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Arboricultural Report

Planning and Development

Arboricultural Appraisal and Implications Assessment

Project Name and Address	**All Saints Church, The Avenue, Hampton, Middlesex, TW12 2RG.**		
Prepared for	The Parish Office, All Saints Church	**Project Ref**	-
ACS Ref	jc/aiams1/allsaints	**Checked**	H. Appleyard
Prepared by	James Cox BSc. (Hons), AA Tech. Cert. Arb		
Report Date	20th December 2016		

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Summary of Conclusions and Recommendations

The following proposal to is to be carried out in the vicinity of trees:
Demolition of the existing Church Hall and the bungalow at No 44 The Avenue Hampton TW12 2RG and the construction of a new Narthex to All Saints' Church, a new Church Hall (Use Class D1: Non-Residential institutions) incorporating two flats (Use Class C3: Dwelling Houses), three 4 Bedroom houses and one three bedroom house (Use Class C3 Dwelling Houses

Some small and lower quality trees have been identified for removal in order to facilitate the scheme whilst some of those trees to be retained will require light pruning to provide a comfortable separation from the proposal. This report assesses the impact of the proposed construction upon the locality and sets out the tree protection measures that are to be adopted in order to successfully integrate the development project into the landscape.

In addition, I have provided specific recommendations to protect the potential rooting zones of trees that are to be retained within the proposed areas of construction.

Subject to the implementation of the proposed scheme in accordance with the recommendations set out in this report, the landscape and important trees will not be adversely affected either directly by or resulting from the construction of the proposed scheme.

As a consequence of the above, the scheme will have a low impact upon the visual character and appearance of the area.

Recommendations

1. **Undertake a pre-commencement site meeting**
2. **Agree the sequence of events**
3. **Adhere to the tree protection measures stipulated in this report**
4. **Monitor tree protection during construction period**

1.0 Introduction and Scope

1.1 This report has been commissioned by the Parish Office of All Saints Church to; i) assess the trees in accordance with BS 5837:2012 'Trees in relation to design, demolition and construction- Recommendations' (The BS); ii) detail the arboricultural consequences of the proposed project and assess its visual impact upon trees and amenity; iii) provide recommendations for effective tree protection, which are commensurate and appropriate for the scale and type of development; iv) develop a tree protection strategy for the duration of the construction including any land preparation or demolition works.

1.2 Reference to 'the proposed scheme' below will mean the scheme under consideration by the Local Planning Authority (LPA).

1.3 The trees were inspected, in accordance with the BS on 14th December 2016 and a total of 11 tree records are provided.

1.4 This report sets out the protection measures that will be adopted to ensure effective tree preservation. The basic principles are that; the established fenced and ground protected areas are exclusion zones for the duration of the construction (or as duly agreed) and; excavations within the BS root protection areas (RPA) will be subject to professional assessment (see Note 1).

1.5 A full hazard assessment of the trees (including for example the assessment of decay or defects and its implications), has not been undertaken as this information is considered beyond the scope of this report. Naturally, any obvious hazards have been identified in the schedule and, I recommend that these are acted upon as soon as practicable.

1.6 Any operational practices recommended in this report are to be undertaken by the appropriate specialist company. Operatives are to carry out the relevant risk assessment and record such information, prior to commencement of tasks and work in accordance with current Health and Safety standards, practices and legislation. Unless formally agreed, no contractors are assessed, appointed or monitored by ACS Consulting. Responsibility and liability of all actions, non-actions, products and services associated directly with this report will be limited to the relevant client and contractor.

General Site Description

1.7 The site comprises two plots of land containing an existing church hall and bungalow that are to be demolished to accommodate the proposed scheme. Existing hard surfacing is located to the south west of the church hall whilst the bungalow is surrounded by a private garden mainly laid to lawn. The site is predominantly flat and geological records show that this area consists of sand and gravel deposits overlying London Clay bedrock suggesting the soil has mixed drainage properties. Whilst the site does not fall within a Conservation Area a Tree Preservation Order (TPO) ref: T0885 exists at the site and the tree included in the TPO is identified upon the TPP.

Fig. 1. View of site from The Avenue showing existing hall and bungalow.

2.0 Tree Appraisal & Implications

2.1 The tree details are presented at **Appendix 1**. These details conform to those recommended by the BS. The position of the trees is shown on the Tree Protection Plan (TPP1_ASC) at **Appendix 2**. The trees identified as being most relevant to this proposal are No's 2, 3, 4, 5 and 10 in terms of removal to facilitate the scheme, with consideration given to No's 1 and 11 in relation to providing suitable protection during construction.

2.2 The tree stock consists of a mixture of broadleaved species of varying ages, such as Oak, Sycamore, Elder, Cherry, and Eucalyptus, many of which are self-sown specimens. The trees are located predominantly around the site perimeter

and several are positioned off site within neighbouring land. The church hall and bungalow are currently in use and there is evidence of historic tree management including the removal of a diseased Beech tree near to the site entrance. Eight of the 11 trees are ‘C’ grade specimens with two ‘B’ grade and one high quality ‘A’ grade Oak (TPO) adjacent to the entrance.

2.2.1 Tree No 1 is a mature English Oak in good physiological and structural condition. It is located towards the front of the site and dominates the visual landscape in this area offering high landscape contribution. I have assigned this tree ‘A’ grade status as set out in the BS and it is also subject to a TPO.

2.2.2 Tree No’s 7 and 11 are a mature Sycamore and Eucalyptus respectively both located off site. Inspection was limited due to access but both trees appear to be in reasonable physiological and structural condition offering medium landscape contribution due to their visible presence within the landscape. Accordingly I have given them ‘B’ grade status.

2.2.3 Tree No’s 2, 3, 4, 5, 6, 8 and 10 are unremarkable ‘C’ grade trees located within the grounds surrounding the bungalow. No.10 is a reasonable Cherry tree but has included bark within the main trunk union and represents a significant structural defect. Many of the other trees in this group are self-sown trees such as Elder and Sycamore that have been allowed to mature in unsuitable locations. They are generally small in size and therefore offer low landscape contribution.

Fig. 2. View of bungalow showing some of the ‘C’ grade trees.

2.3 The implications of the proposed scheme, in terms of tree pruning and other works are detailed in the table below. An assessment of the visual impact of the

works resulting from the scheme OR as a consequence of sensible arboricultural husbandry is also provided.

Table 1 – Proposed and Recommended Tree Works

Tree Works (Spec.)	Tree Nos	Visual Landscape Impact of Works*	Available Replacement Planting(Y/N)	Comments
Fell (SP6)	2, 3, 4, 5, 10	Low	Y	To facilitate the scheme and improve overall quality of the tree stock.
Reduce west side of canopy by up to 2.5m to reduce overhang (SP2)	11	Low	N/A	To facilitate access during development and create a comfortable separation from scheme.
Reduce lower east side of canopy by up to 2.5m (SP2)	1	Low	N/A	To facilitate access during development and create a comfortable separation from scheme.
Root Investigation and treatment (SP8)	1, 11	None	N/A	Supervised manual excavations and root treatment as necessary.
Total				

*This is a preliminary visual appraisal based upon the opinion of the author having inspected the trees in the context of their current surroundings. – None (no change or beneficial impact) Negligible or indiscernible difference to treed landscape; Low – Noticeable but mitigated by retention of other landscape trees and features; Medium – Obvious but temporary alteration to the treed landscape; High – Obvious and permanent alteration to the landscape.

Visual receptors include the public or community at large, residents, visitors or other groups of viewers together with the visual amenity of potentially affected people.

Specifications for recommended tree works:

General

All work is to conform to BS 3998:2010 'Tree work – Recommendations' and with current arboricultural best practice. Tree works are to be undertaken by a professional and specialist arboricultural contractor, who carries the appropriate experience and insurance cover, equipment and PPE. All works and processes are to comply with all relevant Planning, Wildlife, Environmental, Conservation and Health and Safety legislation.

SP2. Part reduction (selective pruning) includes pruning back from structures or boundaries and which is normally applied to no more than two sides of a tree's canopy. The amount of pruning is specified in metres. The result form will be even and provide a

framework for re-growth in an even form. The extent of pruning will not impinge upon tree condition and seek to preserve so far as possible, the natural outline of the tree, which is species determined. All pruning cuts are to be made to a suitable growing point (secondary shoot) or removed from the parent branch or stem and no inter-nodal cuts are to occur.

SP6.Felling involves the careful removal of a tree to ground level (or other specified height), either in sections or in one unit (straight felling). The method of felling will be suited to the constraints of the site and judged by the competent operator undertaking the task. Removing the stump may be part of the requirements and this will be carried out using a mechanical stump grinder where accessible.

SP8.Root pruning is to be carried out or supervised by a competent person (arboricultural contractor). Only sharp and specific pruning tools will be used for the root pruning exercise. No roots are to be pruned if it is considered that their loss (or shortening) will adversely impact upon tree condition or anchorage, immediately or in the future. Any exposed roots will be covered with a material to prevent desiccation. All exposed cut root surfaces will be made as small as possible. If possible roots will be pruned back to side shoot.

2.4 As a consequence of my assessment above, I believe the visual impact of the scheme to be low in the context of trees and their sustainable contribution to the landscape and local amenity.

2.5 Commencement of all or some of the proposed works may be subject to written authorisation from the Local Planning Authority (LPA) should planning consent be obtained. We strongly advise that authorisation for any tree works is obtained from the LPA prior to commencement.

2.6 **Specific Comments on Tree Stock in Relation to Scheme** (Impact of scheme on trees)

2.6.1 The proposed schemes involves demolition of the existing church hall and bungalow and construction of a new church hall and four houses with private gardens and associated access parking.

2.6.2 Overall, the visual impact of the proposed arboricultural management works will be low as the trees identified for removal are small or poor in quality and those that are to be retained only require light pruning to provide a comfortable separation from the proposed scheme.

2.6.3 Overhanging portions of the canopy belonging to tree No 1 and 11 may require some minor pruning work to cut back overhanging branches despite the canopies

being well clear of the existing buildings. This will facilitate access during construction and provide a comfortable separation from the finished scheme. The majority of tree canopies are located at a distance from the proposed scheme as to remain unaffected.

2.6.4 In conjunction with the standard protective fencing around trees I have given consideration to the impact of the development upon the potential rooting zone of tree No's 1 and 11. I have made recommendations for suitable ground protection within relevant areas highlighted on the TPP in conjunction with supervised manual excavations and suitable root treatment where necessary. In addition, I believe that existing foundations and hard surfacing will have already reduced normal root growth within these areas.

