Arboricultural Report

Impact Assessment & Method Statement

For planning purposes at

South Hampstead Synagogue
Eton Villas
London
NW3 4SG

Dated
25th November 2013

CROWN Consultants

Tree consultants throughout England and Wales

Contents

1. Introduction

1.1. Instruction

1.1.1. We are instructed by Sabrina Bremmer of The Ecology consultancy to undertake an arboricultural survey at South Hampstead Synagogue and produce our findings in a report. We are also instructed to assess the likely impact of development proposals and produce a Method Statement detailing how trees shall be protected from the proposed construction activity.

1.2. Scope and Purpose of the Report

1.2.1. This report is designed to accompany a planning application for development proposals at the above site. Its purpose is to assist and inform the planning process. It is produced according to the guidance and recommendations within *BS 5837: 2012 - Trees in Relation to Design, Demolition and Construction.*

1.2.2. The Method Statement should be viewed as a *Heads of Terms* Method Statement which specifies the general principals to be adopted during construction and demolition. However, specific construction activities proposed within Root Protection Areas may need to be agreed in more detail if requested by the local authority at the reserved matters stage.

1.3. Drawings

1.3.1. We have been supplied with a measured plan of the site with tree positions already plotted. Where applicable, additional trees have been plotted according to measurements taken on site.

1.3.2. The *Tree Constraints Plan* shows the existing layout. For each tree the stem location is indicated and scaled according to its diameter, the canopy is indicated according to measurements taken along the four cardinal points of the compass. Root protection areas (RPAs) are indicated which are calculated according to the guidelines within BS 5837 (2012).

1.3.3. Where appropriate, the shapes of the RPAs have been amended to reflect actual site conditions or where trees have been heavily pruned. The 'original' RPAs are indicated as a dashed line

1.3.4. The *Tree Removal Plan* indicates the tree constraints with the proposals overlaid. Trees to be removed are notated as are works that are proposed within Root Protection Areas. This plan accompanies the Impact Assessment which is to be found in Section 5.

1.3.5. The *Tree Protection Plan* shows the protection measures that are to be installed during the construction phase. This plan accompanies the Method Statement which is to be found in Section 6.

2. Site Overview

2.1. Brief Description (Existing Layout)

2.1.1. The synagogue is located on the corner of Eton Villas and Eton Road in South Hampstead. The co-ordinates are 51.545420° -0.158434° and the altitude is 50m above sea level. (Co-ordinates may be pasted or typed into the following site: http://maps.google.co.uk/ where maps, satellite imagery and street views may be accessed).

2.1.2. Our survey covered all trees whose roots or canopies could potentially be within influencing distance of the proposal as indicted in Figure 1.

Figure 1 Extent of the survey (image is not current).

2.1.3. The majority of the site is occupied by the synagogue building which extends to the north, south and western boundaries. In front of the building is predominantly hard standing for car parking with a small planted strip close to the northern boundary.

2.1.4. In this planted strip is a large tree of heaven (T4) and four smaller suppressed trees (Indian bean tree, cherry, Lawson cypress and a holm oak) which are growing mainly beneath the canopy of T4.

2.1.5. In an adjacent garden close to the front-left corner of the site is a large false acacia tree whose branches overhang the site.

2.1.6. Beyond the rear-left corner of the building grow a group of 3 trees (sycamore and lime) whose branches also overhang the site at a very high level.

2.1.7. Across the road (Eton Villas) are two large plane trees whose canopies stretch over the road and almost reach the existing building.

3. Tree Survey and Data Schedule

This page is largely generic. Tree officers and other persons familiar with arboricultural reports may go straight to the next section.

3.1. Survey Details

3.1.1. A ground level survey undertaken on 3rd June 2013. The survey was conducted by Ivan Button. No climbed inspections or specialist decay detection were undertaken. Only trees with a stem diameter over 75mm were included, which lie within the site boundary or relatively close to it.

3.1.2. Where applicable, trees with significant defects have been highlighted and appropriate remedial works have been recommended. However, this report should not be seen as a substitute for a full *Safety Survey* or *Management Plan* which are specifically designed to minimise risk and liability associated with responsibility for trees.

3.1.3. Wherever possible, dimensions are obtained using diameter tapes, logger's tapes, distometers and clinometers. Where obstacles prevent accurate measurement, dimensions are estimated. Trees on privately owned third party are surveyed from the best available vantage point and observations relating to the condition of these trees should be treated accordingly. All height measurements should be regarded as approximate.

3.2. Data Schedule

3.2.1. The findings of the survey are presented in The Tree Data Schedule which is provided as a separate document as well as being appended to the end of this document within Appendix 6.

3.2.2. The Schedule includes scaled tree images based on measurements recorded for stem diameter, crown spread, crown height and overall height. Their purpose is to indicate, at a glance, the relative dimensions of each tree.

3.2.3. A definition of the Retention Categories can be found in Appendix 1. All other terms used within the Tree Data Schedule are defined and explained in Appendix 3.

3.3. RPA calculation - Single Stems & Multiple Stems

3.3.1. For single stemmed trees, the RPA is calculated according to the following formula:

RPA radius = 12 x stem diameter (measures at 1.5m above ground level)

3.3.2. Where a tree has more than one stem, the equivalent-single-stem diameter is usually recorded. This is calculated by adding the squares of the stems and then finding the square root of this total. The radius of the Root Protection Area is then calculated by multiplying the equivalent-stem-diameter by 12.

3.3.3. Occasionally this method is not appropriate (e.g. for coppiced specimens where there are numerous stems). In such cases the diameter at ground level may be recorded or a stem diameter which would provide a suitable Root Protection Area calculation. The form of the tree is recorded in the notes section.

4. Vegetation Overview (independent of proposals)

This section summarises all the recommendations within the Tree Data Schedule regardless of whether trees are to be retained, felled or pruned to facilitate the proposed development. It does not specify works that may be required to facilitate the development proposals. The protection status of the trees is also reported in this section.

4.1. Preliminary Management Recommendations

4.1.1. The trees were all deemed to be in an acceptable condition and no significant defects were observed. Consequently, no remedial works have been recommended.

4.2. Future Inspections

4.2.1. The table below suggests a schedule of future inspections based on the condition and location of each tree:

Inspection Frequency (years)	Tree Number
0.5	None
1	None
1.5	None
3	T1, T2, T3, T4, T5, T6, G7, G8

4.2.2. The trees should be inspected sooner if there is a noticeable decline in their condition, or following extreme weather events.

4.3. Tree Protection Status– Site Specific

4.3.1. On 4th June 2013, we were informed, by Katie of London Borough of Camden that:

- The site is within Eton Conservation Area.
- There is a tree preservation order affecting the false acacia (T1) growing beyond the southeast corner of the site.

4.4. Tree Protection – General Notes

4.4.1. Before undertaking works to trees protected by a tree preservation order, consent needs to be obtained from the local authority which will provide application forms and advice to potential applicants. The removal of dead wood is exempt.

4.4.2. Where the works are proposed for reasons of safety or ill health, a report from a suitably qualified arborist will usually be required. Trees that are dead, dangerous or dying are technically exempt from protection, though it would be prudent to give the local authority 5 days' notice of intention and take photographs before undertaking works without prior consent being granted. Unauthorised works to protected trees may result in a criminal prosecution and a large fine (unlimited).

4.4.3. Where trees are located in a conservation area, works are not permitted without first giving the local authority 6 weeks' notice of intention. During this time the local

authority may elect to create a tree preservation order or to inform the applicant that they have no objection to the proposed works. If the local authority does not respond within 6 weeks, then the intended work may be undertaken.

4.4.4. Where planning permission is granted and tree works have been approved as part of the planning consent, no further application is required in respect of protected trees and no further notice is required in respect of trees within a conservation area.

4.5. Species Present – Additional Information

4.5.1. The table below contains general information about the tree *species* (rather than the actual tree *specimens*) included in the survey. Its purpose is to assist readers who are unfamiliar with the characteristics of the various species.

Species (tree No)	Typical Height at Maturity	Typical Canopy Spread at Maturity	General Notes
Cherry (T3)	8	10	Many cultivars available, bred for their abundance of spring flowers, edible cherries or ornamental bark (e.g. Tibetan Cherry). Usually white or pink flowering, often in very early spring. Usually with a single bole to around 2.5m and multi-stemmed thereafter. Most varieties have excellent autumn colour.
False Acacia (T1)	20	12	Deciduous fast growing tree native to the US. Pinate leaves. Part of the pea family and its roots fix nitrogen. Bright yellow 'Frisia' cultivar is widely planted in gardens. All parts are toxic except the white flowers which appear in May or June. Seed pods ripen in winter. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Robinia+pseudoacacia for more info.
Holm Oak (T6)	25	20	Also called Evergreen Oak or Holly Oak because of its evergreen vaguely holly-like leaves. Originating in the Mediterranean region. Mulched leaves are said to repel slugs and grubs. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Quercus+ilex+ballota for more info.
Indian Bean Tree (T2)	16	12	The 'Indian Bean Tree'. Native to S. Catalpa, Florida, Alabama and Mississippi. More frequent in the southern UK as it prefers a warmer climate. Leaves are very large and smell foul when crushed. Flowers in large candles at the branch ends in summer followed by slender hanging seed pods to 40cm long. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Catalpa+bignonioides for more info.
Lawson Cypress (T5)	40	10	Erect, narrowly conical evergreen tree native to Southwest Oregon and N. W. California. Introduced to Britain in the 1850's and now a common tree in gardens and parks. Makes an excellent dense hedge. Many varieties are available including golden and miniature varieties. Easily distinguished from Leyland cypress by the presence of small cones. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Chamaecyparis+lawsoniana for more info.
London Plane (G7)	30	20	Deciduous tree arisen in cultivation probably as a cross between the Oriental Plane and the American Buttonwood. Has attractive bark which peels off in small plates leaving a multi-coloured flecked pattern. Very common as a street tree, especially throughout London where it dominates the streetscape. Often managed as a pollard in order to constrain its large size to more manageable proportions, especially where there are clay soils and adjacent buildings. Visit http://en.wikipedia.org/wiki/Platanus for more info.
Tree of Heaven (T4)	25	18	Fast growing deciduous tree native to northern China with ash-like pinnate leaves and fat twigs sporting small round buds. Bark is smooth and grey with white vertical 'snakes'. Tolerant of a wide range of soils and conditions including drought and pollution. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Ailanthus+altissima for more info.
Lime (G8)	25	12	Very common street tree. Several species exist; the one most often found in woods is 'common lime' which produces a mass of suckers at the stem base, making it very cheap to propagate. Limes have non-symmetrical heart shaped leaves which are much loved by aphids (hence the sticky honeydew on cars parked beneath). Limes are tolerant of heavy pruning and are often managed as pollards. Old limes tend to support a lot of small dead branches. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Tilia+x+europaea for info.
Sycamore (G8)	25	16	Deciduous tree native to S. Europe, widely naturalised in the UK. Often regarded as a weed species due to its invasive nature and ability to tolerate most conditions. Responds well to pruning. Not a good tree to park beneath in summer due to the sticky sap secreted by aphids. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Acer+pseudoplatanus for info

4.5.2. The figures quoted regarding typical height and canopy spread should be treated as approximate. Actual heights and spreads vary according to several environmental factors such as soil conditions, climate and presence of competing vegetation. The figures quoted are NOT the maximum dimensions that the species may attain.

5. Arboricultural Impact Assessment

5.1. Overview

5.1.1. It is proposed to demolish the existing buildings and construct a new 3 storey building with basement as indicated on the plans in Appendix 6.

