BS 5837 Arboricultural Report

Impact Assessment

at
10 Lyndhurst Road
London
NW3 5PX

Dated
14th February 2024

CROWN
Tree Consultancy
Branching out through England and Wales

Contents

1. Introduction

1.1. Instruction

1.1.1. We are instructed by John Fitzpatrick of 26 Lyndhurst Road to:

- Undertake a Tree Survey to BS 5837 at 10 Lyndhurst Road 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.

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. Consideration is also given to the impact of the changed juxtaposition between trees and buildings and how that may influence future tree management.

1.2.3. 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 the project architect and studied topographical surveys and projected ground levels to attain an adequate understanding of the project to enable us to carry out an accurate assessment of the proposals.

1.4. Survey Details

1.4.1. A visual ground-level assessment of all trees was undertaken on the 26th of January 2024 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 Joe Taylor - FdSc (Arboriculture), M. Arbor A. Details of the author's experience that qualify him to produce such a report are detailed in Appendix 4.

2. Site Overview

2.1. Summary of Observations

2.1.1. Number 10 Lyndhurst Road is a semi-detached residential property with gardens to the front and rear.

2.1.2. Within the curtilage of the site, we identified one Retention Category C tree.

2.1.3. Beyond the curtilage of the site, we identified one Retention Category A tree, four Retention Category B trees, four Retention Category C trees, and one Retention Category U tree.

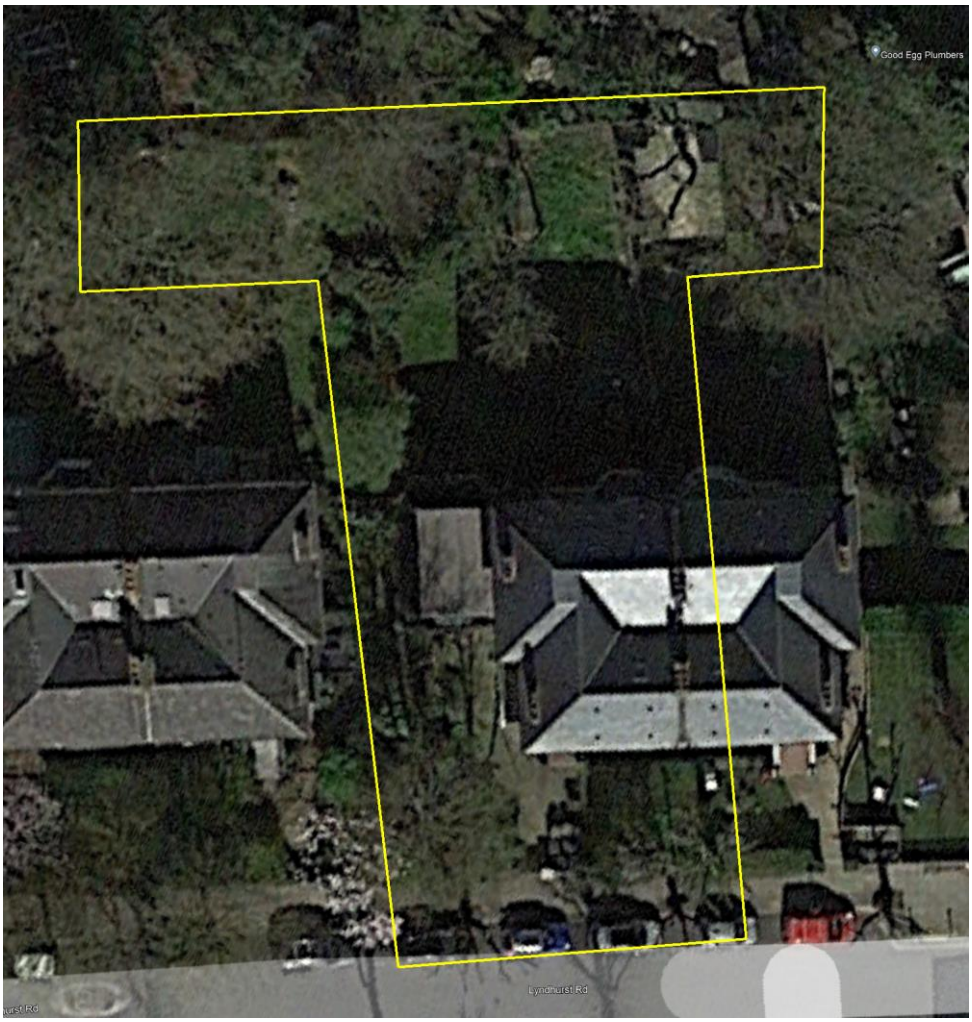
2.1.4. The Tree Constraints Plan and Tree Data Schedule (see Appendix 6) should be referred to for descriptions and locations of all trees.

