

BS 5837 Arboricultural Report

Impact Assessment & Method Statement



at

**25 Leyborne Park
London
TW9 3HB**



**Dated
30th July 2021**



CROWN
Tree Consultancy

Branching out through England and Wales



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1. Introduction

1.1. Instruction

1.1.1. We are instructed by Noel Duigan to:

- Undertake an Arboricultural Survey at 25 Leyborne Park 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. 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 the project architect and structural engineer 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 6th July 2021 by Joe Taylor. 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 tree locations shown on the accompanying plans which are reproduced in Appendix 6 have been plotted according to measurements taken on site.

1.4.3. 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.



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Arboricultural Report to BS 5837: 2012 for: Noel Duigan

Crown Ref: 10872

Site: 25 Leyborne Park, London

Author: Emma Hoyle

Date: 30th July 2021

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. Author

1.5.1. This report was compiled by Emma Hoyle FDS (Arboriculture), ED (Forestry & Arboriculture), M. Arbor. A. Details of the author's experience that qualify her to produce such a report are detailed in Appendix 4.



2. Site Overview

2.1. Brief Description

- 2.1.1. Number 25 Leyborne Park is a semi-detached, residential property with gardens to front and rear. Within the public footway to the front of the site the site is a Retention Category C street tree (T1).
- 2.1.2. The larger rear garden is occupied by soft ground and pedestrian paving. A single-storey outbuilding is located at the rear of the garden.
- 2.1.3. Within the rear garden grow five Retention Category C trees (T2, T3, T4, T5 and T6) and a Retention Category B tree (T7) grows at the very rear of the garden between the existing outbuilding and rear boundary fence.
- 2.1.4. The site is a rectangular plot measuring approximately 44m by 6m and is approximately flat with no abrupt level changes.
- 2.1.5. 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°28'46.25"N 0°17'5.03"W

2.3. Survey Extent

- 2.3.1. The area indicated below¹ shows the extent of the survey.



¹ 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. The following recommendations are made in order to maintain the trees in an acceptable condition:

3.1.2. The stem of the mature Sycamore, T7, was inaccessible during our survey. Whilst no significant defects were observed from within the garden of the property or the public footpath to the rear of the site, we recommend that access is arranged so the trees lower stem may be inspected for any defects.

3.1.3. 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	T7
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	None
1	T1 and T7
1.5	None
3	T2, T3, T4, T5 and T6

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 6th July 2021, we were informed by Ghazala Sultan of London Borough of Richmond upon Thames that:

- The site lies within the **Kew Gardens Conservation Area**.
- There are no tree preservation orders affecting trees within the site.



3.4. Tree Protection – General Notes

- 3.4.1. Heavy fines exist for carrying out unauthorised works to protected trees so we advise that further checks are made before any tree-works are undertaken.
- 3.4.2. 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.
- 3.4.3. 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
Apple	6	8	Deciduous tree native across Europe and W. Asia. Hundreds of cultivars available due to its popular fruit. Flowers white, pink or red in spring. Some species will self pollinate. Most species have a relatively untidy habit. Older specimens are susceptible to a variety of rusts, moulds and cankers. Excellent habitat tree. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Malus+domestica for more info.
Cherry Laurel	10	8	Large evergreen shrub, native to Asia Minor to Iran, Bulgaria and Serbia. Bright, glossy green large leaves. White flowers in erect tails in mid spring and with black 15mm cherry-like fruits (toxic if eaten in bulk). Commonly planted as a hedge though it tends to sprawl. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Prunus+laurocerasus for more info.
Holly Oak	25	20	Also called Holm Oak or Evergreen Oak. So named because of its evergreen vaguely holly-like leaves. Originating in the Mediterranean region. Mulched leaves are said to repel slugs and grubs. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Quercus+ilex+ballota for more info.
Rowan	14	12	Deciduous tree native across Europe and N Africa. Also known as mountain ash due to its pinnate leaves and ability to grow at high altitudes. Attractive autumn colour and berries along with spring flowers. Good wildlife tree. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Sorbus+aucuparia for more info.
Sycamore	25	16	Deciduous tree native to S. Europe, widely naturalised in the UK. Often regarded as a weed species due to its invasive nature and ability to tolerate most conditions. Responds well to pruning. Not a good tree to park beneath in summer due to the sticky sap secreted by aphids. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Acer+pseudoplatanus for 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. Overview

4.1.1. It is proposed to demolish the existing outbuilding, construct a new outbuilding and install a rear extension to the existing dwelling as indicated on the plans in Appendix 6. The existing layout is indicated in black, and the footprint of the proposed layout is indicated in green.

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

Activity	Trees Potentially Affected
Tree Removal	None
Tree Pruning	None
RPA: Outbuilding Foundations	T7
RPA: Rear Extension Foundations	None
RPA: Other Foundations	None
RPA: New Hard Surface	None
RPA: Replace Existing Hard Surface	None
RPA: Underground Services	Unknown – To be confirmed
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. No trees require removal to facilitate the development.

4.3. Impact on Tree Canopies

4.3.1. No canopy pruning is necessary to facilitate the proposed outbuilding. However, restrictions are placed on activities throughout the site to ensure that no canopies are accidentally damaged – see the accompanying Arboricultural Method Statement.

4.4. Impact on Tree Roots

4.4.1. Building Foundations:

4.4.2. The new outbuilding is to be located no closer to the stem of T7 than the existing building sits and less than 2% of the outer portion of the RPA of T7 shall be affected by foundations for the new building. Consequently, the potential impact upon T7 shall be minor. In order to ensure impact is kept to a minimum, the following restrictions are proposed:

- Ground beams are to be installed.
- Excavation shall be limited to a maximum depth of 200mm to facilitate the ground beams and shall be overseen by the project arborist.



- Only hand tools shall be used during the excavation.
- The beams are to be supported on narrow screw piles. Before installing such piles, their location shall be determined by trial pits excavated to a depth of 600mm using hand tools. Trial pit dimensions should not exceed 300mm x 300mm. If any roots in excess of 30mm diameter are encountered, the pile shall be relocated.

4.4.3. By adopting such a sympathetic method of installation, it will be possible to retain all significant roots and ensure that the root system will be able to supply the canopy with the required water and nutrients. Hence, it is considered that the proposal shall not result in any long term detrimental impact on the health of T7.