5.1.2. The following trees are to be retained and protection measures employed to ensure their well-being:

Location	Tree Number
On-site Trees	T4
Trees Adjacent to the Site	All trees (T1, G7, G8)

5.1.3. The table below summarises the potential impact on trees due to various activities.

Activity	Trees Potentially Affected
Tree Removal	T2, T3, T5, T6
Building Close to Tree Canopies	T4, G7
Foundations	T4
New Surface	T4
Underground Services	None Anticipated
Change of Ground Levels	None
Soil Compaction	T4

5.1.4. Other potentially damaging activities often associated with construction sites include demolition or the careless use of plant machinery, hazardous materials, or fires.

5.1.5. All of the above potential impacts are considered in detail throughout this section. Section 6 specifies the measures proposed to minimise all possible potential risks of damage to the retained trees.

5.2. Tree Removal

5.2.1. **Retention Category A:** It is proposed to retain all Retention Category A trees.

5.2.2. **Retention Category B:** It is proposed to retain all Retention Category B trees.

5.2.3. **Retention Category C:** It is proposed to remove the following Retention Category C trees: T2, T3, T5 and T6. These trees are all growing very close together in a narrow planted strip beneath the canopy of the tree of heaven, T4. They are relatively small trees (4m, 4.5m, 6m and 8m). They are planted so close together that they have insufficient room to mature and are currently damaging the boundary wall (see Photograph 7). Their removal is necessary in order to enable the repairs to the boundary wall, the installation of a security hut and the reconfiguration of the landscape features nearby.

5.2.4. Due to their small stature and relatively poor form, their removal is not considered to have significant impact on local visual amenity. What screening they do offer will be easy to replace over the short term buy new planting.

5.2.5. **Retention Category U:** The site does not contain any Retention Category U trees.

5.3. Mitigation Planting

5.3.1. The enlarged planter at the front-right corner of the site offers an opportunity for the planting of shrubs or small trees to maintain some greenery on the corner of Eton Villas and Eton Road.

5.4. Impact on Tree Canopies

5.4.1. It will be possible to demolish the existing building and install the new one without any significant pruning. The canopies of T4 and the London planes (G7) may require very light trimming to facilitate the installation of scaffolding as their branch tips almost reach the existing building. Such pruning may be undertaken with secateurs as the scaffolding is installed. It shall not harm or disfigure these trees.

5.5. Impact on Tree Roots

5.5.1. The Root Protection Area of T1, T4, G7 and G8 have been amended on the Tree Constraints Plan to take into account the presence of roads and buildings which will influence the rooting system of these trees. A notional RPA is indicated as a dotted circle and an amended RPA is also indicated which better reflects the likely rooting zone of this tree.

5.5.2. **Foundations:**

5.5.3. The proposal shall require excavation for a basement within the Root Protection Area of T1 and T4. If we allow for an additional excavation of 1m beyond the build line (to accommodate any additional excavation), the portion of RPAs affected shall be as follows:

Tree No	Total RPA (m^2)	Area of RPA affected (m^2)	% of RPA affected
T1	127	8.5	**6.7**
T4	147	22.2	**15.1**

(Note: the calculations for T1 and T4 are based on an amended RPA which takes into account the impact of the adjacent road on the likely rooting zone of these trees. The Tree Constraints Plan indicates both a notional RPA shown as a dotted circle, along with a more realistic RPA which extends further in all directions except beneath the road.)

5.5.4. The table shows that the proposal footprint shall extend over 6.7% of the RPA of T1 and 15.1% of the RPA of T4, and shall be at distances of 4m and 5.3m respectively from these trees. This allows for an additional excavation of 1m beyond the footprint of the basement. If the extent of excavation may be reduced (e.g. by the use of contiguous piling) then the extent of Root Protection Area affected will be significantly less.

5.5.5. Research has shown that healthy trees of most species are able to withstand the loss of some roots (to a maximum of about 20% of the rooting area) with no long term detrimental impact (Helliwell, D.R. and Fordham, S.F. (1992) Tree Roots and Tree Growth. Reading Agricultural Consultants, Didcot, UK.).

5.5.6. We have specified restrictions within the Method Statement to ensure excavation does not exceed 1m beyond the footprint of the basement. This should ensure no long term impact on the health of T1 and T4, due to the installation of the basement.

5.5.7. The cycle park, bin store and gas cupboard in the vicinity of T1 shall be founded on a concrete raft foundation. Excavation for this foundation shall not exceed the depth of the existing surface and sub-base. This will ensure no damage to the roots of T1.

5.5.8. The security hut in the vicinity of T4 shall be founded on a concrete raft foundation or on wooden posts with a wooden floor. Excavation for this foundation shall be undertaken using hand tools and shall be overseen by the local authority tree officer or an appointed arborist. All roots in excess of 25mm shall be retained. If necessary the floor of the hut shall be raised to enable this. This will ensure no damage to the roots of T4.

5.5.9. **New Surfaces:**

5.5.10. The enlarging of the existing planted strip will give more room for the buttress roots of T4 to develop without damaging the edge of the planter as they currently are doing.

5.5.11. The existing hard surface over the Root Protection Area of T4 shall be replaced with a new surface. To ensure no roots are damaged, any excavation shall be limited to the removal of the existing surface and the associated sub-base. Soils in these areas are likely to be compacted already and no net increase in traffic is anticipated; therefore no

5.5.12. **Underground Services**

5.5.13. It is important that the locations of all underground services are approved by the local authority after consultation with the appointed arborist to assess the potential impact on trees.

5.5.14. **Changes in Ground Levels**

5.5.15. The finished ground levels shall approximate the existing ground levels and there shall be no impact on tree roots from land re-grading.

5.5.16. **Soil Compaction:**

5.5.17. In order to minimise any negative impact due to soil compaction, or contamination, on the roots of T1 and T4, it is proposed to ensure that a suitable load spreading surface in in place over its RPA at all times. Ground protection measures shall be installed and maintained throughout the construction phase as specified in Section 10. This shall be fully in accordance with industry best practice as specified in BS 5837 (Section 6.2.3).

5.6. Demolition Activities

5.6.1. In order to avoid inadvertent damage to roots, branches or stems, care shall need to be taken when demolishing or removing surfaces close to retained trees. The use of a (carefully marshalled) mechanical excavator shall be acceptable so long as the adjacent walls are demolished inwards onto the building footprint, and foundations/surfaces are carefully lifted. Machinery operatives shall need to be made aware of this requirement.

5.7. Hazardous Materials

5.7.1. All hazardous materials (including cement and petrochemical products) are to be controlled as specified in Section 6.18 in order to ensure there is no detrimental impact on trees.

5.8. Cabins and Site Facilities

5.8.1. There is limited room for the siting of cabins and storage of materials / spoil during the construction phase so the logistics of the development shall need to be well organised to ensure that there is adequate space outside of the Tree Protection Zones for construction activity.

5.9. Boundary Treatments

5.9.1. Precise proposals to amend boundary features close to trees shall be agreed with the local authority after consultation with the appointed arborist.

5.9.2. In order to minimise any impact on roots, the existing walls and foundations must be carefully removed using hand tools. No excavation shall be permitted beyond the existing foundations. Alternatively, the existing foundations may be left in place and re-used.

5.10. Impact of Retained Trees on the Development

5.10.1. Other than the basement, the new building shall be within the footprint of the existing building so shall not result in an increase in the perceived nuisance afforded by the trees.

5.11. Summary

5.11.1. It is proposed to remove four Retention Category C trees to enable the development (T2, T3, T5 and T6). These are relatively low quality suppressed trees (see Section 5.2.3).

5.11.2. The new, wider, planting strip will enable the planting of new trees or shrubs to mitigate any impact on visual amenity caused by the removal of these 4 small trees.

5.11.3. The proposal seeks to retain T4 and all trees adjacent to the site. Protection measures are proposed to ensure minimal impact:

- Foundations for the cycle park, gas cupboard and bin store (close to T1), shall be limited to the depth of the existing surface and associated sub-base. The existing hard surface and the foundations of the boundary wall will ensure that no significant roots are present at such depths. Any proposal to excavate deeper shall be subject to approval by the local authority and shall be supervised by an appointed arborist and / or the local authority tree officer.
- The security hut in the vicinity of T4 shall be founded on a concrete raft foundation or on wooden posts with a wooden floor. Excavation for this foundation shall be undertaken using hand tools and shall be overseen by the local authority tree officer or an appointed arborist. All roots in excess of 25mm shall be retained. If necessary the floor of the hut shall be raised to enable this. This will ensure minimal impact on the roots of T4.
- Excavation for the basement in the vicinity of T1 and T4 shall also be limited by utilising contiguous piling or by shoring up the soils within 1m of the extent of the basement.
- All resurfacing over Root Protection Areas shall be undertaken without excavation below the depth of the existing surface and its sub-base.
- A suitable load spreading surface shall be in place at all times over the RPAs of T1 and T4.
- Heavily compacted soils beneath the public highway will ensure that no roots of G7 will trespass into the site. No specific restrictions are therefore required to protect the roots of these trees.
- The foundations of the existing buildings will deter significant roots of G8 from growing within the site. No specific restrictions are therefore required to protect the roots of these trees.
- No construction activity is proposed beyond the site boundary so no additional tree protection barriers are required for off-site trees.

6. Method Statement

Section A: Introduction and Overview

6.1. Definition of Terms

6.1.1. Some terms used within the Arboricultural Method Statement have very specific meanings. These are defined below:

6.1.2. **Root Protection Area (RPA).** This is a theoretical area of ground around a tree where the roots are likely to proliferate. Ground disturbance in this area should be minimised in order to avoid significant impact on tree health. RPAs are indicated on all plans accompanying this report as a pink line.

6.1.3. **Construction Exclusion Zone (CEZ).** These zones are created to protect roots and canopies form inadvertent damage by construction activity. They are usually fenced off by protective barriers throughout the entire construction phase. No works are permitted in these zones other than minor landscaping works which do not require a change in ground level. Where practicable the entire *Root Protection Area* and the area beneath the tree canopy shall be treated as a *Construction Exclusion Zone*. These zones are hatched purple on the Tree Protection Plan.

6.1.4. **Restricted Activity Zone (RAZ).** In this instance it is not possible to create a Construction Exclusion Zone. This is because access will be required and some works are proposed within the RPA. Instead *Restricted Activity Zones* will be created where limitations are placed on construction activity. Ground protection measures are specified and excavation will be restricted. See the legend on the Tree Protection Plan to identify these zones.

6.2. Tree Protection Barriers - Overview

6.2.1. The Tree Protection Plan indicates the location of all proposed tree protection barriers according to the following legend and overview:

Symbol on Tree Protection Plan	Barrier type See Section 9	Location
	In-Ground System or Back-Stay System	N/A
	Back-Stay System	N/A
	Barrier Mesh System	N/A
	Plywood Boxing	Around the stem of T4
	Cloth and Wire Wrap	N/A

6.2.2. The barriers shall be installed prior to the commencement of any construction activity including soil stripping and delivery of materials. A detailed specification of the barriers can be found in Section 9.

6.2.3. The tree protection plan also indicates where ground protection measures shall be installed as specified in sections 6.7 onwards (Restricted Activity Zones) and Section 10–*Ground Protection Measures.*

6.3. Planning Status

6.3.1. Tree protection measures specified within this report should be agreed with the local authority so that they may be conditioned upon planning consent.

6.3.2. The site manager must be familiar with all aspects of this Method Statement and should liaise with the author of this report for clarification, or regarding any unforeseen issues where trees may be impacted upon.

6.3.3. A copy of this Method Statement shall be available on-site at all times. All personnel working on the site shall be made aware of any sections appertaining to their work. This includes short term contractors and persons responsible for deliveries and installation of services.

