BS 5837 Arboricultural Report

Impact Assessment & Method Statement

at

1 Ferncroft Avenue
London
NW3 7PG

Dated
10th May 2019

CROWN
Tree Consultancy
Branching out through England and Wales

Contents

1. Introduction

1.1. Instruction

1.1.1. We are instructed by Rosaria Scirica of Space Construction Ltd to:

- Undertake an Arboricultural Survey at 1 Ferncroft Avenue and assess all trees potentially within influencing distance of proposed development within the site.
- 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.
- Provide guidance for architects or developers to enable them to understand and design within the existing tree constraints.
- Assess the potential impact of the development proposals and provide guidance as to appropriate mitigation measures.
- Produce an Arboricultural Impact Assessment for submission to the local authority once the design has been finalised.
- 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 accompanying Arboricultural 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 client 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 Details and Findings

1.4.1. A visual ground level inspection of all trees was undertaken on the 30th April 2019 by Ivan Button. No climbed inspections or specialist decay detection were undertaken. Details of how the survey was undertaken can be found in Appendix 1.

1.4.2. 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. The vegetation is further discussed in Section 3.

1.4.3. 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.

1.4.4. 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 2. A more detailed description of the survey method is detailed in Appendix 3.

1.5. Drawings

1.5.1. The tree locations shown on the accompanying plans which are reproduced in Appendix 6 have been plotted according to measurements taken on site.

1.5.2. 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).

1.5.3. When using the Tree Constraints Plan for design purposes, the RPAs should be amended to reflect actual site conditions. Where the circular RPAs extend beneath roads or existing buildings, that part of the RPA should be ignored and the RPA extended a suitable distance in other directions.

1.5.4. 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.

1.5.5. The *Tree Protection Plan* shows the protection measures that are to be installed during the construction phase. This plan forms part of the accompanying Arboricultural Method Statement which is also appended to this report (see Appendix 6).

1.6. Author

1.6.1. This report was compiled by Ivan Button N.C.H. (Arb), FDSc (Arb), BSc (Hons), P.G.C.E., M. Arbor. A. Details of the author's experience that qualify him to produce such a report are detailed in Appendix 4.

2. Site Overview

2.1. Brief Description

2.1.1. Number 1 Ferncroft Avenue is a detached, two-storey residential property located on the corner of Ferncroft Avenue and Platt's Lane.

2.1.2. Beyond the front boundary grow three street trees. These are mature London Planes which are in good condition. There is no significant vegetation within the front garden.

2.1.3. Alongside the side boundary with Platt's Lane is a group of seventeen Leyland cypresses (G8) and a protected oak (T4). Many of the cypresses and the oak are growing so close to the retaining boundary wall that the wall is beginning to become displaced by the tree roots. Two street trees (T9 and T10) grow within the public footway on Platt's Lane.

2.1.4. Close to the rear boundary is a bay laurel (T5), a false acacia (T6) and three Lawson cypresses (G7).

2.1.5. The site is approximately flat with no abrupt level changes.

2.1.6. The Tree Constraints Plan and Tree Data Schedule (see Appendix 6) should be referred to for descriptions and locations of all trees.

2.2. Coordinates

2.2.1. The site coordinates are 51°33'33.26"N 0°11'38.55"W and the altitude is approximately 92m above sea level[1].

2.3. Survey Extent

2.3.1. The area indicated below[2] shows the approximate extent of the survey.

[1] To access satellite imagery and street views of the site these co-ordinates may be entered into: http://maps.google.co.uk/

[2] Image taken from Google Earth and may not be current

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. By using a metal probe we were able to establish that the protected oak, T4, has a large basal cavity. It was not possible to determine the extent of the cavity or any associated decay. We therefore recommend that this tree is inspected using decay detection equipment such as a Picus Tomograph. Because this tree overhangs a public highway, we recommend that these works are undertaken as a matter of high priority.

3.1.2. 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	T4
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
0.5	T4
1	None
1.5	T6
3	T1, T2, T3, T5, G7, 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 23rd April 2019, we were informed, by the London Borough of Camden that:

- The site is within Redington Frognal Conservation Area.
- A tree preservation order protects the oak, T4 and a liquidambar tree. However, this tree has long since been removed.
- There are no tree preservation orders immediately adjacent to the site.

3.4. Tree Protection – General Notes

3.4.1. 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.

3.4.2. 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 or imminently dangerous are technically exempt from protection, as are dead branches. If the tree work is not urgently necessary however, at least five working days notice of intention should be given to the local authority. In any case in would be prudent to 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).

3.4.3. Where trees are located in a conservation area (but not protected by a TPO), 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. Note: the local authority cannot refuse consent for works to trees within a conservation area; they may only create a tree preservation order if they wish to have further control over what works are undertaken.

3.4.4. 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.

3.5. Species Present – Additional Information

3.5.1. 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	Typical Height at Maturity (m)	Typical Canopy Spread at Maturity (m)	General Notes
Claret Ash	18	14	Fast growing deciduous variety of the Narrow-leafed Ash with stunning autumn colours. The outer canopy turns wine coloured followed by the interior canopy with orange and pink. Introduced to Britain in 1928 from Australia. Often planted as a street tree. Can have narrow forks causing limbs to shear off. Visit http://en.wikipedia.org/wiki/Claret_Ash for more info.
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.
Lawson Cypress	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.
Leyland Cypress	40	8	Vigorous evergreen tree, cultivated hybrid between Nootka Cypress and Monterey Cypress. Widely planted and widely hated. Excellent hedging species unless it is undermanaged in which case it forms a giant, dense wall of foliage. Very hardy. Tolerates most conditions. Size may be managed by regular trimming. Golden forms available. (The details of the specific cultivar surveyed are not listed here.) Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Cupressocyparis+leylandii 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 Innonotus hispidus. Visit http://en.wikipedia.org/wiki/Platanus for more info.
Pedunculate Oak	20	16	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.

3.5.2. 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.

4. Arboricultural Impact Assessment

4.1. Proposal Overview

4.1.1. It is proposed to replace the existing boundary wall (and fence) along Platt's Lane, and to replace it with a new, stronger wall supporting a new fence.

4.1.1. 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	G8, T5
Tree Removal: Retention Category U	None
Tree Pruning	None
RPA: Retaining Wall Foundations	T4
RPA: Other Foundations	None
RPA: New Hard Surface	None
RPA: Underground Services	None
RPA: Change of Ground Levels	None
RPA: Soil Compaction	Trees adjacent the construction area (preventable by installing tree protection measures)

4.1.2. Other potentially damaging activities often associated with construction sites include demolition or the careless use of plant machinery, hazardous materials, or fires. All of the above potential impacts are considered in detail throughout this section.

4.1.3. The accompanying Arboricultural Method Statement (duplicated in Appendix 6) specifies the measures proposed to minimise all possible potential risks of damage to the retained trees.

4.2. Tree Removal

4.2.1. All trees to be removed are indicated on the Tree Removal Plan and are listed below:

- **Retention Category A:** It is proposed to retain all Retention Category A trees.
- **Retention Category B:** It is proposed to retain all Retention Category B trees.
- **Retention Category C:** It is proposed to remove Leyland cypress tree (G8) and the bay laurel, T5.

Several of the trees within G8 have been planted so close to the boundary wall that they are causing it to become displaced and this will get worse over time (see Photographs 8, 13, 14 and 19 to 23). According to the structural engineers report by Malachy Walsh and Partners, the wall has vertical shear cracks. I also observed horizontal shearing (see Photographs 21 to 23). Hence removal of these trees is recommended in order to prevent future damage.

One of the trees within G8 is growing so close to an outbuilding that future growth will cause damage to the building (see Photograph 24).

Other trees within this group are beginning to over-dominate the garden so it is the owner's preference to have them removed and replaced with a species that does not have such a large growth potential.

The bay laurel, T5 is a multistemmed specimen which is rather overshadowed by the protected oak, T4. The canopy of the laurel grows into the canopy of the oak. It is proposed to remove the laurel in order to benefit the oak and to enable new foundations for a sturdier retaining wall to be built.

