BS 5837 Arboricultural Report

Impact Assessment & Tree Protection Plan

at
29A Frognal
London
NW3 6AR

Dated
8th December 2023

CROWN
Tree Consultancy
Branching out through England and Wales

Contents

1. Introduction

1.1. Instruction

1.1.1. We are instructed by Boyer Planning to:

- Undertake a Tree Survey to BS 5837 at 29A Frognal 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 trees are growing within a conservation area or are protected by a tree preservation order.
- 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.
- Produce a Tree Protection Plan to show where tree and ground protection measures will be required.

1.2. Purpose of this Report

1.2.1. This report is produced according to the guidance and recommendations within *BS 5837: 2012 - Trees in Relation to Design, Demolition, and Construction.* It is tailored to accompany a planning application. It assesses the impact of all proposed construction works on the tree population. Tree removal, canopy pruning, and the impact upon roots from various groundworks are all considered in detail. Best practice mitigation is specified wherever appropriate.

1.2.2. This document should not be used to inform management decisions relating to liability or risk management. Such decisions should be based on a more detailed inspection of the trees than was carried out for this report.

1.3. References

1.3.1. We have liaised with our 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

1.4.1. A visual ground-level assessment of all trees was undertaken on the 29th November 2023 by Carl Lothian. 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 drawings are based on a measured drawing of the site supplied to Crown Tree Consultancy. This drawing had the tree positions already plotted. Where applicable, additional trees have been plotted by us according to measurements taken on-site.

1.5. Author

1.5.1. This report was compiled by Emma Hoyle FDSc (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 Site Description

2.1.1. Number 29a Frognal is a semi-detached, residential property. Vehicular access leads onto a driveway at the front of the dwelling from the east.

2.1.2. Within the garden grow three Retention Category C trees (T1, T2 and T5) and three Retention Category U trees (T3, T4 and T6).

2.1.3. In an adjacent garden to the northwest is a Retention Category C Pyracantha (T7) and a Retention Category B Cherry (T8). The roots of these trees may extend into the site.

2.1.4. Within the public footway along Arkwright Road is a large Retention Category A London Plane (T9).

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°33'5.91"N 0°10'50.94"W, and the altitude is approximately 76m above sea level[1].

2.3. Survey Extent

2.3.1. The area indicated below[2] shows the extent of the site. Our survey included all trees within the curtilage of the property and those adjacent to it.

[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.

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. Trees T3, T4 and T6 are in a poor condition and are recommended for removal to prevent tree or limb failure. These works should be prioritised as indicated on the Tree Data Schedule.

3.1.3. All other trees were deemed to be in satisfactory 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	None
Moderate	Within 1 year	T3, T4 and T6
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	T9
1.5	T6
3	T1, T2, T5, T7 and T8

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. Species Present – Additional Information

3.3.1. 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
Cherry	8	10	Many cultivars available, bred for their abundance of spring flowers, edible cherries or ornamental bark (e.g. Tibetan Cherry). Usually white or pink flowering, often in very early spring. Usually with a single bole to around 2.5m and multi-stemmed thereafter. Most varieties have excellent autumn colour.
Elder	8	8	Deciduous tree native throughout Europe, N Africa and W Asia. Untidy, shrubby habit. Very fast growing. Covered in dense creamy flowers and deep red berries which are excellent for making wine. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Sambucus+nigra for more info.

Species	Typical Height at Maturity (m)	Typical Canopy Spread at Maturity (m)	General Notes
Laburnum	9	10	Deciduous tree native to Southern and Central Europe. Garden tree prized for its small stature and abundance of hanging yellow flowers in spring. Poisonous. Liable to split at forks. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Laburnum+anagyroides 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.
Plum	6	8	Small fruit tree. Many varieties available. Usually white flowering. Fruits may be green, yellow, red or dark purple. Often quite an untidy looking tree.

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 the presence of competing vegetation. The figures quoted are not the maximum dimensions that the species may attain.

4. Statutory Protection – TPOs and Conservation Area Status

Before undertaking most works on trees protected by a tree preservation order[3], consent needs to be formally obtained from the local authority. Where trees are in a conservation area (but not protected by a TPO), works are generally not permitted without first giving the local authority six weeks' notice of intention[4]. Unauthorised works to protected trees, or trees in a conservation area, may result in criminal prosecution and a fine. Where works are required to implement a fully approved development, no such consent or notice is required.