6.4. Overview of Protection Measures

6.4.1. Below is a list of potential arboricultural impacts and a summary of the proposed protection measures:

Reference	Comments	Potential Impact	Protection measures
T1, T4	Access is required over the Root Protection Area.	Compaction and contamination adjacent to proposed works.	Suitable load spreading surface to be installed at all times.
T1	Bin store, gas cupboard and cycle park to be installed	Root disturbance	Raft foundation to been utilised. Excavation undertaken using hand tools only and supervised by the local authority tree officer and / or the appointed arborist Excavation limited to existing surface and sub-base. No excavation beyond the depth of sub-base or any other foundations.
T4	Security hut installed.	Root disturbance	Raft foundation to been utilised (or a timber floor supported by timber posts). Excavation undertaken using hand tools only and supervised by the local authority tree officer and / or the appointed arborist.
T4	Existing surface replaced. Planted area enlarged.	Root disturbance	Excavation limited to existing surface and sub-base. No excavation beyond the depth of sub-base or any other foundations. Only hand tools to be used.
T1, T4	Excavation for basement in RPA.	Excessive root severance if excavation extends significantly into the Root Protection Area.	Restricted Activity Zone Created. Contiguous piling to be installed adjacent the proposed footprint using narrow diameter piles OR ground to be shored up to prevent any ground disturbance beyond 1m from the basement footprint.

6.4.2. The above measures are described in more detail throughout the remainder of this section.

6.5. Timing of Operations

6.5.1. Activity within the site shall be phased according to the following chronology:

Order	Phase	Activity
1st.	Pre-Construction Phase	Detailed design submission for approval (see Section 6.6 below). Discharge of any planning conditions relating to trees.
2nd.		Undertake all specified tree removal and pruning (see Section 8 -*Tree Works Schedule*).
3rd.		Install the tree protection barriers (see Tree Protection Plan and Section 9 -*Tree Protection Barriers.*
4th.		Install ground protection measures (see Tree Protection Plan and Section 10 –*Ground Protection Measures*)
Protection measures confirmed acceptable by the local authority		
5th.	Construction Phase	Demolish existing structures and remove existing surfaces where applicable.
6th.		Install new buildings, hard surfaces and services taking into account restricted activities as specified in Sections 6.7 onwards
7th.	Post-Construction Phase	Remove protective barriers (fencing and ground protection measures as applicable).
8th.		Undertake landscaping operations, including boundary treatments, pedestrian surfaces and any proposed tree planting.

6.6. Confirming Detailed Proposals (Reserved Matters)

6.6.1. This Method Statement is a *Heads of Terms* method statement. This means that it specifies the general principles to be adopted during proposed development works. Often additional input is required from engineers to confirm the exact locations of services or technical specifications which are beyond the scope of an arborist. This is usually provided at the reserved matters stage via planning conditions. The table below highlights where such confirmation is required.

Nature of Activity	Areas Potentially Affected	To be Confirmed
Services	Throughout the site	Exact location of all underground services and trenches. Location of any proposed soak-aways. Method of installation where services pass through Root Protection Areas.

6.6.2. The limitations specified within this report need to be considered in detail by building and/or demolition contractors. Any conflicts should be raised at an early stage so that issues may be resolved and agreed with the local authority. This may require the production of a revised Method Statement.

Section B: Restrictions on Activities – Specific Zones

6.7. Restricted Activity Zone A

6.7.1. Within these zones (indicated on the Tree Protection Plan) access will be required to facilitate construction. Adjacent to T4, the existing planter (shall be enlarged, a shed shall be installed and the boundary wall shall be replaced along with the existing hard surfacing. Adjacent to T1, bike parking, is to be installed along with a bin store and a gas cupboard. The following restrictions shall apply:

- No permanent or temporary structures shall be erected without written approval from the local authority.
- Removal of existing structures such as, walls, steps and hard surfaces shall be undertaken using hand tools or a mechanical excavator operating from outside the Restricted Activity Zone and carefully marshalled by an appointed arborist.
- A suitable load spreading surface shall be in place at all times. If necessary, ground protection measures shall be installed as specified in Section 10 *–Ground Protection Measures*. These shall remain in place throughout the entire construction phase.
- Vehicles or plant machinery in excess of 2 tonnes shall not be permitted in this area.
- Any new hard surfaces or resurfacing shall be done in accordance with the Guidelines in Section 11 *-New Surfaces*.
- The bin store, gas cupboard and cycle parking close to T1, shall be installed on a raft foundation. This foundation shall be installed without any excavation beneath the existing hard surface and its associated sub-base.
- The security hut adjacent to T4 shall also be installed on a raft foundation or on a timber floor supported by timber posts. Excavation for this foundation shall be excavated using hand tools only and in the presence of the appointed arborist and / or the local authority tree officer. All roots in excess of 25mm diameter are to be retained. If necessary, the floor of the hut shall be raised to enable all such roots to be retained.
- Similarly, the foundations for the low retaining walls of the planted area around T4 shall not extend beneath the depth of the existing foundations for the existing retaining walls.
- Should it be determined that additional excavation is required, this shall be undertaken using hand tools only and overseen by the appointed arborist and / or the local authority tree officer.
- If roots are encountered in excess of 25mm diameter, they shall be retained wherever possible and protected with damp sacking during times that they are unearthed. Any roots in excess of 10mm that need to be severed shall be pruned with secateurs.
- No further excavation shall occur in this zone without consulting the appointed arborist and obtaining approval from the local authority.
- Storage of materials shall be limited to that which is required for the task in hand. Heavy materials that require storage for more than two days shall be stored outside the Restricted Zone.
- No spoil shall be stored.
- No fires shall be permitted.
- All hazardous materials (including non-essential cement products) shall be forbidden.
- No machinery in excess of 3m tall shall pass through or operate in this zone.

6.8. Restricted Activity Zone B

6.8.1. Within this zone (indicated on the Tree Protection Plan) it is proposed to excavate for the basement. The following restrictions shall apply in order to minimise the extent of excavation beyond the footprint of the basement:

- Either contiguous piling shall be installed along the edge of the basement, OR soil shall be shored up at a maximum distance of 1m from the basement.
- Soils beyond the piling or beyond the shoring sheets shall remain undisturbed and protected by ground protection measures.
- If a pile driver is used it shall operate form the side away from the trees OR the ground protection measures shall be strengthened to accommodate the forces generated by the pile driver. This may require the installation of a concrete slab. The exact nature of the ground protection measures shall be agreed and approved by the local authority after consultation with piling engineers and the appointed arborist.

Section C: Restrictions on Activities – Throughout the Site

6.9. Canopy Protection

6.9.1. In order to protect tree canopies outside of *Construction Exclusion Zones* the following restrictions shall apply:

- No machinery in excess of 3m shall pass beneath the canopy of any tree without being carefully marshalled in order to ensure that no branches are damaged. This includes the use of piling rigs.
- If materials require installation or delivery beneath tree canopies, this shall be done without the use of overhead cranes.
- If materials are to be installed or delivered close to tree canopies (but not beneath them) and a crane is required, they shall be carefully marshalled in order to ensure that branches are not accidentally damaged.

6.10. Site Hoarding

6.10.1. If site hoarding shall be installed over the Root Protection Area of any tree, the following restrictions shall apply:

- Ground levels shall be maintained as existing.
- Post holes shall not exceed 300mm x 300mm.
- No post hole shall be excavated within 1.5m of any tree stem.
- Post holes shall be excavated using hand tools or by a post-hole auger attached to plant machinery sited outside the Root Protection Area(s).
- Roots in excess of 25mm shall be retained wherever possible.
- Roots in excess of 10mm shall be pruned with sharp secateurs.
- Pruning shall be minimal and only undertaken where absolutely necessary to facilitate the site hoarding. It shall be undertaken by a reputable tree surgeon working to BS 3998 (2010).
- Cement products shall be mixed away from Root Protection Areas (see Section 6.18 - *Hazardous Materials*).

6.10.2. Site hoarding may be installed in place of the specified tree protection measures subject to the approval of the local authority with regard to its location and specification.

6.11. Boundary Treatments / Permanent Fencing

6.11.1. If permanent fencing is to be installed within Root Protection Areas, the following restrictions shall apply:

- All post holes shall be excavated by hand and kept as narrow as possible (maximum diameter 300mm).
- Exploratory post holes shall be dug before committing to post / panel positions. If any roots in excess of 25mm are encountered they are to remain intact and the post hole shall be relocated slightly. The fencing system must permit such flexibility (i.e. where fixed panel widths are used, all post holes must be excavated before committing to the final location)
- Any roots in excess of 10mm which are severed shall be neatly pruned back with secateurs. This will encourage healing and reduce the likelihood of infection.

6.11.2. Walls shall be avoided over Root Protection Areas unless their foundations may be spanned over roots using a beam system.

6.11.3. Hedges may be planted within Root Protection Areas using hand tools to minimise excavation.

6.12. Demolition and Ground works

6.12.1. No demolition, removal of surfaces, or soil stripping shall commence until the tree protection fencing is installed to the satisfaction of the local authority.

6.13. Underground Services

6.13.1. No underground services shall pass through any part of the *Restricted Activity Zones* unless done so in a manner detailed in a specific Method Statement and approved by the local authority.

6.14. Lighting, Bollards, CCTV and associated Cables

6.14.1. If any of the above are to be installed close to tree canopies or within Root Protection Areas of retained trees; installation methods shall be detailed in a specific Method Statement and approved by the local authority. Consideration should be given to the following:

- Pruning of branches to enable sufficient clearance for light and views. Branches should be removed to the *branch collar* as per British Standard 3998 (2010).
- Post holes should be excavated by hand or using an appropriate sized auger. No other form of mechanical excavation should be used.
- Cables should be routed in a direction directly away from the tree. It will not be acceptable to excavate a trench across any Root Protection Areas.

6.15. Use of Heavy Plant

6.15.1. All machinery operatives are to be made aware of any *Restricted Activity Zones* that apply to this site (see the Tree Protection Plan and Section 6.7 onwards).

6.15.2. All machinery operatives are to respect these zones and ensure that no damage occurs to trees due to the careless use of machinery.

6.15.3. Plant machinery shall be limited to a maximum weight of 2 tonnes in Restricted Zone A)

6.16. Scaffolding

6.16.1. If scaffolding is required in areas containing ground protection measures, the protective boards shall need to remain in-situ and be strengthened and stabilised to bear the weight of scaffold poles.

6.16.2. Prior to the installation of any scaffolding within 0.5m of any tree branches, the appointed arborist shall be consulted to specify any pruning works that may be required.

6.17. Siting of Cabins and Storage of Materials

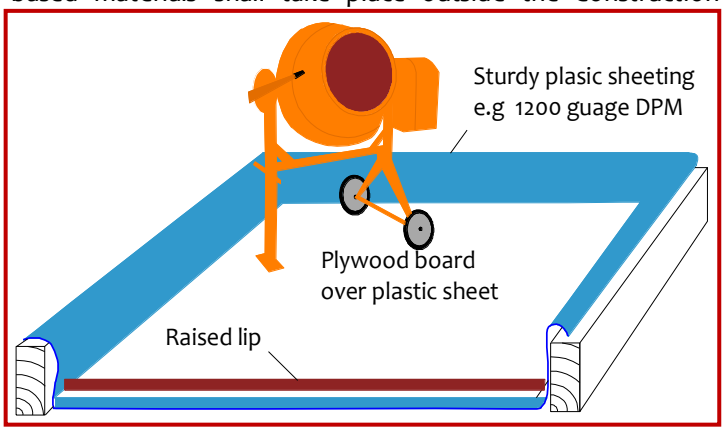
6.17.1. Cabins and heavy building materials may be located or stored anywhere outside of *Construction Exclusion Zones* and *Restricted Activity Zones*.

6.17.2. Any proposal to install cabins or materials within these zones shall be agreed in writing with the local authority prior to installation.