- **Retention Category U:** Our survey did not identify any Retention Category U trees.

4.2.2. None of the trees to be removed are protected by a tree preservation order or considered worthy of special protection.

4.2.3. Details specific to each tree can also be found in the Tree Data Schedule.

4.3. Mitigation Planting

4.3.1. The owner of the site intends to plant several young trees along the western boundary in order to maintain good screening from Platt's Lane. No trees should be planted within 1m of the boundary wall.

4.4. Impact on Tree Canopies

4.4.1. The canopies of all retained trees are located sufficiently far from proposed building works and sufficiently high over access routes throughout the site that they shall not be impacted upon by any construction activity. Consequently no pruning works are required to facilitate construction activity or access throughout the site. Restrictions are placed on activities throughout the site to ensure that no canopies are accidentally damaged – see the accompanying Arboricultural Method Statement

4.5. Impact on Tree Roots

4.5.1. The only retained tree potentially affected by the proposed works is the protected oak, T4. This tree grows very close to the wall that is to be replaced and it is likely that large roots will be growing adjacent to, and immediately below, the existing foundations.

4.5.2. In order to ensure no damage to this tree it is proposed to retain and strengthen the existing foundations close to this tree (rather than remove them and replace with deeper foundations). For a distance of 4m on either side of the tree, the existing foundations shall be retained and strengthened by installing narrow screw piles into holes drilled through the concrete foundations. Beams may then sit atop the foundation and be secured to the screw piles.

4.5.3. In order to keep the tree stable, the masonry above this 8m section of foundation shall be retained until the last possible moment (i.e. until the rest of the foundation has been installed and builders are ready to commence building the new wall). The masonry shall be removed using hand tools and with minimal disturbance of the soils and root beyond. As soon as the foundations have been strengthened the masonry along this 8m section should be replaced and backfilled with soil and Claymaster (see Section 4.8).

4.5.4. The operations of dismantling the final 8m section wall, installing the piles and then rebuilding the wall should be overseen by an appointed arborist to ensure no damage to the structural roots of this protected tree. These works should be undertaken within the course of a week where no high winds are forecast.

4.5.5. **New Surfaces:**

4.5.6. No new surfaces are proposed within the Root Protection Areas of any trees.

4.5.7. **Underground Services:**

4.5.8. No underground services are to be installed through any Root Protection Areas.

4.5.9. **Changes in Ground Levels:**

4.5.10. No changes to ground levels are proposed over Root Protection Areas.

4.5.11. **Soil Compaction:**

4.5.12. The majority of tree roots lie within the upper soil horizons. This is because the availability of oxygen decreases with depth and roots need to breathe to stay alive. In addition, nutrients are more readily available in the form of organic matter close to the soil surface.

4.5.13. Healthy soils contain about 25% air space between solid particles. Increased loading of the soils caused by construction activity causes air to be squeezed out as the soil becomes compacted preventing roots from breathing. Even an increase in pedestrian activity may cause some soil compaction.

4.5.14. It is important therefore that ground compaction and soil disturbance over the Root Protection Area of T4 should be avoided during the demolition and construction phase. This may be done by installing protective fencing and ground protection measures as recommended within the accompanying Arboricultural Method Statement.

4.6. Hazardous Materials

4.6.1. 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. Provision shall need to be made to ensure that cement and cement run-off are contained outside of all Root Protection Areas.

4.7. Cabins and Site Facilities

4.7.1. On this site there is ample room for the siting of cabins and storage of materials / spoil during the construction phase without impacting on trees.

4.8. Impact of T4 on the New Wall

4.8.1. In order to extend the lifespan of the wall, it is recommended that a compressible material such as Claymaster™ or similar (expanded polystyrene) is inserted behind the new wall wherever the overseeing arborist determines it to be appropriate.

4.8.2. This material will absorb some expansion of the root system and delay the time whereby the new wall is affected by the future growth of this tree.

5. Photographs

Refer to the Tree Constraints Plan for photo locations

Photo 1.

Photo 2.

Photo 3.

Photo 4.

Photo 5.

Photo 6.

Photo 7.

Photo 8.

Photo 9.

Photo 10.

Photo 11.

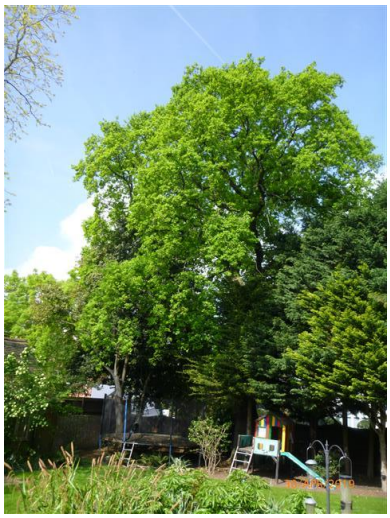


Photo 12.

Photo 13.

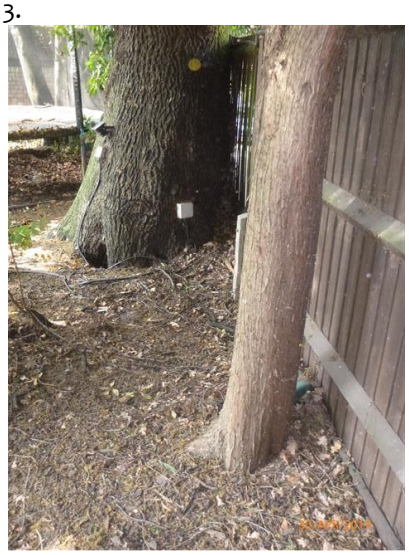


Photo 14.

Photo 15.

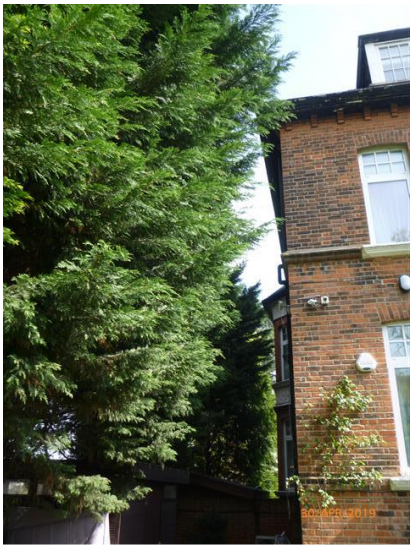


Photo 16.

Photo 17.

Photo 18.

Photo 19.

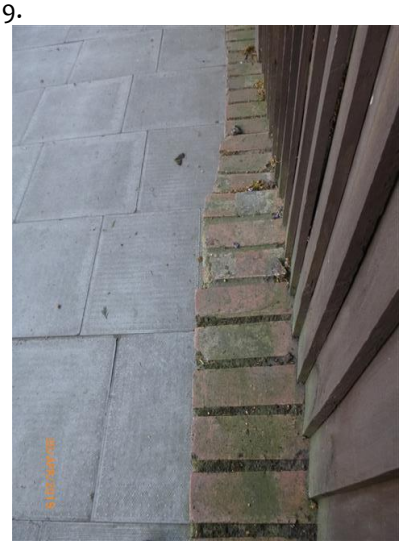


Photo 20.

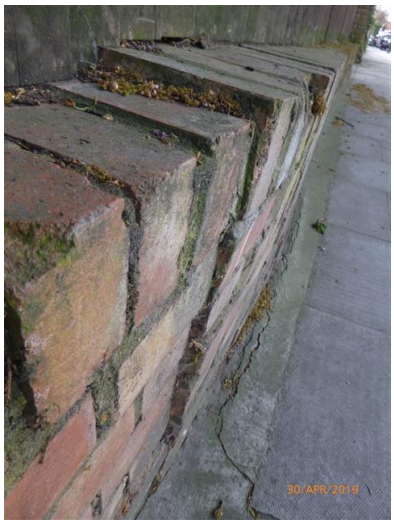


Photo 21.