2.6.5 Temporary fencing should be erected during the demolition phase as marked upon the TPP and I have recommended that the existing hard surfacing be retained where possible to afford suitable ground protection against soil compaction caused by demolition/ construction traffic. If this surfacing needs to be replaced, it should be removed with care and with a view to installing low invasive and permeable surfacing. This methodology should also be employed where the new car parking is proposed to the north of tree No 1, although this should be installed at the beginning of the project to provide suitable access to carry out the necessary demolition and construction work whilst affording sufficient protection to the trees rooting environment.

2.6.6 The relationship between trees, their growth and living space is a common cause for conflicts, through excess shading, dropping of debris such as leaves and fruits and the mere size of trees can cause concern. In this current proposal, the separation between the trees and habitable rooms and garden space is adequate and normal. On this basis, there seems no reason to expect undue or irresistible pressure to be placed upon retained trees.

2.6.7 I note with reference to the literature that English Oak and Eucalyptus have moderate-good tolerance to root loss[1, 2] and in general, it has been shown that severed roots can readily regenerate from the callus that forms over

1. Matheny. N, Clark. J. R, 1998. '*Trees and development; A technical guide to the preservation of trees during land development*'. ISA
2. Costello, L.R, Jones. K. S, 2003. '*Reducing infrastructure damage by roots: A compendium of strategies.*' ISA Western Chapter.
3. Roberts. J, Jackson. N, Smith. M, 2006. '*Tree roots in the built environment*.' TSO DCLG
4. Lindsey, P. Bassuk, N. 1991 *'Specifying soil volumes to meet the water needs of mature urban street trees and trees in containers'.* Journal of Arboriculture vol. 17 No 6.
5. Harris et al, 1999 *'Arboriculture, Integrated Management of Trees, Shrubs and Vines'* Third Edition Prentice Hall

Table 2 Summary of Implications of Construction on Trees*

Tree Ident.	Landscape Contribution	Impact/Potential impact	Mitigation measures	Impact Assessment**
2, 3, 4, 5, 10	Low	Removed due to low quality and to accommodate development.	1. Robust planting of suitable replacement tree species during landscaping phase.	Positive
1, 11	Medium- High	Canopy damage due to vehicle access during demolition of existing hard surfacing.	1. Conduct all tree pruning works professionally and prior to commencement.	Neutral
1	High	Soil compaction, root damage, root severance, loss of rooting area.	1. Retain hard surfacing in RPA's for as long as possible. 2. Supervised removal of existing hard surfacing within RPA's of retained trees. 3. Install BS- grade fencing on preserved ground. 4. Carry out manual excavations and suitable root treatment. 5. Install low invasive and permeable hard surfacing 6. Drainage systems to comply with NJUG4 guidelines.	Neutral
11	Medium	Soil compaction, root damage, root severance, loss of rooting area.	1. Install BS- grade fencing and ground protection on preserved ground. 2. Carry out manual excavations and suitable root treatment. 3. Drainage systems to comply with NJUG4 guidelines.	Neutral

* Main trees selected for comment included above. Refer to previous notes on other trees.
** Negative – adverse impact upon tree(s) and landscape; Neutral – no material impact (negative or positive); Positive – improvement (potential) to tree quality and landscape

3.0 Tree Protection Measures

General

3.1 A tree's BS root protection area (RPA) is based upon a radius measurement taken from the trunk centre and is included with reference to para. 4.6 of the BS (See **Appendix 1**). Professional arboricultural judgement may identify modifications to the morphology of an RPA. Any work within a tree's RPA will be subject to professional advice and the guidance set out in this report, particularly where construction is required within this area but beyond the position of fixed tree protection fencing.

3.2 Effective tree protection will be afforded subject to following a logical sequence of events, which **will follow a pre-commencement site meeting** (see para. 6.0). Invitees will include the site agents and any specialist supervisors:

('S' refers to the stage in order)

S1 Undertake any agreed and or necessary tree works.

S2 Erect protective fencing and install ground protection

S3 Carry out demolition works and construct site access and parking areas

S4 Carry out root investigations and ground works including excavations for foundations and services

S5 Erect scaffolding and complete construction works

S6 Remove protective fencing and complete porous hard surfacing areas and landscaping works

3.3 The protection fencing will be erected in the position indicated on the Tree Protection Plan (TPP1_ASC) at **Appendix 2**.

3.4 The type of fencing and its recommended specification is attached at **Appendix 3**. In this case fixed Heras fencing will be effective.

3.5 The protection fencing will remain in position for the duration of the construction phases for the church hall and houses, including the removal of the existing structures and land preparation. Clear signs will be attached to the fencing once erected – suggested wording will be **'Protected Trees – No Access and Do Not Move this Fence'**.

Fig.1 Example of site signage (Tree protection)

It is possible to increase tree protection during construction by positioning tree protection in stages and agreeing that particular construction processes can be brought forward or delayed in the development period. For example, the hard standing areas may be constructed toward the end of the development enabling a higher degree of protection for the maximum amount of time. Where appropriate, the TPP indicates, by colour coding, the position of fencing which will be re-located or removed to provide space for construction at most effective times. Any alteration to the position of fencing will be agreed with the LPA.

3.6 Where, for construction purposes, it is necessary to position tree protection fencing within the RPA of tree No's 1 and 11, suitable ground protection will be installed to prevent undue soil/root compaction from pedestrian and/or vehicular traffic. At **Appendix 3** are recommended examples of effective ground protection suited for this location. Included in the Appendix also is a diagrammatic indication of how ground protection or hard surfacing offers effective root/soil protection. The type of ground protection will be suitable for the type of proposed traffic e.g. scaffold boards over compressible material will be suitable for pedestrian and light machinery such as wheel barrows but polyethylene or steel ground plates will be used for heavier machinery and temporary re-enforced concrete may be suitable by agreement.

3.7 It is proposed to construct parking bays and other hard standing areas within the identified RPA of tree No 1. This will be undertaken by adopting the low-invasive methodology as described in the BS at para. 7.4. At **Appendix 4** is our recommended guidance for completing a 'low-invasive' style hard standing surface within the RPA. Light weight constructions such as paths, bin store or cycle store bases are also subject to low-invasive construction techniques. A specific methodology is also included at **Appendix 4**. Included also is a recommended example of load dissipating material (cellular confinement system), which will be used as part of this methodology. Similar products are also available.

3.8 A suggested specification for a permeable, low invasive surface is as follows:

- Within the identified RPAs manually excavate out the soft top soil (max 150mm depth)
- Lay no less than 500 micron gauge/78grams per sqm woven geotextile membrane (e.g. Terram 1000 Multitrack or Fastrack G90)
- Compound MOT type 3 or similar into position as a sub base material

- Load-spreading material (for domestic drive) 100mm depth of Cellweb or similar cellular confinement system
- Backfill with 50 graded to 10 washed stone (MOT Type 3)
- Retain using 100-150mm mild steel band with steel road-pin style supports at no less than 1000mm spacing (haunched with lean mix concrete).
- Wearing course seated on a 25mm blinding layer of sharp sand. Blocks to be 60mm Marshalls Priora blocks or similar with lugs.

3.9 Hand excavations, which are required and agreed to occur within the RPA of tree No's 1 and 11 may encounter some roots. Although soil excavation near trees and root pruning is outlined in **Appendix 6**, specifically in this case however the treatment of roots will be undertaken in the following ways:

i) Clearly mark out the area for hand dig (using biodegradable marker paint) (see TPP)

ii) Use hand tools (forks and spades) to remove the spoil and deposit beyond RPA.

iii) Identify roots to be retained by brushing or the use of compressed air

iv) Unless after professional assessment permits pruning, roots in excess of 25mm Ø are to be retained in-situ by manually clearing around (with compressed air for example), wrapping with non-woven geotextile (e.g.Terram), covering with a void former e.g. split, rigid polythene piping, and filling with an compressible material (e.g. polyurethane foam).

v) Unless after professional assessment permits pruning, retention of roots 50mm Ø or more will be by the use of void-formers (see **Appendix 6**).

vi) Roots <25mm Ø will be pruned using sharp pruning tools ensuring that no splits or tears occur and that the pruning wound is made as small as possible. Roots will be pruned back to a side shoot where possible or to a suitable position.

4.0 Underground Services & Foundations

4.1 The proposed scheme can make use of some existing services (e.g. main drainage and electricity). There is no requirement for new excavations in the vicinity of retained trees at this stage. If this is to change, installation of services must adhere to the methods set out in Appendix 6. The location of suggested new services is indicated (as a preliminary guide and subject to engineers' advice) on the TPP.

4.2 The foundations of the structures located within the BS RPA of tree No 1 and 11 will be constructed by adopting the following methods (subject to confirmation by the consulting engineers and the detailed root investigations): Traditional strip (trench) foundations

5.0 Soil Grade Level Changes

5.1 There are no significant changes proposed to soil levels (existing grade level), within the RPA of any retained tree. As such, no specific instructions are required to address grade changes and tree preservation.

6.0 Site Supervision - Arboricultural Specialist

6.1 It is important to recognize that the Local Planning Authority Officers (Enforcement Departments) have stringent powers to serve a **Temporary Stop Notice** through recent changes in the legislation governing planning and development. Circular 02/2005 (see Note 2). It is therefore important that works, which may impact upon trees and amenity, are suitably controlled by competent personnel. Identified below are details of a site monitoring process designed to minimize potential risks to retained trees on or off site.

6.2 A **pre-commencement** site meeting, involving invited representatives from the local planning authority, the developer, contractors and engineers (as appropriate) will be undertaken to establish the principal timings and actions.

6.3 The details pertaining to tree protection as set out in this method statement, specifically include:

i) erection of tree protection barriers:

ii) the installation of ground protection;

iii) lines of communication and incident reporting,

are to be explained to the Site Agent at the pre-commencement site meeting. It will be the responsibility of the Site Agent to ensure that all personnel working on site are aware to the tree protection measures processes. A copy of this method statement is to be retained on site for the duration of the build process together with a scaled, colour copy of the Tree Protection Plan.

***Pre-commencement means i) before any works including tree felling or pruning and ii) before any ground works or demolition commences and upon completion of the initial installation of the tree protection, including ground protection.**

6.4 So as to ensure that the tree protection measures are implemented, an arboricultural specialist will be appointed to record the condition of the trees to be retained and the position and type of tree protection erected and or installed. The specialist will make a record of visits and which will be retained by the contractor/developer and or left on site for inspection (see **Appendix 5**).