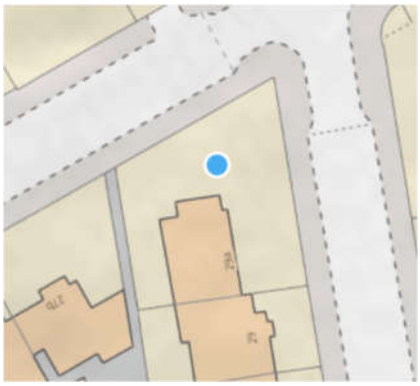
[3] https://www.gov.uk/guidance/tree-preservation-orders-and-trees-in-conservation-areas

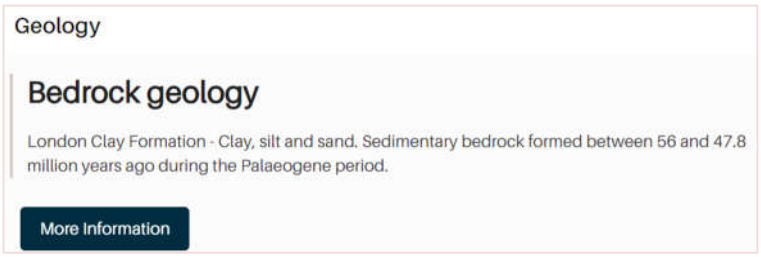
[4] During this time, the local authority may elect to create a tree preservation order or to inform the applicant that they have no objection to the proposed works. If the local authority does not respond within six weeks, then the intended work may be undertaken. Note: the local authority cannot refuse 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.

5. Local Geology and Soils

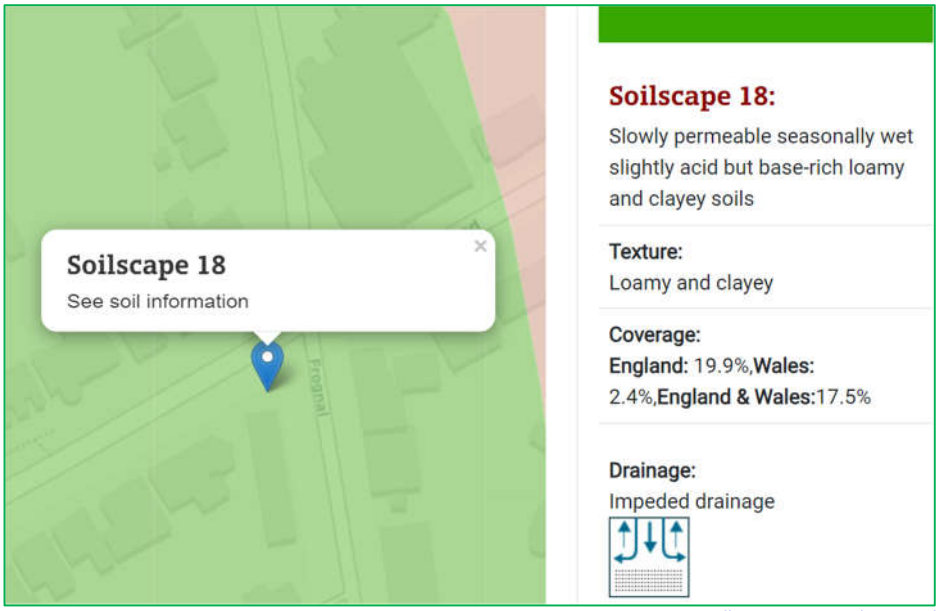
5.1. Desktop Research

5.1.1. Desktop research into local geology based on the postcode **NW3 6AR** obtained the following results:





Source: https://geologyviewer.bgs.ac.uk/?_ga=2.100849601.17774785.1660229567-1737936254.1660229567



Source http://www.landis.org.uk/soilscapes/

5.2. Site Investigations

5.2.1. We are unaware of any specific investigations into soil properties at the site.

5.3. Conclusion and Relevance

5.3.1. Based on the information reproduced in Section 3.1, local soils are assumed to have a loamy & clayey texture.

5.3.2. Loamy soils contain a mixture of clay and sand. Soil compaction may occur due to vehicular activity on building sites, so ground protection is recommended wherever vehicles operate. Most tree species will grow well in loamy soils.

5.3.3. Clay soils may be especially prone to compaction and slurrying caused by general construction activity. Both of which significantly impair root function. This must be guarded against using boards to protect any soils where roots are growing. When planting new trees, species should be selected that can tolerate heavy soils.

5.3.4. Trees of most species are less likely to root deeply in clay soils. Any new surfacing over tree roots should avoid deep excavation and have good load-spreading properties.

6. Arboricultural Impact Assessment

6.1. Overview

6.1.1. It is proposed to extend the existing dwelling and install a new garden patio as indicated on the drawings in Appendix 6. The existing layout is indicated in black, and the footprint of the proposal is indicated in pink.

6.1.2. Existing vehicular access from Frognal is to be maintained, resurfaced and a new soft planting bed installed.

6.1.3. 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	Small shrubs and mixed young trees
Tree Removal: Retention Category U	T3, T4 and T6
Tree Pruning	T7
RPA: Building Foundations	None
RPA: New Hard Surface	T8
RPA: Replace Existing Hard Surface	T2
RPA: Underground Services	None
RPA: Change of Ground Levels	T8
RPA: Soil Compaction	Trees adjacent the construction area (preventable by installing tree protection measures)

6.1.1. 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.

6.2. Tree Removal

6.2.1. All trees to be removed are indicated on the Impact Assessment Plan and are listed below:

6.2.2. **Retention Category A:** It is proposed to retain the Retention Category A tree.

6.2.3. **Retention Category B:** It is proposed to retain the Retention Category B tree.