Photo 22.

Photo 23.

Photo 24.

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

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.

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.

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.

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.

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.

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.

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.

Shade Constraints. The previous Standard (BS 5837 2005) suggested that shade constraints should be indicated on the TCP. This 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).

A2.1 General Observations

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.

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.

Species: Common names and Latin names are given.

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

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.

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.

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.

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

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.

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

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.

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.

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.

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.

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.

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.

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

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

A2.2 Evaluation of Defects

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.**
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.
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 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.
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.

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.**
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

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).

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.

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.

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.

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

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

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.

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

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

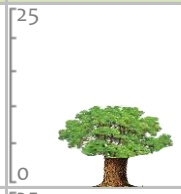
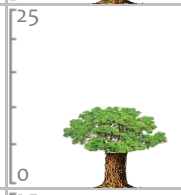
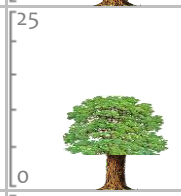
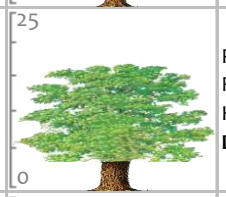
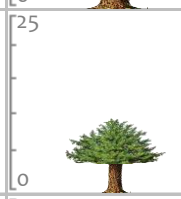
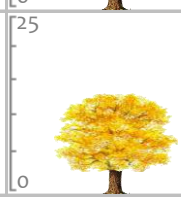
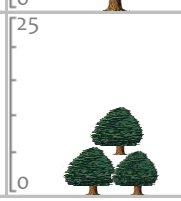
Communities and Local Government website with numerous downloadable documents, from: http://www.communities.gov.uk/planningandbuilding/planning/treeshighhedges/

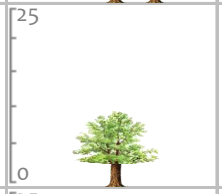
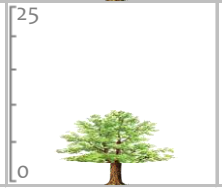
Tree Specific Websites

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 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 E S	Scaled Tree Diagram (m) 9 0 9	Notes	Recommendations (Independent of any development proposals) Priority / Inspect Freq (yrs)	Vigour Physiological Condition Structural Condition	Amenity Value Life Expectancy (yrs) Retention Category
T1	Mature **London Plane** Platanus x hispanica.	10	4.5	81	N 4 W 4.5 E 5 S 5		Position: Street tree. Form: Multi-stemmed at 4m with a balanced crown. History: Managed by cyclical reduction. **Defects: No significant defects observed.**	No action required. n/a / 3	Moderate Good Good	High 40+ A
T2	Mature **London Plane** Platanus x hispanica.	10	5	72	N 4 W 4 E 4.5 S 4.5		Position: Street tree. Form: Multi-stemmed at 4m with a balanced crown. History: Managed by cyclical reduction. **Defects: No significant defects observed.**	No action required. n/a / 3	Moderate Good Good	High 40+ A
T3	Mature **London Plane** Platanus x hispanica.	12	5	64	N 4 W 4 E 4 S 4		Position: Street tree. Form: Multi-stemmed at 4m with a balanced crown. History: Managed by cyclical reduction. **Defects: No significant defects observed.**	No action required. n/a / 3	Moderate Good Good	High 40+ A
T4	Mature **Pedunculate Oak** Quercus robur.	17	4	99	N 6 W 9 E 9 S 9		Position: Adjacent west boundary. Form: Single stemmed and vertical with a well-formed crown. History: No evidence of significant pruning. **Defects: Major hollow at stem base.**	Decay detection required. High / 0.5	High Good Poor	High 10-20 B
T5	Early-Mature **Bay Laurel** Laurus nobilis.	9	3.5	42	N 3 W 5 E 3 S 4		Position: Adjacent rear boundary. Form: Multi-stemmed at ground level with a slightly unbalanced crown. History: No evidence of significant pruning. Other: Growing into the canopy of T4. Recorded stem diameter is equivalent for 4 stems (33cm, 15cm, 15cm, 16cm).	No action required. n/a / 3	Moderate Good Fair	Low 20-40 C
T6	Semi-Mature **False Acacia** Robinia pseudoacacia.	13	3	37	N 4 W 4 E 4.5 S 7		Form: Single stemmed and vertical with a balanced crown. History: No evidence of significant pruning. **Defects: No significant defects observed.** Other: Sparse canopy.	No action required. n/a / 1.5	Moderate Fair Good	Low 20-40 C
G7	Semi-Mature **Lawson Cypress** Chamaecyparis lawsoniana.	av 5	av 1	av 22	N av W 2 E 2 S 2 each		Form: Row of three. History: No evidence of significant pruning. **Defects: No significant defects observed.**	No action required. n/a / 3	High Good Good	Low 40+ C

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) 9 0 9	Notes	Recommendations (Independent of any development proposals) Priority / Inspect Freq (yrs)	Vigour Physiological Condition Structural Condition	Amenity Value Life Expectancy (yrs) Retention Category
G8	Semi-Mature **Leyland Cypress** X Cupressocyparis leylandii.	7.5	2	25	N 2 W 2 E 2 S 2		Position: Adjacent west boundary. Form: Group of seventeen trees. All Single stemmed and vertical with a narrow, upright habit. Stem diameters range from 8cm to 39cm. History: No evidence of significant pruning. **Defects: No significant defects observed.**	No action required. n/a / 3	High Good Good	Low 10-20 C
T9	Semi-Mature **Claret Ash** Fraxinus angustifolia 'raywood'.	9	3	29	N 1.5 W 4.5 E 2.5 S 5		Position: Street tree. Form: Twin-stemmed at 3m with a compact crown. History: No evidence of significant pruning. **Defects: No significant defects observed.**	No action required. n/a / 3	Moderate Good Good	Moderate 40+ B
T10	Semi-Mature **Claret Ash** Fraxinus angustifolia 'raywood'.	9	3	33	N 4 W 4.5 E 5 S 5.5		Position: Street tree. Form: Twin-stemmed at 4m with a well-formed crown. History: No evidence of significant pruning. **Defects: No significant defects observed.**	No action required. n/a / 3	High Good Good	Moderate 40+ B +

Photographs

Photo 1.

Photo 2.

Photo 3.

Photo 4.

Photo 5.

Photo 6.

Photo 7.

Photo 8.

Photo 9.

Photo 10.

Photo 11.

Photo 12.

Photo 13.

Photo 14.

Photo 15.

Photo 16.

Photo 17.

Photo 18.

Site Overview

Brief Description

Number 1 Ferncroft Avenue is a detached, two-storey residential property located on the corner of Ferncroft Avenue and Platt's Lane.

Beyond the front boundary grow three street trees. These are mature London Planes which are in good condition. There is no significant vegetation within the front garden.

Alongside the side boundary with Platt's Lane is a group of seventeen Leyland cypresses (G8) and a protected oak (T4). Many of the cypresses and the oak are growing so close to the retaining boundary wall that the wall is beginning to become displaced by the tree roots. Two street trees (T9 and T10) grow within the public footway on Platt's Lane.

Close to the rear boundary is a bay laurel (T5), a false acacia (T6) and three Lawson cypresses (G7).

The site is approximately flat with no abrupt level changes.

The Tree Constraints Plan and Tree Data Schedule (see Appendix 6) should be referred to for descriptions and locations of all trees.