4.4.4. **New Surfaces:**

4.4.5. No new hard surfacing is proposed in any area where there currently exists soft ground.

4.4.6. **Underground Services:**

4.4.7. No underground services should be installed through any Root Protection Area without consulting the project arborist and if necessary, gaining approval from the local authority.

4.4.8. **Changes in Ground Levels:**

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

4.4.10. **Soil Compaction:**

4.4.11. Geological maps (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>) indicate that the underlying geology of the area is clay (London Clay). This means that soils throughout the site are likely to be susceptible to compaction and the root systems are likely to be relatively shallow.

4.4.12. 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.



4.4.13. 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.

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

4.5. **Demolition Activities**

4.5.1. The tree protection measures specified within the accompanying Arboricultural Method Statement should be installed prior to the commencement of all demolition activities (including soil stripping) to prevent any detrimental impact on tree health.

4.5.2. In order to avoid inadvertent damage to roots, branches or stems, care shall need to be taken when demolishing the existing outbuilding. Foundations/surfaces should be



carefully lifted and walls should be demolished inwards onto the existing building footprint.

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. Consideration should be given to the location of any site welfare facilities in terms of potential impact on trees. Where it is proposed to install cabins or site facilities in Root Protection Areas, the project arborist should be consulted and approval obtained from the local authority.

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

4.8. Boundary Treatments

4.8.1. We are not aware of any changes are proposed to the existing boundary features that might impact on trees.

4.9. Impact of Retained Trees on the Development

4.9.1. The proposal does not alter the current juxtaposition between trees and buildings so there shall be no post-development pressures to overly-prune or remove them.

4.9.2. The outbuilding is not considered to be a living space, so the shade cast by the trees is not considered to be relevant from a planning perspective.

4.9.3. The foundations and any new surfaces should be designed to accommodate all potential impacts due to future tree rooting activity. These include potential vegetation related subsidence, vegetation related heave, and lifting of surfaces / light structures due to direct root pressure.

4.9.4. The gutters will need occasional maintenance to avoid blockage from leaves. This will be relatively easy to manage as the proposal is a single storey building.

4.10. Summary

4.10.1. The proposal seeks to retain all of the vegetation surveyed.

4.10.2. No pruning works are required to enable the proposal.

4.10.3. No new hard surfacing is proposed in Root Protection Areas.

4.10.4. Foundations are proposed within the Root Protection Area of several trees. However, the small extent of RPA affected coupled with the sympathetic foundation design shall ensure no detrimental impact on trees.

4.10.5. Suitable protection measures are specified in the accompanying Arboricultural Method Statement ref CCL/10872.



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Arboricultural Report to BS 5837: 2012 for: Noel Duigan

Crown Ref: 10872

Site: 25 Leyborne Park, London

Author: Emma Hoyle

Date: 30th July 2021

5. Photographs

Photo 1.



Photo 2.



Photo 3.



Photo 4.



Photo 5.



Photo 6.





Appendix 1: BS 5837: 2012 – Guidance Notes

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

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

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

A1.1 Stage 1: Survey Details and Notes

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. These are denoted as a circle-segment drawn northwest to due east with a radius equal to the height of the tree. These do not represent the actual shade pattern which varies through the seasons. Rather, they indicate the area most shaded by the tree throughout the course of the year. Ideally habitable room windows should be located outside of these shade constraints. Where we consider it appropriate, we will include shade constraints information on our Impact Assessment Plan or Proposed Layout Plan.

A1.2 Stage 2: Arboricultural Impact Assessment

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

A1.3 Stage 3: Arboricultural Method Statement

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



Appendix 2: Explanation of Tree Data & Glossary

This section explains the terms used in the **Tree Data Schedule** (see Section 3 and Appendix 6).

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

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.
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.
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.
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 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.
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.
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.
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.
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.
Limb	A large lateral branch growing from the main trunk or from another larger branch.
Lopping	In trees, a general term that related to the removal of branches from a tree.
Mycelium	A mass of growing filaments (hyphae) formed by fungi.
Mycorrhizae	The symbiotic relationship between roots and certain beneficial fungi. Mycorrhizae are the combined root / fungal growth.
Occluding tissue	The general term of wood, cambium and bark that develop around the site of a wound on a woody plant
Pathogen	A microorganism that causes diseases within another organism.
Phloem	The principle conductive tissue that the products of Photosynthesis are transported around the plant
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
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.
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.
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 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.
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.
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.
Suppressed	Trees which are dominated by surrounding vegetation and whose crown development is restricted from above.
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.
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 Preservation Order	In Great Britain, an order made by the local planning authority, where consent must be gained before undertaking all but exempt works to a tree.
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
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 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.

Ivan is a professional member of the Arboricultural Association, the International Society of Arboriculture and the Consulting Arborist Society

Ivan is trained and licensed in QTRA (Quantified Tree Risk Assessment). He has undertaken professional expert witness training provided by Bond Solon and has been registered as a Sweet and Maxwell Checked Expert Witness from 2008-2017, after which the service was no longer offered.

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, is a professional member of the Arboricultural Association and is a LANTRA accredited *Professional Tree Inspector*. 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](http://www.forestry.gov.uk/website/pdf.nsf/pdf/wgsfell.pdf/$FILE/wgsfell.pdf)

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

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

Communities and Local Government website with numerous downloadable documents, from:

<http://www.communities.gov.uk/planningandbuilding/planning/treeshighhedges/>

Lighting Levels

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

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

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

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

I.P. Duncan; D. Hawkes, *Passive solar design in non-domestic buildings*. *ETSU Report S-110*. Harwell, Energy Technology.

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

High Hedges

Communities and Local Government website with numerous downloadable documents, from:

<http://www.communities.gov.uk/planningandbuilding/planning/treeshighhedges/>

Tree Specific Websites

www.crowntrees.co.uk

Crown Consultants site containing useful information

www.trees.org.uk

Arboricultural Association

www.rfs.co.uk

Royal Forestry Society of England, Wales and N. Ireland

www.treehelp.info

The Tree Advice Trust

www.woodland-trust.org.uk

The Woodland Trust

www.treecouncil.org.uk

The Tree Council



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Arboricultural Report to BS 5837: 2012 for: Noel Duigan

Crown Ref: 10872

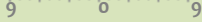







Site: 25 Leyborne Park, London

Author: Emma Hoyle

Date: 30th July 2021

Appendix 6: Tree Data Schedule, Site Plans & Arboricultural Method Statement.