6.17.3. It may be acceptable to locate site cabins such that they act as a tree protection barrier and replace the specified protective fencing. Where this is being considered, written approval must be sought from the local authority.

6.18. Hazardous Materials

6.18.1. Any mixing of cement based materials shall take place outside the Construction Exclusion Zones and Restricted Activity Zones. Where cement is to be mixed at considerable distances from trees and water run-off cannot enter Root Protection Areas, then no further special measures are required. Otherwise, provision shall be made to ensure that the mixing area is contained so that no water run-off enters the Root Protection Area of any trees (see diagram for example). Mixers and barrows shall be cleaned within this area.



6.18.2. All other chemicals hazardous to tree health, including petrol and diesel, shall be stored in suitable containers as specified by current COSHH Regulations, and kept away from Root Protection Areas.

Section D: Post-Construction Phase

6.19. Removal of Tree Protection Barriers

6.19.1. This will be done after all major construction work is complete.

6.19.2. The local authority tree officer shall be made aware that the barrier is to be removed.

6.20. Tree Planting

6.20.1. Trees planted in poor soils or compacted soils are unlikely to become established, so prior consideration should be given to rooting conditions. Where compaction or contamination is believed to have occurred expert horticultural or arboricultural advice should be sought.

6.20.2. Any new tree planting shall be carried out after completion of all construction activity in the vicinity.

7. Site Inspection

7.1. Inspection Schedule

7.1.1. In order to ensure that the trees are adequately protected it shall be necessary to periodically monitor the works. This will be done by the local authority tree officer or an appointed arborist (see Section 7.2 below) who will provide the tree officer with a copy of inspection details.

7.1.2. The following inspection schedule is suggested though the local authority may specify additional supervision where deemed necessary.

Inspection	Attendees	Comments
Pre- Start To occur prior to any works taking place on the site.	N/A.	Site manager to study this Method Statement & contact the appointed arborist to agree all protection measures.
Pre-Construction Meeting After tree works completed & tree protection barriers / ground protection measures installed. Prior to any other activity, inc. demolition & soil stripping.	Site manager, appointed arborist and/or local authority tree officer. *	Tree protection fencing locations & specification checked. Additional ground protection measures checked. Further protection measures / restrictions agreed.
Excavation in Restricted Zone A This includes the removal of existing structures such as walls, steps and hard surfaces.	Site manager, appointed arborist and/or local authority tree officer.	Start of operation to be overseen. Supervision continued as appropriate. Any excavation below the existing surface and its sub-base shall be undertaken (using hand tools only) in the presence of the appointed arborist and/or local authority tree officer.

* Where agreed with the L.A. it may be acceptable to supply photographs of the fencing to avoid the necessity for a site visit.

7.2. The Appointed Arborist

7.2.1. The appointed arborist must be acceptable to the local authority. He / she must have a good understanding of the project requirements and be suitably qualified to understand the hazards associated with development near to trees.

7.2.2. The appointed arborist should work closely with the site manager and shall have the authority to insist upon work stoppage until resolution of any major issues arising which could be detrimental to the health of protected or important trees.

7.2.3. The appointed arborist must keep the local authority updated at each of the stages within the inspection schedule and will advise on any unexpected issues arising throughout the project which could impact on trees.

8. Tree Works Schedule

8.1. Tree Works Specification

8.1.1. The following table specifies the tree works which will be required prior to the commencement of construction activity:

Tree Reference	Action Required	Notes
T2, T3, T5, T6	Remove.	Stumps of trees shall be removed with a stump grinder NOT a mechanical excavator.

9. Tree Protection Barriers

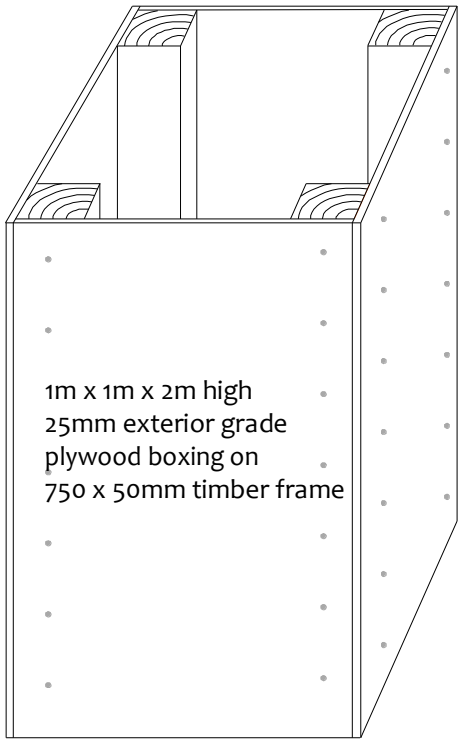
Detailed Specification

9.1.1. The purpose of tree protection barriers is to keep construction activity away from *Restricted Activity Zones* or *Construction Exclusion Zones*. They should be appropriate to the nature and proximity of activity within the site. The barriers should be erected prior to the commencement of all activity including demolition, soil stripping and delivery of materials and demolition (except where existing structures require demolition to enable the barriers to be installed). Barrier systems are specified below and should be installed according to the legend on the Tree Protection Plan.

9.2. Stem Protection – Timber Boxing

9.2.1. Where indicated by a turquoise square on the Tree Protection Plan (around T4), it shall be necessary to install robust plywood boxing to protect the tree stem, The plywood boxing specification is indicated in the diagram opposite. It shall be affixed in place without securing it to any part of the tree. Instead, it shall be secured to the ground or to adjacent structures. It shall be made firm enough to withstand occasional knocks from construction vehicles.

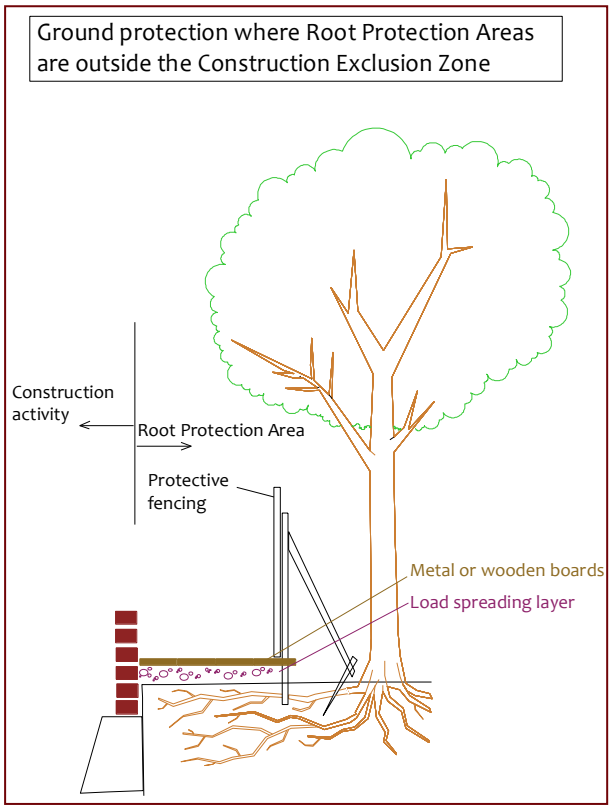
Tree Protection Plywood Box



10. Ground Protection Measures

Detailed Specification

10.1.1. Where indicated on the Tree Protection Plan (Restricted Activity Zone A), ground protection measures shall need to be installed over any soft landscaping. The purpose of the ground protection is to prevent soil compaction and contamination where it is not practicable to fence off Root Protection Areas because access is required.



10.1.2. Where vehicles or machinery are required to operate within the Restricted Zone, a geotextile fabric shall be installed followed by a compression resistant layer such as 150mm of compressible material (e.g. woodchip) or a 3D cellular confinement system in-filled with 7 – 40mm angular gravel (e.g. *Cellweb*^{TM}). Either system shall act to spread the load of any vehicles passing through the restricted zone. Above this load spreading layer, 25mm wooden boards or 12mm road plates shall be secured. Plant machinery shall be limited to 2 tonnes.

10.1.3. If only pedestrian access is required, then 25mm wooden boards, e.g. scaffold boards firmly affixed together and laid directly onto the ground shall suffice. If the ground is uneven, then it shall first be made even using sand or soil to ensure the boards distribute loads over a large area of ground. Boards shall be appropriately weighted or pinned to prevent movement. Alternatively scaffold boards may be supported above ground on a scaffold framework

10.1.4. **Where existing hard surfacing is to be retained throughout the entire project it shall not be necessary to install additional ground protection measures. However the hard surfacing must be firm enough to spread the load of any traffic passing overhead. Paving slabs shall need to be reinforced with scaffold boards or similar if vehicles or machinery are to be used in this area.**

10.1.5. The ground protection measures shall be installed and approved before commencement of demolition and construction activity and before the arrival of plant machinery or materials. They shall remain in place until all heavy construction activity is complete or until they are due to be replaced with a new hard surface.

11. New Surfaces

Detailed Specification

11.1. Resurfacing an Existing Hard Surface

11.1.1. Where it is proposed to replace an existing hard surface over Root Protection Areas (Restricted Zone A) the following restrictions shall apply:

- The existing hard surfacing shall remain in place throughout the entire construction project or until it is due to be replaced with a new surface. If the hard surfacing is removed for any reason it shall immediately be replaced by ground protection measures as specified in Section 10 until a permanent hard surface is installed. No vehicle shall pass over this zone unless a permanent hard surface or ground protection is in place.
- No excavation in excess of the existing sub-base shall occur. The existing sub-base may be retained undisturbed and incorporated into the new structure.
- Hand operated tools shall be used to lift existing surface. Mechanical excavators may be used so long as they operate from outside Root Protection Areas and are carefully marshalled by the appointed arborist or local authority tree officer.
- Any exposed roots in excess of 25mm are to be retained. Before the new surface is installed, 25mm of soil (or river sand) and a geotextile membrane shall be laid over the root. Until such times, the root shall be adequately protected from pedestrian damage using timber and sand.
- A 3 dimensional cellular confinement system may be incorporated into the sub-base and is encouraged. However, this is not considered compulsory since the resurfacing operation shall not cause a deterioration of rooting conditions beneath the existing driveway.
- No salt or lime based products are to be incorporated within the sub-base.

11.1.2. Where the existing surface is porous, it shall be replaced with a new surface which is equally as porous. Where the existing surface is impermeable (e.g. concrete or asphalt), replacement with a porous surface is encouraged but not compulsory.

12. Photographs

Refer to the Tree Constraints Plan for photo locations

Photo 1.

Photo 2.

Photo 3.

Photo 4.

Photo 5.

Photo 6.

Photo 7.

13. Signature

This report represents a true and factual account of the trees and potential impact of development along with proposed protection measures at

South Hampstead Synagogue
Eton Villas
London
NW3 4SG

Signed

.....

Ivan Button N.C.H. (Arb), FDSc (Arb), BSc (Hons), P.G.C.E., M. Arbor. A.

on behalf of

Crown Consultants Ltd

Dated

25th November 2013

CROWN Consultants
Tree consultants throughout England and Wales

Appendix 1: BS 5837: 2012 – Guidance Notes

This Standard prescribes the principles to be applied to achieve a satisfactory juxtaposition of trees and structures. It sets out to assist those concerned with trees in relation to design, demolition and construction to form balanced judgements.

It acknowledges the positive contribution trees may offer to a site, as well as the negative aspects of retaining inappropriate trees. It addresses the negative impacts that construction activity may have upon trees and offers mitigation strategies to minimise these impacts.