Tree Protection Status – Site Specific

On 23rd April 2019, we were informed, by the London Borough of Camden that:

- The site is within Redington Frognal Conservation Area.
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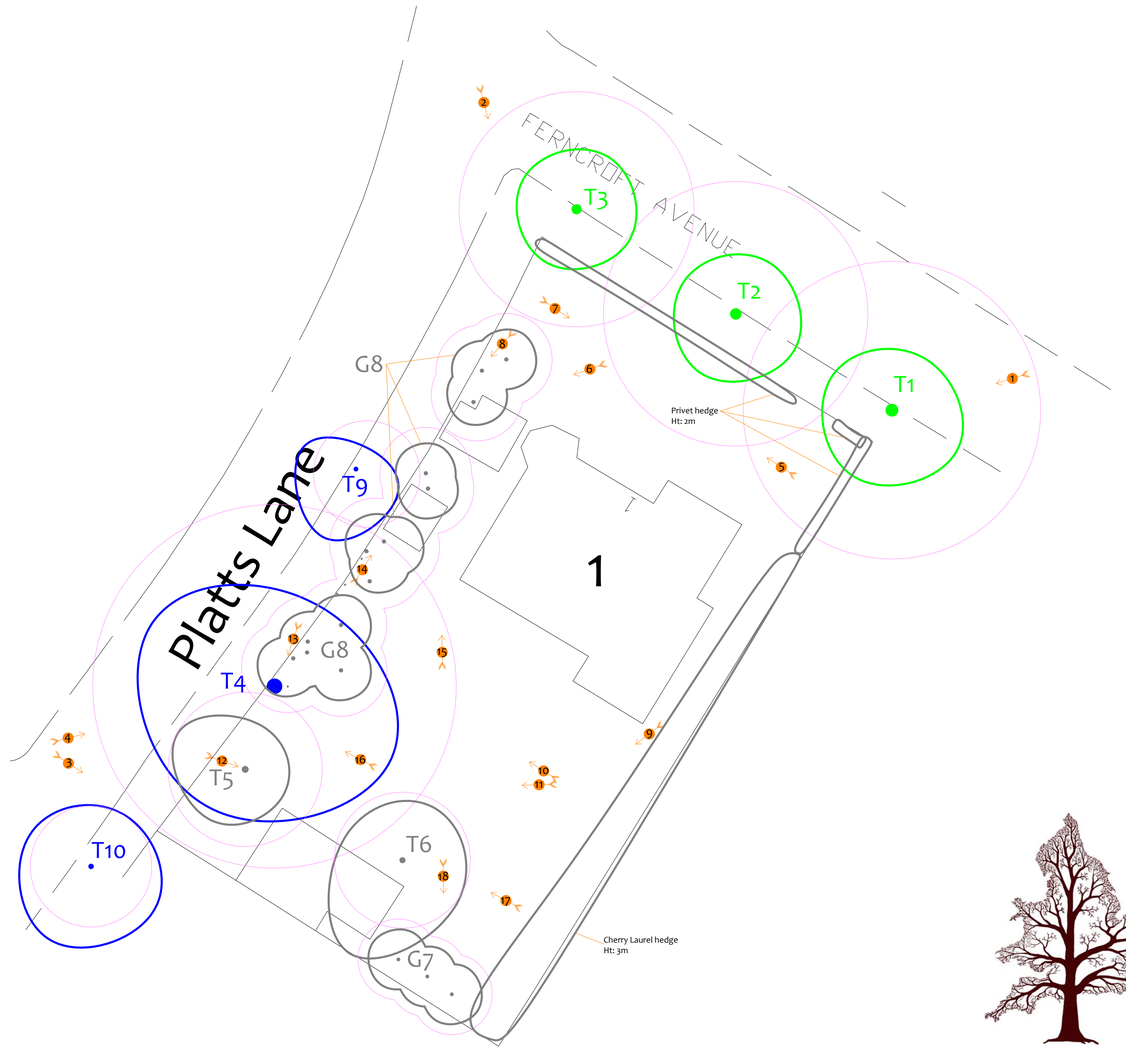

Work Priority and Future Inspections

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	T4
Moderate	Within 1 year	None
Low	Within 3 years	None

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	T4
1	None
1.5	T6
3	T1, T2, T3, T5, G7, T8, T9, T10

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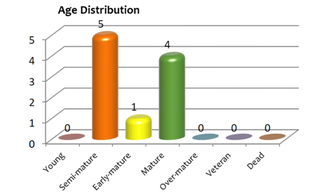

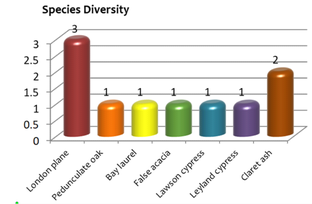

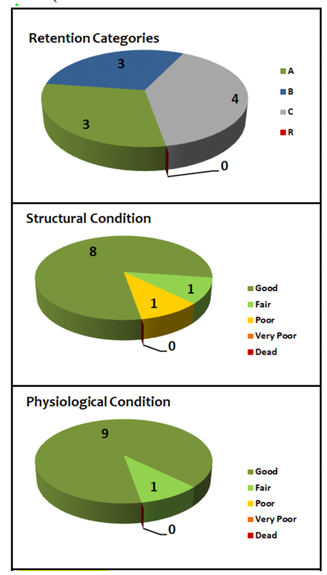

Aerial Imagery of the site (Bing Maps)

Reference C= 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	Impact Trees (cm)	Vigour Physiological Condition	Vigour Structural Condition	Amenity Value Life Expectancy (yrs)	Amenity Value Retention Category
T1	Mature **London Plane** Platanus x hispanica.	10	4-5	81	4 4.5 5 5	15 1	Position: Street tree. Form: Multi-stemmed at 4m with a balanced crown. History: Managed by cyclical reduction. **Defects: No significant defects observed.**	No action required. n/a	3	Moderate	Good	High	40+ A
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T5	Early-Mature **Bay Laurel** Laurus nobilis.	9	3.5	42	3 5 3 4	15 1	Position: Adjacent rear boundary. Form: Multi-stemmed at ground level with a slightly unbalanced crown. History: No evidence of significant **pruning.** Other: **Growing into the** canopy of T4. Recorded stem diameter is equivalent for 4 stems (33cm, 15cm, 15cm, 16cm).	No action required. n/a	3	Moderate	Good Fair	Low	20-40 C
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Drawing No:	CCL 10303 / TCP Rev: 1
Title:	Tree Constraints Plan (Existing Layout)
Site:	1 Ferncroft Avenue NW3 7PG
Scale:	1:200 Paper Size: A1

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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

(Existing Layout)

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.

Excerpts from the Arboricultural Impact Assessment

Proposal Overview

It is proposed to replace the existing boundary wall (and fence) along Platt's Lane, and to replace it with a new, stronger wall supporting a new fence.

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	G8, T5
Tree Removal: Retention Category U	None
Tree Pruning	None
RPA: Retaining Wall Foundations	T4
RPA: Other Foundations	None
RPA: New Hard Surface	None
RPA: Underground Services	None
RPA: Change of Ground Levels	None
RPA: Soil Compaction	Trees adjacent the construction area (preventable by installing tree protection measures)

Other potentially damaging activities often associated with construction sites include demolition or the careless use of plant machinery, hazardous materials, or fires. All of the above potential impacts are considered in detail throughout this section.

The accompanying Arboricultural Method Statement (duplicated in Appendix 6) specifies the measures proposed to minimise all possible potential risks of damage to the retained trees.

Tree Removal

All trees to be removed are indicated on the Tree Removal Plan and are listed below:

- **Retention Category A:** It is proposed to retain all Retention Category A trees.
- **Retention Category B:** It is proposed to retain all Retention Category B trees.
- **Retention Category C:** It is proposed to remove Leyland cypress tree (G8) and the bay laurel, T5.

Several of the trees within G8 have been planted so close to the boundary wall that they are causing it to become displaced and this will get worse over time (see Photographs 8, 13, 14 and 19 to 23). According to the structural engineers report by Malachy Walsh and Partners, the wall has vertical shear cracks. I also observed horizontal shearing (see Photographs 21 to 23). Hence removal of these trees is recommended in order to prevent future damage.

One of the trees within G8 is growing so close to an outbuilding that future growth will cause damage to the building (see Photograph 24).

Other trees within this group are beginning to over-dominate the garden so it is the owner's preference to have them removed and replaced with a species that does not have such a large growth potential.

