualified and experienced companies who comply with current British Standards (3998) and always check that they carry Public Liability Insurance within a minimum of £2,000,000 cover, and the relevant Employers Liability Insurance. A list of contractors approved by the Arboricultural Association can be found at www.trees.org.uk or by calling 01242 522 152.

Appendix 6 – Example signage

TREE PROTECTION FENCING

KEEP OUT

This fencing must not be removed

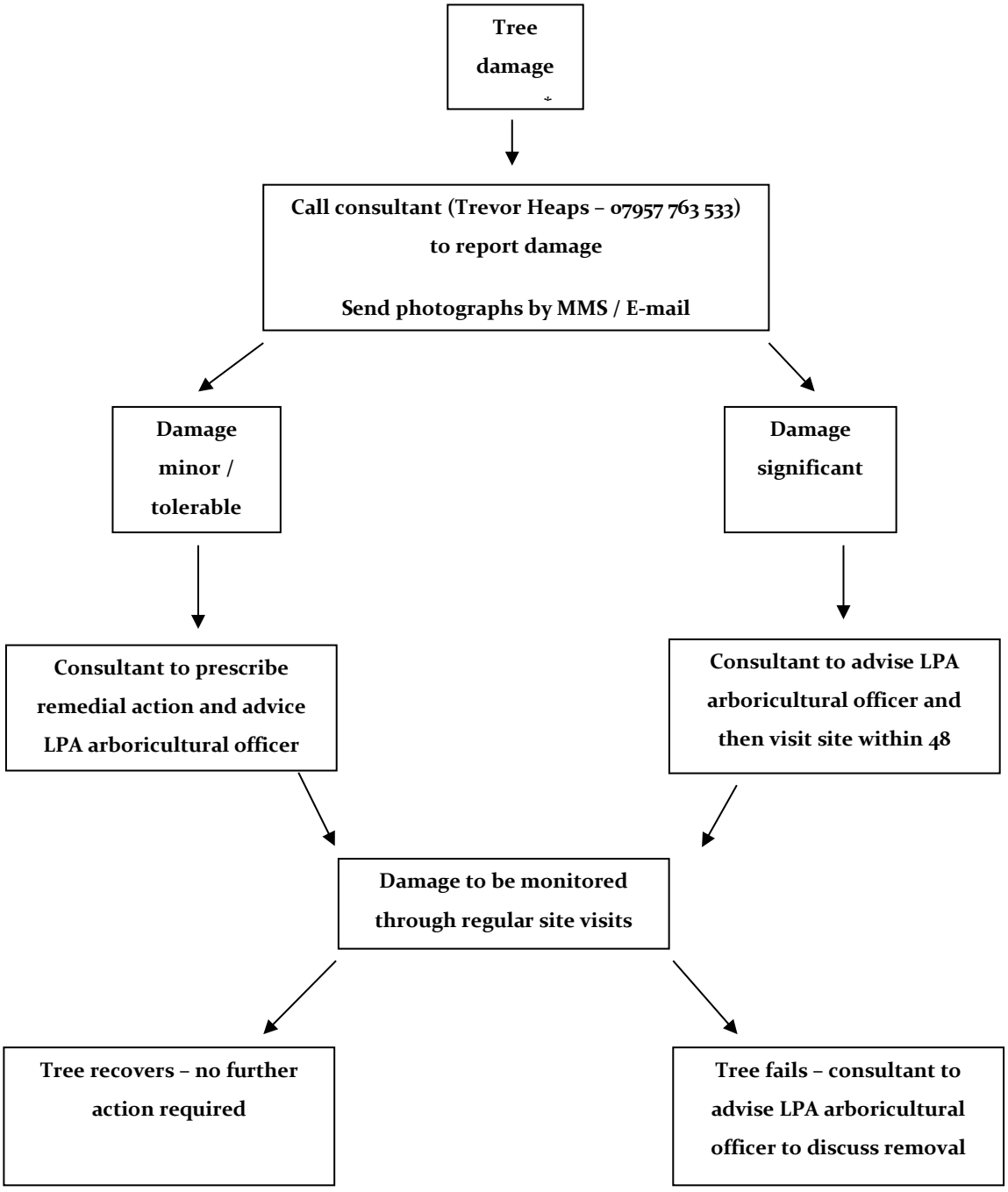
or altered in any way without prior consultation with the project arboriculturist!

