

BS 5837 Arboricultural Report

Impact Assessment & Method Statement

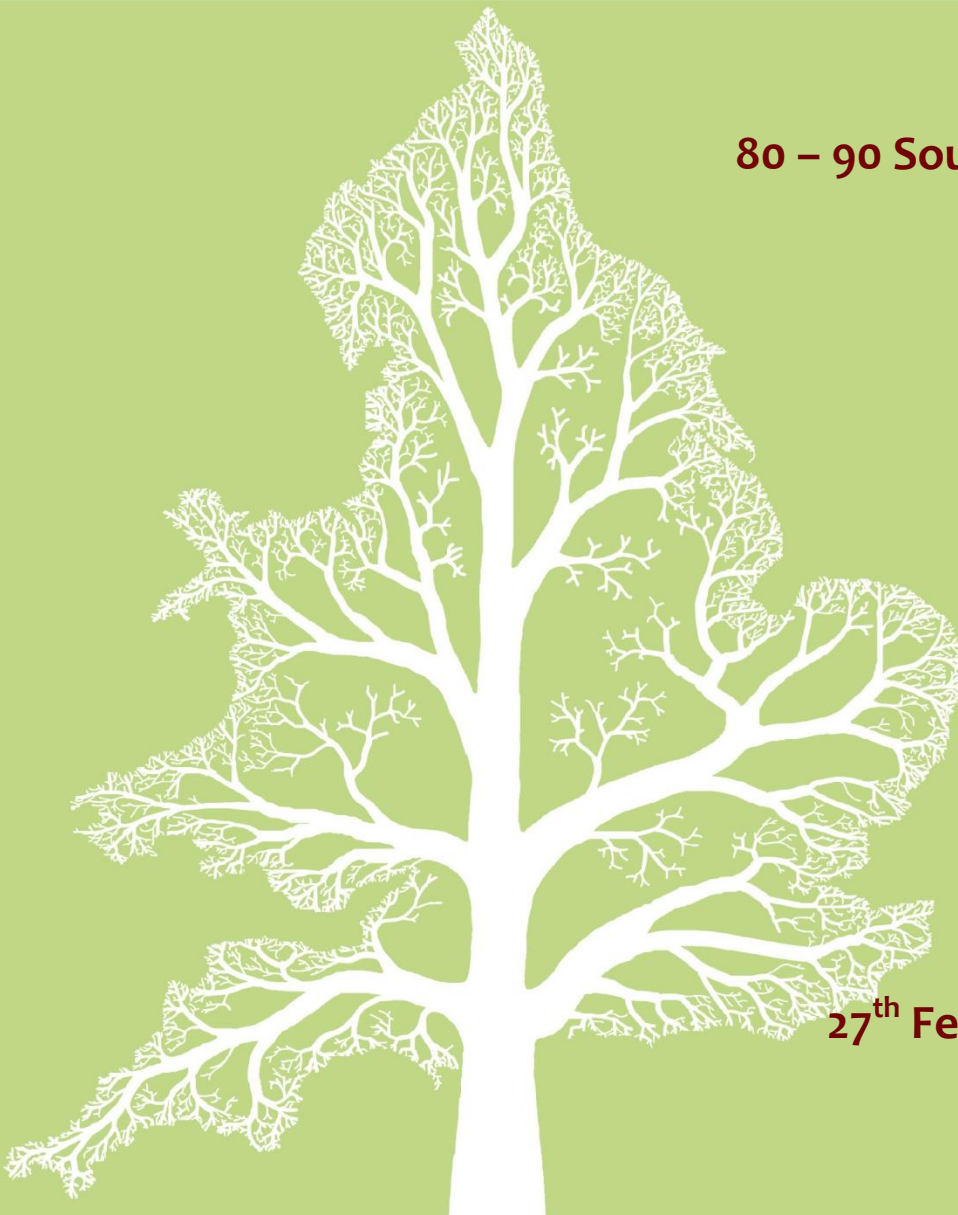


at

**80 – 90 South Hill Park
London
NW3 2SN**

Dated

27th February 2018



CROWN
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Arboricultural Report to BS 5837: 2012 for: Peter Morris

Crown Ref: 09958

Site: 80 - 90 South Hill Park, London

Author: Ivan Button

Date: 27th February 2018

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1. Introduction

1.1. Instruction

1.1.1. We are instructed by Peter Morris of 80 South Hill Park to:

- Undertake an Arboricultural Survey to the rear of 80 - 90 South Hill Park and assess all trees potentially within influencing distance of the fence to the rear of the properties.
- Plot the trees on a Tree Constraints Plan and record the data in a Tree Data Schedule.
- Provide an overview of the site and any management recommendations.
- Determine if any of the trees are growing within a conservation area or are protected by a tree preservation order.
- Assess the potential impact of the proposal to replace the fence and provide guidance as to appropriate mitigation measures.
- Produce an Arboricultural Impact Assessment for submission to the local authority.
- Produce a Tree Protection Plan and Arboricultural Method Statement specifying how the retained trees shall be protected from inadvertent damage by demolition or 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 specifies the principles to be adopted during construction and demolition that will minimise any impacts on trees. 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 (for an outline planning applications) or via planning conditions.

1.3. References

1.3.1. We have liaised with the our client throughout the writing of this report in order to attain an adequate understanding of the project to enable us to carry out an accurate assessment of the proposals and to specify suitable tree protection measures.

1.4. Survey Data and Technical Terms

1.4.1. A visual ground level inspection of all trees was undertaken in February 2018 by Ivan Button (Appendix 3 describes how the survey was undertaken). Data was gathered according to BS 5837 guidelines see Appendix (1). Additional observations about the trees form, amenity value, location or structural condition were recorded where deemed to be relevant in a planning context. However, a detailed assessment of the root plate, buttresses and all aerial parts (such as that undertaken in a safety survey) was not made. Hence, this report should not be seen as a substitute for a detailed safety survey or management report.

1.4.2. The findings of the survey are presented in The Tree Data Schedule (see Appendix 6). The Schedule includes scaled tree images based on the data gathered. Their purpose is



to indicate, at a glance, the relative dimensions of each tree. They are not images of the actual trees surveyed – though photographs of the trees may be viewed in Section [8](#).

1.5. Drawings

- 1.5.1. The trees and relevant constraints are plotted on the accompanying *Tree Constraints Plan* (see Appendix 6). Their locations and canopy spreads have been plotted according to measurements taken on site by our surveyor (see Appendix 1 for survey methodology).
- 1.5.2. The *Impact Assessment Plan* indicates the tree constraints with the proposals overlaid. Where applicable, this plan shows where works are proposed in Root Protection Areas and which trees are to be pruned or removed. This plan accompanies the Impact Assessment which is to be found in Section [4](#).
- 1.5.3. 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 [5](#).