6.2.4. **Retention Category C:** It is proposed to retain all significant Retention Category C trees. Only small shrubs and mixed young trees require removal to facilitate the proposal. These are small specimens located within a residential garden. They are not considered to have any landscape value and their removal shall not have a significant impact on the visual amenity of the locality. Consequently, they are not considered to be a material planning consideration.

6.2.5. **Retention Category U:** It is proposed to remove Retention Category U trees T3, T4 and T6. Trees within this category are recommended for removal regardless of development proposals. Consequently, the removal of Category U trees is not considered to be a direct impact of the development.

6.2.6. None of the trees to be removed are considered worthy of special protection. Details specific to each tree can also be found in the Tree Data Schedule.

6.3. Mitigation Planting

6.3.1. The site offers opportunity to plant new vegetation as part of a post-development landscaping scheme and to mitigate the trees proposed for removal.

6.4. Impact on Tree Canopies

6.4.1. It is proposed to trim the overhanging foliage of T7 (a Pyracantha) back towards the boundary. Such pruning shall increase clearance for construction activity and demolition of the shed. This minimal pruning of a Retention Category C Pyracantha is not considered to be a material planning consideration.

6.4.2. All other tree canopies are sufficiently far from proposed building works and high over access routes such that they should not be impacted by construction activity. Consequently, no further pruning works are required to enable the build.

6.5. Impact on Tree Roots

Building Foundations:

6.5.1. No new building foundations are proposed within the Root Protection Area of any tree. Consequently, no restrictions on foundation design or implementation are considered necessary from an arboricultural perspective.

New Surfaces:

6.5.2. A new garden patio is proposed as part of the development; the periphery of T8's theoretical RPA shall be affected by installation of the new patio. Approximately 4% of the RPA shall be affected, which is considered to be very minor and within tolerable limits.

6.5.3. It is proposed to undertake excavation using hand tools only to minimise soil disturbance and ensure impact is kept to the minimum. So long as excavation in this area is limited to the footprint of the proposed patio, and any tree roots encountered are neatly pruned using clean, sharp secateurs, impact on T8 shall be minimal.

Replace Existing Surfaces:

6.5.4. A section of the existing driveway is to be removed and replaced with a soft planting bed. Such a tiny portion of T2's RPA shall be affected, the potential impact is considered to be negligible.

6.5.5. The existing driveway over the Root Protection Area of T2 is to be replaced with a new permeable surface. To ensure no roots are damaged, excavation shall be limited to the removal of the existing surface and the associated sub-base. Soils in these areas are likely to be compacted already and no net increase in traffic is anticipated; therefore, no significant detrimental impact shall occur as a result of resurfacing, and the installation of a 3D cellular confinement system beneath the surface is not considered necessary.

Underground Services:

6.5.6. No new underground services are to be installed within Root Protection Areas.

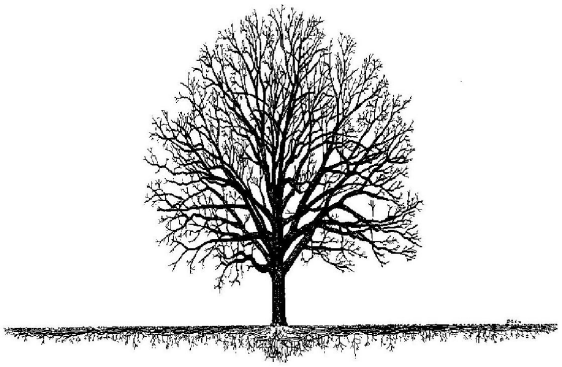
Changes in Ground Levels:

6.5.7. Ground levels are to be lowered slightly where the new patio is to be installed. So long as excavation is limited to the footprint of the proposed patio and any roots encountered are neatly severed, impact on T8 shall be minimal.

6.5.8. No further changes of ground levels in excess of 100mm within Root Protection Areas shall be made without consulting the arborist and, if necessary, gaining approval from the local authority.

Soil Compaction:

6.5.9. 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.



6.5.10. Healthy soils contain about 25% air space between solid particles. Increased loading of the soil 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.

6.5.11. 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.

6.6. Demolition Activities

6.6.1. Adequate tree protection methods should be specified in an Arboricultural Method Statement, and approved by the local authority before demolition takes place. Areas should be designated for the storage of debris.

6.7. Waste and Materials Storage

6.7.1. 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 spillage avoids all Root Protection Areas.

6.7.2. Areas designated for the storage of building materials and waste products will need to be approved by the local authority. Root Protection Areas should be avoided. Where this is not possible, suitable ground protection measures will need to be installed.

6.8. Cabins and Site Facilities

6.8.1. 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.

6.8.2. 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.

6.9. Boundary Treatments

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

6.10. Impact of Retained Trees on the Development

6.10.1. 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.

6.11. Summary

6.11.1. Only low-quality shrubs and young trees are to be removed to enable the proposal.

6.11.2. A Pyracantha (T7) requires minimal pruning to increase clearance for construction activity.

6.11.3. No foundations are proposed within Root Protection Areas.

6.11.4. A new patio is proposed within the periphery of the RPA of T8. Only circa 4% of the RPA shall be affected, so the impact shall be minimal and well within BS 537 recommended limits.