The Standard suggests a three stage approach to ensure best practice is followed when developing close to trees:

A1.1 Stage 1: Survey of Existing Trees

This identifies the existing trees on and adjacent to the site. Data is recorded for each tree and is presented in a Tree Data Schedule. Each tree is allocated a ***Retention Category*** according to its size, amenity value, condition and safe useful life expectancy. The categories are allocated independently of development proposals. Our interpretation of the Retention Categories is explained below:

A1.1.1 Retention Categories

A Category: Trees of high quality and amenity value. Usually, mature trees with a significant life expectancy which would enhance any development. Retention of these trees is strongly encouraged.

B Category: Trees of moderate quality and amenity value. Usually these are maturing trees or younger trees with exceptional form. Retention of these trees is desirable though the removal of occasional specimens may be acceptable.

C Category: Trees of low quality or small specimens with a relatively low amenity value. These trees are not considered to be a material planning constraint and their removal will generally be seen as acceptable in order to facilitate development.

U Category: Trees of such low quality that their removal is recommended regardless of development proposals.

A1.1.2 Occasionally trees are borderline and do not fall neatly into one of the categories A, B or C. In such cases we apply a superscript (**+/-**) such that:

C^{+} Indicates borderline C/B, though Category C is deemed to be most appropriate.

B^{-} Indicates borderline C/B, though Category B is deemed to be most appropriate.

A1.1.3 The British Standard suggests that each of the A, B and C categories may be further subdivided (A1, A2, A3, B1, B2, B3 etc) such that subcategory 1 denotes mainly arboricultural values, subcategory 2 denotes mainly landscape values and subcategory 3 denotes mainly cultural values (including conservation). Multiple subcategories may be used.

Our experience suggests that these subdivisions lack clarity and can be confusing. Within this report subcategories are **not** denoted. Where appropriate, the use of phrases such as *'Part of a formal group'*, or *'Has a high ecological value'*, or *'Offers good screening to the site'* are incorporated into the observation section of the Tree Data Schedule. We believe this conveys all relevant landscape and cultural information without any confusion.

A1.1.4 **Tree Constraints Plan (TCP).** This indicates the position, crown spread, Retention Category and Root Protection Area of each tree. It is used to inform where development may proceed without causing damage to trees.

A1.1.5 **Root Protection Area (RPA).** This is the area around each tree likely to contain the majority of roots. It should ideally remain undisturbed to avoid a detrimental impact on tree health. It is calculated according to the formula "radius of RPA" = "12 x stem diameter". This shape can then be modified to take into account site factors which influence rooting activity, e.g. underground structures. Where development works are proposed within the RPA they should be undertaken in a sympathetic manner to minimise root disturbance.

A1.1.5 **Shade Constraints.** BS 5837 suggests that shade constraints should be indicated on the TCP. This is denoted as a circle-segment drawn northwest to due east with a radius equal to the height of the tree. This does not represent the actual shade pattern which varies through the seasons. Rather, it indicates the area most shaded by the tree throughout the course of the year. Ideally habitable room windows should be located outside of these shade constraints.

A1.2 Stage 2: Arboricultural Impact Assessment

After the initial survey and the production of the Tree Constraints Plan, arborists and designers are encouraged to work together to establish a design proposal with minimal impact on the high quality trees. An assessment should be made of all possible impacts including the impact that the trees may have upon the proposal. The arborist may recommend mitigation strategies to minimise these impacts and help achieve a more harmonious juxtaposition between buildings and trees.

A1.3 Stage 3: Arboricultural Method Statement

This type of report specifies the measures necessary to protect trees against damage from construction activity. The Method Statement should be written in a manner that it may be conditioned and enforced by the local authority upon granting of planning permission. The site manager should be familiar with all aspects of the Method Statement and should ensure that all persons working on the site are aware of those aspects which appertain to their work. This includes service installation engineers and operators of plant machinery.

Appendix 2: Explanation of Tree Data & Glossary

This section explains the terms used in the **Tree Data Schedule** within Section 3.

A4.1 General Observations

A4.1.1 Numbering System: Each item of vegetation has its own unique number prefixed by a letter such that T1=Tree 1, G2=Group 2, H3=Hedge 3 and W4=Woodland 4, S5=Shrub 5.

A4.1.2 Age Categories:

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

A4.1.3 Species: Common names and Latin names are given.

A4.1.4 Height: Measured from ground level to the top of the crown.

A4.1.5 Stem Diameter: Taken at 1.5m above ground level where possible. On multi-stemmed trees this measurement may be taken at ground level, though usually an indication of the number of stems and average diameter is given, e.g. 3 x 30cm.

A4.1.6 Crown Height: Measured from ground level to the height at which the main crown begins. 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.

A4.1.7 Tree Diagram: This scaled drawing is computer generated based on measurements taken for stem diameter, crown height and spread, and overall height. It is designed to help the reader rapidly assess the data. It is not an accurate representation of the form of the tree.

A4.1.8 Crown Spread: Measured N, E, S & W, taken from the centre of the stem and usually rounded up to the nearest metre.

A4.1.9 Observations: If a tree's position is considered to be relevant it will be commented upon (e.g. overhanging a children's play area). Tree form and pruning history are also recorded along with an account of any significant defects. Defects and descriptive terms are dealt with in more detail at the end of this section.

A4.1.10 Recommendations: Usually based on any defects observed and intended to ensure that the tree is in an acceptable condition.

A4.1.11 Priority Scale: Depending upon the threat posed by the tree, and the likelihood of failure, recommendations should be carried out according to the following priority scale:

Urgent	To be carried out as soon as possible.
Very High	To be carried out within 1 month.
High	To be carried out within 3 months.
Moderate	To be carried out within 1 year.
Low	To be carried out within 3 years.

A4.1.12 Inspection Frequency: An interval of 6 months, 1 year, 1.5 years or 3 years is allocated before the next inspection is due. Wherever practical, consideration should be given to seasonal changes so that deciduous trees are not always surveyed in winter when they have no leaves, or in summer when leaves may obscure branches within the upper crown.

A4.1.13 Vigour: An indication of growth rate and the tree's ability to cope with stresses:

High	Having above average vigour.
Moderate	Having average vigour.
Low	Having below average vigour.
Very Low	Tree is struggling to survive and may be dying.

A4.1.14 Physiological Condition:

Good	Healthy and with no symptoms of significant disease.
Fair	Disease present or vigour is impaired.
Poor	Significant disease present or vigour is extremely low.
Very Poor	Tree is dying.

A4.1.15 Structural Condition:

Good	Having no significant structural defects.
Fair	Some defects observed though no high priority works are required.
Poor	Significant defects found. Tree requires monitoring or remedial works.
Very Poor	Major defects which will usually require significant remedial works or tree removal.

A4.1.16 Amenity Value:

Very High	Exceptional specimen, observable by a large number of people.
High	Attractive specimen, observable by a significant number of people.
Moderate	One of the above factors is not applicable.
Low	Unattractive specimen or largely hidden from view.

A4.1.17 Life Expectancy: The estimated number of years before the tree may require removal. Classified as (<10), (10 – 20), (20 – 40), or (40+).

A4.1.18 Retention Category: These are explained in detail in Appendix 1.

A4.2 Evaluation of Defects

A4.2.1 Cavities, wounds, deadwood etc are all evaluated as follows:

Major	Such that structural integrity is, or will become, compromised and the tree is, or will inevitably become, hazardous.
Significant	A defect that may over time become a major defect, though not necessarily so. This will depend on the vigour of the tree and its ability to deal with decay etc.
Minor	A defect that is not likely to compromise the tree's structural integrity.

General Glossary

Adaptive growth	In tree biomechanics, the process whereby wood formation is influenced both in quantity and quality by the action of gravitational forces and mechanical stresses on the cambial zone.
Aerobic	Conditions in which oxygen is freely available, or to biomechanical processes that depend on the presence of oxygen.
Anaerobic	A condition marked by the absence of oxygen; Generally such areas are unsuitable for normal life and growth of plant tissues. These sites tend to be populated by bacteria capable of surviving low oxygen conditions often associated with Slime Flux.
Arboriculture	The culture and management of trees as groups and individuals primarily for amenity and other non-forestry purposes.
Arborist	A person possessing the technical competence through experience and related training to provide management of trees or other woody plants in a landscape setting. Generally involved with the development or management of trees for visual amenity or land management rather than the growth of trees for product or profit.
Barrier zone	A layer within an annual increment of wood which contains abnormal xylem cells, laid down by the cambium in response to wounding or other trauma.
Body language	In trees, the outward display of growth responses and or deformation in response to mechanical stress.
Bole	Or Trunk, the main stem of a tree below its first major branch.
Bracket	A type of fruiting body produced by various fungal species, plate like to hoof like in shape and often a one sided attachment to the wood or bark.
Branch bark ridge	A ridged area located at the union of a branch to a trunk or stem.
Branch Collar	Trunk tissue that forms around the base of a branch between the main stem and the branch, or between a main branch and a lateral branch. As a branch decreases in vigour or begins to die, the collar usually becomes more pronounced and completely encircles the branch.
Brown Rot	Form of decay where cellulose is degraded, while lignin is only modified.
Buttress Root	Roots that emerge from the base of the tree stem, normally large and well developed that rapidly reduce in diameter to create the Root Plate this offers structural support for the tree. Buttress roots divide rapidly forming the connection between the stem and the transport roots.
Cabling Bracing	Installing cables within the crown of a tree to prevent collapse.
Callus	Undifferentiated cells often formed at the edges of recent injuries. This tissue quickly becomes differentiated, forming cells of the type characteristic of that position on the tree (e.g. forming wood, bark, roots, etc.) see wound response tissue.
Cambium	A thin layer of actively growing and dividing cells, located between the xylem (sapwood) and bark of a plant; the part responsible for radial growth of a tree stem or branch.
Canopy	The topmost layer of twigs and foliage in a woodland, tree or group of trees.
Canker	A localised area of dead bark and cambium on a stem or branch, caused by fungal or bacterial organisms, characterised by woundwood development on the periphery. This may be annual or perennial.
Cavity	An open and exposed area of wood, where the bark is missing and internal wood has been decayed and dissolved.
Chlorotic	Also Chlorosis. A condition of the plant marked by yellowing of normally green foliage, often indicating nutrient deficiency or plant dysfunction.
Clinometer	Devices that measures vertical angles, and provides direct height measurements of objects by triangulation.
Co-dominant stems/trunk	Are forked branches or trunks of nearly the same size in diameter and lacking a normal branch union.
Compacted soils	Soils in which the air-space (oxygen space) has been reduced or eliminated, reducing water infiltration and percolation, reducing root presence and inhibiting new root development.
Compartmentalisation	The physiological process that creates the chemical and mechanical boundaries that act to limit the spread of disease and decay organisms.
Compression Failure	Localized buckling of fibres and other longitudinal elements produced by compression of wood along the grain; compression failures sometimes develop in standing trees.
Compression Strength	The ability of a material or structure to resist failure when subjected to compressive loading; measurable in trees using special drilling devices
Compression Wood	Abnormal wood formed on the lower side of branches and curved stems, with physical properties different from normal wood.
Conservation Area	In Great Britain, designated areas of architectural or historical interest, in which there are special procedures for planning applications. Additionally tree works cannot generally be undertaken without prior notification (Currently 6 weeks) to the relevant local planning authority. See also Tree Preservation Orders.
Core Sample	A sample of wood extracted from a trunk or branch, using an increment borer tool. The resulting core can be analysed for characteristics of growth, wood strength, structure, decay, and for species identification.
Crotch	The union of two or more branches; the auxiliary zone between branches.
Crown	The upper canopy of a tree, including upper trunk, scaffold branches, secondary branches, stems and leaves.
Crown lifting / raising	Crown Lift The removal of the lowest branches, usually to a given height. It allows more residual light and greater clearance underneath for vehicles etc.
Crown reduction	The reduction of a tree's height or spread while preserving its natural shape.
Crown thinning	The removal of some of the density of a tree's crown, usually 5-25% allowing more light through its canopy and reducing wind resistance.
Deadwood (noun)	Deadwood is often present within the crown or on the stems of trees. It may be an indication of ill health, however, it may also indicate natural growth processes. If a target is present beneath the tree, deadwood may fall and cause injury or damage and should be removed, otherwise deadwood can remain intact for conservation purposes (insects, fungi, birds etc.).
Deadwood (verb)	The removal of dead branches from a tree's canopy, usually of a specified size (in diameter).
Decay	Progressive deterioration of organic tissues, usually caused by fungal or bacterial organisms, resulting in loss of cell structure, strength, and function. In wood, the loss of structural strength.
Decay Detection	The assessment of decay within a tree has been traditionally difficult, but recent advances have made it possible to achieve accurate representations of the internal section of a tree in both 2D and 3D, removing doubt over the condition of the tree and allowing accurate management decisions.
Decurrent	In trees a, system of branching in which the crown is borne on a number of major widely spreading limbs of similar size. In fungi relates to toadstools whose gills run down the stem and leaves and other plant organs, which extend down the stem.
Defect	In relation to tree hazards, any feature of a tree which detracts from the uniform distribution of mechanical stress, or which makes the tree mechanically unsuited to its environment.