1.6. Author

- 1.6.1. This report was compiled by Ivan Button N.C.H. (Arb), FDS Sc (Arb), BSc (Hons), P.G.C.E., M. Arbor. A on behalf of Crown Consultants. Details of the author's qualifications and experience can be found in Appendix 4.



2. Site Overview

2.1. Brief Description and Proposal Overview

- 2.1.1. Along the rear boundaries of the properties at 80 – 90 South Hill Park is a timber fence which is becoming dilapidated and in need of replacement. Beyond the fence is a pedestrian footway leading down to a lake. Beyond the path is a wooded area containing several large London planes along with occasional oaks, willows and cherries.
- 2.1.2. Within the shared garden of the properties (i.e. inside the fence) grows one large horse chestnut (T2) and several small trees and shrubs.
- 2.1.3. The Tree Constraints Plan and Tree Data Schedule (see Appendix 6) may be referred to for detailed descriptions and locations of all trees.

2.2. Survey Extent

- 2.2.1. Our survey covered the area indicated in Figure 1.



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

- 2.2.2. Photographs of the site are included in Section [8](#).



3. 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.

3.1. Preliminary Management Recommendations

- 3.1.1. The following recommendations are made in order to maintain the trees in an acceptable condition:
- 3.1.2. A fungal fruiting bracket of the *Ganoderma* species (wood decay fungi) was observed at the base of the London Plane, T1. In order to ascertain the extent of internal decay we recommend that specialist decay detection is undertaken using a Picus Tomograph. The buttress roots should also be investigated by excavation and the use of a Resi-Drill. Depending on the results of these investigations, it is likely that this tree will need remedial works such as crown reduction if it is to be retained.
- 3.1.3. The mature horse chestnut, T2, has major bark wounds and some decay to both stems between 0.5m and 2m above ground level. These wounds appear to be historic wounding due to fire damage. This twin-stemmed tree also has extensive included bark between its stems. Included bark often results in weakened attachments and is one of the most common causes of structural failure of branches and stems. If this tree is to be retained, we recommend that a cable brace is installed between the two stems at a height of approximately 10m above ground level. Bracing the stems in this manner will significantly reduce the likelihood of one of the stems failing in windy conditions.
- 3.1.4. All other trees were deemed to be in an acceptable condition.

3.2. Work Priority and Future Inspections

- 3.2.1. The table below suggests a schedule for completing the works recommended in the Tree Data Schedule based on the perceived risk:

| Work Priority | Definition | Tree Number |
|------------------|---------------------|-------------|
| Urgent | As soon as possible | None |
| Very High | Within 1 Month | None |
| High | Within 3 Months | T1, T2 |
| Moderate | Within 1 year | None |
| Low | Within 3 years | None |

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

| Inspection Frequency (years) | Tree Number |
|------------------------------|-----------------------------|
| 1 | T1, T2, T3 |
| 3 | T4, T5, T6, T7, T8, T9, T10 |

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



3.3. Tree Protection Status – Site Specific

3.3.1. On 27th February 2018, we were informed, by Hitesh of the London Borough of Camden that:

- The site is within South Hill Park Conservation Area.
- There are no tree preservation orders affecting trees the trees surveyed.

3.4. Species Present – Additional Information

3.4.1. 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 | Typical Height at Maturity (m) | Typical Canopy Spread at Maturity (m) | General Notes |
|----------------|--------------------------------|---------------------------------------|--|
| Ash | 25 | 18 | Large deciduous tree with a straight bole and a high open domed crown. Native to Britain and commonly found in woodlands and adjacent roadsides. Not suitable for small gardens. Easily identified by its oppositely arranged pinnate leaves and black buds. Branches are relatively brittle resulting in a fairly high incidence of small branch failure in windy conditions. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Fraxinus+excelsior for more info. |
| Cherry | 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 | 20 | 12 | Deciduous fast growing tree native to the US. 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 flowers which appear in June. Seed pods ripen in winter. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Robinia+pseudoacacia for more info. |
| Goat Willow | 10 | 8 | Also called Pussy Willow or Great/Common Sallow. Native and abundant in Britain except on the lightest soils. One of the first pioneer species to colonise an abandoned site due to its light far-blown seeds. Traditionally coppiced and used for basket making. rarely planted as an ornamental due to its untidy habit. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Salix+caprea for more info. |
| Horse Chestnut | 25 | 18 | Deciduous tree native to Albania and N Greece. Naturalised throughout the UK. Iconic landscape tree. Susceptible to attack by Bleeding Canker, as well as Leaf Miner and Leaf Blotch. Should be inspected regularly if located close to high public use areas. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Aesculus+hippocastanum for more info. |
| London Plane | 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 multicoloured 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. Somewhat susceptible to the decay fungus <i>Inonotus hispidus</i> . Visit http://en.wikipedia.org/wiki/Platanus for more info. |
| Oak | 22 | 18 | Deciduous, long lived tree native and common throughout Europe with very durable timber. Excellent habitat tree - provides food and shelter for thousands of native species. Can be very attractive as a mature open grown specimen though not particularly ornamental, having no autumn colour or showy flowers. Responds well to pruning. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Quercus+robur for more info. |

3.4.2. 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.



4. Arboricultural Impact Assessment

4.1. The Proposal

- 4.1.1. It is proposed to replace the existing timber fence with a metal railing where indicated on the Impact Assessment Plan. In order to do this the existing fence posts will need to be carefully removed where tree roots are likely to be present and the new post holes will need to be excavated by hand. Provision should be made to ensure that new post holes may be re-located if large tree roots are found to be present.
- 4.1.2. The fence should be installed by contractors working from the footpath side of the fence in order to avoid damaging the shrubs and young trees growing within the private gardens.
- 4.1.3. Ground protection measures should be installed close to the top of the footpath to avoid compacting the soils in which the roots of T1 grow. If only pedestrian activity is proposed in this area, these measures may be as simple as a few timber boards.

4.2. Overview Table

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

| Activity | Trees Potentially Affected |
|------------------------------------|---|
| Tree Removal: Retention Category A | None |
| Tree Removal: Retention Category B | None |
| Tree Removal: Retention Category C | None |
| Tree Removal: Retention Category U | None |
| Tree Pruning | None |
| RPA: House Foundations | None |
| RPA: Fence Post Foundations | T1, T2, T3, T4, T5, T8, T9. |
| RPA: New Hard Surface | None |
| RPA: Replace Existing Hard Surface | None |
| RPA: Underground Services | None |
| RPA: Change of Ground Levels | None |
| RPA: Soil Compaction | T1, T2 (preventable by installing tree protection measures) |

- 4.2.2. Other potentially damaging activities often associated with construction sites include demolition or the careless use of plant machinery, hazardous materials, or fires.
- 4.2.3. All of the above potential impacts are considered in detail throughout this section. Section 5 specifies the measures proposed to minimise all possible potential risks of damage to the retained trees.