6.11.5. Adequate space has been allowed between the proposal and all trees such that there should be no future pressure to overly-prune or remove them as a consequence of the proposal.

6.11.6. So long as suitable protection measures are implemented during demolition and construction stages, I see no arboricultural reasons why the proposal should not proceed.

6.12. Arboricultural Method Statement

6.12.1. BS 5837 recommends that a detailed methodology is agreed in the form of an Arboricultural Method Statement, which shall ensure that trees are well protected during the construction phase. This should detail all tree protection measures and limitations on construction activity. All of the issues raised within this Impact Assessment should be covered by the Method Statement.

7. Photographs

Refer also to the Tree Constraints Plan for photo locations

Photo 1.

Photo 2.

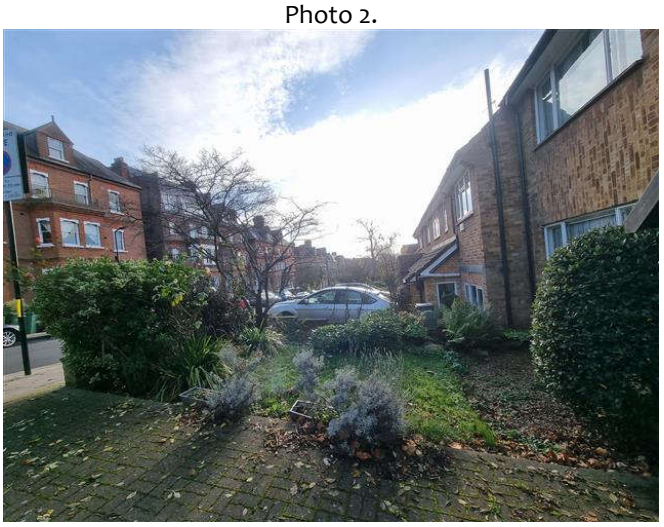


Photo 3.

Photo 4.

Photo 5.

Photo 6.

Photo 7.

Photo 8.

Photo 9.

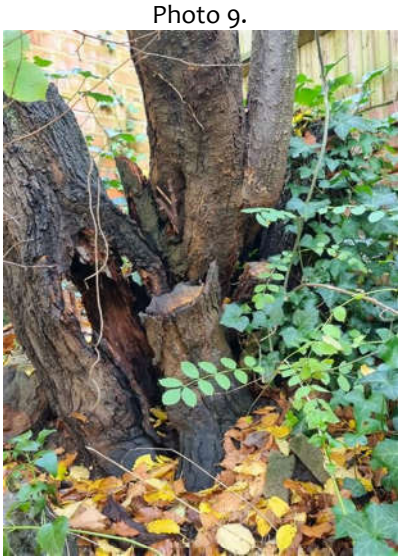


Photo 10.

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: 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 3: Glossary of Tree Data

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 thatis unlikely to develop into a major defect.

Appendix 4: Author & Surveyor Qualifications

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 Carl Lothian – BSc (Hons) (Arboriculture).

Carl began his career undertaking a Level 3 extended diploma in arboriculture and forestry at Merrist Wood College in 2015. Upon completion of his diploma, Carl worked with several tree surgery firms completing a range of arboricultural works. In 2018 Carl began his BSc (Hons) in arboriculture and urban forestry, graduating with a first-class degree and attaining the Institute of Chartered Foresters student of the year award.
After graduating, Carl worked as a TreeRadar technician where he carried out tree root and decay surveys with specialist ground-penetrating radar equipment. During this time Carl was fortunate enough to work at prestigious sites, such as the Palace of Westminster and the National Maritime Museum.
Whilst working at Crown, Carl has undertaken a range of tree surveys and written reports relating to development, safety, subsidence, and decay detection. Carl is a professional member of the Consulting Arborist Society and an associate member of the Institute of Chartered Foresters.

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: 2015. 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

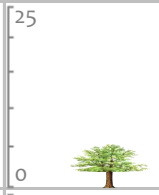
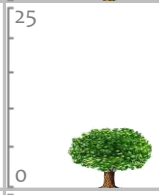
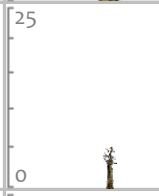
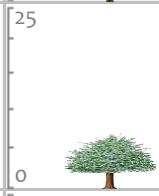
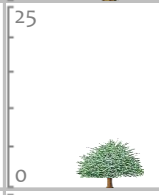
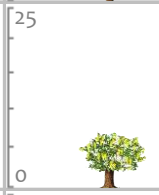
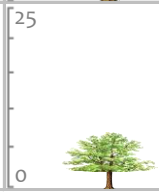
Communities and Local Government website with numerous downloadable documents, from:
http://www.communities.gov.uk/planningandbuilding/planning/treeshighhedges/