The bay laurel, T5 is a multistemmed specimen which is rather overshadowed by the protected oak, T4. The canopy of the laurel grows into the canopy of the oak. It is proposed to remove the laurel in order to benefit the oak and to enable new foundations for a sturdier retaining wall to be built.

- **Retention Category U:** Our survey did not identify any Retention Category U trees.

None of the trees to be removed are protected by a tree preservation order or considered worthy of special protection.

Details specific to each tree can also be found in the Tree Data Schedule.

Mitigation Planting

The owner of the site intends to plant several young trees along the western boundary in order to maintain good screening from Platt's Lane. No trees should be planted within 1m of the boundary wall.

Impact on Tree Canopies

The canopies of all retained trees are located sufficiently far from proposed building works and sufficiently high over access routes throughout the site that they shall not be impacted upon by any construction activity. Consequently no pruning works are required to facilitate construction activity or access throughout the site. Restrictions are placed on activities throughout the site to ensure that no canopies are accidentally damaged – see the accompanying Arboricultural Method Statement

Impact on Tree Roots

The only retained tree potentially affected by the proposed works is the protected oak, T4. This tree grows very close to the wall that is to be replaced and it is likely that large roots will be growing adjacent to, and immediately below, the existing foundations.

In order to ensure no damage to this tree it is proposed to retain and strengthen the existing foundations close to this tree (rather than remove them and replace with deeper foundations). For a distance of 4m on either side of the tree, the existing foundations shall be retained and strengthened by installing narrow screw piles into holes drilled through the concrete foundations. Beams may then sit atop the foundation and be secured to the screw piles.

In order to keep the tree stable, the masonry above this 8m section of foundation shall be retained until the last possible moment (i.e. until the rest of the foundation has been installed and builders are ready to commence building the new wall). The masonry shall be removed using hand tools and with minimal disturbance of the soils and root beyond. As soon as the foundations have been strengthened the masonry along this 8m section should be replaced and backfilled with soil and Claymaster (see Section 4.8).

The operations of dismantling the final 8m section wall, installing the piles and then rebuilding the wall should be overseen by an appointed arborist to ensure no damage to the structural roots of this protected tree. These works should be undertaken within the course of a week where no high winds are forecast.

New Surfaces:

No new surfaces are proposed within the Root Protection Areas of any trees.

Underground Services:

No underground services are to be installed through any Root Protection Areas.

Changes in Ground Levels:

No changes to ground levels are proposed over Root Protection Areas.

Soil Compaction:

The majority of tree roots lie within the upper soil horizons. This is because the availability of oxygen decreases with depth and roots need to breathe to stay alive. In addition, nutrients are more readily available in the form of organic matter close to the soil surface.

Healthy soils contain about 25% air space between solid particles. Increased loading of the soils caused by construction activity causes air to be squeezed out as the soil becomes compacted preventing roots from breathing. Even an increase in pedestrian activity may cause some soil compaction.

It is important therefore that ground compaction and soil disturbance over the Root Protection Area of T4 should be avoided during the demolition and construction phase. This may be done by installing protective fencing and ground protection measures as recommended within the accompanying Arboricultural Method Statement.

Hazardous Materials

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. Provision shall need to be made to ensure that cement and cement run-off are contained outside of all Root Protection Areas.

Cabins and Site Facilities

On this site there is ample room for the siting of cabins and storage of materials / spoil during the construction phase without impacting on trees.

Impact of T4 on the New Wall

In order to extend the lifespan of the wall, it is recommended that a compressible material such as Claymaster[TM] or similar (expanded polystyrene) is inserted behind the new wall wherever the overseeing arborist determines it to be appropriate.

This material will absorb some expansion of the root system and delay the time whereby the new wall is affected by the future growth of this tree.

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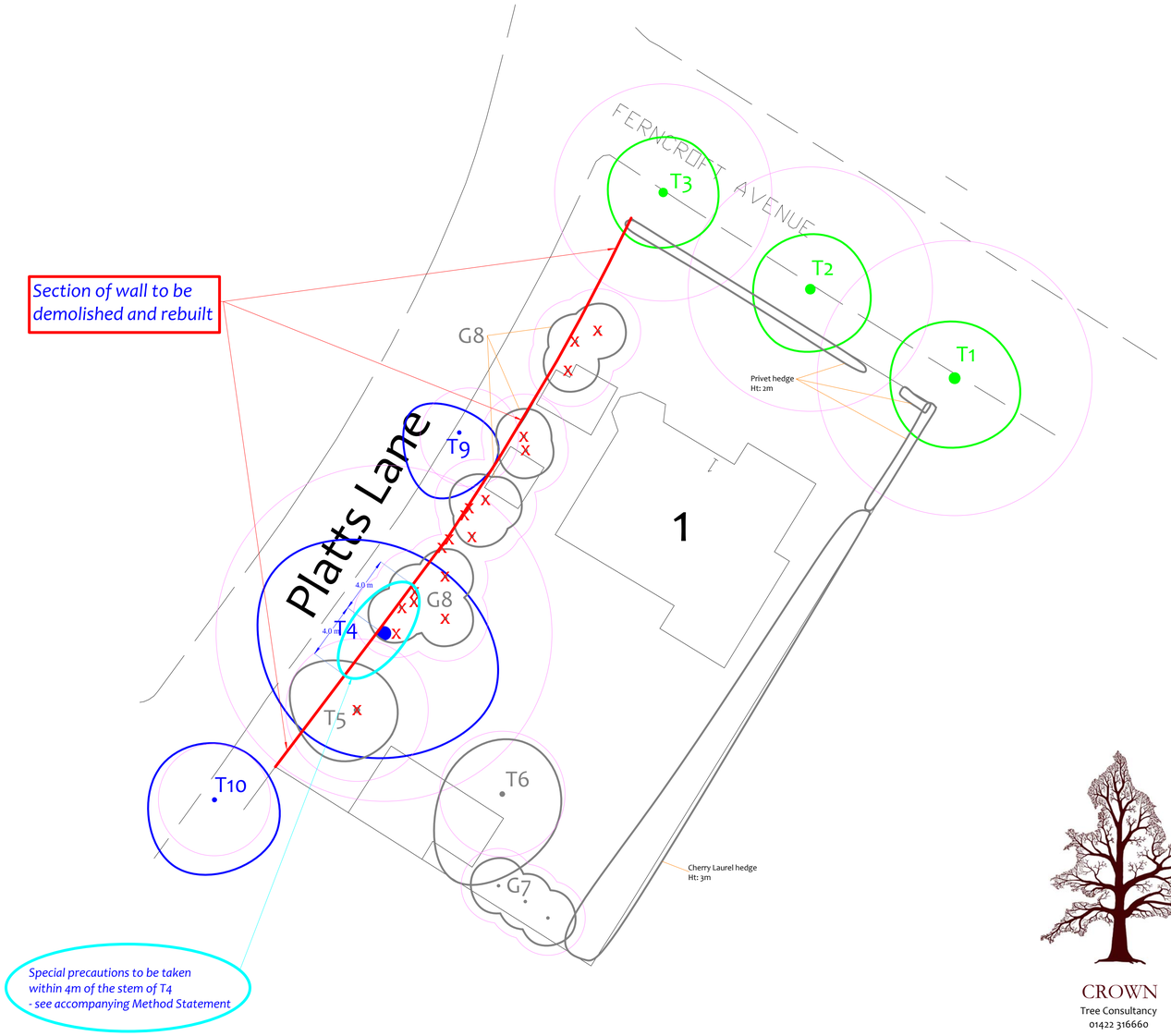

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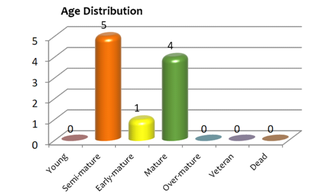