4.3. Tree Removal

- 4.3.1. All trees surveyed are to be retained.



4.4. Facilitative Pruning

- 4.4.1. The canopies of all significant trees are located sufficiently high over the footpath and the existing fence that no facilitative pruning will be required. Light trimming of some of the climbers and adjacent shrubs could be undertaken at the time of the installation if desirable to improve access.

4.5. Impact on Tree Roots

4.5.1. Fence Post Removal:

- 4.5.2. In order to ensure minimal disturbance of the soils, the existing foundations for the fence post should be removed using only hand tools. Any roots encountered in excess of 25mm diameter should be left intact and the post foundation worked out in a manner that enables their retention. The use of mechanical excavators to remove fence posts should be avoided.

- 4.5.3. Alternatively, the concrete fence posts may be left in-situ and the timber posts flush cut at their base.

4.5.4. Fence Post Installation:

- 4.5.5. The new fence posts should be installed in a manner that involves minimal soil disturbance and does not damage any large roots. This means that a flexible fencing system, which allows for exploratory holes to be excavated and the re-siting of posts where there is little rooting activity, will be required. If any roots in excess of 50mm are unearthed, they should be left intact and the post hole relocated. This may require some fence panels to be shortened. Alternatively, a variety of panel sizes should be available to the contractor working on site so that shorter panels may be occasionally be selected if required.

- 4.5.6. The only area where large roots could be unearthed is within the upper quarter of the fence line, closest to T1 and T2.

- 4.5.7. So long as the above considerations are taken into account, and all significant roots are retained, there should be no detrimental impact on any of the trees surveyed.

4.5.8. New Surfaces:

- 4.5.9. No new surfaces are proposed as part of the project.

4.5.10. Services:

- 4.5.11. No underground services or electric cabling are to be installed as part of the project.

4.5.12. Changes in Ground Levels:

- 4.5.13. No changes to ground levels are proposed as part of the project.

4.5.14. Soil Compaction:

- 4.5.15. When replacing the fence, we understand that plant machinery and vehicles are not to be used. Hence any potential increase in soil compaction will only be due to pedestrian activity. Currently, the pathway down to the lake is clear of vegetation and is clearly walked on by pedestrians, albeit rather occasionally. Never-the-less, the upper soil horizons seem quite compacted and stony, so the temporary increase in pedestrian activity associated with the project is not considered sufficient to warrant elaborate ground protection measures.

- 4.5.16. So long as activities are limited to the footpath alongside the fence and are further limited to pedestrians and hand barrows only (no vehicles or plant machinery), then we



consider that there shall be no significant impact on the health of trees due to increased soil compaction.

- 4.5.17. We recommend that simple barrier Mesh fencing is installed to create an exclusion zone over much of the RPA of T1 and that vehicles and plant machinery are prohibited from the footpath. If delivery vehicles need to turn or park close to the top of the footpath then suitable load-spreading ground protection measures will be required.

4.5.18. **Hazardous Materials Cement:**

- 4.5.19. All hazardous materials (including cement and petrochemical products) will need to be controlled according to COSHH regulations in order to ensure there is no detrimental impact on tree health.

- 4.5.20. Provision shall need to be made to ensure that cement and cement run-off are contained outside of all Root Protection Areas and cannot enter soils if they are used within RPAs.

- 4.5.21. If any paints or coatings are to be applied to the fence or posts, they must be applied in a manner that avoids escape into the soils or the air.



5. Method Statement

5.1. Definition of Terms

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


5.1.2. **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.

5.1.3. **Construction Exclusion Zone (CEZ).** These zones are created to protect roots and canopies from inadvertent damage by construction activity – see Section 5.5. -*Construction Exclusion Zones*. 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.

5.1.4. **Restricted Activity Zone (RAZ).** It is not always possible to create a *Construction Exclusion Zone* over the entire RPA. This is because access may be required or some works may be proposed within the RPA. In such circumstances a *Restricted Activity Zone* is created where limitations are placed on construction activity. Ground protection measures may be specified or the *Restricted Activity Zone* may be fenced off throughout part of the construction phase. See the legend on the Tree Protection Plan to identify these zones.

5.2. Tree Protection Barriers - Overview

5.2.1. 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 7 | Location |
|---|---|---|
|  | Barrier Mesh System or Back Stay System | As indicated on the Tree Protection Plan. |

5.2.2. The barriers shall be installed prior to the commencement of any localised construction activity including delivery of materials and dismantling of the existing fence. A detailed specification of the barriers can be found in Section 7.

5.2.3. The tree protection plan also indicates where a suitable load spreading surface shall need to be installed / maintained if vehicles are to park or turn.

5.3. Planning Status

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

5.3.2. 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.

5.3.3. 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.

5.4. Overview of Protection Measures

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

| Reference | Comments | Potential Impact | Protection measures |
|-----------------------------------|----------|--|--|
| T1, T2, T3, T4, T5, T8, T9. | | Root severance. Soil Compaction or contamination. | No vehicles or plant machinery to operate in exclusion zones or Restricted Activity Zones. Temporary fencing installed to limit the area of activity over RPA of T1. Excavation for post holes to be kept to a minimum and using hand tools only. Roots in excess of 40mm to be retained and post hole relocated. No further excavation or ground disturbance to occur. No cement washings to enter the soil. Ground protection measures to be installed if vehicles are to turn or park at the top of the path. |

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

5.5. Construction Exclusion Zones

5.5.1. Within Construction Exclusion Zones (shaded purple on the Tree Protection Plan) the following restrictions shall apply:

- Tree Protection Barriers shall be erected and maintained throughout the entire project as indicated on the Tree Protection Plan and specified in Section 7 - *Tree Protection Barriers*.
- No construction activity whatsoever shall occur.
- No vehicles or plant machinery shall be driven or parked.
- No tree works, other than those specified in this report shall be undertaken.
- No alterations of ground levels or conditions.
- No chemicals or cement washings permitted.
- No excavation whatsoever shall occur.
- No temporary structures.
- No spoil shall be stored.
- No fires shall be permitted.
- All hazardous materials (including non-essential cement products) shall be forbidden.