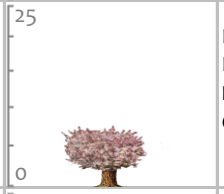
Tree Specific Websites

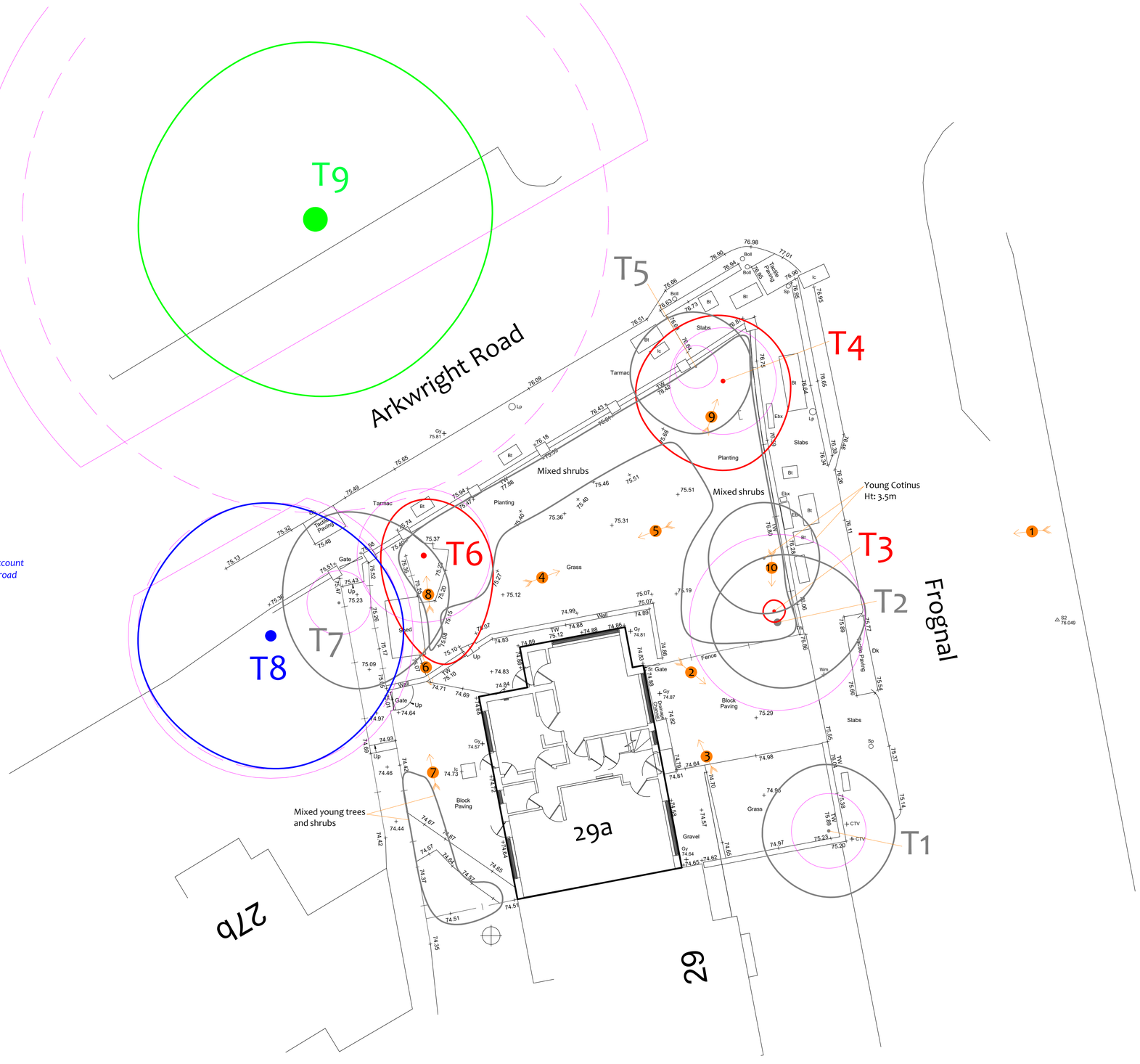
www.crowntrees.co.uk	Crown Consultants site containing useful information
www.trees.org.uk	Arboricultural Association
www.rfs.co.uk	Royal Forestry Society of England, Wales and N. Ireland
www.treehelp.Info	The Tree Advice Trust
www.woodland-trust.org.uk	The Woodland Trust
www.treecouncil.org.uk	The Tree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