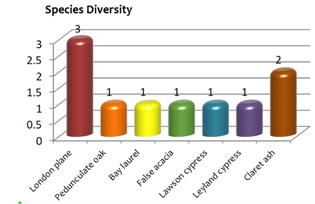

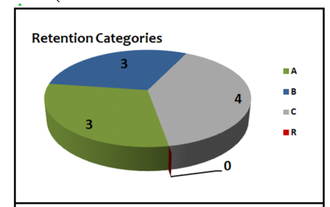

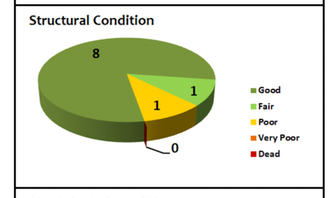

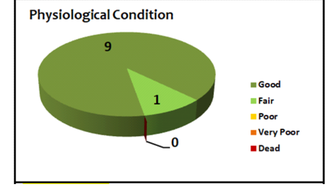

Aerial Imagery of the site (Bing Maps)

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T3	Mature **London Plane** Platanus x hispanica.	12	5	64	4 4 4 4	15 1	Position: Street tree. Form: Multi-stemmed at 4m with a balanced crown. History: Managed by cyclical reduction. **Defects: No significant defects observed.**	No action required.	n/a	Moderate	Good	High	40+ A
T4	Mature **Pedunculate Oak** Quercus robur.	17	4	99	6 9 9 9	15 1	Position: Adjacent west boundary. Form: Single stemmed and vertical with a well-formed crown. History: No evidence of significant pruning. **Defects: Major hollow at stem base.**	Decay detection required.	High 0.5	High Good	Poor	High	10-20 B
T5	Early-Mature **Bay Laurel** Laurus nobilis.	9	3-5	42	3 5 3 4	15 1	Position: Adjacent rear boundary. Form: Multi-stemmed at ground level with a slightly unbalanced crown. History: No evidence of significant **pruning.** Other: **Growing into the** canopy of T4. Recorded stem diameter is equivalent for 4 stems (33cm, 15cm, 15cm, 16cm).	No action required.	n/a	Moderate	Good	Low	20-40 Fair C
T6	Semi-Mature **False Acacia** Robinia pseudoacacia.	13	3	37	4 4 4.5 7	15 1	Form: Single stemmed and vertical with a balanced crown. History: No evidence of significant pruning. **Defects: No significant defects observed.** Other: Sparse canopy.	No action required.	n/a 1.5	Moderate	Fair Good	Low	20-40 C
G7	Semi-Mature **Lawson Cypress** Chamaecyparis lawsoniana.	av 5	av 1	av 22	av 2 2 2 each	15 1	Form: Row of three. History: No evidence of significant pruning. **Defects: No significant defects observed.**	No action required.	n/a	High	Good	Low	40+ Good C
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T9	Semi-Mature **Claret Ash** Fraxinus angustifolia 'raywood'	9	3	29	1.5 4.5 2.5 5	15 1	Position: Street tree. Form: Twin-stemmed at 3m with a compact crown. History: No evidence of significant pruning. **Defects: No significant defects observed.**	No action required.	n/a	Moderate	Good	Moderate	40+ Good B
T10	Semi-Mature **Claret Ash** Fraxinus angustifolia 'raywood'	9	3	33	4 4.5 5 5.5	15 1	Position: Street tree. Form: Twin-stemmed at 4m with a well-formed crown. History: No evidence of significant pruning. **Defects: No significant defects observed.**	No action required.	n/a	High	Good	Moderate	40+ Good B

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Drawing No:	CCL 10303 / IAP Rev: 1
Title:	Impact Assessment Plan (Existing Layout with Proposals Overlaid)
Site:	1 Ferncroft Avenue NW3 7PG
Scale:	1:200 Paper Size: A1

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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.
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Impact Assessment Plan

(Existing Layout with Proposals Overlaid)

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

X Tree to be removed due to its low quality

Proposed pruning

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.

Arboricultural Method Statement

CROWN Tree Consultancy 08000 14 13 30

Site: 1 Ferncroft Avenue, NW3 7PG

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

Date: 10 / 05 / 2019 | Revision: 1 | CCL ref No: 10303

Client: Space Construction Ltd

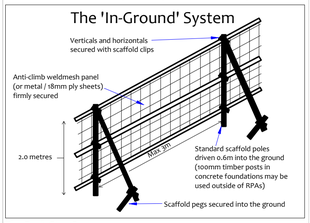
Tree Protection Barriers

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.

The In-Ground System

This system may be installed where indicated by a solid purple line on the Tree Protection Plan. It should be robust enough to withstand occasional knocks by plant machinery and, once installed, shall remain in place throughout the entire construction phase.

Vertical scaffold poles are driven into the ground, onto which are affixed horizontal scaffold poles and diagonal bracing struts. Weldmesh panels (or similar – e.g. Heras type fencing panels, or 18mm+ plywood boards) are secured to this scaffold framework using sturdy clips e.g. standard scaffold clips. The system is illustrated in the diagram to the right and is based on BS 5837 guidelines.

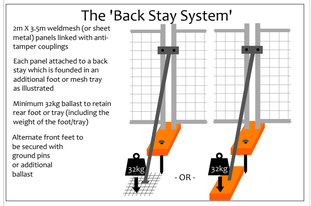


The Back-Stay System

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.

Within this system, weldmesh fencing panels (minimum height 2m) are affixed into rubber or concrete feet and clipped together with anti-tamper couplers. 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.

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.



Notices

Suitable weather-proof notices should be displayed to identify tree protection zones. They should state the purpose of the fencing and that it should not be moved, or traversed, other than by authorised personnel.

Ground Protection Measures

Within Restricted Activity Zone A, soils containing roots may be subject to compaction due to general construction activity (including pedestrian activity). In order to minimise compaction, it is proposed to ensure that a suitable load-spreading surface is in place at all times that any activities are occurring in this zone.

Since only pedestrian traffic will occur, the ground protection measures may be as simple as timber boards, or scaffold planks installed directly onto the ground. Alternatively the boards may be supported by a scaffold framework. The scaffold may be founded on poles driven into the ground and/or onto blocks (to raise the scaffold) with additional couplings to make the framework secure.

Where only barrows are to operate, thick wooden boards or scaffold planks should also suffice.

The ground protection measures shall be installed and approved before any activities occur within this zone including storage of spoil or materials.

Construction Exclusion Zones

Within Construction Exclusion Zones 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 under the header -*Tree Protection Barriers*.
- These shall remain in place at all times except when authorised landscaping works are being undertaken. At such times, all restrictions that apply to the *Restricted Activity Zone* shall apply. Furthermore, the project arborist shall be informed prior to any works being undertaken in these zones.
- No construction activity or excavation shall occur unless agreed otherwise by the project arborist and local authority.
- 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 shall occur.
- No chemicals or cement washings permitted.
- No temporary structures shall be installed.
- No spoil shall be stored.
- No fires shall be permitted.
- All hazardous materials (including non-essential cement products) shall be forbidden.
- Removal of hard surfaces, structures or turf shall be done using hand operated tools only and supervised by the project arborist.

Restrictions in Specific Zones

Restricted Activity Zone A

Within this zone trees roots are likely to be present where access will be required to facilitate construction. The following restrictions shall apply:

- No vehicles or plant machinery shall park or operate unless a suitable load spreading surface is in place. The load spreading surface shall be installed and/or maintained as specified under the heading **Ground Protection Measures**. This shall remain in place throughout the entire construction phase or until any new permanent hard surfacing is installed. Any pedestrian activity other than very occasional shall also require a suitable load spreading surface.
- Storage of materials and spoil shall be avoided unless it has been agreed with the project arborist that the ground protection measures are adequate to ensure no soil compaction or contamination occurs. All hazardous materials (including cement products) shall be forbidden.
- No excavation or ground disturbance shall occur whatsoever.
- No new permanent or temporary structures shall be erected other than those shown on the planning application documents unless approved by the local authority.