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) 	Notes	Recommendations (Independent of any development proposals)		Vigour		Amenity Value	
								Priority	Inspect Freq (yrs)	Physiological Condition		Life Expectancy (yrs)	
										Structural Condition	Retention Category		
T1	Semi-Mature Rowan <i>Sorbus aucuparia.</i>	3.5	2	11	2 1 2 1.5		Position: Street tree. Form: Multi-stemmed at 2m with an unbalanced crown. History: No evidence of significant pruning. Defects: Minor bark wounding to lower stem. Minor die back to upper canopy. Other: Acceptable condition at present.	No action required.	Low Poor Fair	High 10-20 C			
T2	Semi-Mature Holly Oak <i>Quercus ilex.</i>	5	1	19	2 2 3 2		Form: Multi-stemmed at 1m with a balanced crown. History: Topped at 2m. Defects: No significant defects observed.	No action required.	High Good Good	Low 40+ C			
T3	Early-Mature Apple <i>Malus domestica.</i>	3.5	1.5	23	3.5 1 3 2		Form: Multi-stemmed at 1.5m with an unbalanced crown. History: Multiple pruning wounds due to crown reduction. Defects: No significant defects observed.	No action required.	Moderate Fair Fair	Low 10-20 C			
T4	Mature Pittosporum <i>Pittosporum sp.</i>	6.5	1.5	31	2 3 2 3		Form: Multi-stemmed at 0.5m with a balanced crown. History: Topped at 5m. Defects: Minor included bark to stem unions (acceptable condition at present). Other: Four stem diameters measured at 20cm, 15cm, 15cm and 10cm.	No action required.	High Good Fair	Low 10-20 C			
T5	Young Holly Oak <i>Quercus ilex.</i>	5.5	2	14	3.5 2 2.5 1		Form: Single stemmed and leaning with an unbalanced crown. History: No evidence of significant pruning. Defects: No significant defects observed.	No action required.	High Good Good	Low 40+ C			
T6	Semi-Mature Cherry Laurel <i>Prunus laurocerasus.</i>	3	2	11	2 1 2.5 1.5		Form: Twin-stemmed at ground level with an unbalanced crown. History: Topped at 2.5m. Defects: No significant defects observed. Other: Two stem diameters measured at 7cm and 9cm.	No action required.	High Good Good	Low 20-40 C			
T7	Mature Sycamore <i>Acer pseudoplatanus.</i>	16	4	70	6 2 8 5.5		Position: Situated between outbuilding and rear boundary fence. Form: Multi-stemmed at 5m with an unbalanced crown. History: Eastern canopy reduced back close to site boundary. Defects: No significant defects observed. Other: Cannot access tree (limited inspection, dimensions estimated).	Arrange access and re-inspect.	Moderate Good Fair	Low 20-40 B			

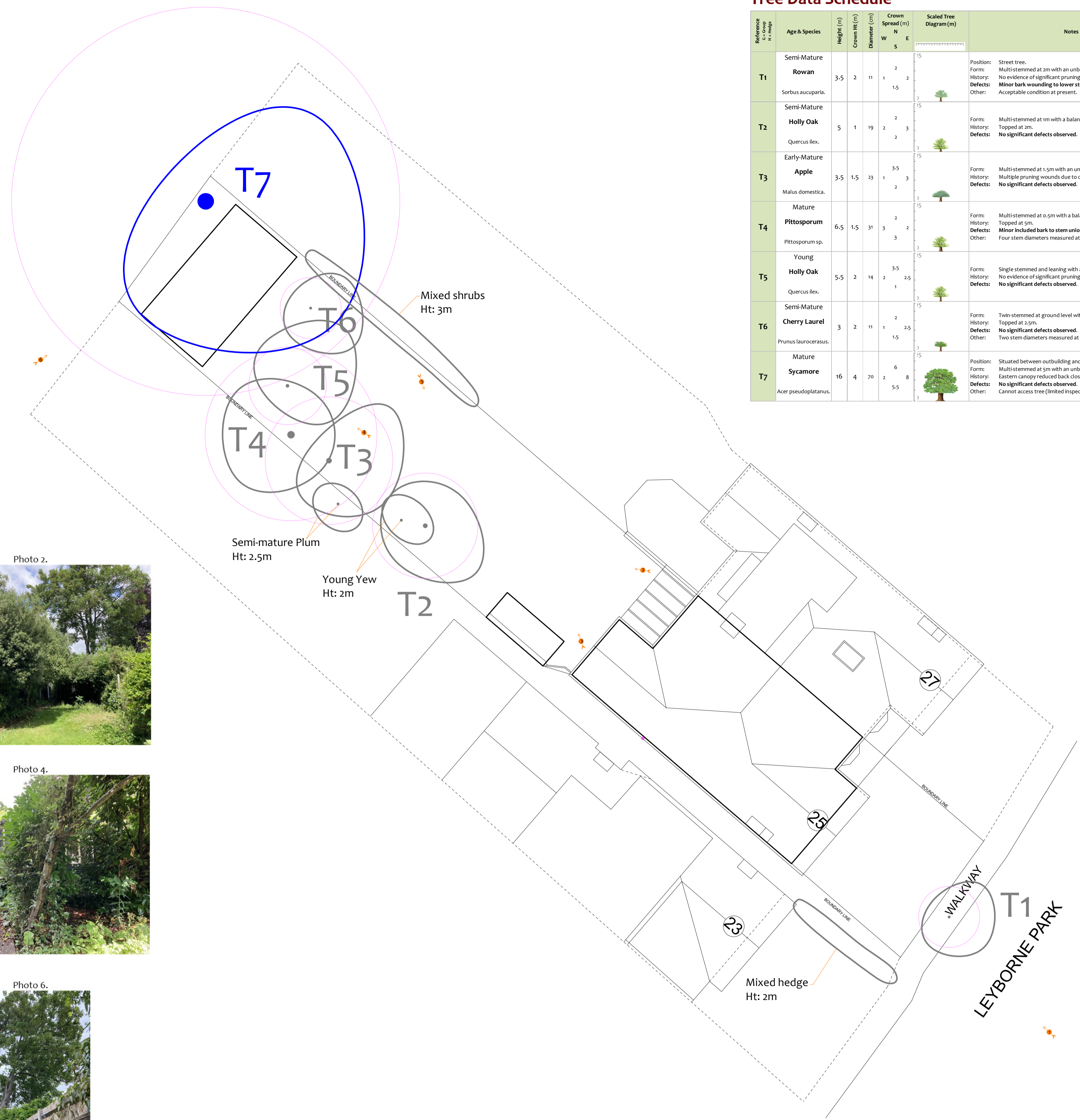


Tree Constraints Plan

(Existing Layout)