Defoliation	The losing of plants foliage.
Dieback	Progressive death of buds, twigs and branch tissues, on individual limbs resulting in Deadwood, or throughout the canopy, extreme cases can result in Stag Heading.
Dripline	A projected line on the ground that corresponds to the spread of branches in the canopy; the farthest spread of branches.
Epicormic shoots	Fast growing, weakly attached shoots/branches that often grow as a response to stress factors upon a tree or branch removal.
Excurrent	In trees, a system of branching that a single leader remains dominant, through the control of lateral branches.
Failure	In connection with tree hazards, a partial or total fracture within the wood tissue or loss of cohesion between roots and soil. (In total failure affected parts will snap or tear away completely, Partial failure there is a crack or deformation, which results in an altered distribution of mechanical stress.
Feeder Roots	Fine fibrous Water and nutrient absorbing roots located in the outer root system.
Flush-Cut	In trees and shrubs, a pruning cut close to the parent stem, which removes the branch bark ridge.
Foliage	The live leaves or needles of the tree; the plant part primarily responsible for photosynthesis.
Formative pruning	The trimming of a tree to remove weaknesses and irregularities which may lead to problems. The formative pruning operation is aimed at reducing the potential for future weaknesses or problems within the tree's crown.
Gall	An abnormal, disorganized growth of plant tissues, caused by parasitic or infectious organisms such as insects, fungi, bacteria, or viruses.
Girdling	In woody plants, any form of damage that destroys the bark and / or the Cambium all the way around the stem, branch or root, normally resulting in death of the damaged section.
Girdling Root	In woody plants, a root that grows across the buttress, or across other roots, eventually causing constriction of the radial growth.
Growth Increment	The incremental growth added as new annual ring develops each season over existing wood. This is seen as (growth) rings in cross-sections of wood.
Hazard beam	An upwardly curved branch in which strong internal stresses may occur without the compensatory formation of extra wood (longitudinal splitting may occur in some cases).
Heartwood	Inner non functioning tissues that provide structural support to trunk.
Heave	In relation to shrinkable clay soils, expansion due to rewetting of a volume of soil previously subjected to the removal or water by plant / trees following felling or root severance. Also in relation to root growth, the lifting of pavements and other structures by radial expansion. Also in relation to tree stability, the lifting of one side of a wind rocked root plate.
Herbicide	A chemical compound that causes the death of a plant.
Included Bark	Bark that becomes embedded in a crotch between branch and trunk or between co-dominant stems, usually found in narrow or tight crotches, and causes a weak structure.
Increment Borer	A tool that cuts and extracts a narrow cylinder of wood from a tree for analysis of the wood tissue and growth increments.
Leader	The primary terminal shoot or trunk of a tree.
Limb	A large lateral branch growing from the main trunk or from another larger branch.
Lion Tailing	Often the result of poor pruning practices; the main leader or branches are largely devoid of side branches, growth is restricted to the end of branches and is likely to suffer damage through end loading.
Lopping	In trees, a general term that related to the removal of branches from a tree.
Monitoring	Due to the relative life span of trees in relation to our own, long-term monitoring provides a valuable insight to the health of trees, identifying decline and or stabilisation and or improvement.
Mulch	A material laid over the root system of a tree to help conserve moisture within the soil. Additionally it may help control the development of weeds close to the tree.
Mycelium	A mass of growing filaments (hyphae) formed by fungi.
Mycorrhizae	The symbiotic relationship between roots and certain beneficial fungi. Mycorrhizae are the combined root / fungal growth.
Natural Pruning	The shedding of a branch or twig that has died back naturally and has become decayed at or near its base.
Necrosis	The failure and subsequent death of a branch, leader or tree.
Negligence	A failure to take reasonable action to deal with a hazard to prevent damage to property or person.
Nutrient	Substances that are absorbed by living organisms for the maintenance of internal processes.
Occluding tissue	The general tern of wood, cambium and bark that develop around the site of a wound on a woody plant
Pathogen	A microorganism that causes diseases within another organism.
Phloem	The principle conductive tissue that the products of Photosynthesis are transported around the plant
Photosynthesis	The process were light energy is used to create energy (Carbohydrate) for use within the plant.
Pollard	A term for a pollarded tree.
Pollard head	The swollen section of branch / stem that forms behind the pollarding cut.
Pollarding	The complete or partial removal of the crown of a young tree so as to encourage the development of numerous branches either for amenity or historically as fodder, repeated management is required cyclically to maintain the feature
Prune or Pruning	Selective removal of woody plant parts of any size, using saws, Loppers, Secateurs, or other pruning tools.
Reaction Wood	Wood with distinctive anatomical characteristics, formed in parts of leaning or crooked stems and in branches to provide additional strength / support. In hardwoods, tension wood usually forms. In conifers, compression wood is usually found.
Reaction Zone	A zone normally darker than surrounding wood that denoted the boundary often a defensive one between functional sapwood and dysfunctional or decaying wood.
Re-grading	The raising or lowering of a soil profile from its original grade.
Rejuvenation pruning	Where historically or environmentally important trees are to be retained, their life spans can be significantly extended through the adoption of particular pruning regimes.
Rejuvenation root treatment	Management of the root zone can have a significant positive effect upon the health of trees. Physical, mechanical and biological approaches are available and can be prescribed in accordance within the constraints of individual sites.
Remedial pruning	The removal of old stubs, deadwood, epicormic growth, rubbing or crossing branches and other unwanted items from the tree's crown.
Resistograph	Invasive decay detection technique whereby the resistance offered by the timber to a spinning probe is measured and plotted.
Rib	In tree body language, a long narrow, axial protuberance which often over lays a crack.
Ring Barking	Artificial Girdling of the stem, to result in the death of a tree. May be used in habitat creation were the retention of dead standing trees is required.
Rod Bracing / Bolting	Traditionally, this has relied upon the Installation of steel rods or bolts through the stems or limbs, to reduce twisting or splitting of the wood. The installation of such features does require legal interpretation.

Root Barriers	Both Buildings and services can benefit from the installation of root barriers to protect a soil volume from the ingress of roots.
Root Collar	The basal area of the tree; transition zone from trunk to root. Also sometimes called trunk flare.
Root Plate	The primary support area for the tree; an area of the root system close to the base that structurally anchors the tree to the soil.
Root Rot	Either a general term for decay within the wood of the lower stem / buttress roots, or a disease in which the fine roots are killed.
Root System	The portion of the tree containing the root organs, including buttress roots, transport roots, and fine absorbing roots; all underground parts of the tree.
Root Zone	The area and volume of soil around the tree in which roots are expected. May extend to three or more times the branch spread of the tree, or several times the height of the tree.
Sail Area	That area or the tree subjected to wind load.
Sanitation	In plant disease control, the removal of material that could a source of infection by a pathogen. Removal of diseased plant parts, such as fallen leaves and twigs, and pruning of dead and diseased branches. Diseased parts should be burned or buried under soil or active compost.
Sapwood	Xylem wood tissue, usually light in colour, representing the outer growth rings of the wood. Usually living, reactive wood tissue, in a healthy tree. See heartwood
Scaffold limbs / scaffold Branches	The branches that from the main network framework of the crown of a tree.
Senescent	A decline in growth and vigour due to age or stress factors.
Shrub	A woody plat that branches at or close to the ground level and so does not have a single stem.
Slime Flux	Relating to a toxic condition from the spreading of bacteria or their products from a source of infection; characterized by malodorous gases, or salt deposits upon the bark. If these products enter the sap stream, localised vessel necrosis can result, usually associated with anaerobic conditions.
Soft Rot	A kind of wood decay, were a fungi degrades cellulose within the cell wall, without causing overall degradation.
Soil Compaction	The compression of soil, causing a reduction of pore space and an increase in the density of the soil. Air is squeezed out and nutrients become locked. Tree roots cannot grow in compacted soil.
Soil Profile	The characteristics of a soil as regards to relative depth; the changes in soil texture and composition that occur with depth.
Soil Texture	The classification of the constituent particles of soil; includes sand, silt and clay particles. Directly related to soil porosity, permeability, and aeration.
Sonic Decay Detection	Non invasive method whereby sound waves are passed through the tree and the speed is measured. Slow speeds indicate decay and a tomography picture representing the inner stem is produced.
Stag Heading	In a tree, a state of dieback were dead branches protrude beyond the current living crown.
Stress	In plant physiology, conditions were one or more physiological functions Are not working within normal parameters.
Stump Grinding	The removal of a tree stump using a specialist grinding machine.
Subsidence	In relation to vegetation, the removal of water by plant growth resulting in localised shrinkage in the soil volume.
Sucker	Same as sprout.
Suppressed	Trees which are dominated by surrounding vegetation and whose crown development is restricted from above.
Systemic	Affecting the whole plant or organism. A systemic compound is carried throughout the entire plant to all parts through the vascular system.
Target	Any person or object within reach of a falling tree or part of a tree that may be injured or damaged.
Target Pruning	The pruning of a branch were the wound affects only branch material, often result in a target shaped wound.
Tension Wood	Reaction wood typically formed on the upper side of limbs or curved stems; characterized by lack of cell wall lignifications (higher ratios of cellulose to lignin).
Tight Union / Tight Crotch	Also, narrow crotch. A crotch with a narrow angle between branches, often having included bark.
Tomography	The comparison of sound or stress waves through the tree allows the creation of a 2D or 3D representation of the internal structure of a stem or branch section and highlights areas of damage. Virtually non-injurious.
Topography	The configuration of surface features, including the vertical and horizontal relationships of the ground and other features.
Topping	Cutting large limbs back severely, without regard to form or habit of the tree. Cuts are usually made between lateral branch nodes. This practice is extremely injurious to trees, and promotes decay and structural weakness within the crown.
Tree	A woody plant that typically has a single stem, at maturity has a height of a least 4 metres and a stem diameter at breast height of at least 75mm.
Tree Preservation Order	In Great Britain, an order made by the local planning authority, were consent must be gained before undertaking all but exempt works to a tree.
Trunk Flare	The basal area of the trunk that flares or widens, and merges with the main roots. See root collar
Veteran Tree	Veteran trees are often found in large parks or estates and commonly affected by extensive decay or have been subject to extensive works. These trees are retained for historical importance and often pose greater risk than normal, which is generally justified. They need careful management and often propping or bracing to support them, some require fencing to limit access.
Vigour	Active, healthy growth of plants: ability to respond to stress factors.
Visual Tree Assessment (VTA)	An assessment of the mechanical condition of trees based upon their 'body language'. Trees are dynamic and respond to faults / decay / environmental factors in various ways, these responses can be indicative of structural integrity.
Wetwood	An infection caused by bacteria living inside the plant tissues. The bacteria ferment the plant fluids, resulting in death of nearby cells, and often causing exudations of fluid from the bark, often referred to as a Slime Flux.
White Rot	A kind if wood decay were a fungi attacks the lignin within the wood matrix
Wind loading	Forces placed upon tree canopy, branches, trunk and roots of a tree under windy conditions.
Wind Throw	The failure of a tree due to wind loading.
Witches Broom	A deformed or unusual growth of twigs from adventitious buds, caused by insects, disease, or dieback of twigs and buds.
Wood	Secondary Xylem; the main structural support and water conducting tissue of trees and shrubs.
Wound Response Tissue	Also Occluding Tissue, Wound Wood or Callus. Differentiated wood tissue that grows around the margins of a wound or injury.
Wound Wood	Wood with atypical features, formed in the vicinity of a wound and a term to describe the occluding tissues around a wound
Xylem	Plant tissues with special function of translocation of water and dissolved nutrients.