Appendix 6: Tree Data Schedule and Drawings

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	Young **Amelanchier** Amelanchier sp.	4.5	1.5	14	N 3 W 3 E 3 S 3		Position: Situated within the front garden. Form: Multiple-stemmed specimen. History: No evidence of significant pruning. **Defects: No significant defects observed.** Other: Recorded stem diameter is equivalent for 3 stems at 8cm and one stem at 9cm diameter.	No action required. n/a / 3	Moderate Good Good	Moderate 40+ C
T2	Mature **Elder** Sambucus nigra.	7	2	33	N 3 W 3 E 4 S 3		Form: Multi-stemmed at 1m with a narrow, upright habit. History: Previously topped at 3m. **Defects: No significant defects observed.** Other: Recorded stem diameter is equivalent for 4 stems (22cm, 20cm, 11cm and 9cm).	No action required. n/a / 3	Moderate Good Fair	Low 40+ C
T3	Semi-Mature **Cherry** Prunus sp.	3.5	3.5	15	N 0.5 W 0.5 E 0.5 S 0.5		Form: Dead tree.	Remove. Moderate / N/A	Dead **Dead** **Dead**	Dead Dead **U**
T4	Semi-Mature **Plum** Prunus sp.	6	2.5	20	N 3 W 4 E 3 S 4		Form: Multiple stemmed and leaning with a slightly unbalanced crown. History: Two significant stems previously removed. **Defects: Major decay to base.** Other: Recorded stem diameter is equivalent for 2 stems (18cm and 8cm).	Remove. Moderate / N/A	Moderate Fair **Very Poor**	Low <10 **U**
T5	Young **Plum** Prunus sp.	5	0.5	8	N 2.5 W 3 E 2.5 S 3		Form: Multi-stemmed at ground level with a slightly unbalanced crown. History: No evidence of significant pruning. **Defects: No significant defects observed.**	No action required. n/a / 3	Moderate Good Good	Low 40+ C
T6	Early-Mature **Laburnum** Laburnum anagyroides.	6.5	1.5	25	N 2.5 W 2 E 3 S 5		Form: Twin-stemmed at ground level and leaning with a poorly formed crown. History: No evidence of significant pruning. **Defects: Evidence of decay to stems.** Other: Recorded stem diameter is equivalent for 3 stems (17cm, 16cm and 8cm).	Remove or reduce overall height to 3.5m above ground level and monitor. Moderate / 1.5	Moderate Fair Poor	Low <10 **U**
T7	Semi-Mature **Firethorn** Pyracantha sp.	6.5	2	12	N 4 W 2.5 E 5 S 4		Position: Situated on third party land. Form: Twin-stemmed at ground level with an unbalanced crown. History: Previously topped at 3m. **Defects: No significant defects observed.** Other: Limited inspection, dimensions estimated. Recorded stem diameter is equivalent for 2 stems estimated at 9cm and 8cm.	No action required. n/a / 3	Moderate 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)	Notes	Recommendations (Independent of any development proposals) Priority / Inspect Freq (yrs)	Vigour Physiological Condition Structural Condition	Amenity Value Life Expectancy (yrs) Retention Category
T8	Early-Mature **Cherry** Prunus sp.	8	2	50	N 6 W 6 E 6 S 6		Position: Situated on third party land. Form: Multi-stemmed at 1m with a balanced crown. **Defects: No significant defects observed.** Other: Recorded stem diameter is equivalent for 3 stems at 20cm, 30cm and 35cm. Limited inspection, dimensions estimated.	No action required. n/a / 3	Moderate Good Fair	Moderate 40+ **B**
T9	Mature **London Plane** Platanus x hispanica.	20	8	110	N 8 W 8 E 8 S 8		Position: Situated on third party land. Form: Multi-stemmed at 5m with a balanced crown. History: Managed by cyclical pollarding, recently pruned. **Defects: No significant defects observed.** Other: Limited inspection, dimensions estimated.	No action required. n/a / 1	Moderate Good Good	High 40+ **A**



RPAs of T8 and T9 based on their stem diameter.

RPAs of T8 and T9 amended to account for the influence of the adjacent road on their likely rooting pattern.

Drawing No:	CCL 11720 / TCP Rev: 1
Title:	Tree Constraints Plan (Existing Layout)
Site:	29A Frognal, London, NW3 6AR
Scale:	1:100 (0 to 5)
Paper Size:	A1