6.5 Key times for site supervision include:

1. Completion of agreed/necessary tree works
2. Erection of tree protection fencing
3. Installation of ground protection
4. Works within RPAs of retained trees
5. Landscaping

Table 3. Proposed Sequence of actions for effective tree protection

Stage	Action	Arboricultural Supervisor (AS) (Required – Y/N)	Notes
1	Pre-commencement meeting	Y	Site Agent(SA) and LPA and contractor to attend
2	Tree works	Y	Following completion of tree works
3	Installation of tree protection fencing, ground protection and low invasive surfacing	Y	PRIOR to ground/demolition works
4	Carry out demolition of existing buildings	Y	AS to monitor tree protection at agreed and appropriate intervals
5	Carry out hand dig root investigations, suitable root treatment and ground works	Y	SA to advise AS prior to commencement
6	Construction phase	Y	AS to monitor tree protection at agreed and appropriate intervals
7	Remove tree protection fencing/ground protection	N	No tree protection is to be removed without prior agreement from the AS
8	Tree planting/landscaping	Y	Brief landscape company & Sign off

NOTE: THE APPOINTED ARBORICULTURAL SUPERVISOR IS TO BE CONSULTED BEFORE ANY WORK, EITHER SCHEDULED OR UNSCHEDULED, IS CONSIDERED WITHIN THE EXCLUSION ZONE OR ROOT PROTECTION AREAS OF ANY RETAINED TREE. FAILURE TO DO SO MAY LEAD TO ENFORCEMENT ACTION BY THE LPA.

6.6 Effective site monitoring will be undertaken from the outset of the project and at agreed intervals thereafter. The frequency of monitoring may well decrease following the proper installation of all tree protection measures. Below is a recommended programme of arboricultural supervision. (This programme may alter dependent upon site circumstances or by agreement.)

Table 4 Contact List (to be completed **PRIOR** to commencement)

Interested Party	Name	Company/LPA	Contact Number(s)	Comment/ Responsibilities
Site Agent	TBA			Day to day site management; co-ordination of timings; **contact with project Arboriculturist**
Main Contractor	TBA			Legal and administrative running of the project; finance; liaison with all project consultants
Arb. Supervisor	TBA			Tree protection and management; dissemination of tree-related information
LPA Tree Officer	Ben Clutterbuck	London Borough of Richmond	08456 122660	Tree protection and management
Site Engineers	TBA			Technical advice and design
Architects	David Loxton	Loxton and Associates	020 8941 5631	Design

TBA – to be advised

7.0 Precautions during Landscape Work

7.1 The following steps (both general and site specific), are advisable in relation to implementing any landscape works, which may have the potential to affect retained and or protected trees:

1. Developer/Contractor to advise arboricultural supervisor of intended time frame of landscape work in advance of commencement.

2. If necessary, re-locate existing tree protection fencing/ground protection to enable landscape work to proceed.
3. With bio-degradable spray paint or site pins with plastic tape, mark out the position of the relevant tree root protection areas (RPA) as per the tree protection plan.
4. Within the RPAs, avoid using any mechanical tools or vehicles (e.g. tracked or wheeled machinery).
5. All/any mulch or top soil is to be spread manually, with the use of wheel barrows and hand tools. It will be acceptable to use of the back actor of a tracked excavator to spread piled top soil or mulch into the RPAs of protected trees provided the bucket does not come in contact with the ground and that the power unit is positioned outside of the RPAs at all times.
6. Any planting pits are to be excavated manually within the RPAs of any retained trees.
7. Multiple passes within the RPAs along one route, pedestrian and with wheel barrows will require some ground protection to be installed prior to working. Ground protection can be scaffold boards over wood chip for example.
8. A record of the landscape working method is to be made and provided to the Council for their file.
9. Hard landscaping features will be constructed under specialist supervision where this falls within the RPA of retained trees and will avoid, where possible, the re-grading of soil.

8.0 General Site Care

8.1 No fires will be lit on site.

8.2 No access will be permitted to within the fenced or otherwise protected areas (unless for site accommodation or Authorised agreement) at any stage during construction.

8.3 No materials, equipment or debris will be stored within the fenced areas unless agreed with the arboricultural supervisor.

8.4 Areas for mixing are to be located beyond RPAs of trees and contained to prevent leaching into the soil.

8.5 A copy of this report and the Tree Protection Plan is to remain on site at all times.

Note 1. RPA to be assessed by an arboriculturist. BS 5837:2012 'Trees in Relation to Construction - Recommendations' paras. 4.6.1-3.

Re-building of existing structures located within the protection distances, such as retaining walls, may require soil excavation and root treatment.

Note 2. The Circular 02/2005 gives guidance on the temporary stop notice provisions in Part 4 of the Planning and Compulsory Purchase Act 2004, which inserted sections 171E to 171H to the Town and Country Planning Act 1990.

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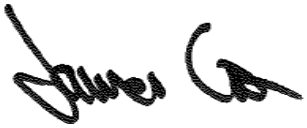
Please note that all relevant planning approvals and approval to planning conditions must first have been issued by the relevant planning authority in order for this report to become effective. We strongly advise that you consult your planning advisors before implementing any recommendations set out in this report.



James Cox
Date: 20th December 2016

APPENDIX 1

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Tree Survey Schedule

Site: All Saints Church, The Avenue, Hampton

Surveyor: J.Cox

Date: 6th March 2014; 14th December 2016

Ref:ts1/allsaints

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Age Class	Stem Diameter	Protection Multiplier	Protection Radius	Growth Vitality	Structural Condition	Landscape Contribution	B.S. Cat	Sub Cat	Useful Life	Observations
T1	Oak, Common	25	12 7 12 12	3/SE5	Mature	1050	12	12.6	Normal	Good	High	A	1,2	>40	A tree with insignificant defects Inspection limited by ivy/access Co-dominant with T2
T2	Elder	5	2 3 1 2	2/N2	Mature	240	12	2.9	Normal	Fair	Low	C	1,2	10-20	Boundary self-set tree Over hanging branches
T3	Yew, Common	4	1 1 1 1	2/N2	Young	180	12	2.2	Normal	Good	Low	C	1,2	20-40	A tree with insignificant defects Boundary screen tree
T4	Sycamore	6	4 4 4 4	2/E2	Mature	270	12	3.2	Normal	Fair	Low	C	1,2	10-20	Multi stem weakness Boundary self-set tree 5x stems
G5	Elder	4	2 2 2 2	2/N2	Mature	120a	12	1.4	Normal	Fair	Low	C	2	10-20	Boundary self-set group Understorey vegetation
T6	Sycamore	9	2 2 2 2	2/N2	Middle Aged	180	12	2.2	Normal	Good	Low	C	1,2	10-20	Off-site tree Boundary self-set tree
T7	Sycamore	12	4 4 4 4	2/N2	Mature	400e	12	4.8	Normal	Good	Medium	B	1,2	20-40	Off-site tree Over hanging branches No significant defects

Notes:

1. Height describes the approximate height of the tree in meters from ground level.
2. The Crown Spread refers to the crown radius in meters from the stem centre and is shown above on each of the four compass points (i.e. N, E, S, W) clockwise.
3. Ground Clearance is the height in meters of crown clearance above adjacent ground level together with the height and direction of the lowest branch
4. Stem Diameter is the diameter of the stem measured in millimetres at 1.5m from ground level or just above ground level for multi stemmed trees. The diameter may be estimated (e), where access is restricted. An average (a) may be taken for tree groups. A full inspection is always recommended.
5. Protection Multiplier is 12 for single-stemmed trees; for multi-stemmed a cross-sectional area is calculated to derive the DBH, which in turn is multiplied by 12.
6. Protection Radius is a radial distance measured from the trunk centre and is used to calculate the BS RPA.
7. Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree).
8. Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major defects present or suspected.
9. Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees).
10. B.S. Cat. refers to British Standard 5837:2012 Table 1 category and refers to tree/group quality and value; 'A' - High, 'B' - Moderate, 'C' - Low, 'U' - Remove or very poor quality.
11. Sub Cat refers to the retention criteria values where 1 is Arboricultural, 2 is Landscape and 3 is Cultural including Conservation/ecological, historic and commemorative.
12. Useful Life is the tree's estimated remaining effective contribution in years.

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Tel: 020 8687 1214

Tree Survey Schedule

Site: All Saints Church, The Avenue, Hampton

Surveyor: J.Cox
Ref:ts1/allsaints

Date: 6th March 2014; 14th December 2016

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Age Class	Stem Diameter	Protection Multiplier	Protection Radius	Growth Vitality	Structural Condition	Landscape Contribution	B.S. Cat	Sub Cat	Useful Life	Observations
T8	Sycamore	9	2 3 4 3	2/E2	Middle Aged	210	12	2.5	Normal	Fair	Low	C	1,2	20-40	A tree with insignificant defects Boundary self-set tree 2x stems
G9	Cherry, Pear	4	1 1 1 1	2/N2	Young	100a	12	1.2	Normal	Good	Low	C	2	10-20	Boundary self-set group Garden ornamental No significant defects
T10	Cherry, Wild	9	5 6 5 5	2/W2	Mature	420	12	5.0	Normal	Fair	Medium	C	1,2	20-40	Twin stem Branches hitting structures 2x stems, stubs and snags
T11	Eucalyptus	17	7 8 7 7	2/E3	Mature	500e	12	6.0	Normal	Fair	Medium	B	1,2	20-40	Ivy covered trunk and branches Off-site tree Over hanging branches

Notes:

1. Height describes the approximate height of the tree in meters from ground level.
2. The Crown Spread refers to the crown radius in meters from the stem centre and is shown above on each of the four compass points (i.e. N, E, S, W) clockwise.
3. Ground Clearance is the height in meters of crown clearance above adjacent ground level together with the height and direction of the lowest branch
4. Stem Diameter is the diameter of the stem measured in millimetres at 1.5m from ground level or just above ground level for multi stemmed trees. The diameter may be estimated (e), where access is restricted. An average (a) may be taken for tree groups. A full inspection is always recommended.
5. Protection Multiplier is 12 for single-stemmed trees; for multi-stemmed a cross-sectional area is calculated to derive the DBH, which in turn is multiplied by 12.
6. Protection Radius is a radial distance measured from the trunk centre and is used to calculate the BS RPA.
7. Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree).
8. Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major defects present or suspected.
9. Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees).
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11. Sub Cat refers to the retention criteria values where 1 is Arboricultural, 2 is Landscape and 3 is Cultural including Conservation/ecological, historic and commemorative.
12. Useful Life is the tree's estimated remaining effective contribution in years.