Tree Data Schedule

Reference No.	Age & Species	Height (m)	Crown Spread (m)			Scaled Tree Diagram (m)	Notes	Recommendations		Vigour	Life Expectancy (yrs)	Retention Category
			W	E	N			Priority	Inspection Fees (est)			
T1	Semi-Mature Rowan <i>Sorbus aucuparia</i>	3.5	2	11	2		Position: Street tree. Form: Multi-stemmed at 2m with an unbalanced crown. History: No evidence of significant pruning. Defects: Minor bark wounding to lower stem. Minor die back to upper canopy. Other: Acceptable condition at present.	No action required.	Low	High	10-20	C
T2	Semi-Mature Holly Oak <i>Quercus ilex</i>	5	1	19	2		Form: Multi-stemmed at 1m with a balanced crown. History: Topped at 2m. Defects: No significant defects observed.	No action required.	High	Low	40+	C
T3	Early-Mature Apple <i>Malus domestica</i>	3.5	1.5	23	3.5		Form: Multi-stemmed at 1.5m with an unbalanced crown. History: Multiple pruning wounds due to crown reduction. Defects: No significant defects observed.	No action required.	Moderate	Low	10-20	C
T4	Mature Pittosporum <i>Pittosporum sp.</i>	6.5	1.5	31	3		Form: Multi-stemmed at 0.5m with a balanced crown. History: Topped at 5m. Defects: Minor included bark to stem unions (acceptable condition at present). Other: Four stem diameters measured at 20cm, 15cm, 15cm and 10cm.	No action required.	High	Low	10-20	C
T5	Young Holly Oak <i>Quercus ilex</i>	5.5	2	14	2.5		Form: Single stemmed and leaning with an unbalanced crown. History: Topped at 5m. Defects: No significant defects observed.	No action required.	High	Low	40+	C
T6	Semi-Mature Cherry Laurel <i>Prunus laurocerasus</i>	3	2	11	2		Form: Twin-stemmed at ground level with an unbalanced crown. History: Topped at 2.5m. Defects: No significant defects observed. Other: Two stem diameters measured at 7cm and 9cm.	No action required.	High	Low	20-40	C
T7	Mature Sycamore <i>Acer pseudoplatanus</i>	16	4	70	2		Position: Skewed between outbuilding and rear boundary fence. Form: Multi-stemmed at 5m with an unbalanced crown. History: Eastern canopy reduced back close to site boundary. Defects: No significant defects observed. Other: Cannot access tree (limited inspection, dimensions estimated).	Arrange access and re-inspect.	Moderate	Low	20-40	B



Photographs



Tree Constraints Plan

Drawing No: CCL 10872 / TCP Rev 1
 Title: Tree Constraints Plan (Existing Layout)
 Site: 25 Leyborne Park
 Scale: 1:100 Paper Size: A1

Tree Retention Categories

- Category A tree
- Category B tree
- Category C tree
- Category U tree

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BS 5837 Root Protection Area (radius = 1xstem diameter)
 Root Protection Area needing amendment due to site conditions, e.g. presence of existing road or building.
 Root Protection Area having been amended to account for site conditions

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

Photo 1
 MN = Measured North
 Canopy spreads are sometimes measured to an approximate N defined by site features. Often more accurate, especially where rows of trees are not aligned N-S or E-W.

Tree Ref.	Species	Height (m)	Root Protection Area	
			Radius (m)	Square (m)
T1	Rowan	3.5	1.5	2.3
T2	Holly Oak	5	2.3	16
T3	Apple	3.5	2.8	24
T4	Pittosporum	6.5	3.7	43
T5	Holly Oak	5.5	1.7	9
T6	Cherry Laurel	3	1.3	5
T7	Sycamore	16	8.4	222

Excerpts from the Arboricultural Impact Assessment

Overview

It is proposed to demolish the existing outbuilding, construct a new outbuilding and install a rear extension to the existing dwelling as indicated on the plans in Appendix 6. The existing layout is indicated in black, and the footprint of the proposed layout is indicated in green.

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

Activity	Trees Potentially Affected
Tree Removal	None
Tree Pruning	None
RPA: Outbuilding Foundations	T7
RPA: Rear Extension Foundations	None
RPA: Other Foundations	None
RPA: New Hard Surface	None
RPA: Replace Existing Hard Surface	None
RPA: Underground Services	Unknown - To be confirmed
RPA: Change of Ground Levels	None
RPA: Soil Compaction	Trees adjacent the construction area (Preventable by installing tree protection measures)

Tree Removal

No trees require removal to facilitate the development.

Impact on Tree Canopies

No canopy pruning is necessary to facilitate the proposed outbuilding. However, 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

Building Foundations:

The new outbuilding is to be located no closer to the stem of T7 than the existing building sits and less than 25% of the outer portion of the RPA of T7 shall be affected by foundations for the new building. Consequently, the potential impact upon T7 shall be minor. In order to ensure impact is kept to a minimum, the following restrictions are proposed:

- Ground beams are to be installed.
- Excavation shall be limited to a maximum depth of 200mm to facilitate the ground beams and shall be overseen by the project arborist.
- Only hand tools shall be used during the excavation.
- The beams are to be supported on narrow screw piles. Before installing such piles, their location shall be determined by trial pits excavated to a depth of 600mm using hand tools. Trial pit dimensions should not exceed 300mm x 300mm. If any roots in excess of 30mm diameter are encountered, the pile shall be relocated.