Please report any damage to trees and/or fencing to the site manager or the project arboriculturist

Trevor Heaps

07957 763 53

Appendix 7 - Procedure to follow in case of damage to retained trees



*Tree damage could include: unauthorised branch / root pruning; accidental damage to roots, stem, branches or crown; bark damage to vehicle / machinery strikes; and spillage of toxic materials within root protection areas (RPAs)

Appendix 8 - Induction form for all site personnel

Site name: .....

App. No.: .....

Appointed Site Supervisor: .....

- 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 trees have shallow roots and any excavation works beneath the canopy could cause irreparable damage.

- I am aware that the tree protective fencing / ground protection 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 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 9 - Site inspection record

Date: Time: Site:	Planning application reference:

Those present in addition to project arboriculturist:

Client / Agent: .....

Project / Site manager: .....

LPA arboricultural officer: .....

Other (specify): .....

	Yes	**No**	**Action Required?**
Tree protection measures located in accordance with TPP?			
Any disturbance within construction exclusion zone?			
Any materials stored within construction exclusion zone?			
Any evidence of damage to tree roots, stems or canopies?			
Any works programmed before next planned site visit that may affect retained trees? (if yes, provide details below)			

Notes:

Additional site visit required to ensure compliance with required action? (Y / N)

Proposed visit date:

Signed: Date:

Appendix 10: Tree Protection Plan

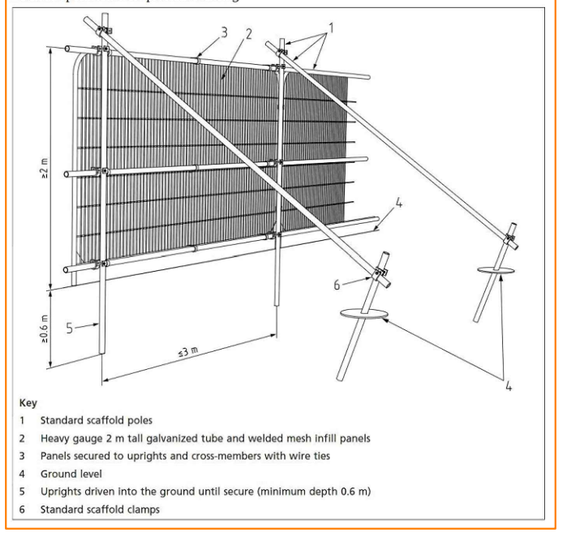
At this site, operations are to occur in the following sequence:

1. Carry out tree work operations specified in the tree data schedule (Appendix 2)
2. Erect protective fencing along the position(s) shown by the solid red line/s on the TPP .
3. Commence construction
4. Remove tree protection when all construction activity has ended.
5. Carry out tree planting and any other landscaping works (see Appendix 4.8 for further details).