Table 1 **Cascade chart for tree quality assessment**

Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see Note)				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	• Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) • Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline • Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality *NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see **4.5.7**.*			See Table 2
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**	
Trees to be considered for retention				
Category A **Trees of high quality** with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	See Table 2
Category B **Trees of moderate quality** with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value	See Table 2
Category C **Trees of low quality** with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value	See Table 2

APPENDIX 2

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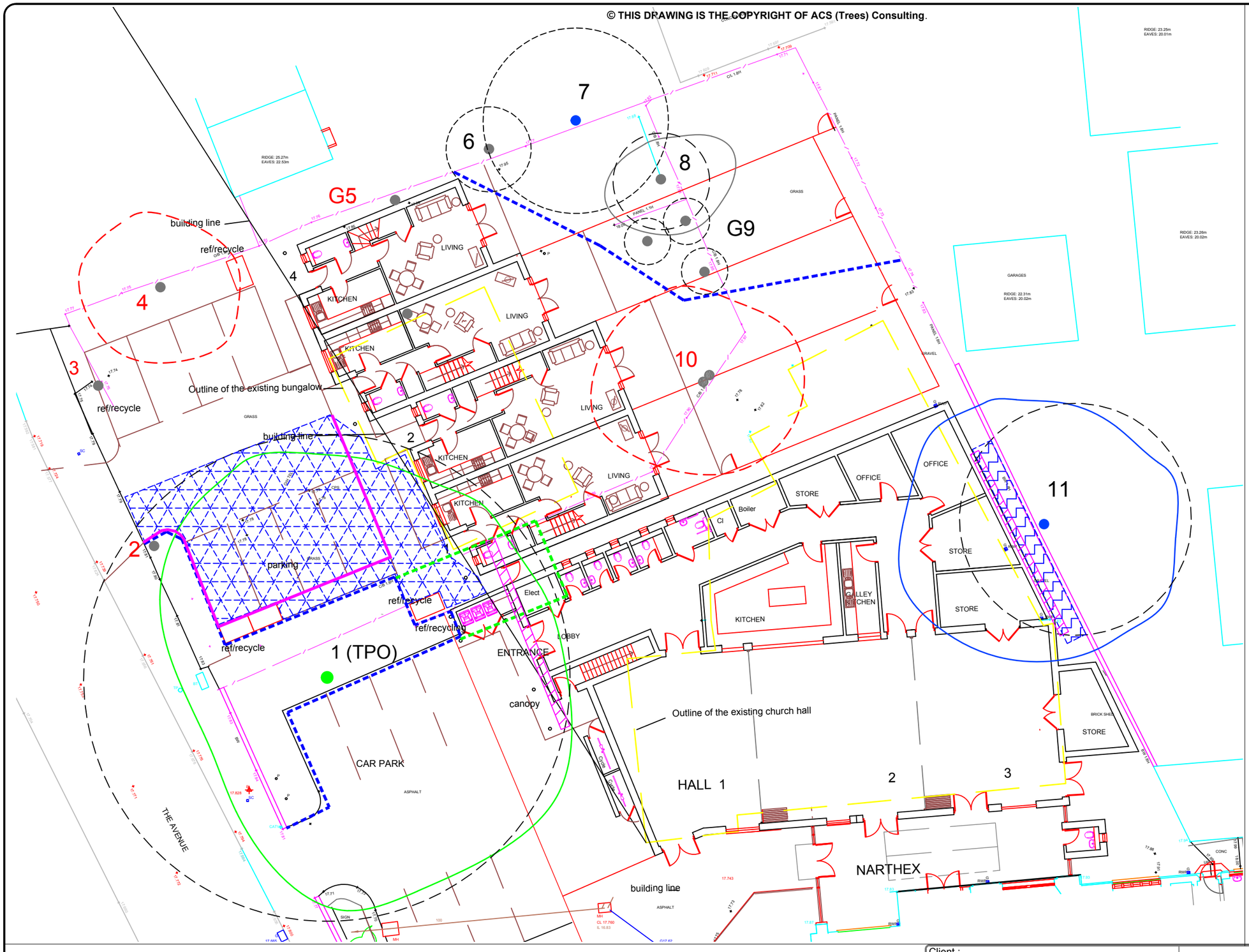

0 5 m 10 m 20 m

Scale: 1:200

ACS (Trees) Consulting LEGEND

Indicative

BS Root Protection Area, (RPA) shown uniform (above left) but site features such as roadways, retaining walls and foundations, may modify root patterns and therefore the RPA shape.

- A grade trees
- B grade trees
- C grade trees
- U grade trees
- Trees to be removed/replaced
- Recommended position for temporary tree protection fencing
- Recommended position for fixed tree protection fencing; denotes construction exclusion zone.
- Area for effective ground protection suitable for the project
- Recommended area for suitable ground protection and low-invasive & permeable hard standing construction methods.
- Area identified for hand excavations prior to construction of foundations. All work to be supervised by an arborist to advise upon root treatment where necessary.
- Area identified for low-invasive edging detail

Tree Protection Methods to be adopted on site.

1. Undertake pre-commencement site meeting to agree tree protection methods and timings.
2. Carry out any permitted tree works - ask before beginning.
3. Erect and fix in place all tree protection (see Appendix).
4. Undertake demolition/ground works in accordance with contractor's specification
5. Clear spoil from site.
6. Construction phase.
7. Remove tree protection.
8. Undertake new landscaping.

Client : The Parish Office, All Saints Church.

Project : All Saints Church, The Avenue, Hampton, Middlesex, TW12 2RG

Title : Tree Protection Plan

Scale : 1:200@A3 | Dwg No : TPP1_ASC | Rev : -

Date : Dec.2016

Do not scale from this drawing. Any discrepancies are to be reported to ACS (Trees) Consulting.
This drawing is to be used when printed to scale & in colour.

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Consultants in the Management of Trees and Woodlands
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TEL: 01737 249351 | Mobile: 07770 820 105
ALSO At:
Office Eighty Five | 272 Kensington High Street | London | W8 6ND
TEL: 020 8687 1214
www.acstrees.co.uk

ACS (TREES) Consulting
Urban & rural tree management

APPENDIX 3

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Tree Protection Fencing

Specifications (specifically identified by outline box)

2.4m Hoarding

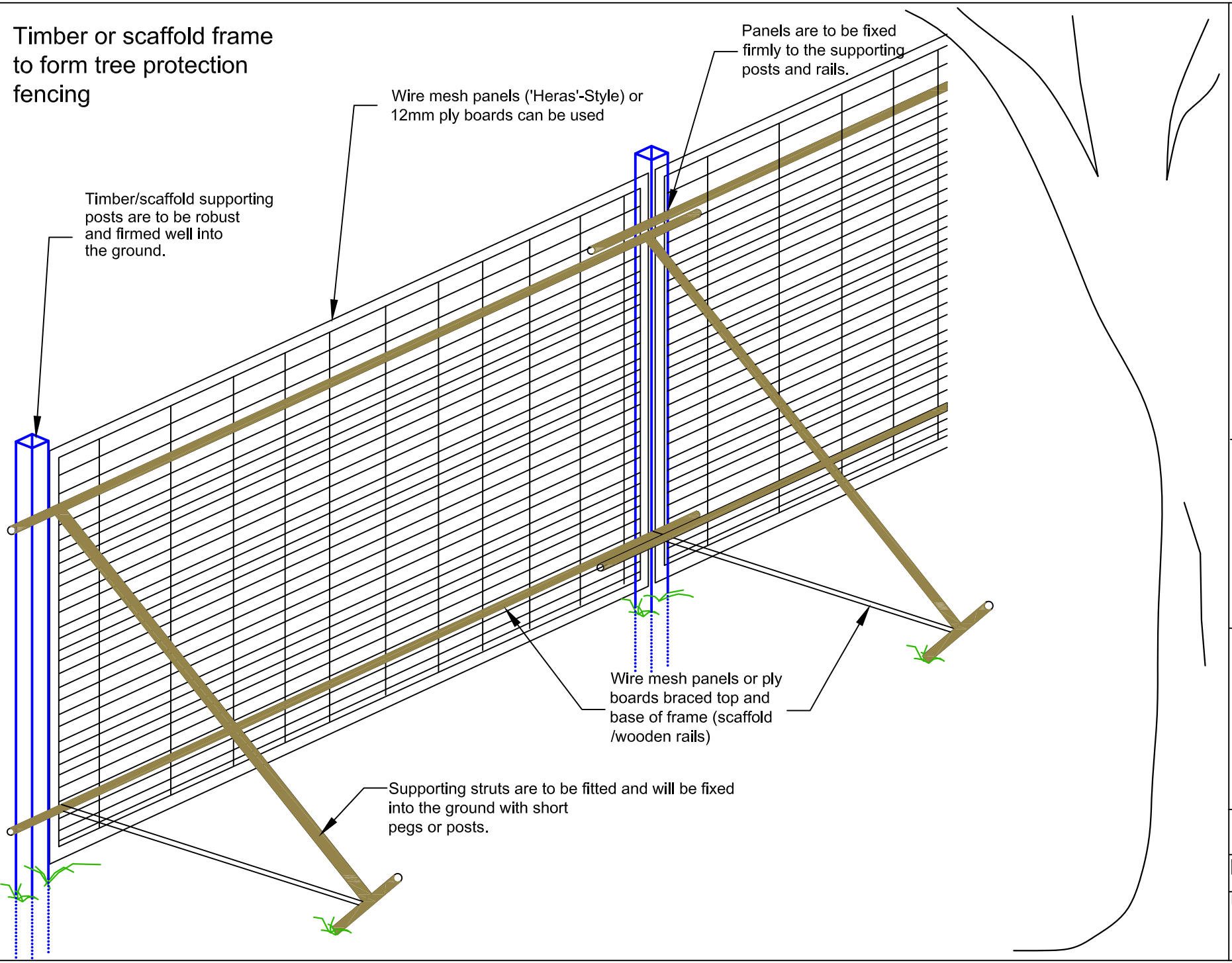
3.0m 100 X 100mm square wooden posts
3 X 38 X 87mm wooden rails affixed to posts
2.4m X 1200 outside grade ply panels (12mm) affixed to rails.
50 X 100mm angled supporting struts affixed internally (quantity as required).

(Supporting posts fixed into position using concrete. All post holes to be hand excavated. Post holes to be no larger than 300 X 300mm.)