By adopting such a sympathetic method of installation, it will be possible to retain all significant roots and ensure that the root system will be able to supply the canopy with the required water and nutrients. Hence, it is considered that the proposal shall not result in any long term detrimental impact on the health of T7.

New Surfaces:

No new hard surfacing is proposed in any area where there currently exists soft ground.

Underground Services:

No underground services should be installed through any Root Protection Area without consulting the project arborist and if necessary, gaining approval from the local authority.

Changes in Ground Levels:

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

Soil Compaction:

Geological maps (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>) indicate that the underlying geology of the area is clay (London Clay). This means that soils throughout the site are likely to be susceptible to compaction and the root systems are likely to be relatively shallow.

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 Root Protection Areas should be avoided during the construction phase. This may be done by installing protective fencing and ground protection measures as recommended within the accompanying Arboricultural Method Statement.

Demolition Activities

The tree protection measures specified within the accompanying Arboricultural Method Statement should be installed prior to the commencement of all demolition activities (including soil stripping) to prevent any detrimental impact on tree health.

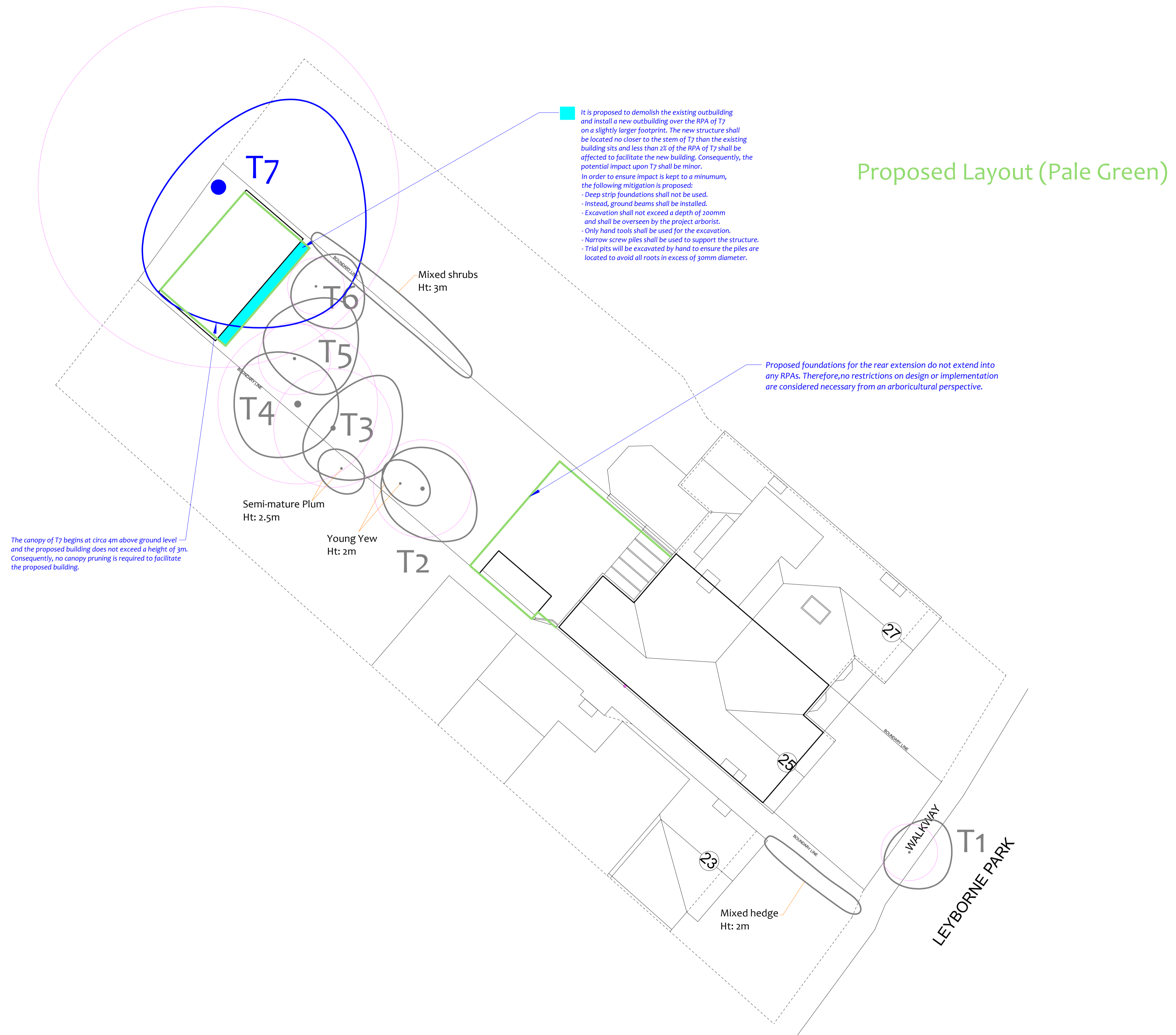
In order to avoid inadvertent damage to roots, branches or stems, care shall need to be taken when demolishing the existing outbuilding. Foundations/surfaces should be carefully lifted and walls should be demolished inwards onto the existing building footprint.

See Section 4 for a more detailed assessment



Impact Assessment Plan

(Existing Layout with Proposals Overlaid)



It is proposed to demolish the existing outbuilding and install a new outbuilding over the RPA of T7 on a slightly larger footprint. The new structure shall be located no closer to the stem of T7 than the existing building sits and less than 25% of the RPA of T7 shall be affected to facilitate the new building. Consequently, the potential impact upon T7 shall be minor. In order to ensure impact is kept to a minimum, the following mitigation is proposed:

- Deep strip foundations shall not be used.
- Instead, ground beams shall be installed.
- Excavation shall not exceed a depth of 200mm and shall be overseen by the project arborist.
- Only hand tools shall be used for the excavation.
- Narrow screw piles shall be used to support the structure.
- Trial pits will be excavated by hand to ensure the piles are located to avoid all roots in excess of 30mm diameter.

Proposed Layout (Pale Green)

Proposed foundations for the rear extension do not extend into any RPAs. Therefore, no restrictions on design or implementation are considered necessary from an arboricultural perspective.

The canopy of T7 begins at circa 4m above ground level and the proposed building does not exceed a height of 3m. Consequently, no canopy pruning is required to facilitate the proposed building.