Restricted Activity Zone B

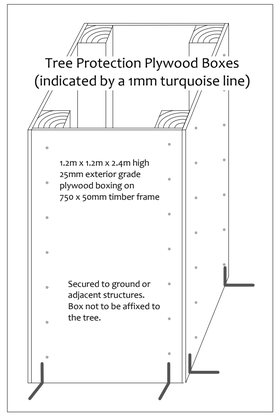
This zone encompasses the wall and foundation to a distance of 4m either side of the oak, T4. In order to minimise the impact on roots, the following restrictions shall apply:

- All operations in this zone shall be overseen by the project arborist.
- The existing masonry shall be retained intact until all foundations have been installed on either side of this zone.
- Only hand tools shall be used to demolish the masonry.
- Soils and roots behind the wall shall be retained undisturbed.
- The project arborist, in conjunction with the structural engineer, shall determine where strengthening pillars may be installed (these will be positioned to avoid significant root disturbance).
- The existing foundations shall be retained intact and strengthened with screw piles drilled through. Additional beams or reinforced concrete may be applied above the foundation if desired.
- In order to re-stabilise the tree and the ground, the new wall shall be built as soon as reasonably possible after the strengthening of the foundations.
- The works should be carried out over as short a timescale as practicable and during times when no strong winds are forecast.
- Any gaps between the rear face of the wall and the retained soil shall be filled with soil or expanded polystyrene (Claymaster™ or similar). The project arborist in conjunction with the structural engineer shall determine where expanded polystyrene may be installed.
- If roots in excess of 25mm diameter are exposed, they shall be retained intact and protected with damp hessian sacking or similar during times that they are exposed. Any smaller roots that need to be severed shall be pruned with secateurs.

Tree Protection Barriers - Continued

Stem Protection – Timber Boxing

Where indicated by a turquoise square on the Tree Protection Plan, it shall be necessary to install robust plywood boxing to protect a tree stem. The plywood boxing specification is indicated in the diagram below. The actual size of the plywood boxing shall be determined by the extent of the basal flare at the base of each stem. The box shall be large enough to avoid contact with any part of the tree that it surrounds. No fixings shall be attached to any part of the tree. Instead, it shall be free standing or attached to the ground or adjacent structures (e.g. walls or fences). It shall be made firm enough to withstand occasional knocks from any plant machinery that may be operate in its vicinity.



Removal of Tree Protection Barriers

Removal of protective fencing or ground protection measures shall be done after all major construction work is complete and their removal has been approved by the appointed arborist.

Tree Works Specification

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

Tree Reference	Action Required	Notes
T5, G8	Remove.	Stumps of trees within the RPAs of retained trees shall be removed with a stump grinder NOT a mechanical excavator.

General Restrictions - Throughout the Site

Preparatory Works

No demolition, removal of surfaces, or soil stripping shall commence until the protective fencing and ground protection measures are installed to the satisfaction of the local authority.

Fires

No fires shall be permitted beneath any tree canopy or within 5m of any tree stem, branch or foliage. No fires shall be permitted within any Construction Exclusion Zone or Restricted Activity Zone. No fires shall be permitted in the vicinity of any exposed tree roots.

Canopy Protection

In order to protect tree canopies the following restrictions shall apply throughout the site:

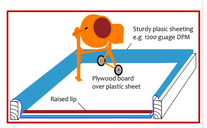
- No machinery in excess of 2m shall pass beneath the canopy of any tree without being carefully marshalled in order to ensure that no branches are damaged.
- If materials require installation or delivery beneath tree canopies, this shall be done without the use of overhead cranes.
- If materials are 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.

Storage of Spoil and Materials

Storage of materials and spoil shall be avoided in any Construction Exclusion Zones and Restricted Activity Zones unless it has been agreed with the project arborist that the ground protection measures are adequate to ensure no soil compaction or contamination occurs. All hazardous materials (including non-essential cement products) shall be forbidden.

Hazardous Materials

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.



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.

Underground Services

No underground services (including soak-aways) shall be located in any part of the Construction Exclusion Zones or Restricted Activity Zones unless done so in a manner detailed in a specific Method Statement and approved by the local authority.

Site Hoarding

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 of Root Protection Areas.
- 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).

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.

Siting of Cabins

Cabins shall be located outside of Construction Exclusion Zones and Restricted Activity Zones unless agreed otherwise by the project arborist. Where this is being considered, the project arborist shall be consulted and specific tree protection measures agreed. The following general restrictions will apply:

- All services to and from site cabins shall be installed above ground through any Root Protection Areas.
- No excavation shall occur within Root Protection Areas to enable cabins to be installed.
- The cabins shall be founded on a suitable load spreading surface.

Fence Posts or Decking Posts

If permanent fencing or decking 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.

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

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

Timing of Operations

Activity within the site shall be phased according to the following chronology

Order	Phase	Activity
1st.	Pre-Construction Phase	Planning conditions relating to trees to be identified and discussed with the Project arborist and site manager.
2nd.		All specified tree removal and pruning to be undertaken (see Header -*Tree Works Schedule*).
3rd.		Install the tree protection barriers (fencing and ground protection boards - see Headers -*Tree Protection Barriers* and *Ground Protection Measures*).
4th.		Pre-Commencement site meeting: Tree protection barriers inspected. Additional protection measures to be agreed. Variances to be agreed Scope of future inspections / monitoring to be agreed.
5th.		Arboricultural Method Statement to be revised and approved if required.
		Protection measures confirmed acceptable by the local authority
6th.	Construction Phase	Demolish the wall except within 4m of T4. Install new foundations.
7th.		Demolish and rebuild the wall within 4m of T4, taking into account restricted activities as specified in Restricted Activity Zone B.
8th.		Rebuild the rest of the wall and install new fencing.
9th.	Post-Construction Phase	Remove protective barriers (fencing and ground protection measures as applicable).

Site Monitoring Accountability

This table should be completed at the Pre-Start Meeting or earlier

Position	Name	Contact Phone & email	Roles
Project Manager	Insert Details	Insert Details	Liaising with site manager & project arborist regarding any potential issues relating to trees. Oversight of this monitoring schedule. Instructing the project arborist and arranging access. Liaising with local authority regarding discharge of planning conditions and variances to the Arboricultural Method Statement.
Site Manager	Insert Details	Insert Details	Familiarity with Arboricultural Method Statement. Implementation of the tree protection measures. Day-to-day compliance with Tree Protection Measures. Informing the Project Manager of Tree Protection variances & issues affecting trees.
Project Arborist	Crown Tree Consultancy	08000 14 13 30 0203 797 7449 Info@crowntrees.co.uk	Inspect tree works and report to the project manager. Inspect tree protection measures and report to Project Manager. Oversee excavations in RPAs, provide mitigation advice, undertake root pruning. Monthly site monitoring and reporting to the Project Manager on tree protection and variances.
Local Authority	London Borough of Camden	0207 974 4444	Liaising with the project arborist and project manager regarding tree protection issues relating to planning conditions. Advice and assistance with the discharge of planning conditions relating to trees.
Additional Contact	Insert Details	Insert Details	Insert Details
Additional Contact	Insert Details	Insert Details	Insert Details

Site Monitoring Schedule

Inspection	Site Attendees	Comments
Pre- Start Desk-top To occur prior to any works taking place on the site.	N/A.	Project Manager and Site manager to study this Method Statement & contact the Project Arborist to agree all protection measures.
Pre-Start Meeting After tree works completed & tree protection barriers / ground protection measures installed. Prior to any other activity, inc. demolition & soil stripping.	Site manager, project arborist. Tree Officer invited.	Tree protection fencing locations & specification checked. Additional ground protection measures checked. Further protection measures / restrictions agreed.
All works within Restricted Activity Zone B Including demolition, foundation strengthening and rebuilding.	Site manager, project arborist. Tree Officer invited.	Two week's notice to be given prior to works. Works to be as specified in this Method Statement. Works to be recorded and photographed. Mitigation measures to be employed wherever specified by the project arborist.
Intermediate Inspection and Reporting Throughout the demolition and external construction phase.	Site manager and project arborist.*	Project manager, site manager and project arborist to liaise regarding any issues which may affect trees. To occur at least once per month.
Post-Construction Meeting Post external construction activity but prior to removal of fencing & landscaping operations.	Site manager, project arborist. Tree Officer invited.	Retained trees inspected. Ground conditions assessed and mitigation measures agreed where appropriate. Further landscaping operations and restrictions to be agreed.