Heras Fencing

Heras fencing describes the 2.4m galvanised steel mesh panelled fencing normally supplied with pre-cast concrete bases. **Bases are to be replaced with a fixed frame to which panels are clamped/ firmly fixed.** For extra stability, scaffold poles/4x4 wooden posts are to be firmed into the ground as supporting posts and supporting struts are to be attached at a 45 degree angle on the 'tree-side' of the fencing and fixed into the ground. Supporting posts will be braced at the top and base for added support.

Timber or scaffold frame to form tree protection fencing



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Title:

Example of Tree Protection Fencing

Note:

Steel scaffold or timber can be used to support boards or wire mesh panels

Date: Jan. 07

Ref:

Note: Sketch Plan Only - Not to Scale

Tree Protection Fencing

Scaffold Framework supporting ‘Heras’ type panels with signs attached.

Wooden Framework with ‘Heras’ type panels attached.

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Fig. 1 Ground protection – hoarding over sharp sand and wood chip

Installing heavy-duty OSB boarding over a depth (min. 50mm) of sharp sand and/or wood chip between the tree protection fencing and the foundation line of new development is effective in protecting roots, which grow in the soil beyond the position of the fencing.

Ground Protection using heavy-duty ground plates.

(Courtesy of Eve Trackway UK – Tel: 08700 767676)

Robust aluminum, interlocking plates deflect heavy loads and prevent soil compaction beneath.

Effective use of X Trackpanel for site access.

Suitable for

- Heavy Duty Roadway
- Medium Duty Roadway
- Light Duty Roadway
- Walkway
- Eve Install

Specification

- Width: 3m
- Length: 2.5m
- Height: 50mm
- Weight: 254kg

1. Lay min. 75m depth of sharp sand/wood chip over identified ground area
2. Lay 15mm aluminium road plates over sand/wood chip
3. Fix ground protection cover into place with road pins or similar
4. Erect protection fence as per BS grade.
5. Monitor condition and efficacy and maintain as appropriate.
6. Remove ground protection upon completion/landscaping only.

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Example of a suspended work platform - ground/root protection.

Note:
Effective for confined work areas

Do not drive scaffold poles through roots

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Tree protection fencing or frame

TREE

Work platform

Scaffold poles supporting work platfrom of OSB boarding

existing ground level

scaffold clamp

Root zone

Root zone

Short scaffold driven firmly into the ground

APPENDIX 4

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Low-invasive, Permeable Surface (LIS)

Construction Methodology

The following design criteria for low-invasive surfaces (LIS) will need to be considered when installing new hard, permeable surfacing within the BS Root Protection Areas (RPAs) of retained trees:

- Maintain oxygen diffusion through new surface to rooting area (3-12% by volume, **Ref 1**)
- Maintain sufficient passage of water to the rooting area (12-40% by volume, **Ref 2)**
- Maintain existing ground levels to avoid unsustainable root damage (severance and/or asphyxiation)
- Avoid compaction by maintaining a soil structure sufficient to sustain root growth (soil bulk density below 1.6g/cc, **Ref 1**)

The above criteria will provide the conditions for continued tree growth and preservation.

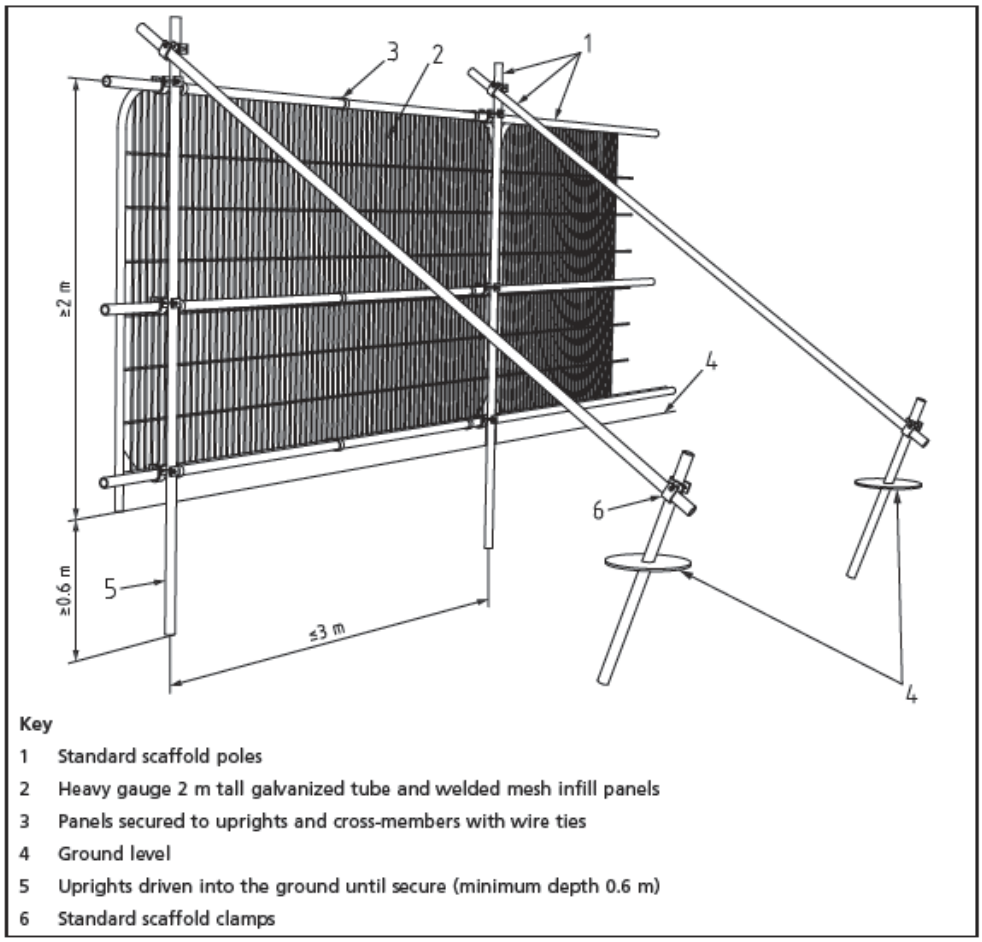
Site analysis of the soil type and its Californian Bearing Ratio (CBR) should be established prior to determining the specific depth of products to be adopted for the LIS. For example, footpaths normally require a depth of 100mm and, 150mm to 200mm depths are used for residential driveways, while greater depths may be required for the passage of heavier traffic such as for construction access and delivery vehicles.

1. The use of a three dimensional cellular confinement system within an LIS is an acceptable approach, which aims to fulfil the above design criteria. This system maintains the passage of oxygen and water to root systems; avoids root loss through severance or asphyxiation and minimises the potential for soil compaction. It is achieved by using Geotextile membranes and the introduction of the three dimensional Cellular Confinement System product. The material is laid onto a geotextile membrane covering the soil, whose existing levels within the Root Protection Area (RPA) of retained trees, is to be maintained so far as practicable.

2. Retained trees must first be protected during all stages of the development including demolition, by the erection of fencing as shown in the diagram below and with reference to specifications and the Tree Protection Plan (TPP). Installing the LIS may require the re-positioning of the tree protection fencing to a secondary location in line with TPP and associated method statement. This follows the

recommendations provided within British Standard 5837:2012 'Trees in relation to design, demolition and construction – Recommendations'.

Figure 2 **Default specification for protective barrier**



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

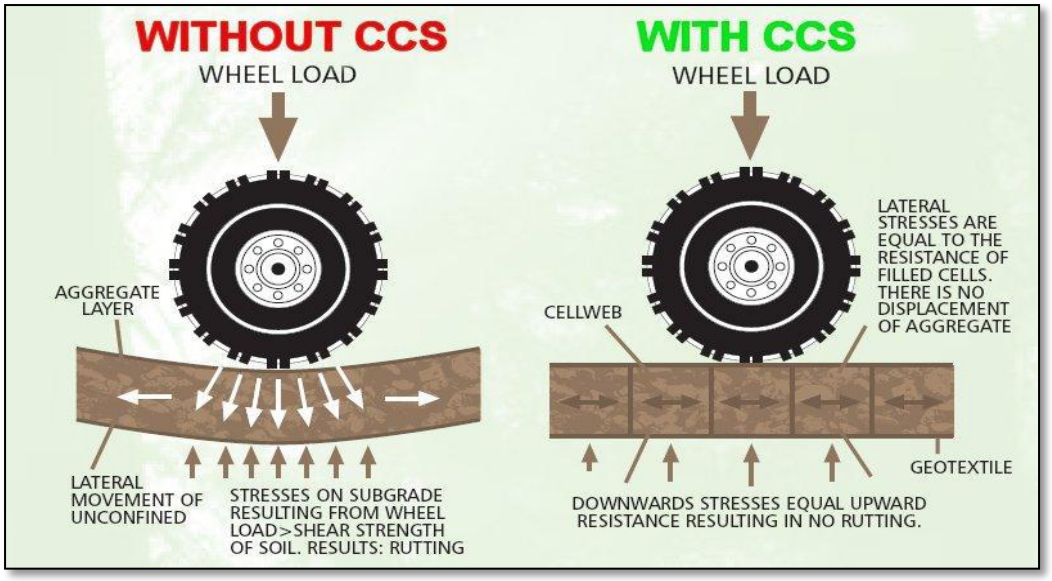
3. Where ground levels are to be raised more than 150mm (**Ref 3**) within the RPA this should be achieved by the use of a granular material, which does not inhibit vertical gaseous diffusion. For example: no-fines gravel (MOT Type 3), washed aggregate, structural soil (min. 20% sand content) or cobbles.

4. The LIS 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 cellular confinement system. Where the LIS is to cover in excess of 20% of the RPA of a previously uncovered RPA, justification is to be provided.

5. The effect of the CSS produces **a composite mattress**, with high flexural stiffness and load support

capabilities. This will prevent soil rutting and mechanical root damage by confining the porous infill materials within the CCS.

Fig. 1 Illustration of stress distribution using a cellular confinement system over roots.



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

6. 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. This operation will be carried out avoiding the use of heavy machinery within the RPA of retained trees. Once filled, the perforated cellular wall structure provides mechanical interlock for infill materials, increasing the shear strength while allowing lateral drainage and gaseous exchange.

7. The system will be used as a permanent base for a wearing course and/or will provide a temporary site access for root protection. The minimum depth for CCS material is 75mm but depths up to 400mm may be suitable; the material required is dependant on the load bearing capacity of the final surface. A structural engineer should design all engineering solutions to surfaces.