5.6. Restricted Activity Zone

5.6.1. Within this zone (indicated on the Tree Protection Plan) access will be required to enable the fencing to be replaced. The following restrictions shall apply:

- Temporary fencing shall be installed to limit the area of construction activity over the RPA of T1.
- No vehicles or plant machinery shall operate or park in the Restricted Activity Zone unless over a suitable load spreading surface and then only within 4m of the asphalt road.
- The existing foundations for the fence posts shall be removed using only hand tools. The use of mechanical excavators to remove fence posts shall not be permitted.
- Any roots encountered in excess of 25mm diameter shall be left intact and the post foundation worked out in a manner that enables their retention. Alternatively, the concrete fence posts may be left in-situ and the timber posts flush cut at their base.
- Excavation for post new holes shall be kept to a minimum and using hand tools only.
- Deep, narrow post holes are preferable to wide shallow post holes, so post holes shall be kept as narrow as practicable.
- The new fence posts shall be installed in a manner that involves minimal soil disturbance and does not damage any large roots.
- A flexible fencing system shall be adopted, which allows for exploratory holes to be excavated and the re-siting of posts to preserve any roots in excess of 40mm that are unearthed.
- If any roots in excess of 40mm are unearthed, they shall be left intact and the post hole relocated.
- This may require some fence panels to be shortened. Alternatively, a variety of panel sizes should be available to the contractor working on site so that shorter panels may be occasionally be selected if required.
- No further excavation or ground disturbance shall occur.
- No cement washings to enter the soil.

5.7. Siting of Cabins and Storage of Materials

5.7.1. Cabins and all building and fencing materials may be located or stored anywhere outside of *Construction Exclusion Zones* and *Restricted Activity Zones*.

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

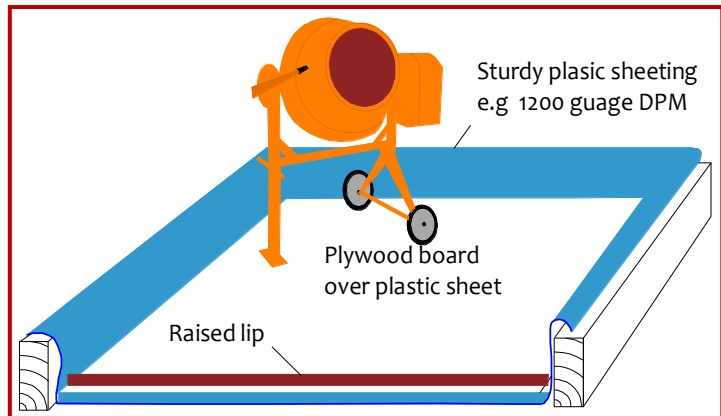
5.7.3. It may be acceptable to locate site cabins such that they act as a tree protection barrier and replace the specified protective fencing. Where this is being considered, written approval must be sought from the local authority.

5.8. Hazardous Materials

5.8.1. In order to ensure rooting zones do not inadvertently become damaged by cement products or other hazardous materials, care must be taken to ensure no spillages or water run off occurs over any Root Protection Areas.

5.8.2. 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.

5.8.3. 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.



5.8.4. 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.

5.9. Removal of Tree Protection Barriers

5.9.1. This will be done after all major construction work is complete. Vehicular access will not be permitted within the Construction Exclusion Zones.

5.9.2. The local authority tree officer shall be made aware that the fencing is to be removed.



6. Site Inspection

6.1. Inspection Schedule

- 6.1.1. In order to ensure that the trees are adequately protected the site manager shall regularly liaise with the appointed arborist in order to ensure that the tree protection measures within this report are installed and operational throughout the construction phase.
- 6.1.2. 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 excavation of post holes. | 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. |
| Intermediate Reporting Throughout the entire project. At least once per month. | N/A. | Site manager to liaise with the appointed arborist regarding any issues which may affect trees. General site photos indicating tree protection measures to be provided monthly. |

* 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. Tree Protection Barriers

Detailed Specification

- 7.1.1. The purpose of tree protection barriers is to keep construction activity away from Construction Exclusion Zones. They should be appropriate to the nature and proximity of activity within the site. Both barrier systems specified below that are considered suitable for the nature of the project.

7.2. The Back-Stay System

- 7.2.1. This system may be installed where indicated by a solid or dashed purple line on the Tree Protection Plan. It is more practical over existing hard surfaces or where the fencing needs to be moved to enable permitted activities within a Restricted Activity Zone. This



system should be able to withstand occasional knocks by machinery and should not be relocated except with the consent of the site manager and the approval of the local authority.

- 7.2.2. Within this system, weldmesh fencing panels (minimum height 2m) are affixed into rubber or concrete feet and clipped together with anti-tamper couplers. Where topography permits, two couplers should be used, spaced at least 1m apart. Alternate panels should be attached to a diagonal back stay connected to an additional foot or baseplate secured with ground pins or additional ballast. Where ground pins are not used, the total weight of the foot/plate plus ballast should total not less than 32kg.

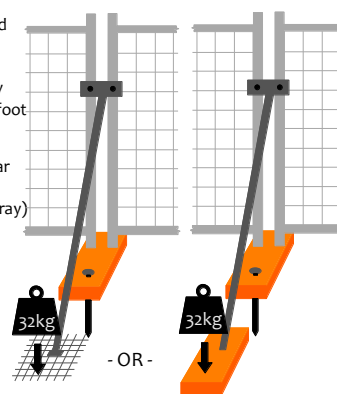
The 'Back Stay System' (an alternative to 'The In-Ground System')

2m X 3.5m weldmesh panels linked with anti-tamper couplings

Each panel attached to a back stay which is founded in an additional foot or mesh tray as illustrated

Minimum 32kg ballast to retain rear foot or tray (including the weight of the foot/tray)

Front feet to be secured with ground pins or additional ballast



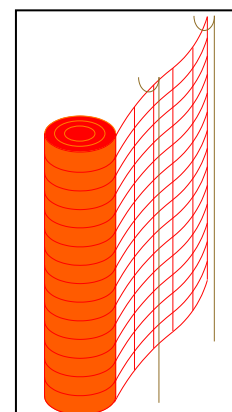
- 7.2.3. Alternatively, timber struts may be used to affix the panels to existing walls using brackets and screws where the fence panels are sufficiently close for this to be effective.
- 7.2.4. Where it is not possible to install diagonal struts (such as very close to a hedge) then the front feet shall be secured using ground pins or ballast.

7.3. The Barrier-Mesh System

- 7.3.1. Where indicated by a thick red line (solid or dashed) on the Tree Protection Plan, it shall be acceptable to install a less robust system than those specified above. This is because of the nature of construction activity or its distance from tree protection areas. The purpose of such a system shall be to demarcate the protection zone. It is not intended that such fencing will withstand knocks by construction machinery.



- 7.3.2. In this system, high visibility plastic safety fencing, 1m high, minimum grade 140g/m² is supported on steel fencing pins located at 2.5m intervals.





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Arboricultural Report to BS 5837: 2012 for:

Peter Morris

Crown Ref: 09958

Site:

80 - 90 South Hill Park, London

Author: Ivan Button

Date:

27th February 2018

8. Photographs

Refer to the Tree Constraints Plan for photo locations

Photo 1.