Drawing No: CCL 10872 / IAP Rev: 1

Title: Impact Assessment Plan (Existing Layout with Proposals Overlaid)

Site: 25 Leyborne Park, London, TW9 3HB

Scale: 1:100 Paper Size: A1



Tree Retention Categories

Stems & canopies shown

Category A tree

Category B tree

Category C tree

Category U tree



Trees of high quality with an estimated life expectancy of 40+ years. Usually large trees with significant presence or smaller trees with excellent form. Retention of these trees is highly desirable.



Trees of moderate quality with a life expectancy of 20+ years. Usually maturing trees or younger trees with good form. Retention of these trees is desirable though less than Category A trees.



Unremarkable trees of low quality and merit. Individual specimens are not considered to be a material planning consideration.



Trees unsuitable for retention due to their very poor condition.

Impact Assessment Plan

(Existing Layout with Proposals Overlaid)

BS 5837 Root Protection Area (radius = 1xstem diameter)

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

Root Protection Area having been amended to account for site conditions

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

MN = Measured North:

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

Tree to be removed to facilitate the proposal

Tree to be removed due to its low quality

Proposed pruning

Tree Ref. Species Height (m) Root Protection Area

Radius (m) m² Square (m)

T1 Rowan 3.5 1.3 5 2.3

T2 Holly Oak 5 2.3 16 4.0

T3 Apple 3.5 2.8 24 4.9

T4 Pittosporum 6.5 3.7 43 6.6

T5 Holly Oak 5.5 1.7 9 3.0

T6 Cherry Laurel 3 1.3 5 2.3

T7 Sycamore 16 8.4 222 14.9

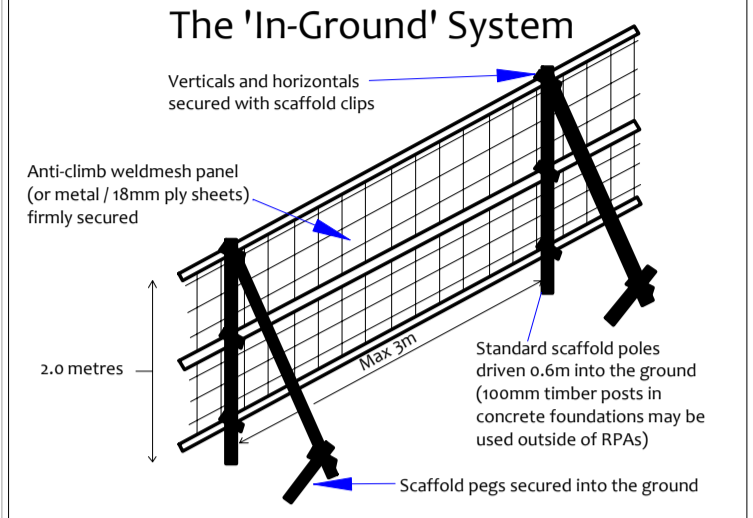
Tree Protection Barriers

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.

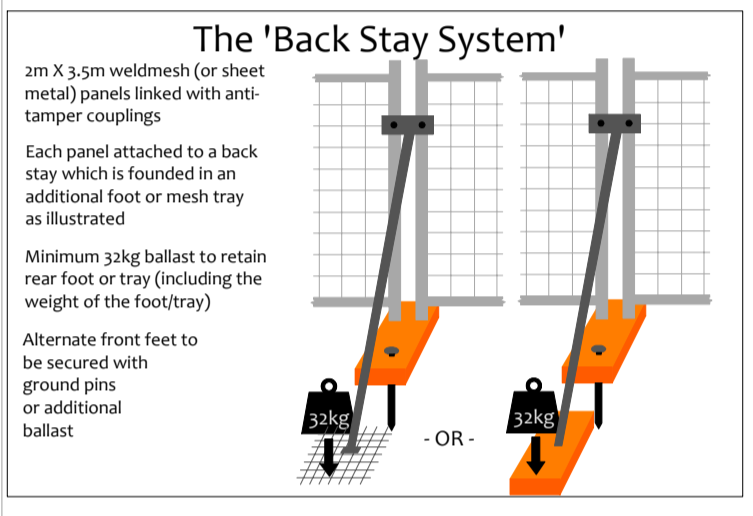
Vertical scaffold poles are driven into the ground, onto which are affixed horizontal scaffold poles and diagonal bracing struts. Weldmesh panels (or similar – e.g. Heras type fencing panels, or 18mm-plywood boards) are secured to this scaffold framework using sturdy clips (e.g. standard scaffold clips). 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 footplate is less than 3kg. 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.

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 demolition and 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.
 - Removal of existing structures such as walls, steps and hard surfaces (where applicable) shall be undertaken using hand tools or a mechanical excavator operating from outside the Restricted Activity Zone and carefully marshalled by the project arborist.
 - No excavation shall occur beneath any existing hard surfacing and its sub-base or beneath the foundations of any structure such as wall, steps or patio.
 - No further excavation shall occur in this zone without consulting the project arborist and obtaining approval from the local authority.
 - Existing ground levels shall be retained undisturbed or raised by no more than 50mm. Ground levels may only be raised using granular topsoil (not rich in clay) or where new surfacing is proposed.
 - No new permanent or temporary structures shall be erected other than those shown on the planning application documents unless approved by the local authority.
 - Underground services shall not be installed in this area without prior consultation with the project arborist and a methodology agreed and approved by the local authority.
 - If roots are encountered in excess of 75mm diameter, they shall be retained wherever possible and protected with damp sacking during times that they are unearthed. Any roots in excess of 10mm that need to be severed shall be pruned with secateurs.
 - 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 non-essential cement products) shall be forbidden.
 - No fires shall be permitted.
 - Vehicles or plant machinery in excess of 2 tonnes shall not be permitted in this area.