8. A pre-commencement site meeting with the appointed ground work contractor, site manager, arboricultural consultant and appointed engineer should be designed to agree the stages and specification for the installation of the LIS. A qualified arboricultural consultant will supervise any works within the RPAs of retained trees.

Stages for Installation of the LIS (with CCS)

Stage 1 **Erection of Tree Protection Fencing** (see Tree Protection Plan).

Stage 2 **Remove existing vegetation** by using a specific herbicide (as advised by a specialist) or manual removal with hand tools only. Agreed removal of shrubs, saplings or trees, within the RPAs of retained trees are to be cut to or just below ground level rather than grubbed or ground out, which can damage roots of retained trees.

Stage 3 **Remove existing hard surfaces** (paving, tarmac etc.) Machinery operating on existing surfaces or outside the RPAs and tree canopies could, be used to carefully remove existing wearing surfaces under specialist arboricultural supervision. The sub base of existing surfaces or foundations should be left in situ where possible to avoid unnecessary root disturbance and provide a base for a new LIS.

Stage 4 **Install the non-woven Geotextile** directly over soil grade level (levelled where necessary, by the infill of no-fines gravel, washed aggregate or structural soil (min. 20% sand content) and fix in place.

Stage 5 **Lay the CCS over the Geotextile**, which is secured open under tension during the infill process with steel staples or wooden pegs.

Stage 6 **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, haunched concrete with road pins, drilled kerbstones or gabians may be appropriate.

Stage 7 **Fill the CCS** ensuring any machinery works only on already filled areas. Typical infill consists of no fines angular granular material 20-40mm, **which will remain uncompacted**.

Stage 8 **Install wearing course surface.**

Permanent permeable surfacing types

Small Block Paving

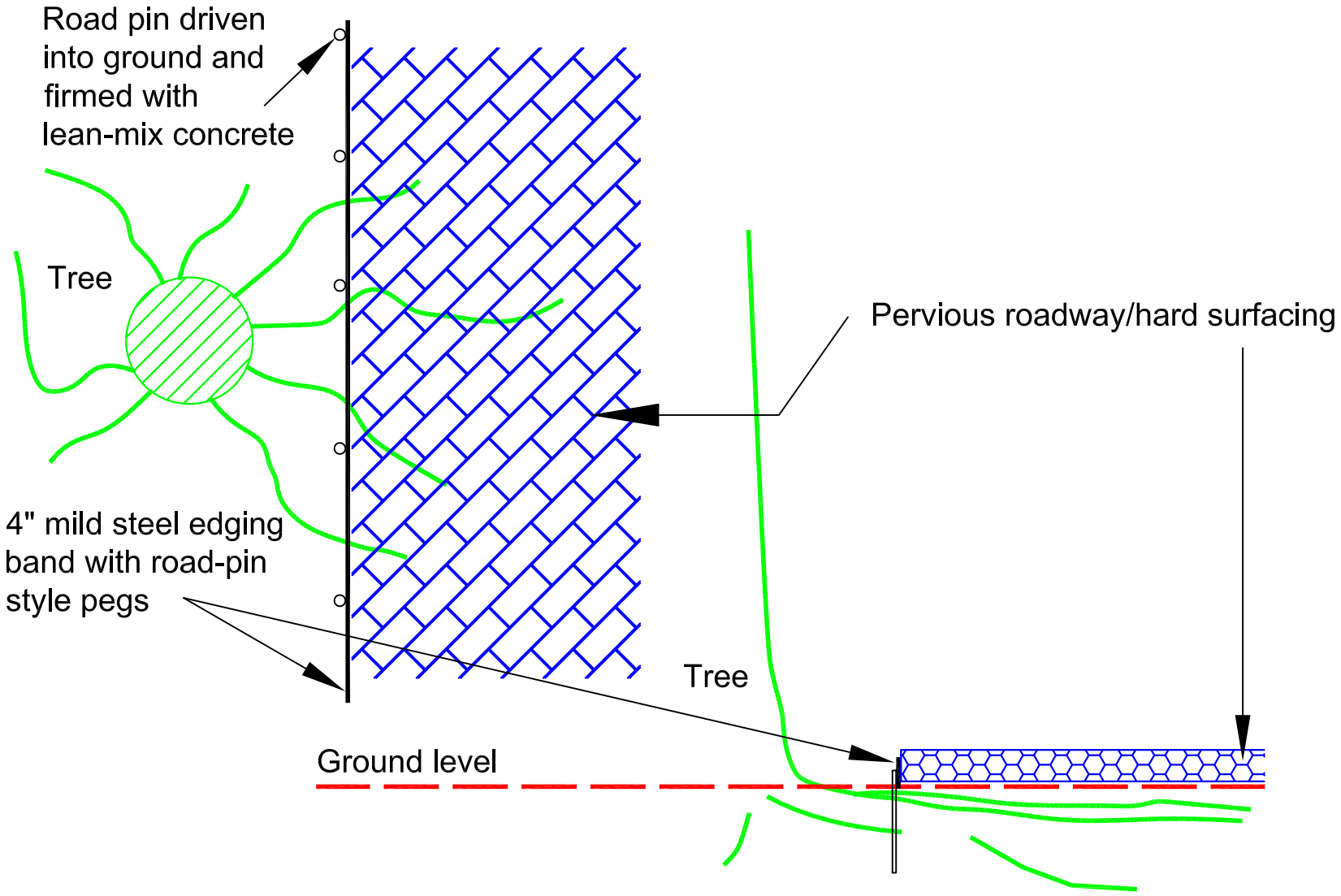
- Lay a second layer of Geotextile separation fabric over the infill CCS.
- Lay a sharp sand-bedding layer to recommended depth.
- Place block paviors as per manufacturer's instructions.

Washed Gravel

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

Example of cellular confinement system without final wearing course.

References: 1 – Tree Roots in the Built Environment 2006, Roberts Jackson Smith HSO
2 - Tree Root Growth Requirements, Dr Kim. D. Coder, University of Georgia. July 2000
3 – Arboriculture, Tree Management of Shade Trees and Vines 2004, Harris, Clarke, Matheny



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Recommended example of low-invasive edging detail near to retained trees.

Date:Jan. 2008

Ref:

Note: Sketch Plan Only - Not to Scale

Bin/Cycle store Base & Footpath Construction (guidance)

In order to construct a hard surface footpath or bin store base within a rooting area of a valued tree, the suggested following precautions and construction process are to be adopted:

NB. The primary principle is to avoid excavations into the soil to a depth which may encounter roots. As such this method seeks to construct a permeable base, (which permits access of moisture and air to the root zone), at or slightly above ground level.

1. All work involving even light excavations within the RPA of a retained tree should be undertaken using hand tools and ensuring that no roots in excess of 25mm Ø are removed or damaged. Roots in excess of 50mm Ø are to be protected by void formers or surrounded by compressible materials such as sharp sand.
2. Only the area identified as the footprint of the Store/footpath is to be prepared for construction.
3. Lay ground protection around the identified foot print to offer protection to roots from inadvertent compaction from light machinery and pedestrian traffic (see examples below).
4. Remove grass or loose surface litter, gravel or hard surface with hand tools. In the case of removing hard surfacing, remove only the wearing course and retain the sub base material.
5. Cover the footprint area of the exposed soil with a non-woven geotextile membrane and lay a suitable sub-base material as appropriate.
6. Install load-dissipating, cellular confinement grid (e.g. Cell Web 100 or Duobloc) and back fill with a no-fines 40-20mm washed stone aggregate. Edges are to be retained with treated wooden boards and pegs (see example below).

Shallow Duobloc can be used to ‘sit’ over existing surfaces and remain pervious. Useful for paths or hard-wearing bases for stores.

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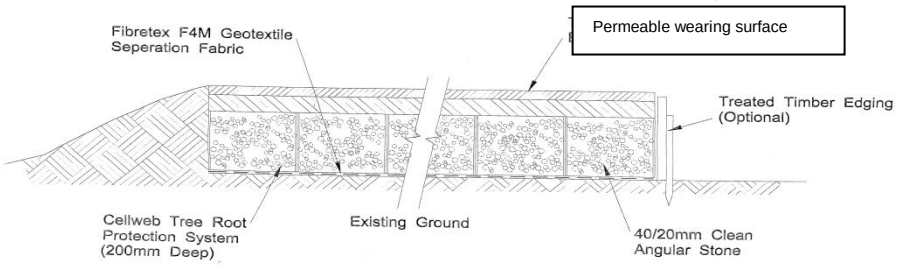

Images courtesy of Geosynthetics Ltd – 0870 850 1018

Example of cycle store with pervious base e.g. Duobloc

Bin store with low-invasive base

Example of ground protection cover –

Image courtesy of Greentech – 0113 267 6000

NOTE:

It is assumed that methods of construction as set out in this guide will be undertaken in accordance with all relevant Health and Safety legislation and Regulations and that all risk assessments have been undertaken PRIOR to construction.

APPENDIX 5

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Arboricultural Site Supervision

ACS CONSULTING

Site: 1 Hyde Park, London
Inspected By: H .Appleyard
Client: RPC
Site Agent: Shaun Clark