CROWN Arboricultural Consultants 01422 316660

Tree Retention Categories
Stems & canopies shown

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

Tree Constraints Plan

Status: Final

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

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

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

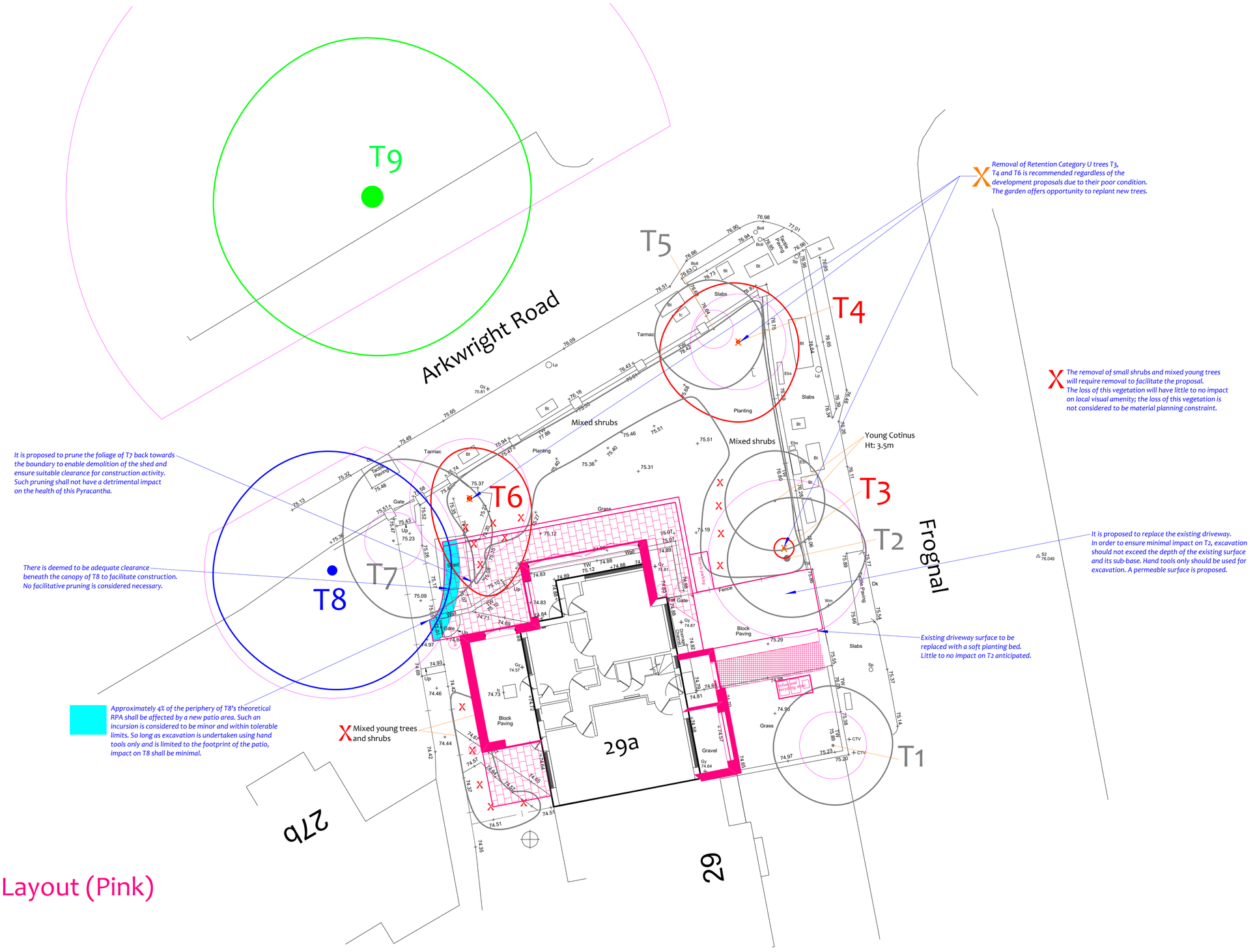
T1 = Tree No 1 G2 = Group No 2 H3 = Hedge No 3

1 Photo 1

MN = Measured North:

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

Tree Ref.	Species	Height (m)	Root Protection Area		
			Radius (m)	m²	Square (m)
T1	Juneberry	4.5	1.7	9	3.0
T2	Elder	7	4.0	49	7.0
T3	Cherry	3.5	1.8	10	3.2
T4	Plum	6	2.4	18	4.3
T5	Plum	5	1.0	3	1.7
T6	Laburnum	6.5	3.0	28	5.3
T7	Firethorn	6.5	1.4	7	2.6
T8	Cherry	8	6.0	113	10.6
T9	London Plane	20	13.2	547	23.4



Drawing No:	CCL 11720 / IAP Rev: 1
Title:	Impact Assessment Plan
Site:	29A Frognal, London, NW3 6AR
Scale:	1:100 (0 to 5)
Paper Size:	A1

CROWN Arboricultural Consultants 01422 316660

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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.

Impact Assessment Plan

Status: Final - for submission

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

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

Root Protection Area having been amended to account for 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.