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

Tree Data Schedule

Reference (T = Tree, G = Group, H = Hedge)	Age & Species	Height (m)	Crown Clt (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	Mature **London Plane** *Platanus x hispanica.*	10	4-5	81	4.5	4	5	5	15 1	Position: Street tree. Form: Multi-stemmed at 4m with a balanced crown. History: Managed by cyclical reduction. **Defects: No significant defects observed.**	No action required. n/a	3	Moderate Good	Good	High 40+	A
T2	Mature **London Plane** *Platanus x hispanica.*	10	5	72	4 4.5	4	4.5		15 1	Position: Street tree. Form: Multi-stemmed at 4m with a balanced crown. History: Managed by cyclical reduction. **Defects: No significant defects observed.**	No action required. n/a	3	Moderate Good	Good	High 40+	A
T3	Mature **London Plane** *Platanus x hispanica.*	12	5	64	4	4	6	4	15 1	Position: Street tree. Form: Multi-stemmed at 4m with a balanced crown. History: Managed by cyclical reduction. **Defects: No significant defects observed.**	No action required. n/a	3	Moderate Good	Good	High 40+	A
T4	Mature **Pedunculate Oak** *Quercus robur.*	17	4	99	9	9	9	9	15 1	Position: Adjacent west boundary. Form: Single stemmed and vertical with a well-formed crown. History: No evidence of significant pruning. **Defects: Major hollow at stem base.**	Decay detection required. High	0.5	High Good	Poor	High 10-20	B
T5	Early-Mature **Bay Laurel** *Laurus nobilis.*	9	3.5	43	5	3	4	3	15 1	Position: Adjacent rear boundary. Form: Multi-stemmed at ground level with a slightly unbalanced crown. History: No evidence of significant pruning. Other: **Growing into** the canopy of T4. Recorded stem diameter is equivalent for 4 stems (33cm, 15cm, 15cm, 16cm).	No action required. n/a	3	Moderate Good	Fair	Low 20-40	C
T6	Semi-Mature **False Acacia** *Robinia pseudoacacia.*	13	3	37	4	4	4.5	3	15 1	Form: Single stemmed and vertical with a balanced crown. History: No evidence of significant pruning. **Defects: No significant defects observed.** Other: Sparse canopy.	No action required. n/a	1-5	Moderate Fair	Good	Low 20-40	C
G7	Semi-Mature **Lawson Cypress** *Chamaecyparis lawsoniana.*	av 5	av 1	av 22	av 2	2	2	2 each	15 1	Form: Row of three. History: No evidence of significant pruning. **Defects: No significant defects observed.**	No action required. n/a	3	High Good	Good	Low 40+	C
G8	Semi-Mature **Leyland Cypress** *X Cupressocyparis leylandii.*	av 7.5	av 2	av 25	av 2	2	2	2 each	15 1	Position: Adjacent west boundary. Form: Group of seventeen trees. All Single stemmed and vertical with a narrow, upright habit. Stem diameters range from 8cm to 39cm. History: No evidence of significant pruning. **Defects: No significant defects observed.**	No action required. n/a	3	High Good	Good	Low 10-20	C
T9	Semi-Mature **Claret Ash** *Fraxinus angustifolia 'Raywood'.*	9	3	29	4.5	4.5	3.5	5	15 1	Position: Street tree. Form: Twin-stemmed at 3m with a compact crown. History: No evidence of significant pruning. **Defects: No significant defects observed.**	No action required. n/a	3	Moderate Good	Good	Moderate 40+	B
T10	Semi-Mature **Claret Ash** *Fraxinus angustifolia 'Raywood'.*	9	3	33	4.5	4	5	5.5	15 1	Position: Street tree. Form: Twin-stemmed at 4m with a well-formed crown. History: No evidence of significant pruning. **Defects: No significant defects observed.**	No action required. n/a	3	High Good	Good	Moderate 40+	B

Tree Protection Plan

CROWN Arboricultural Consultants 01422 316660

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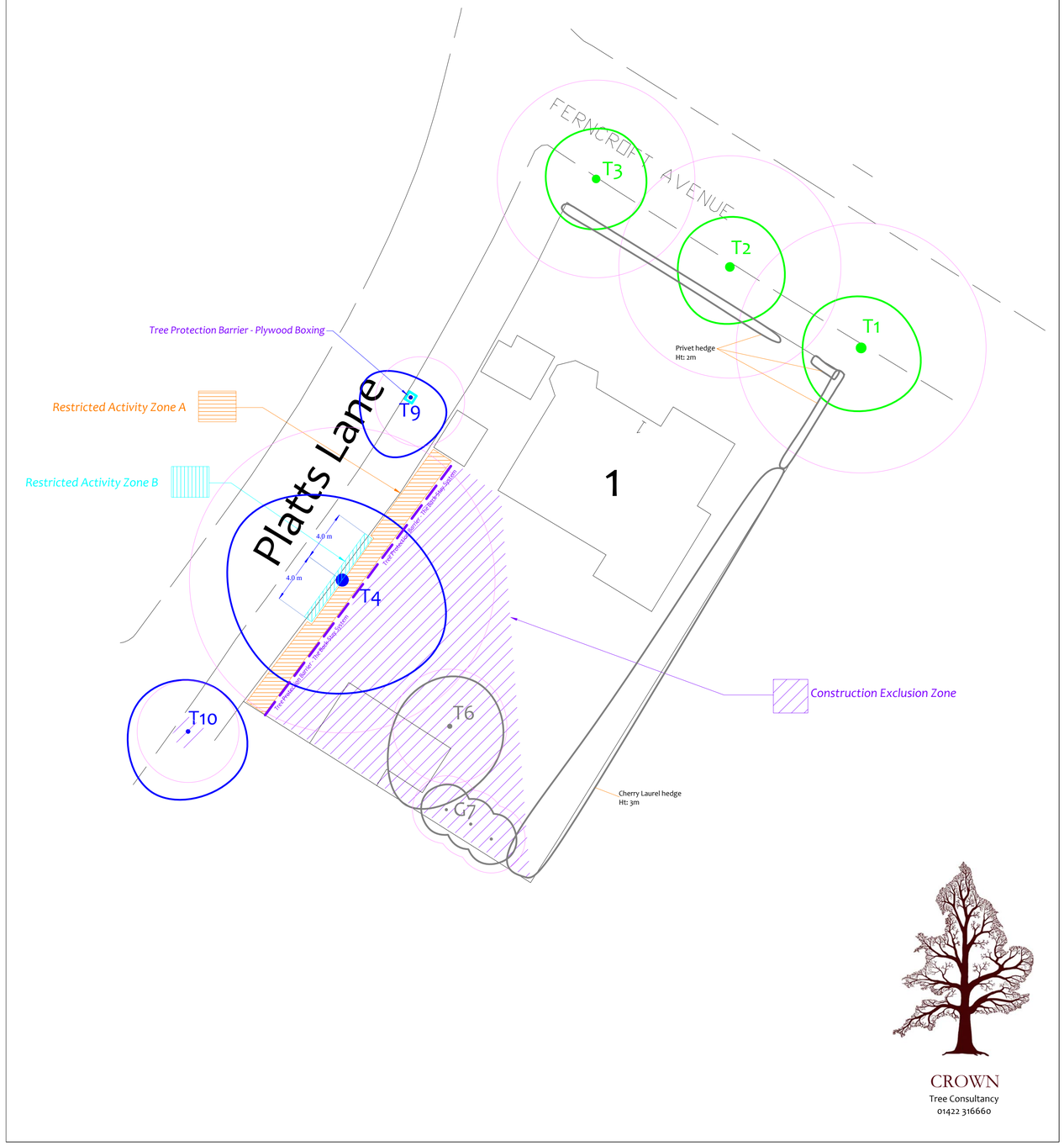

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