Date of Inspection: 15/02/2007
Time of Inspection: 3:30pm

Tree Protective Fencing

Tree protection in correct location

Comments/Action
No action at this time

Effective fencing in position

Agreed Construction Exclusion Zone

No debris within construction exclusion zone

Comments/Action
No action at this time

Amendments to Documentation Required

No amendments required

Comments/Action
Building works outside scope of Method Statement

Fencing with signs

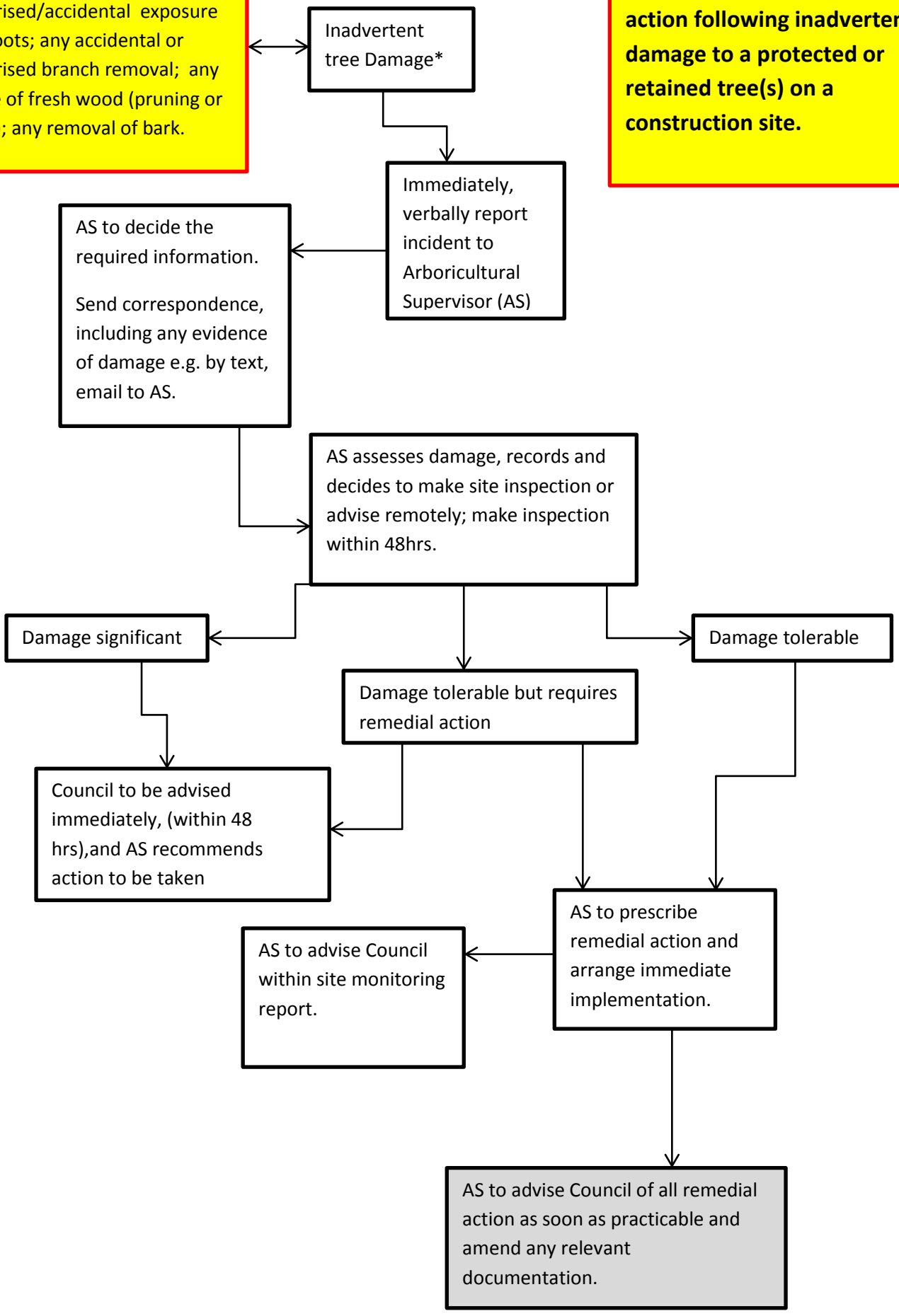
Remedial Works

General Comments

Tree protection and on-site supervsion effective and understood.

Procedure for reporting and action following inadvertent damage to a protected or retained tree(s) on a construction site.

*Tree Damage is defined as: any unauthorised/accidental exposure of tree roots; any accidental or unauthorised branch removal; any exposure of fresh wood (pruning or accident); any removal of bark.



APPENDIX 6

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Hand Digging In the Vicinity of Trees
Method Statement

1.0 Introduction

1.1 Within and adjacent to areas of construction, trees valued as important landscape assets may exist. It is possible such trees are protected by legislation in the form of a Tree Preservation Order, conservation area or by planning conditions. In either case, disregard of the tree's well being by causing damage to the roots, trunk or branches may be an offence. Consent from the Local Planning Authority may be required to undertake works that may have an impact on the tree prior to commencement.

1.2 Whilst the trunk and branches of a tree can be seen and therefore more easily avoided, tree roots are concealed beneath the ground. Their hidden nature can lead to inadvertent damage from construction processes. Dependant upon the extent of any root damage, the whole tree can be adversely affected. It is for this reason that it is necessary to ensure adequate precautions are adopted when considering construction in the vicinity of trees.

1.3 Hand digging rather than excavation by mechanical means has proved to be an effective way of limiting the effects of construction on nearby trees. It is often considered impractical, time consuming and costly to excavate by hand when machinery exists specifically for the purpose of digging. However, avoidance of unsustainable damage being caused to important trees through hand digging may far out weigh subsequent costs associated with legal penalties and loss of amenity.

1.4 Below are detailed the basic principles to acknowledge in respect of tree roots and the practical steps that can be taken to effectively avoid causing unsustainable damage to trees.

1.5 It is assumed that all operations are commenced only AFTER having undertaken and recorded appropriate risk assessments in line with current and relevant Health & Safety legislation, common industry practice and guidance.

2.0 Tree/Root Damage – How it can occur

2.1 The majority of tree roots exist in the upper **600mm to 1000mm** of soil. Excavations of the soil in the vicinity of trees, to this depth, can be harmful to tree roots and consequently the tree.

2.2.1 Tree root systems comprise two main root types, those that **anchor** the tree in the ground and those that **supply** the tree with water and elements. Roots that support the tree are woody and those that are involved with the **conduction** of water and nutrients are non-woody or fibrous. Both types of roots can be damaged directly by severing or crushing. Fibrous roots can die from asphyxiation by **soil compaction** and/or soil contamination. Trees differ in their tolerance of root loss or disturbance, according to their species and condition or both.

2.3 The larger the root damaged, the greater the impact on the tree.

3.0 Hand Digging in the Vicinity of Trees – The Process

3.1 First it is necessary to consider all available options to construct beyond the likely range of influence on the tree's condition – normally beyond 1m from the tree's trunk and within an area below the tree's canopy or by referring to an area calculated using the formulae at para 4.6.1 of BS 5837:2012 'Trees in relation to design, demolition and construction - Recommendations'. This area is called the Precautionary Zone or Root Protection Area. **When it is established that no options are available other than to construct within this zone, hand digging will be needed.** When considering hand digging, an appointed specialist supervisor/consultant will be able to advise during construction and must be on site at the commencement of works.

3.2 Before beginning to dig, mark out the tree's precautionary area with ground marker paint, clearly on the ground. This will identify the area within which hand digging must take place. **For safety and before beginning to dig, ensure there are no underground services or objects that may cause injury if damaged**. Any existing protection fencing is to be located to the nearest position of construction and fixed in place, between the tree and area of construction. It will be clearly visible to operators thereafter where hand digging will need to be undertaken. The use of mechanical digging equipment to remove the top surface layer (50-100mm) is to be avoided and hand tools are required for this exercise too.

3.3 When hand digging, using typical hand tools, carefully work around roots, retaining as many as possible. Using a brush or compressed air will expose roots cleanly before deciding whether it will be necessary to prune. Care must be taken not to damage roots including the roots' bark.

3.4 Retain all roots with a diameter greater than 25mm. Where such roots must be removed, after consulting a trained arboriculturalist (e.g. Local Authority Tree Officer or the

appointed Arboricultural Consultant), these roots must be pruned with sharp cutting tools such as a handsaw, secateurs or pruners. The cut must leave the smallest wound possible and the root must be left as long as practicably possible. Roots in excess of 50mm diameter are to be retained and protected by surrounding the root with uncompacted sharp sand, void-formers or other compressible materials.

3.5 Where roots do not exist, e.g. beyond the depth of the rooting area, mechanical excavation should not be considered without specialist supervision.

3.6 All spoil is to be deposited beyond the precautionary zone. Soil build-up can cause roots to die.

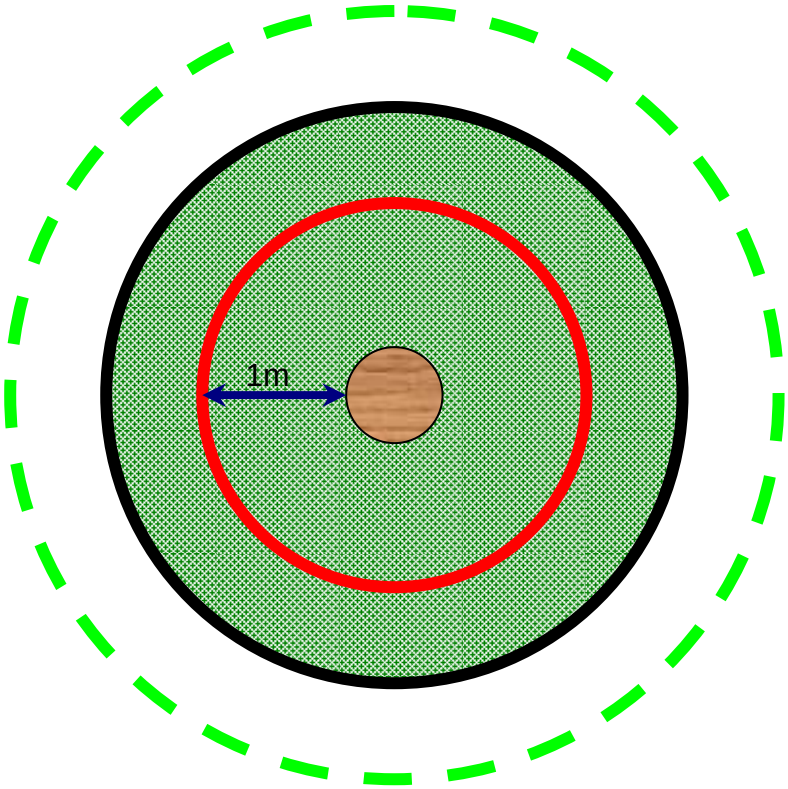
3.7 As soon as practicable, exposed roots are to be covered with loose backfill material such as soil/sand mix or a hessian-type material to offer immediate protection from drying winds and desiccation. When excavating for the introduction of posts, pads or piles, the sides of the pits should be lined with a geotextile material to prevent the potential for lime scorching of small diameter roots.

3.8 Where it is impossible to avoid completing the construction in one day for example, any exposed roots or their cut ends are to be covered with sacking material over night to prevent drying out and to add protection. This is particularly important in winter months, where frost can cause further damage to roots.

3.9 Upon completion of the hand digging, where appropriate protection fences are to be re-located and fixed in their original position.

Attached is an extract from the National Joint Utilities Group publication V4 2007, ‘Guidelines for the planning installation and maintenance of utility services in proximity to trees’.

Before considering hand digging and determining precautionary zones or root protection areas, specialist arboricultural advice should be sought.