- #### Restricted Activity Zone B
- In this zone foundations are to be installed. In order to minimise the impact on roots, it is proposed to install a **Shallow Foundation**. The following restrictions shall apply:
- Deep concrete strip foundations shall not be acceptable in this area.
 - Instead, ground beam foundations shall be installed.
 - Excavation for the ground beams shall be limited to a depth of 200mm and shall be undertaken using hand tools.
 - Excavation shall not exceed 200mm beyond the building footprint unless approved otherwise by the local authority.
 - Roots in excess of 25mm which are located close to the bottom or the edge of the excavation are to be retained intact if possible and covered with wet sacking whilst exposed. All roots in excess of 10mm which cannot be retained shall be neatly pruned with secateurs.
 - Narrow screw piles shall be installed to support the ground beams. Trial pits shall be excavated to determine the location of the piles. Trial pits shall not exceed 300mm x 300mm and excavated using hand tools to a depth of 600mm. Excavation shall be undertaken in the presence of project arborist. If roots in excess of 30mm are encountered, they shall be retained intact and the pile shall be relocated. Roots in excess of 10mm shall be pruned using sharp secateurs. Pile diameter shall not exceed 250mm unless agreed otherwise with the local authority.

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 1m 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.
- #### 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.

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 the stem of T7. The plywood boxing specification is indicated in the diagram opposite. The actual size of the plywood boxing shall be determined by the extent of the root flare at the base of the trees stem. The box shall be large enough to avoid contact with any part of the tree that is surrounded. No fringing shall be attached to any part of the tree. Instead, it shall be free standing or attached to trees or adjacent structures (e.g. walls or fences). It shall be made firm enough to withstand occasional knocks from any plant machinery.

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.

Ground Protection Measures

Within Restricted Activity Zones, soils containing roots may be subject to compaction due to general construction activity (including pedestrian activity and use of plant machinery). In order to minimise compaction, it is proposed to ensure that a suitable load-spreading surface is in place at all times. Any existing hard surfacing may be retained where engineers consider it adequate to spread the load of construction traffic. Otherwise it shall be reinforced or replaced with adequate ground protection measures.

Unless specified otherwise, ground protection shall consist of 34mm OSB boards laid at double thickness and screwed together to prevent slippage. The ground shall first be made even by raking, or by adding a few centimetres of sand or woodchips. Where only pedestrian traffic will occur boards or planks 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 engineers consider OSB boards to be inadequate (e.g. for large plant machinery where the tracks may chew up the timber) sturdier ground protection measures will be installed such as road plates, or soams of 7-40mm angular gravel installed in 3D cellular confinement system (e.g. CellwebTM).

If a piling mat is required, engineer's specifications should be referred to.

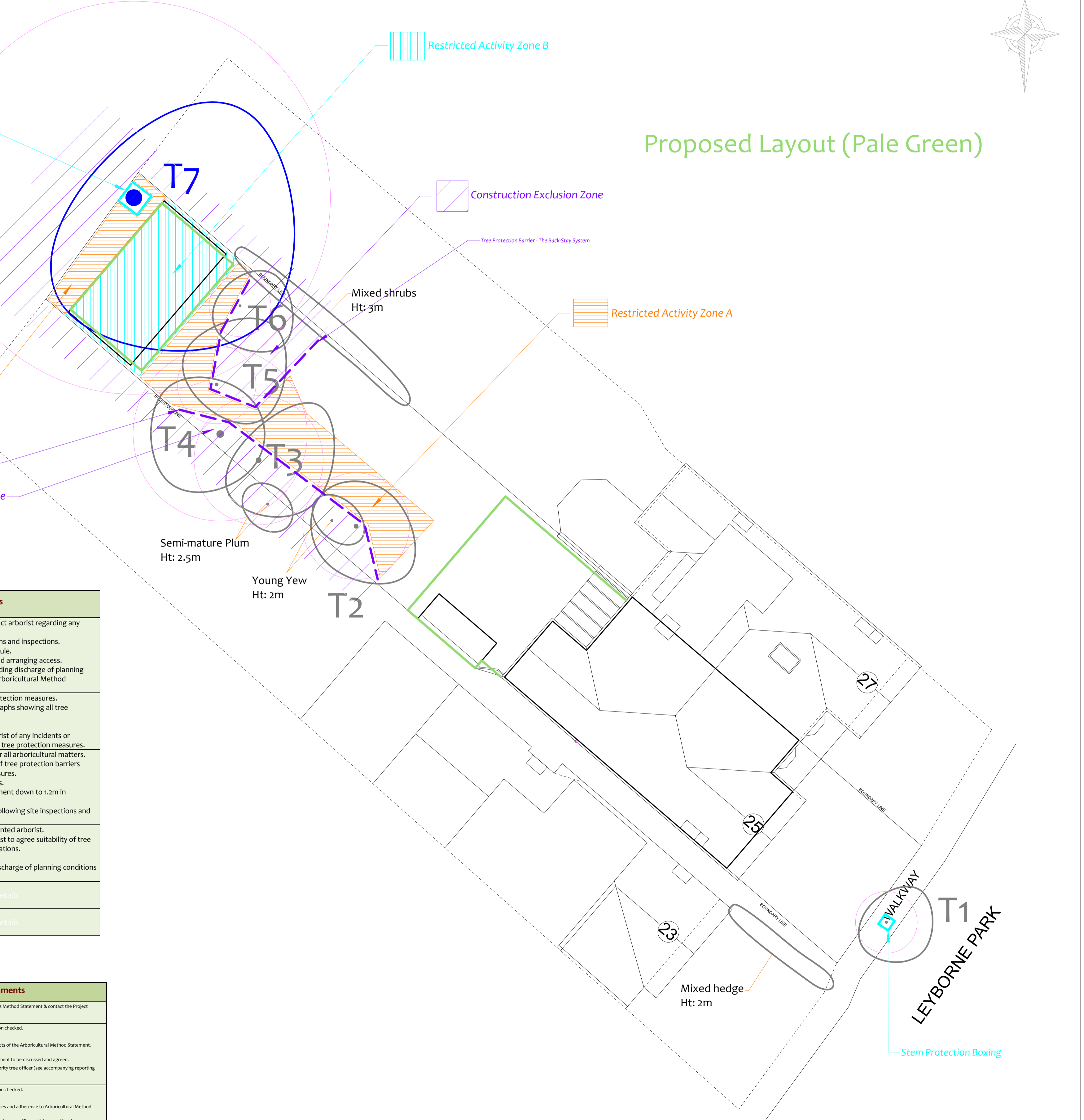
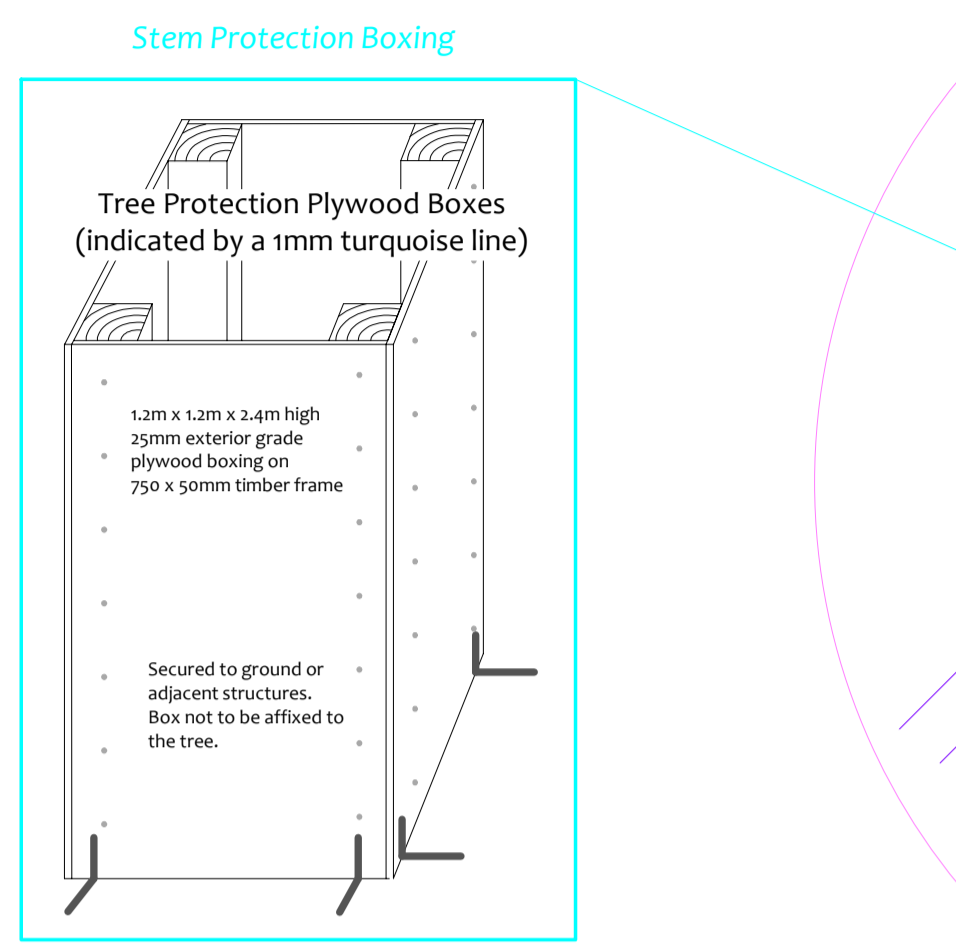
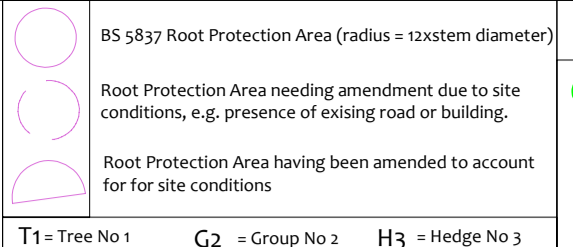
The ground protection measures shall be installed and approved before commencement of demolition and construction activity and before the arrival of plant machinery or materials. They shall remain in place until all heavy construction activity is complete or until they are due to be replaced with a new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