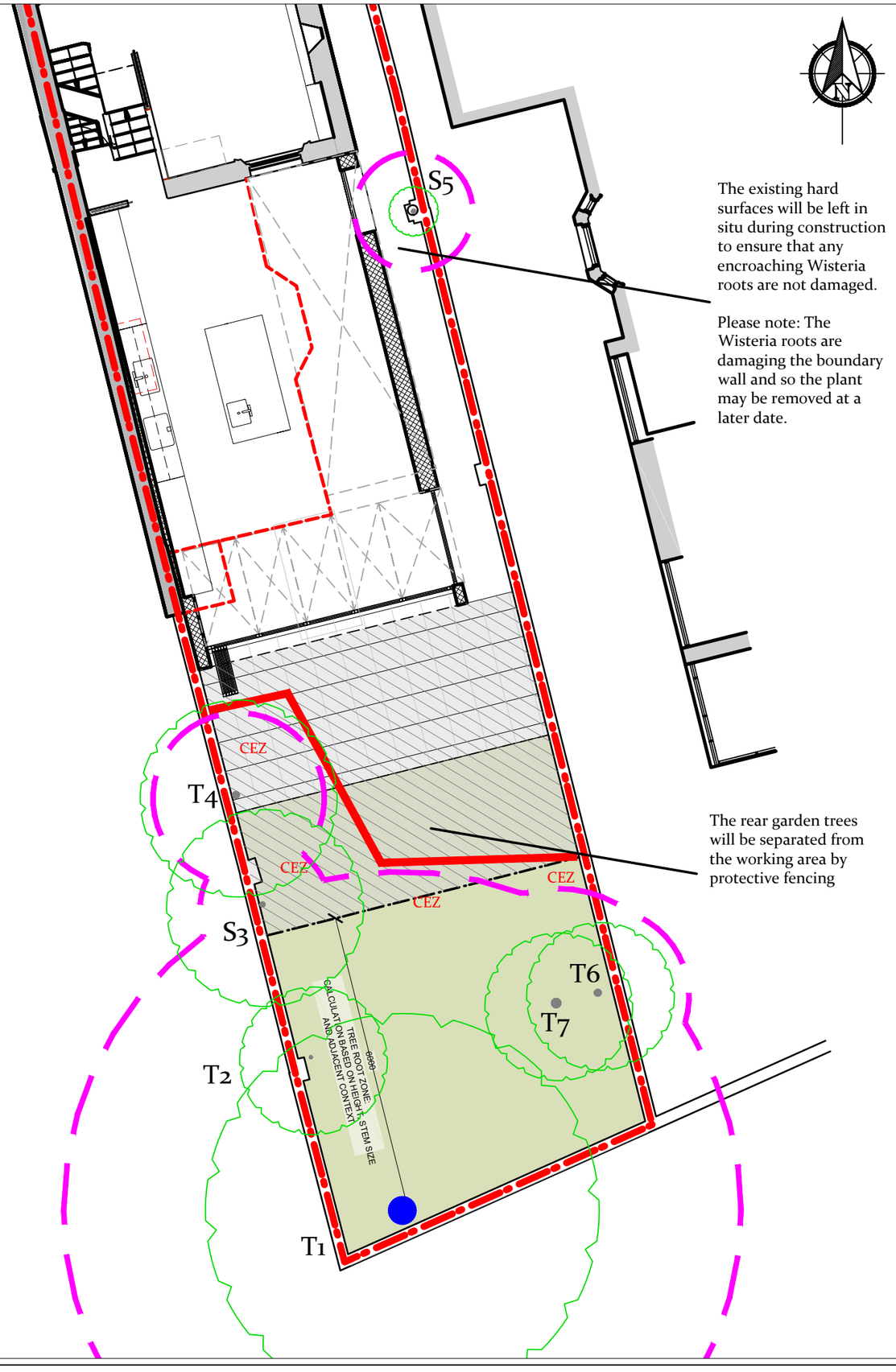
Temporary ground protection should be able to support any traffic entering or using the site without being distorted or causing compaction of underlying soil and might comprise one of the following:

1. For pedestrian-movements only, a single thickness of scaffold boards placed either on top of a driven scaffold frame, to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100 mm depth of woodchip), laid onto a geotextile membrane;
2. For pedestrian-operated plant up to a gross weight of 2 t, proprietary, inter-linked ground protection boards placed on top of a compression-resistant layer (e.g. 150 mm depth of woodchip), laid onto a geotextile membrane;
3. For wheeled or tracked construction traffic exceeding 2 t gross weight, an alternative system (e.g. proprietary systems or pre-cast reinforced concrete slabs) to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.

Default specification for protective fencing



Key
1 Standard scaffold poles
2 Heavy gauge 2 m 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 0.6 m)
6 Standard scaffold clamps



Tree Protection Plan

- Tree to be retained
- Tree to be removed
- Category A Tree
- Category B Tree
- Category C Tree
- Category U Tree

Areas, groups or woodlands are shown as polygons using the same colours as above. Dashed lines show removals

- Root Protection Area (RPA). If an RPA has been amended, the original is shown as a thin, solid magenta circle
- Protective fencing
- CEZ — Construction & storage exclusion zone

NOTE: Stem diameters have been increased on this plan by 250% to make identification of smaller trees easier

Scale: 1:250 @ A3

Site Address: 91 Savernake Road London, NW3 2JN

Client:	Drawing No:
Valeria Pensabene	TH/A3/1519/TPP
Job Ref: TH/1519	Date: 13th November 2017

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