Appendix 3: Survey Methodology

A2.1 Ground level visual surveys are carried out using the *Visual Tree Assessment* technique described by Mattheck and Broeler (1994) and endorsed by the Arboricultural Association (LANTRA Professional Tree Inspection course, 2007).

A2.2 Structural condition is assessed by inspecting the stem and scaffold branches from all angles looking for weak branch junctions or symptoms of decay. Particular attention is paid to the stem-base. Cavities are explored using a metal probe in order to assess the extent of any decay. If this is not possible further inspection is recommended in the form of a climbed inspection or using specialist decay detection equipment.

A2.3 The physiological condition is assessed by inspecting the stem, branches and foliage for symptoms of disease. The overall vigour of the tree is also taken into account.

A2.4 Where significant defects are observed, recommendations are made according to a scale of priority in order to reduce the likelihood of structural failure. The position of the tree and its potential targets are taken into account.

A2.5 Measurements are obtained using a diameter tape, clinometer, distometer and loggers tape. Where this is not practical measurements are estimated.

A2.6 Some trees are surveyed as groups, though this is usually avoided close to areas likely to be developed.

A2.7 Finally, a *Retention Category* is allocated as described in Appendix 1.1.1.

Appendix 4: Author's Qualifications

Qualifications & Experience of Ivan Button N.C.H. (Arb), FDSc (Arb), BSc (Hons), P.G.C.E., M. Arbor. A.

Construction

Between 1983 and 1995 Ivan worked primarily within the construction industry and received training in a broad range of practical building skills and general construction principles. During this time he obtained a BSc (Hons) at Leeds University followed by a P.G.C.E at The University of Wales.

Arboriculture

He obtained a NCH (Arboriculture) at the University of Lincoln and became a member of the Arboricultural Association. He then worked for an Arboricultural Consultancy for one year before establishing a tree surgery and landscaping business in 1998. In 2005 Ivan commenced full time employment with a leading Arboricultural Association approved consultancy and soon adopted a senior role responsible for five consultants.

He obtained a FDSc in arboriculture at the University of Lancashire, which he passed with distinction and is now a Director and Principal Consultant of Crown Consultants Ltd. He is accredited as a LANTRA *Professional Tree Inspector*. A qualification produced in association with the Arboricultural Association and generally recognised as appropriate for all levels of tree inspection.

He is a member of the Consulting Arborist Society and is listed within their areas of professional expertise for QTRA and as an expert witness.

Ivan is a professional member of the Arboricultural Association and the International Society of Arboriculture.

He is a licensed Quantified Tree Risk Assessment user.

Ivan has undertaken professional expert witness training and has been registered as a Sweet and Maxwell Checked Expert Witness since 2008.

Throughout 2009 acted as the principal Tree Officer for Barnsley Metropolitan Borough Council.

Ivan has produced several hundred Arboricultural Reports for the purposes of Development, Safety, Management, Mortgage, Subsidence, Mitigation and Litigation.

Appendix 5: Further Information

Building Near Trees – General

National Joint Utilities Group publication # 10 (1995), *Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees. Downloadable at www.njug.demon.co.uk/pdf/NJUG%20Publication10.pdf*

NHBC Standards Chapter 4.2., *Trees and Buildings.*

Horticulture LINK project 212. (*University of Cambridge,* 2004), *Controlling Water Use of Trees to Alleviate Subsidence Risk.*

Tree Planting and aftercare

See www.trees.org.uk/leaflets.php# for downloadable leaflets on selecting a garden tree, planting, aftercare and veteran tree management.

British Standards

BS 5837: 2012. Trees in Relation to Design, Demolition and Construction – Recommendations.
Bs 3998: 2010. Recommendations for Tree Work.
BS 3936: 1992. Nursery Stock. Part 1: Specification for Trees and Shrubs.
BS 3936: 1992. Nursery Stock. Part 10: Specification for Groundcover Plants.
BS 4043: 1989. Transplanting Root-balled Trees.
BS 8004: 1986. Foundations.
BS 8103: 1995. Structural design of Low-Rise Buildings.
BS 8206: 1992. Lighting for Buildings.
BS 3882: 2007. Topsoil.
BS 4428: 1989. General Landscaping Operations (excluding hard surfaces).

Permission to do Works to Protected Trees / Tree Law

Forestry Commission (Edinburgh, 2003), *Tree Felling – Getting Permission*. Country Services Division - Forestry Commission. Downloadable at www.forestry.gov.uk/website/pdf.nsf/pdf/wgsfell.pdf/$FILE/wgsfell.pdf

Transport and the Regions (Department of the Environment, 2000), *Tree Preservation Orders, A Guide to the Law and Good Practice*. Downloadable at www.communities.gov.uk/publications/planningandbuilding/tposguide

C. Mynors, *The Law of Trees, Forests and Hedgerows* (Sweet and Maxwell, London, 2002)

Communities and Local Government website with numerous downloadable documents, from: http://www.communities.gov.uk/planningandbuilding/planning/treeshighhedges/

Lighting Levels

P.J. Littlefair, *B.R.E. 209: Site layout planning for daylight and sunlight A guide to good practice.* B.R.E. Bookshop, London.

British Standards Institution. Code of practice for day lighting. *British Standard* BS 8206: Part 2 (1992).

Chartered Institution of Building Services Engineers. *Applications manual: Window Design* (London, 1987).

NBA Tectonics. A study of passive solar housing estate layout. *ETSU Report* S-1126. Harwell, Energy Technology Support Unit (1988).

I.P. Duncan; D. Hawkes, Passive solar design in non-domestic buildings. *ETSU Report* S-1110. Harwell, Energy Technology.

P. J. Littlefair, Measuring Daylight, *BRE Information Paper 23/93 f3.50.* (Advises on measuring daylight under the real sky or an artificial sky, allowing for the changing nature of sky light).

High Hedges

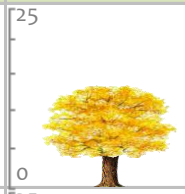
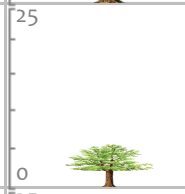
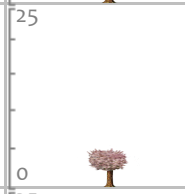
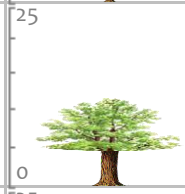
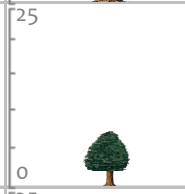
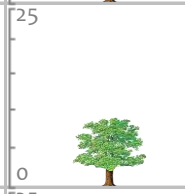
Communities and Local Government website with numerous downloadable documents, from: http://www.communities.gov.uk/planningandbuilding/planning/treeshighhedges/

Tree Specific Websites

www.crowntrees.co.uk	Crown Consultants site containing useful information
www.trees.org.uk	Arboricultural Association
www.rfs.co.uk	Royal Forestry Society of England, Wales and N. Ireland
www.treehelp.Info	The Tree Advice Trust
www.woodland-trust.org.uk	The Woodland Trust
www.treecouncil.org.uk	The Tree Council

Appendix 6: Tree Data Schedule and Site Plan(s)

The Tree Data Schedule and all plans accompanying this report follow this page. They are also provided as separate documents for ease of printing and referring between when viewing on a screen.

Reference (G = Group, H = Hedge)	Age & Species	Height (m)	Crown Ht (m)	Diameter (cm)	Crown Spread (m) N / W / E / S	Scaled Tree Diagram (m)	Notes	Recommendations (Independent of any development proposals) Priority	Inspect Freq (yrs)	Vigour / Physiological Condition / Structural Condition	Amenity Value / Life Expectancy (yrs) / Retention Category
T1	Early-Mature **False Acacia** Robinia pseudoacacia.	13	4	53	N 6 W 4.5 E 6 S 5.5		Position: Situated on third party land. Form: Multi-stemmed at 4m with a well-formed crown. History: No evidence of significant pruning. **Defects: Minor deadwood throughout.**	No action required. n/a	3	High Good Good	Moderate 40+ **B**
T2	Semi-Mature **Indian Bean Tree** Catalpa bignonioides.	4	2	18	N 4 W 4 E 4 S 1.5		Form: Multi-stemmed at ground level with a slightly unbalanced crown (shrubby). History: No evidence of significant pruning. **Defects: No significant defects.**	No action required. n/a	3	Low Fair Fair	Low 20-40 C
T3	Young **Cherry** Prunus sp.	4.5	2	13	N 4 W 2.5 E 3 S 1		Form: Twin-stemmed at ground level with a compact crown. History: No evidence of significant pruning. **Defects: No significant defects.**	No action required. n/a	3	Moderate Good Good	Low 40+ C
T4	Mature **Tree Of Heaven** Ailanthus altissima.	11	5	57	N 6 W 7 E 5.5 S 6.5		Form: Single stemmed with a slight lean and a well-formed crown. History: Occasional pruning wounds due to crown lifting (now healed). **Defects: No significant defects.**	No action required. n/a	3	High Good Good	High 40+ **A**
T5	Semi-Mature **Lawson Cypress** Chamaecyparis lawsoniana.	6	1.5	17	N 2 W 1.5 E 2 S 1		Form: Twin-stemmed at 0.5m with a narrow, upright habit. History: No evidence of significant pruning. **Defects: No significant defects.**	No action required. n/a	3	High Good Good	Low 40+ C
T6	Young **Holm Oak** Quercus ilex.	8	2	18	N 3 W 3 E 1 S 3.5		Form: Single stemmed with a slight lean and an unbalanced crown. History: No evidence of significant pruning. **Defects: No significant defects.**	No action required. n/a	3	Moderate Good Good	Low 40+ C +
G7	Mature **London Plane** Platanus x hispanica.	av 16	av 2.5	av 90	N av 5 W 6 E 6 S 12 each		Form: Situated on third party land (across the road) canopy extends almost to the site boundary. History: No evidence of significant pruning. **Defects: No significant defects.**	No action required. n/a	3	High Good Good	High 40+ **A**

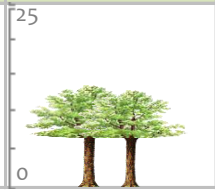
Reference (G = Group, H = Hedge)	Age & Species	Height (m)	Crown Ht (m)	Diameter (cm)	Crown Spread (m) N / W / E / S	Scaled Tree Diagram (m)	Notes	Recommendations (Independent of any development proposals)		Vigour / Physiological Condition / Structural Condition	Amenity Value / Life Expectancy (yrs) / Retention Category
								Priority	Inspect Freq (yrs)		
G8	Semi-Mature **Lime & Sycamore** Tilia & Acer.	av 13	av 7	av 30	av 5 (N) 5 (W) 6 (E) 5 (S) each		Position: Situated on third party land. Form: Goup of close growing specimens. History: No evidence of significant pruning. **Defects: No significant defects.**	No action required. n/a	3	Moderate Good Good	Moderate 40+ **B**

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

MN

Tree Constraints Plan

(Existing Layout)

Photo 6

Photo 7

Drawing No:	CCL 08962 / TCP	Rev: 1
Title:	Tree Constraints Plan (Existing Layout)	
Site:	South Hampstead Synagogue London, N3W 4SS	

0 5 10m

Scale: 1:200 Paper Size: A2

CROWN
Arboricultural Consultants
01422 316660

Tree Retention Categories
Stems & canopies shown

Category A tree	Trees of high quality with an estimated life expectancy of 40+ years. Usually large trees with significant presence or smaller trees with excellent form. Retention of these trees is highly desirable.
Category B tree	Trees of moderate quality with a life expectancy of 20+ years. Usually maturing trees, or younger trees with good form. Retention of these trees is desirable though less than Category A trees
Category C tree	Unremarkable trees of low quality and merit. Individual specimens are not considered to be a material planning consideration.
Category U tree	Trees unsuitable for retention due to their very poor condition.