Photo 2.



Photo 3.



Photo 4.

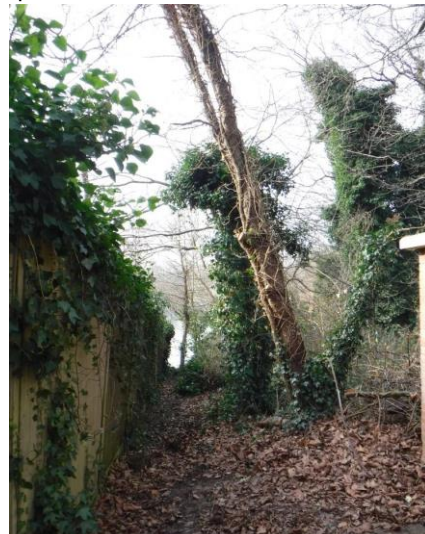


Photo 5.



Photo 6.





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 Details and Notes

8.1.1. A ground level visual survey was undertaken. No climbed inspections or specialist decay detection were undertaken. Only trees with a stem diameter over 75mm, which lie within the site boundary or relatively close to it, were included.

8.1.2. 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.

8.1.3. Wherever practicable dimensions were 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.

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. For single stemmed trees It is calculated according to the formula "radius of RPA" = "12 x stem diameter". 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.

A1.1.5 **Shade Constraints.** The previous Standard (BS 5837 2005) suggested that shade constraints should be indicated on the TCP. These are denoted as a circle-segment drawn northwest to due east with a radius equal to the height of the tree. These do not represent the actual shade pattern which varies through the seasons. Rather, they indicate 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. Where we consider it appropriate, we will include shade constraints information on our Impact Assessment Plan or Proposed Layout Plan.

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** (see Section 3 and Appendix 6).

A4.1 General Observations

| | | |
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| 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

Cavities, wounds, deadwood etc are all evaluated as follows:

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| 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

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| 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 the 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. |
| 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, |



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| | 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. |
| 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. |
| Occluding tissue | The general term 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. |
| 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. |



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| 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 plant 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. |
| 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 where dead branches protrude beyond the current living crown. |
| Stress | In plant physiology, conditions where 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 where the wound affects only branch material, often results 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 at 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, where 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 of wood decay where 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.

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.

In 1995, Ivan 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 and 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.

Qualifications & Experience of Emma Hoyle FDSc (Arboriculture), ED (Forestry & Arboriculture), M. Arbor. A.

Emma is a qualified Arboricultural Consultant educated to Level 5 in Arboriculture at Askham Bryan College and is a professional member of the Arboricultural Association. She has worked for Crown Consultants since 2015 and has since written numerous reports relating to all aspects of arboriculture including; planning and development, vegetation related subsidence, tree preservation orders and tree risk assessment. Emma regularly attends seminars and events in order to keep abreast with current knowledge and best practise in Arboriculture.

Prior to becoming an arboricultural consultant, Emma worked for two reputable tree surgery firms from 2008 and became an NPTC Qualified tree surgeon after completing a Level 3 Extended Diploma in Forestry and Arboriculture at Askham Bryan College. Emma also has experience in other areas of arboriculture such as forest clearance, tree planting, tree maintenance and landscaping.

Qualifications & Experience of Joe Taylor - MArborA, FdSc (Arboriculture)

Joe began his career in Arboriculture as a tree surgeon/climber. During his time as a tree surgeon, Joe has achieved City & Guilds NPTC qualifications in Chainsaw Maintenance and Cross Cutting, Tree Climbing and Rescue, Safe Use of Manually Fed Wood-chipper and Supporting Colleagues Undertaking Tree Related Operations.

Joe obtained a Foundation Degree in Arboriculture at Askham Bryan College in 2015 which he passed with merit. Joe is a professional member of the Arboricultural Association, the International Society of Arboriculture and the Royal Forestry Society and regularly attends industry related seminars in order to keep abreast of industry best practice.

Studying at Askham Bryan College reinforced Joe's passion for trees and drove his enthusiasm to learn more. Learning how trees interact with their surrounding environment and their importance within our urban and rural landscapes highlighted an interest in pursuing a career in consultancy.

Since working for Crown Consultants Joe has undertaken numerous surveys and produced numerous reports for the purpose of planning (BS 5837), tree condition surveys, subsidence risk assessments, root surveys and decay detection investigations.



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Arboricultural Report to BS 5837: 2012 for: Peter Morris

Crown Ref: 09958

Site: 80 - 90 South Hill Park, London

Author: Ivan Button

Date: 27th February 2018

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 8545:2014. Trees: From nursery to independence in the landscape – Recommendations

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](http://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



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Arboricultural Report to BS 5837: 2012 for: Peter Morris

Crown Ref: 09958








Site: 80 - 90 South Hill Park, London




Author: Ivan Button

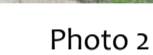
Date: 27th February 2018

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

The Tree Data Schedule and any drawings accompanying this report follow this page.
They are also provided as separate documents for ease of printing and screen viewing.