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, adequate ground protection measures shall be installed, and excavation shall be limited to that required for new planning. Furthermore, the project arborist shall be consulted 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 document 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.

Tree Protection Plan



Personnel and 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. Scheduling of meetings, excavations and inspections. Overseeing 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	Day to day monitoring of tree protection measures. Fortnightly supply of site photographs showing all tree protection measures. Reporting to the Appointed Arborist of any incidents or potential variations to the agreed tree protection measures. Liaising with LPA Tree Officer over all arboricultural matters. Initial inspection and signing off of tree protection barriers including ground protection measures. Monthly site visits and inspections. Oversight of excavation for basement down to 1.2m in Restricted Zones. Reporting to the local authority following site inspections and any variation or incidents. Receipt of reports from the appointed arborist. Liaising with the appointed arborist to agree suitability of tree protection measures and any variations. Enforcement. Advice and assistance with the discharge of planning conditions relating to trees.
Project Arborist	Crown Tree Consultancy	08000 14 13 30 0203 797 7449 info@crowntrees.co.uk	Initial inspection and signing off of tree protection barriers including ground protection measures. Monthly site visits and inspections. Oversight of excavation for basement down to 1.2m in Restricted Zones. Reporting to the local authority following site inspections and any variation or incidents. Receipt of reports from the appointed arborist. Liaising with the appointed arborist to agree suitability of tree protection measures and any variations. Enforcement. Advice and assistance with the discharge of planning conditions relating to trees.
Local Authority	London Borough of Richmond upon Thames	Insert Details	
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	N/A.	Project Manager and Site manager to study this Method Statement & contact the Project Arborist to agree all protection measures.
Pre-Start Meeting	Site manager, project arborist, Tree Officer invited.	Tree protection fencing locations & specification checked. Ground protection measures checked. Contractors to be inducted to all relevant aspects of the Arboricultural Method Statement. Responsibilities checked and acknowledged. Adherence to the Arboricultural Method Statement to be discussed and agreed. Report on findings to be sent to the local authority tree officer (see accompanying reporting template)
Monthly Inspection and Reporting	Site manager and project arborist	Tree protection fencing locations & specification checked. Ground protection measures checked. Past month, present and future month – activities and adherence to Arboricultural Method Statement discussed and checked. Report on findings to be sent to the local authority tree officer within 5 working days.
Overseeing Excavation for Foundations in Restricted Activity Zone B.	Site manager and project arborist.	Two week's notice to be given prior to commencement. Excavation to be as specified in this Method Statement. Roots to be retained or pruned as specified in this Method Statement. Activities to be recorded and photographed. Mitigation measures to be employed specified by the project arborist.
Post-Construction Meeting	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.