TREE PROTECTION ZONE

Key to Diagram

Trunk of Tree

Spread of canopy or branches

PROHIBITED ZONE – 1m from trunk. Excavations of any kind must not be undertaken within this zone unless full consultation with Local Authority Tree Officer is undertaken. Materials, plant and spoil must not be stored within this zone.

PRECAUTIONARY ZONE – beneath canopy or branch spread. Where excavations must be undertaken within this zone the use of mechanical excavation plant should be prohibited. Precautions should be undertaken to protect any exposed roots. Materials, plant and spoil should not be stored within this zone. Consult with Local Authority Tree Officer if in any doubt.

PERMITTED ZONE – outside of precautionary zone. Excavation works may be undertaken within this zone however caution must be applied and the use of mechanical plant limited. Any exposed roots should be protected.

DAMAGE TO TREES

Tree roots keep a tree healthy and upright. Most roots are found in the top 600mm of soil and often grow out further than the tree's height. The majority of these roots are very fine; even close to a tree few will be thicker than a pencil. Most street tree roots grow under the footway but may also extend under the carriageway. If roots are damaged the tree may suffer irreversible harm and eventually die.

PROTECTING ROOTS - DO'S and DON'TS

There are three designated zones around a tree each of which has its own criteria for working practices.

THE PROHIBITED ZONE

Don't excavate within this zone.

Don't use any form of mechanical plant within this zone

Don't store materials, plant or equipment within this zone.

Don't move plant or vehicles within this zone.

Don't lean materials against, or chain plant to, the trunk.

Do contact the local authority tree officer or owner of the tree if excavation within this zone is unavoidable.

Do protect any exposed roots uncovered within this zone with dry sacking.

Do backfill with a suitable inert granular and top soil material mix as soon as possible on completion of works.

Do notify the local authority tree officer or the tree's owner of any damage.

THE PRECAUTIONARY ZONE

Don't excavate with machinery. Where excavation is unavoidable within this zone excavate only by hand or use trenchless techniques.

Don't cut roots over 25mm in diameter, unless advice has been sought from the local authority tree officer.

Don't repeatedly move / use heavy mechanical plant except on hard standing.

Don't store spoil or building material, including chemicals and fuels, within this zone.

Do prune roots which have to be removed using a sharp tool (e.g. secateurs or handsaw). Make a clean cut and leave as small a wound as possible.

Do backfill the trench with an inert granular material and top soil mix. Compact the backfill with care around the retained roots. On non highway sites backfill only with excavated soil.

Do protect any exposed roots with dry sacking ensuring this is removed before backfilling.

Do notify the local authority tree officer or the tree's owner of any damage.

THE PERMITTED ZONE

Don't cut roots over 25mm in diameter, unless advice has been sought from the local authority tree officer.

Do use caution if it is absolutely necessary to operate mechanical plant within this zone.

Do prune roots which have to be removed using a sharp tool (e.g. secateurs or handsaw). Make a clean cut and leave as small a wound as possible.

Do protect any exposed roots with dry sacking ensuring this is removed before backfilling.

Do notify the local authority tree officer or the tree's owner of any damage.

ACS Consulting (London)
Tel: 020 8687 1214

Tree Survey Schedule

Site: All Saints Church, Hampton

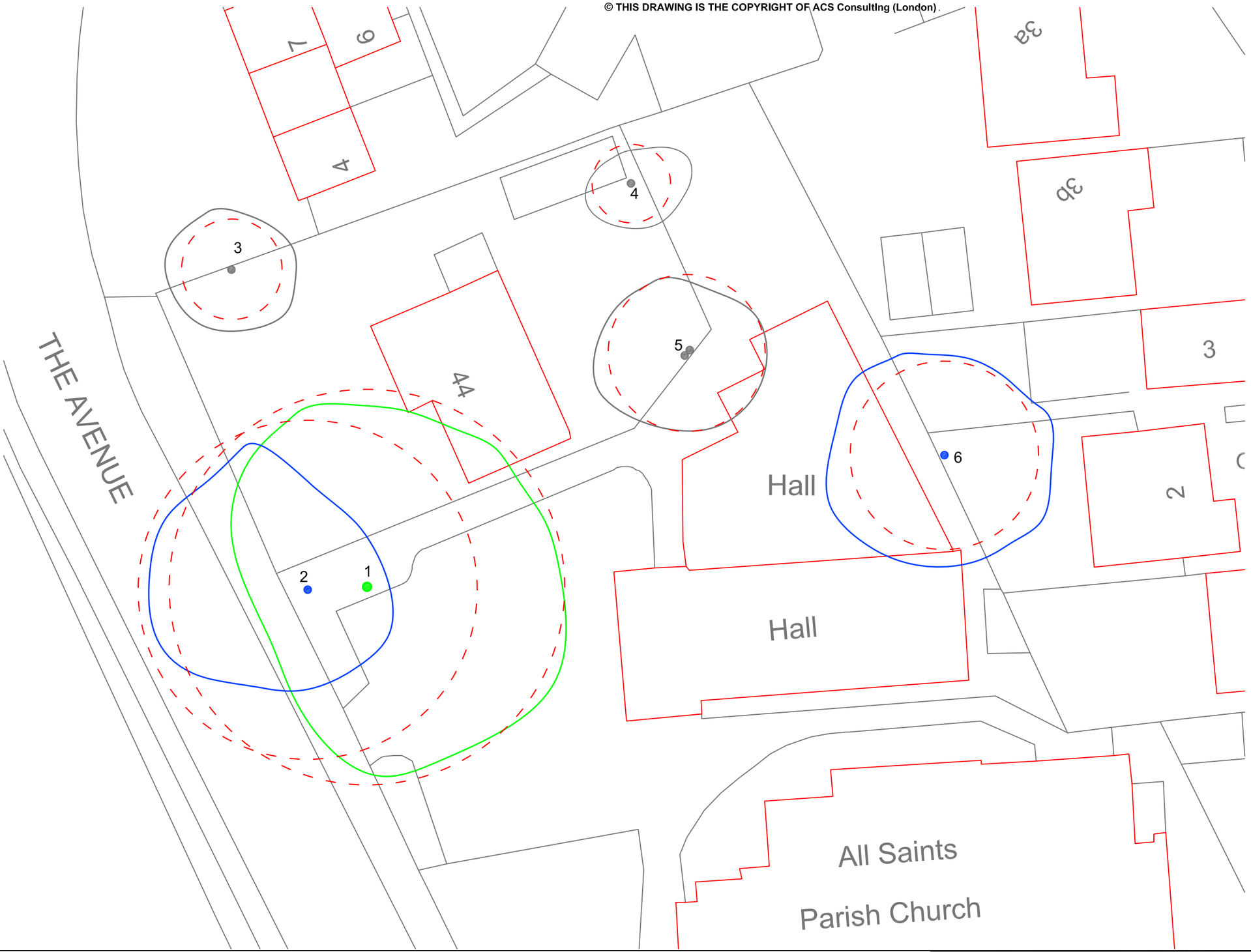
Date: 6th March 2014

Surveyor:JC
Ref:ts1/allsaints

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Age Class	Stem Diameter	Protection Multiplier	Protection Radius	Growth Vitality	Structural Condition	Landscape Contribution	B.S. Cat	Sub Cat	Useful Life	Observations
T1	Oak, Common	25	12 7 12 12	3/SE5	Mature	1050	12	12.6	Normal	Good	High	A	1,2	>40	A tree with insignificant defects Inspection limited by ivy/access Co-dominant with T2
T2	Beech, Common	17	10 10 5 6	4/N2	Mature	900	12	10.8	Moderate	Fair	Medium	B	1,2	20-40	Suppressed by nearby tree(s) Reduced in past Ivy covered trunk
T3	Sycamore	6	4 4 4 4	2/E2	Mature	270	12	3.2	Normal	Fair	Low	C	1,2	10-20	Multi stem weakness Boundary self-set tree 5x stems
T4	Sycamore	9	2 3 4 3	2/E2	Middle Aged	210	12	2.5	Normal	Fair	Low	C	1,2	20-40	A tree with insignificant defects Boundary self-set tree 2x stems
T5	Cherry, Wild	9	5 6 5 5	2/W2	Mature	420	12	5.0	Normal	Fair	Medium	C	1,2	20-40	Twin stem Branches hitting structures 2x stems, stubs and snags
T6	Eucalyptus	17	7 8 7 7	2/E3	Mature	500e	12	6.0	Normal	Fair	Medium	B	1,2	20-40	Ivy covered trunk and branches Off-site tree Over hanging branches

Notes:

1. Height describes the approximate height of the tree in meters from ground level.
2. The Crown Spread refers to the crown radius in meters from the stem centre and is shown above on each of the four compass points (i.e. N, E, S, W) clockwise.
3. Ground Clearance is the height in meters of crown clearance above adjacent ground level together with the height and direction of the lowest branch
4. Stem Diameter is the diameter of the stem measured in millimetres at 1.5m from ground level or just above ground level for multi stemmed trees. The diameter may be estimated (e), where access is restricted. An average (a) may be taken for tree groups. A full inspection is always recommended.
5. Protection Multiplier is 12 for single-stemmed trees; for multi-stemmed a cross-sectional area is calculated to derive the DBH, which in turn is multiplied by 12.
6. Protection Radius is a radial distance measured from the trunk centre and is used to calculate the BS RPA.
7. Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree).
8. Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major defects present or suspected.
9. Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees).
10. B.S. Cat. refers to British Standard 5837:2012 Table 1 category and refers to tree/group quality and value; 'A' - High, 'B' - Moderate, 'C' - Low, 'U' - Remove or very poor quality.
11. Sub Cat refers to the retention criteria values where 1 is Arboricultural, 2 is Landscape and 3 is Cultural including Conservation/ecological, historic and commemorative.
12. Useful Life is the tree's estimated remaining effective contribution in years.



ACS CONSULTING LEGEND

Indicative

BS Root Protection Area, (RPA) shown uniform (above left) but site features such as roadways, retaining walls and foundations, may modify root patterns and therefore the RPA shape (left).

- A grade trees
- B grade trees
- C grade trees
- U grade trees

0 6.25 m 12.5 m 25 m

Scale: 1:250

Client :	-
Project :	All Saints Church, Hampton
Title :	Tree Survey/Constraints Plan
Scale :	1:250 A3
Dwg No :	TCP1_AS
Rev :	-
Date :	March 2014

Do not scale from this drawing. Any discrepancies are to be reported to ACS Consulting.
This drawing is to be used when printed to scale & in colour.

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