| Reference G = Group H = Hedge | Age & Species | Height (m) | Crown Ht (m) | Diameter (cm) | Crown Spread (m) N W S E | Scaled Tree Diagram (m) | Notes | Recommendations (Independent of any development proposals) | | Vigour | Amenity Value |
|-------------------------------------|---|------------|--------------|---------------|--------------------------------------|---|--|--|--------------------|----------------------------------|--------------------------------|
| | | | | | | | | Priority | Inspect Freq (yrs) | Physiological Condition | Life Expectancy (yrs) |
| | | | | | | | | | | Structural Condition | Retention Category |
| T1 | Mature London Plane Platanus x hispanica. | 22 | 4 | 120 | 16 15 8 |  | Form: Single stemmed and vertical with a balanced crown. History: Occasional pruning wounds due to crown lifting. Defects: Ganoderma fruiting bracket at base. | Decay detection required. | | Moderate Fair Poor | High 20-40 B |
| | High | | | | | | | 1 | | | |
| T2 | Mature Horse Chestnut Aesculus hippocastanum. | 15 | 3.5 | 71 | 9 6 7 |  | Form: Twin-stemmed at 0.5m with an unbalanced crown. History: Occasional pruning wounds due to crown lifting (healing slowly). Defects: Major bark wounds (fire damage) and some decay to both stems (0.5m - 2m above ground level) Major included bark between stems. | Install cable brace at 10m above ground level between two stems. | | Moderate Fair Poor | Moderate 10-20 C |
| | High | | | | | | | 1 | | | |
| T3 | Early-Mature Cherry Prunus sp. | 11 | 5 | 31 | 2 0.5 4 |  | Form: Single stemmed and leaning with an unbalanced crown. (Suppressed). History: Occasional pruning wounds due to crown lifting. Defects: No significant defects observed. | No action required. | | Moderate Fair Fair | Low 10-20 C |
| | n/a | | | | | | | 1 | | | |
| T4 | Young Oak Quercus robur. | 7 | 4 | 23 | 1 2 6 |  | Form: Single stemmed and leaning with an unbalanced crown. (Suppressed). History: No evidence of significant pruning. Defects: No significant defects observed. Other: Poor form. | No action required. | | Moderate Good Fair | Low 20-40 C |
| | n/a | | | | | | | 3 | | | |
| T5 | Young Oak Quercus robur. | 8 | 3 | 20 | 3 3 2 |  | Form: Single stemmed and vertical with a balanced crown. History: No evidence of significant pruning. Defects: No significant defects observed. Other: Good potential. | No action required. | | Moderate Good Good | Moderate 40+ B |
| | n/a | | | | | | | 3 | | | |
| T6 | Young Ash Fraxinus excelsior. | 8 | 4 | 13 | 1.5 2 3 |  | Form: Twin-stemmed at 3.5m with a narrow, upright habit. History: No evidence of significant pruning. Defects: No significant defects observed. | No action required. | | High Good Good | Low 40+ C |
| | n/a | | | | | | | 3 | | | |
| T7 | Semi-Mature Goat Willow Salix caprea. | 10 | 1 | 35 | 3 10 8 |  | Position: Water edge. Form: Multi-stemmed at ground level with an unbalanced crown. History: No evidence of significant pruning. Defects: No significant defects observed. | No action required. | | Moderate Good Poor | Low 20-40 C |
| | n/a | | | | | | | 3 | | | |

| Reference G = Group H = Hedge | Age & Species | Height (m) | Crown Ht (m) | Diameter (cm) | Crown Spread (m) W N E S | Scaled Tree Diagram (m) <div><div>90</div><div>0</div><div>9</div></div> | Notes | Recommendations (Independent of any development proposals) | | Vigour | Amenity Value |
|-------------------------------------|--|------------|--------------|---------------|---------------------------------------|---|---|---|--------------------|----------------------------------|---------------------------|
| | | | | | | | | Priority | Inspect Freq (yrs) | Physiological Condition | Life Expectancy (yrs) |
| | | | | | | | | | | Structural Condition | Retention Category |
| T8 | Semi-Mature False Acacia Robinia pseudoacacia. | 14 | 6 | 37 | <div><div>410</div><div>4</div></div> |  | Form: Single stemmed and leaning with an unbalanced crown. History: No evidence of significant pruning. Defects: Low vigour. Significant deadwood throughout. Other: Acceptable condition at present due to remote location. | No action required. | | Moderate Poor Fair | Low 10-20 C |
| | | | | | | | | n/a | 3 | | |
| T9 | Semi-Mature False Acacia Robinia pseudoacacia. | 13 | 5 | 27 | <div><div>45</div><div>4</div></div> |  | Form: Single stemmed and leaning with an unbalanced crown. History: No evidence of significant pruning. Defects: Low vigour. Significant deadwood throughout. Other: Acceptable condition at present due to remote location. | No action required. | | Moderate Poor Fair | Low 40+ C |
| | | | | | | | | n/a | 3 | | |
| T10 | Semi-Mature Cherry Prunus sp. | 10 | 3 | 30 | <div><div>44</div><div>4</div></div> |  | Form: Single stemmed and vertical with a balanced crown. History: No evidence of significant pruning. Defects: No significant defects observed. | No action required. | | High Good Good | Low 20-40 C |
| | | | | | | | | n/a | 3 | | |



| | |
|----|------|
| 51 | 25.5 |
| 28 | 15.1 |
| 43 | 6.6 |
| 24 | 4.9 |
| 18 | 4.3 |
| 8 | 2.8 |
| 55 | 7.4 |
| 62 | 7.9 |
| 33 | 5.7 |
| 11 | 6.4 |



Impact Assessment Plan
(Existing Layout with Proposals Overlaid)