Tree Ref.	Species	Height (m)	Root Protection Area		
			Radius (m)	m²	Square (m)
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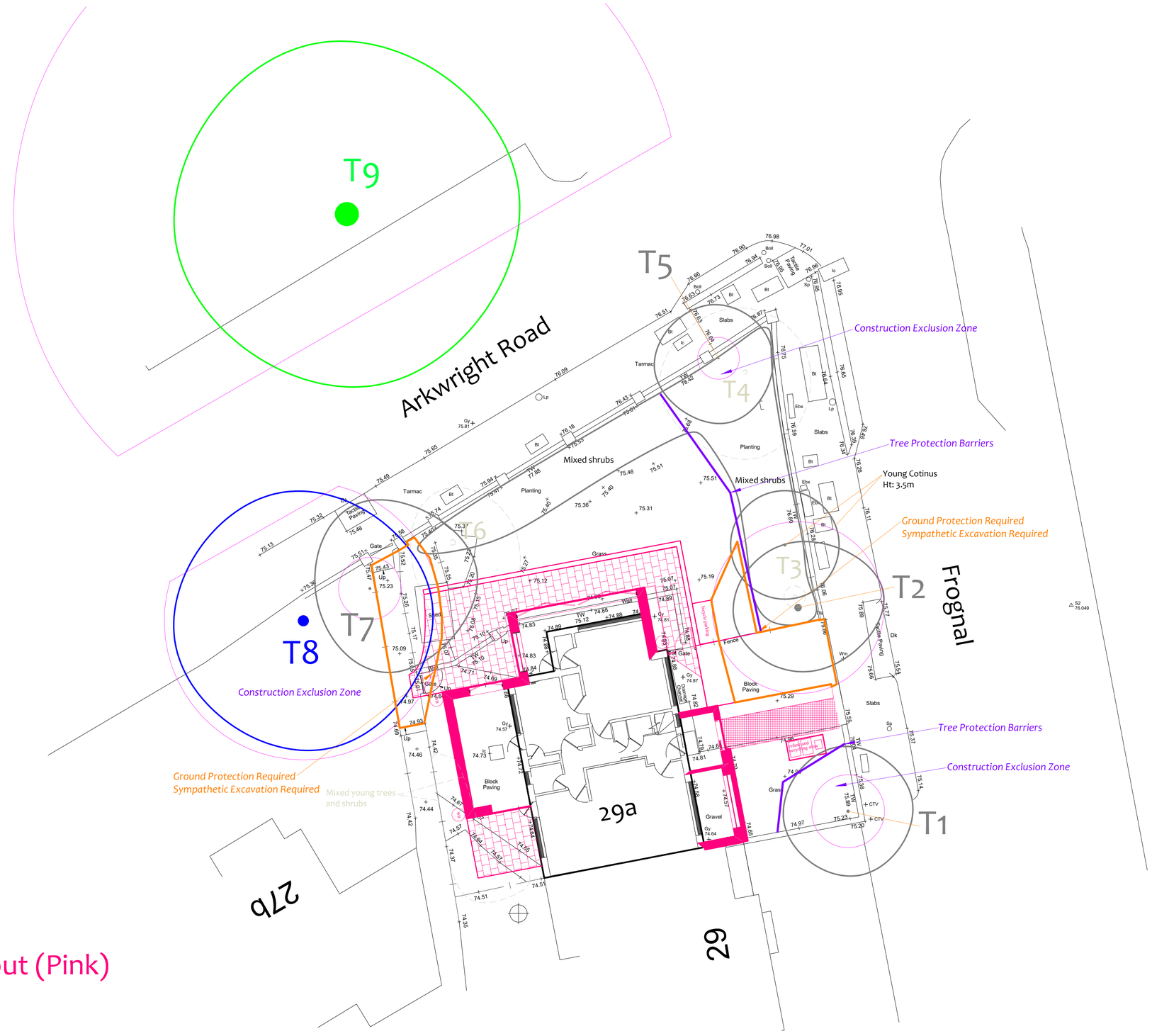
T3	Cherry	3.5	1.8	10	3.2
T4	Plum	6	2.4	18	4.3
T5	Plum	5	1.0	3	1.7
T6	Laburnum	6.5	3.0	28	5.3
T7	Firethorn	6.5	1.4	7	2.6
T8	Cherry	8	6.0	113	10.6
T9	London Plane	20	13.2	547	23.4



Tree Protection Barriers:

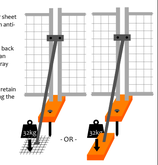
The 'Back Stay System'

2m X 3.5m weldmesh (or sheet metal) panels linked with anti-tamper couplings

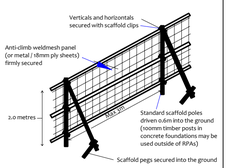
Each panel attached to a back stay which is founded in an additional foot or mesh tray as illustrated

Minimum 35kg ballast to retain rear foot or tray (including the weight of the foot/tray)

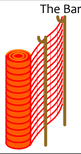
Alternate front feet to be secured with ground pins or additional ballast



The 'In-Ground' System

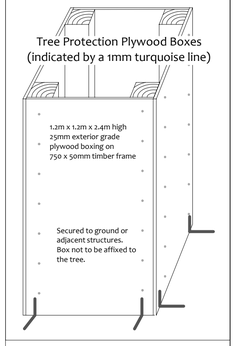


The Barrier Mesh System

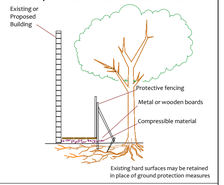


High visibility plastic safety fencing, 1m high, minimum grade 140g/m2, supported on steel fencing pins located at 1.5m intervals and driven into the ground.

Tree Protection Plywood Boxes (indicated by a 11mm turquoise line)



Ground Protection where specified in Restricted Zones



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			Radius (m)	m²	Square (m)
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T7	Firethorn	6.5	1.4	7	2.6
T8	Cherry	8	6.0	113	10.6
T9	London Plane	20	13.2	547	23.4

Drawing No: CCL 11720 / TPP Rev: 1

Title: Tree Protection Plan
(Existing Layout with Proposals Overlaid)

Site: 29A Frognal, London, NW3 6AR

Scale: 1:100 (0 to 5) Paper Size: A1

CROWN
Arboricultural Consultants
01422 316660

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Tree Protection Plan

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