Tree Constraints Plan

BS 5837 Root Protection Area (radius = 12xstem diameter)

Root Protection Area needing amendment due to site conditions, e.g. presence of exising road or building.

Root Protection Area having been amended to account for for site conditions

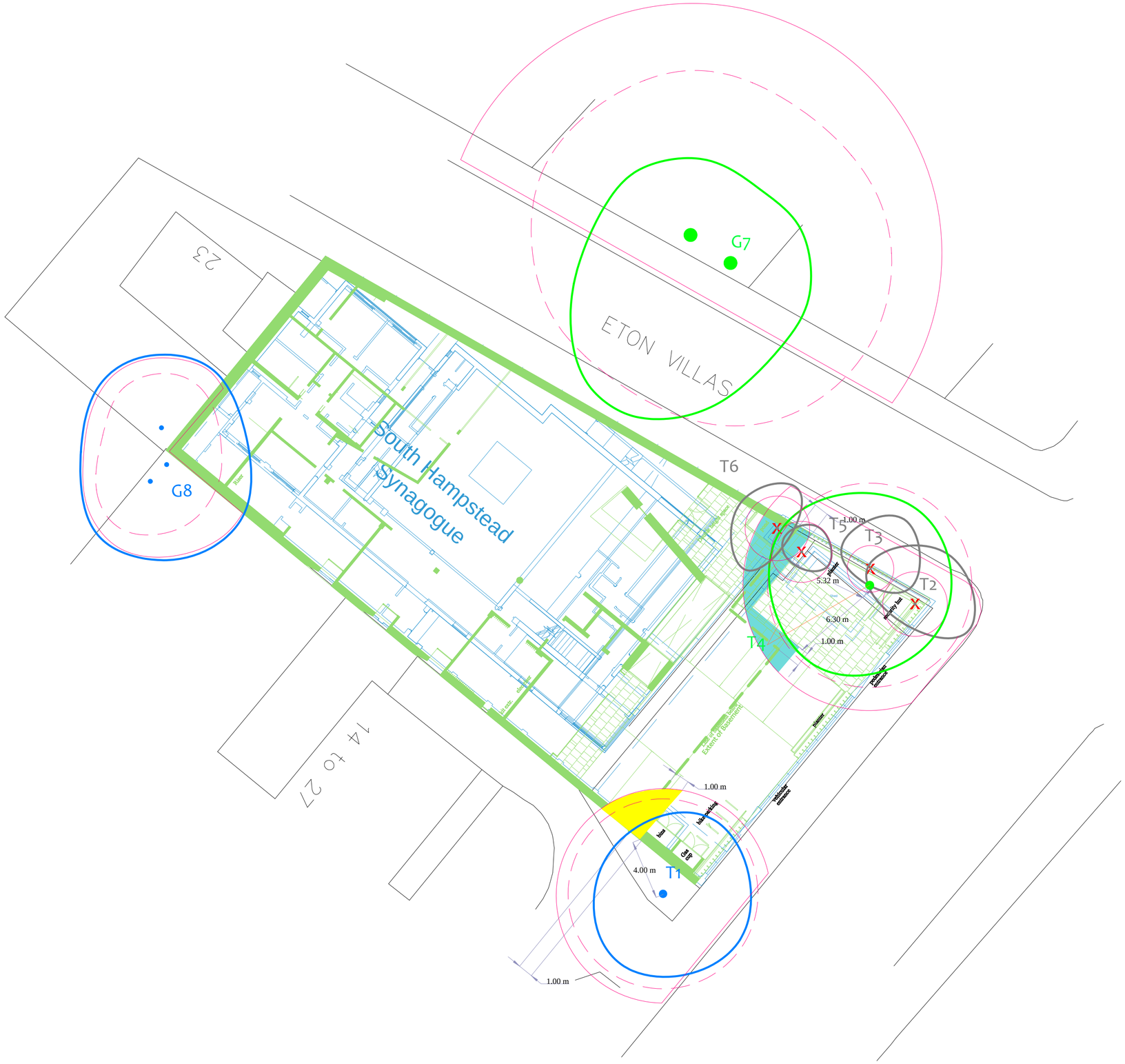
T1 = Tree No 1 G2 = Group No 2 H3 = Hedge No 3

1 Photo 1

MN = Measured North:

Canopy spreads are sometimes measured to an approximate N defined by site features. Often more accurate, especially where rows of trees are not aligned N-S or E-W.

Tree Ref.	Species	Height (m)	Root Protection Area		
			Radius (m)	m²	Square (m)
T1	False Acacia	13	6.4	127	11.3
T2	Indian Bean Tree	4	2.2	15	3.8
T3	Cherry	4.5	1.6	8	2.8
T4	Tree Of Heaven	11	6.8	147	12.1
T5	Lawson Cypress	6	2.0	13	3.6
T6	Holm Oak	8	2.2	15	3.8
G7	London Plane	16	10.8	366	19.1
G8	Lime & Sycamore	13	3.6	41	6.4

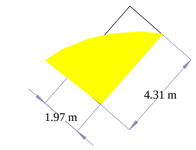


MN

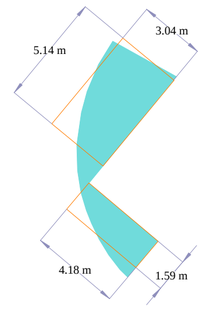
Tree Removal Plan

(Existing Layout with Proposals Overlaid)

T1	RPA Affected by Excavation		
Total RPA (sqm)	RPA affected (sqm)	RPA affected (%)	
127	8.5	6.7	



T4	RPA Affected by Excavation		
Total RPA (sqm)	RPA affected (sqm)	RPA affected (%)	
147	22.2	15.1	



Tree Ref.	Species	Height (m)	Root Protection Area		
			Radius (m)	m²	Square (m)
T1	False Acacia	13	6.4	127	11.3
T2	Indian Bean Tree	4	2.2	15	3.8
T3	Cherry	4.5	1.6	8	2.8
T4	Tree Of Heaven	11	6.8	147	12.1
T5	Lawson Cypress	6	2.0	13	3.6
T6	Holm Oak	8	2.2	15	3.8
G7	London Plane	16	10.8	366	19.1
G8	Lime & Sycamore	13	3.6	41	6.4

Drawing No:	CCL 08962 / TRP Rev: 1
Title:	Tree Removal Plan (Existing Layout with Proposals Overlaid)
Site:	South Hampstead Synagogue London, N3W 4SS
Scale: 1:200	Paper Size: A2

0 5 10m

CROWN
Arboricultural Consultants
01422 316660

Tree Retention Categories
Stems & canopies shown

Category A tree	Trees of high quality with an estimated life expectancy of 40+ years. Usually large trees with significant presence or smaller trees with excellent form. Retention of these trees is highly desirable.
Category B tree	Trees of moderate quality with a life expectancy of 20+ years. Usually maturing trees, or younger trees with good form. Retention of these trees is desirable though less than Category A trees
Category C tree	Unremarkable trees of low quality and merit. Individual specimens are not considered to be a material planning consideration.
Category U tree	Trees unsuitable for retention due to their very poor condition.

Tree Removal Plan

BS 5837 Root Protection Area (radius = 12xstem diameter)

Root Protection Area needing amendment due to site conditions, e.g. presence of exising road or building.

Root Protection Area having been amended to account for for site conditions

T1 = Tree No 1 G2 = Group No 2 H3 = Hedge No 3

X Tree to be removed to facilitate the proposal

MN = Measured North:

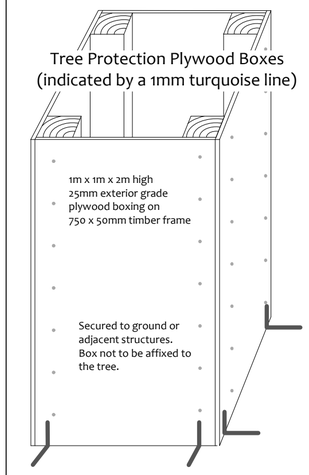
Canopy spreads are sometimes measured to an approximate N defined by site features. Often more accurate, especially where rows of trees are not aligned N-S or E-W.

Tree Protection Plan

Tree Protection Barriers:

Fixed protective barrier: The 'In-Ground System' or the 'Backstay System'. To remain in place for all construction activity		Construction Exclusion Zone Stem protected to a height of 2.5m with thick cloth & wire Tree Protection Boxing 1 x 1 x 2m high 25mm plywood	
Moveable protective barrier: The 'Backstay System'. To remain in place except when approved works are being undertaken in the Restricted Zone		Orange Barrier Mesh Fencing, Ht 1m, on steel fencing pins and wooden posts To remain in place throughout all construction activity	

Tree Protection Plywood Boxes (indicated by a 1mm turquoise line)



Construction Exclusion Zone

Within this area the following restrictions shall apply:

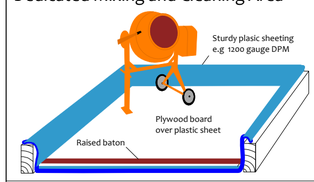
No excavation or land regrading whatsoever.
No storage of materials, rubble, soil or spoil.
No fires within the exclusion zone or within 10m of any tree canopy.
No site cabins or other temporary structures.
No discharge of polluted water, cement or chemicals of any kind.
No use of any machinery, or passage or parking of vehicles.
No tree works without council consent.

Restricted Activity Zones

Restrictions are detailed within the accompanying Method Statement

	Restricted Zone A		Restricted Zone B

Dedicated Mixing and Cleaning Area



Drawing No:	CCL 08962 / TPP Rev: 1
Title:	Tree Protection Plan (Showing only retained trees)
Site:	South Hampstead Synagogue London, N3W 4SS
Scale: 1:200	Paper Size: A2

0 5 10m

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Tree Protection Plan

BS 5837 Root Protection Area (radius = 12xstem diameter)

Root Protection Area needing amendment due to site conditions, e.g. presence of exising road or building.

Root Protection Area having been amended to account for for site conditions

T1 = Tree No 1 G2 = Group No 2 H3 = Hedge No 3

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Tree Ref.	Species	Height (m)	Root Protection Area		
			Radius (m)	m²	Square (m)
T1	False Acacia	13	6.4	127	11.3
T2	Indian Bean Tree	4	2.2	15	3.8
T3	Cherry	4.5	1.6	8	2.8
T4	Tree Of Heaven	11	6.8	147	12.1
T5	Lawson Cypress	6	2.0	13	3.6
T6	Holm Oak	8	2.2	15	3.8
G7	London Plane	16	10.8	366	19.1
G8	Lime & Sycamore	13	3.6	41	6.4