Photo 1



Photo 2



Photo 3



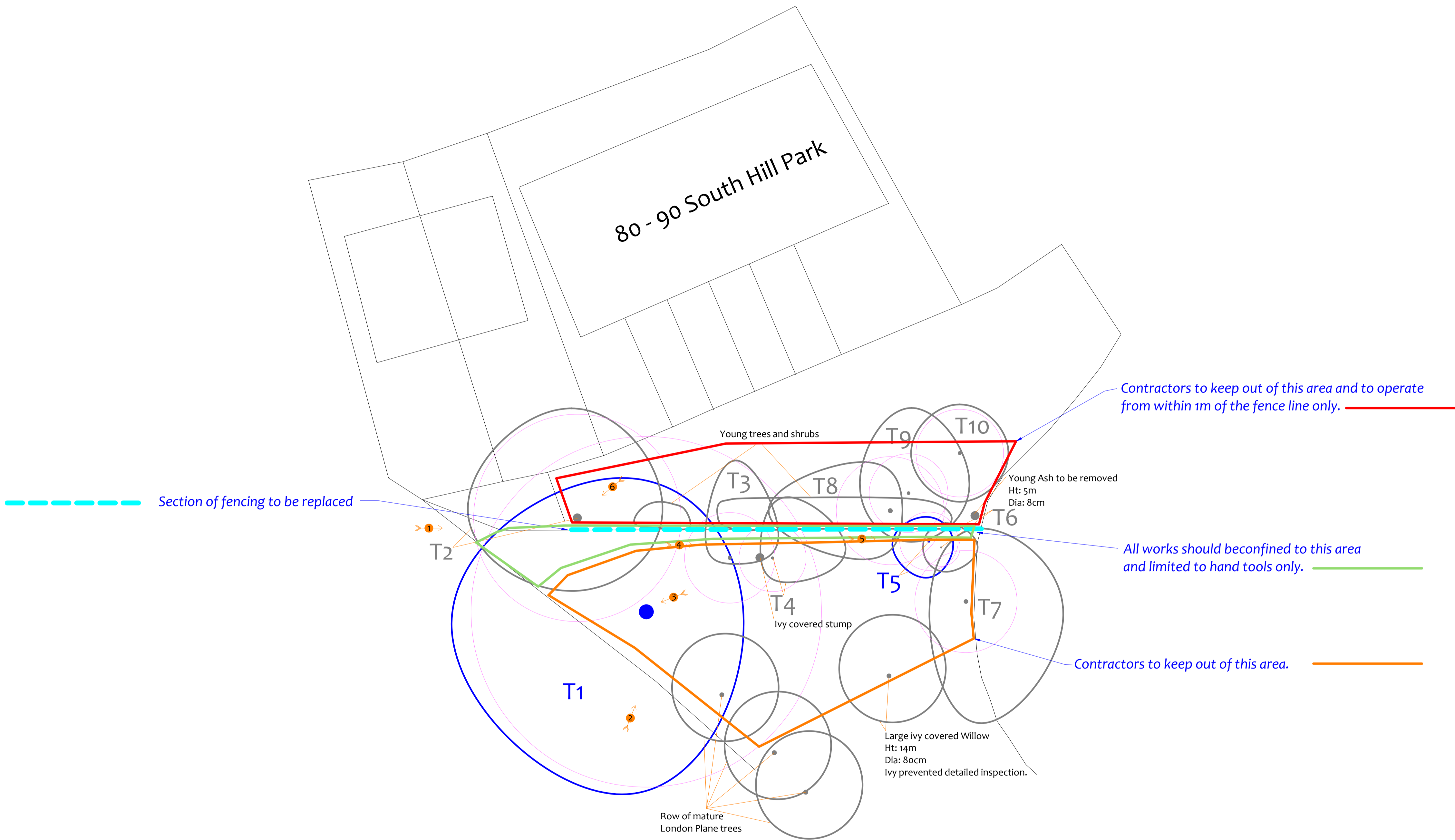
Photo 4



Photo 5



Photo 6



Drawing No: CCL 09958 / IAP Rev: 1
Title: Impact Assessment Plan
(Existing Layout with Proposals Overlaid)
Site: 80 - 90 South Hill Park
NW3 2SN
Scale: 0 5 10m
1:200 Paper Size: A1



Tree Retention Categories
Stems & canopies shown
Category A tree
Category B tree
Category C tree
Category U 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.
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.
Unremarkable trees of low quality and merit. Individual specimens are not considered to be a material planning consideration.
Trees unsuitable for retention due to their very poor condition.

Impact Assessment Plan

(Existing Layout with Proposals Overlaid)

BS 5837 Root Protection Area (radius = 1xstem diameter)
Root Protection Area needing amendment due to site conditions, e.g. presence of existing road or building.
Root Protection Area having been amended to account for site conditions
T1 = Tree No 1 G2 = Group No 2 H3 = Hedge No 3

| Tree Ref. | Species | Height (m) | Root Protection Area | | |
|-----------|----------------|------------|----------------------|----------------|------------|
| | | | Radius (m) | m ² | Square (m) |
| T1 | London Plane | 22 | 14.4 | 651 | 25.5 |
| T2 | Horse Chestnut | 15 | 8.5 | 228 | 15.1 |
| T3 | Cherry | 11 | 3.7 | 43 | 6.6 |
| T4 | Oak | 7 | 2.5 | 24 | 4.9 |
| T5 | Oak | 8 | 2.4 | 18 | 4.3 |
| T6 | Ash | 8 | 1.6 | 8 | 2.8 |
| T7 | Goat Willow | 10 | 4.2 | 55 | 7.4 |
| T8 | False Acacia | 14 | 4.4 | 62 | 7.9 |
| T9 | False Acacia | 13 | 3.2 | 33 | 5.7 |
| T10 | Cherry | 10 | 3.6 | 41 | 6.4 |

Excerpts from the
Arboricultural
Method Statement

Construction Exclusion Zones

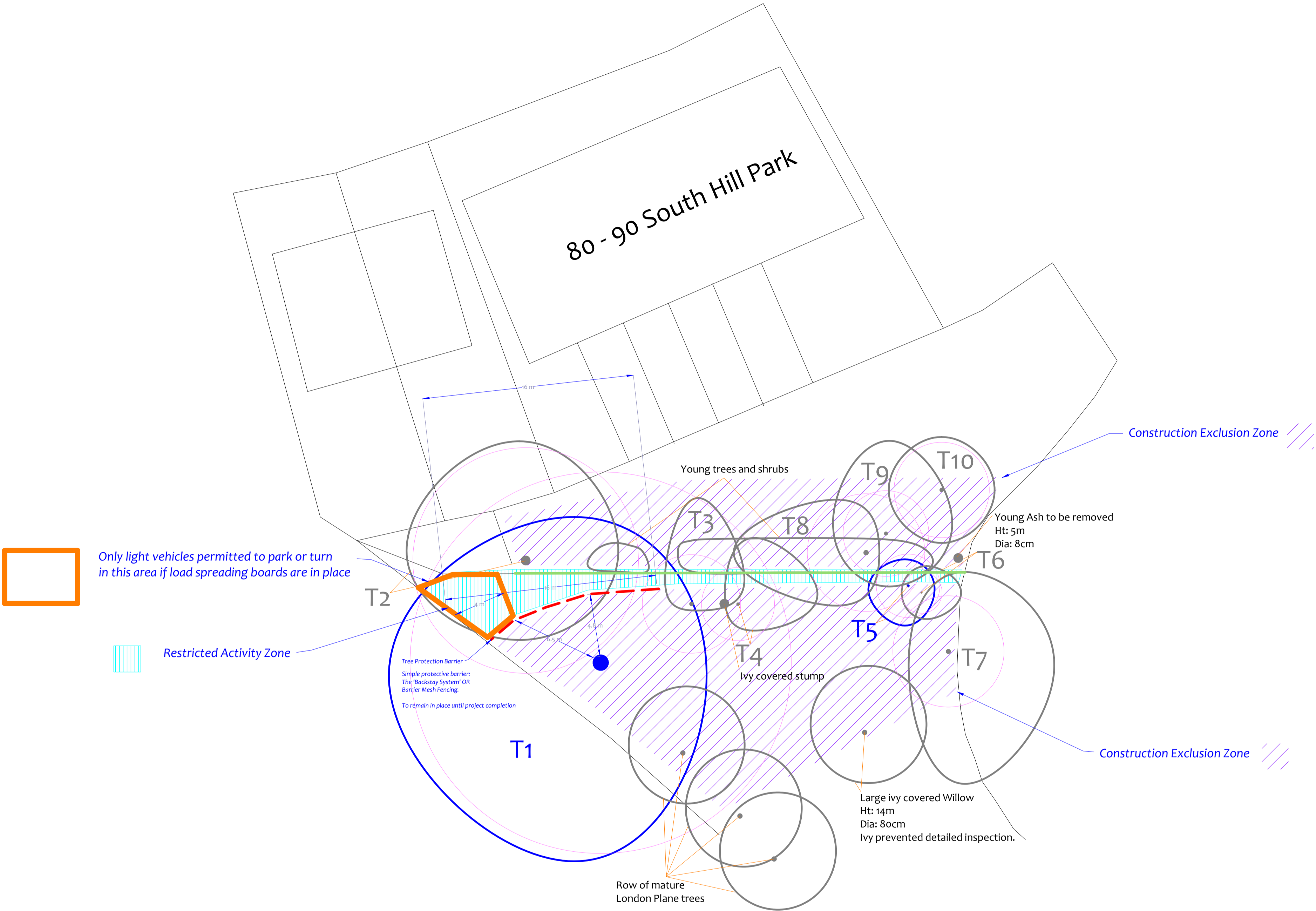
Within Construction Exclusion Zones (shaded purple on the Tree Protection Plan) the following restrictions shall apply:

- Tree Protection Barriers shall be erected and maintained throughout the entire project as indicated on the Tree Protection Plan and specified in Section 2 - Tree Protection Barriers.
- No construction activity whatsoever shall occur.
- No vehicles or plant machinery shall be driven or parked.
- No tree works, other than those specified in this report shall be undertaken.
- No alterations of ground levels or conditions.
- No chemicals or cement washings permitted.
- No excavation whatsoever shall occur.
- No temporary structures.
- No spoil shall be stored.
- No fires shall be permitted.
- All hazardous materials (including non-essential cement products) shall be forbidden.

Restricted Activity Zone

Within this zone (indicated on the Tree Protection Plan) access will be required to enable the fencing to be replaced. The following restrictions shall apply:

- Temporary fencing shall be installed to limit the area of construction activity over the RPA of T1.
- No vehicles or plant machinery shall operate or park in the Restricted Activity Zone unless over a suitable load spreading surface and then only within 4m of the asphalt road.
- The existing foundations for the fence posts shall be removed using only hand tools. The use of mechanical excavators to remove fence posts shall not be permitted.
- Any roots encountered in excess of 25mm diameter shall be left intact and the post foundation worked out in a manner that enables their retention. Alternatively, the concrete fence posts may be left in-situ and the timber posts flush cut at their base.
- Excavation for post new holes shall be kept to a minimum and using hand tools only.
- Deep, narrow post holes are preferable to wide shallow post holes, so post holes shall be kept as narrow as practicable.
- The new fence posts shall be installed in a manner that involves minimal soil disturbance and does not damage any large roots.
- A flexible fencing system shall be adopted, which allows for exploratory holes to be excavated and the re-siting of posts to preserve any roots in excess of 40mm that are unearthed.
- If any roots in excess of 40mm are unearthed, they shall be left intact and the post hole relocated.
- This may require some fence panels to be shortened. Alternatively, a variety of panel sizes should be available to the contractor working on site so that shorter panels may be occasionally be selected if required.
- No further excavation or ground disturbance shall occur.
- No cement washings to enter the soil.



See Section 5 for
more restrictions that
apply throughout the site




| | |
|-------------|---|
| Drawing No: | CCL 09958 / TPP Rev: 1 |
| Title: | Tree Protection Plan (Existing Layout with Proposals Overlaid) |
| Site: | 80 - 90 South Hill Park NW3 2SN |
| Scale: | 0 5 10m 1:200 |
| Paper Size: | A1 |



| Tree Retention Categories | |
|---------------------------|-----------------|
| Stems & canopies shown | |
| | Category A tree |
| | Category B tree |
| | Category C tree |
| | Category U 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. |
| | 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. |
| | Unremarkable trees of low quality and merit. Individual specimens are not considered to be a material planning consideration. |
| | Trees unsuitable for retention due to their very poor condition. |

Tree Protection Plan

| | | |
|---|--|-----------------|
|  | BS 5837 Root Protection Area (radius = 12xstem diameter) | |
|  | Root Protection Area needing amendment due to site conditions, e.g. presence of existing road or building. | |
|  | Root Protection Area having been amended to account for site conditions | |
| T1 = Tree No 1 | G2 = Group No 2 | H3 = Hedge No 3 |

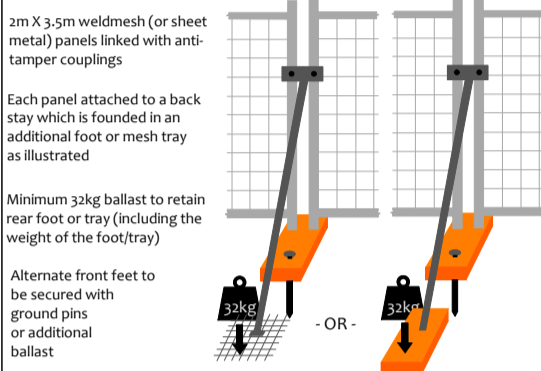


Tree Protection Plan

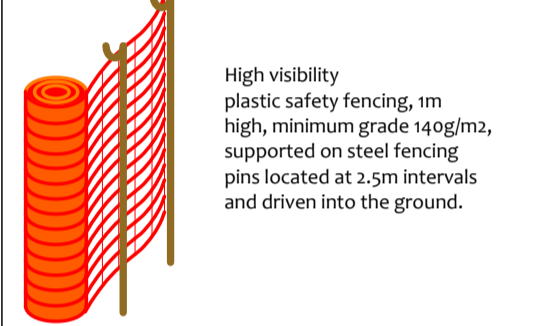
Tree Protection Barriers:

- Simple protective barrier: The 'Backstay System' OR Barrier Mesh Fencing.
- To remain in place except when approved works are being undertaken in the Restricted Zone

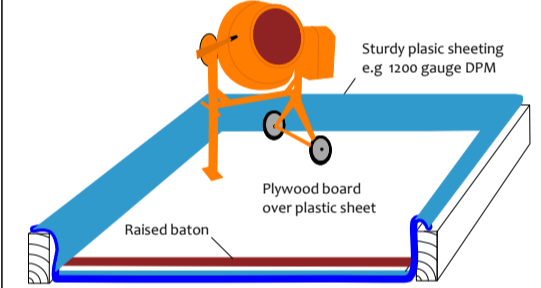
The 'Back Stay System'



The Barrier Mesh System



Dedicated Mixing and Cleaning Area



| Tree Ref. | Species | Height (m) | Root Protection Area | | | |
|-----------|----------------|------------|----------------------|-----|------------|--|
| | | | Radius (m) | m² | Square (m) | |
| T1 | London Plane | 22 | 14.4 | 651 | 25.5 | |
| T2 | Horse Chestnut | 15 | 8.5 | 228 | 15.1 | |
| T3 | Cherry | 11 | 3.7 | 43 | 6.6 | |
| T4 | Oak | 7 | 2.5 | 24 | 4.9 | |
| T5 | Oak | 8 | 2.4 | 18 | 4.3 | |
| T6 | Ash | 8 | 1.6 | 8 | 2.8 | |
| T7 | Goat Willow | 10 | 4.2 | 55 | 7.4 | |
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| T9 | False Acacia | 13 | 3.2 | 33 | 5.7 | |
| T10 | Cherry | 10 | 3.6 | 41 | 6.4 | |