2.2. Coordinates

2.2.1. The site coordinates are 0°10'21.13"W / 51°33'10.39"N, and the altitude is approximately 90m above sea level[1].

2.3. Survey Extent

2.3.1. The area indicated below[2] shows the extent of our survey. 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. T4 is recommended for removal due to its poor condition but is not considered to be immediately hazardous or likely to cause injury or damage. Its removal is of a lower priority.

3.1.3. Trees that are in acceptable condition at present but require work in order to prevent future defects from developing are T10 and T11. Such work is generally less of a priority.

3.1.4. T9 is damaging and grows on top of a retaining boundary wall. We recommend that T9 be removed to prevent further damage to the wall or that the wall be sympathetically repaired and monitored.

3.1.5. 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	T9, T10 and T11
Low	Within 3 years	T4

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	T8, T9, T10 and T11
1.5	T1
3	T2, T3, T5, T6 and T7

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. 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.

3.4. Species Present – Additional Information

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

Species	Typical Height at Maturity (m)	Typical Canopy Spread at Maturity (m)	General Notes
Ash	25	18	Large deciduous tree with a straight bole and a high open domed crown. Native to Britain and commonly found in woodlands and adjacent roadsides. Not suitable for small gardens. Easily identified by its oppositely arranged pinnate leaves and black buds. Branches are relatively brittle resulting in a fairly high incidence of small branch failure in windy conditions. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Fraxinus+excelsior for more info.
Beech	25	18	Deciduous tree native to W and S Europe. Does not have resilient heartwood, therefore typically lives for 100 - 150 years before decay may cause structural failure if unmanaged. Can be an extremely attractive tree at maturity due to its size and majesty. Young branches may retain their foliage through winter as is evidenced in beech hedges. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Fagus+sylvatica for more info.
Lime	25	12	Very common street tree. Several species exist; the one most often found in woods is 'common lime' which produces a mass of suckers at the stem base, making it very cheap to propagate. Limes have non-symmetrical heart shaped leaves which are much loved by aphids (hence the sticky honeydew on cars parked beneath). Limes are tolerant of heavy pruning and are often managed as pollards. Old limes tend to support a lot of small dead branches. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Tilia+x+europaea for 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.
Norway Maple	25	16	Deciduous tree native to S. Norway, S. Sweden and across Europe. Red buds and light brown grooved bark distinguish it from sycamore in winter. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Acer+platanoides for more info.
Persian Ironwood	8	10	A deciduous,often multiple-stemmed wide-spreading tree native to northern Iran. These shrubby trees have attractive flaking bark with leaves that turn yellow, red and purple in Autumn. The flowers are small and crimson coloured. Commonly planted for ornamental purposes. See https://www.rhs.org.uk/plants/details?plantid=1382 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.

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.

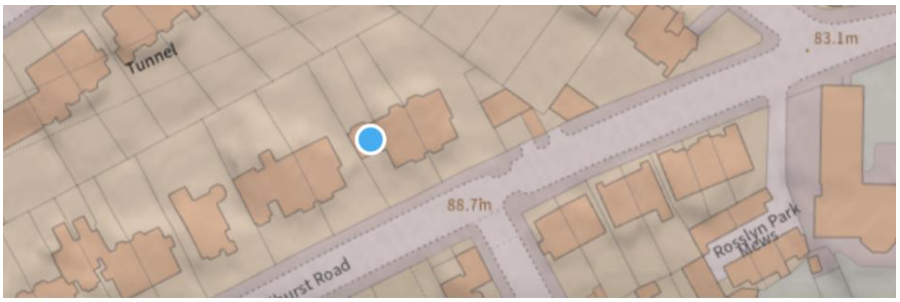
[3] https://www.gov.uk/guidance/tree-preservation-orders-and-trees-in-conservation-areas

[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.

4. Local Geology and Soils

4.1. Desktop Research

4.1.1. Desktop research into local geology based on the postcode NW3 5PX obtained the following results:

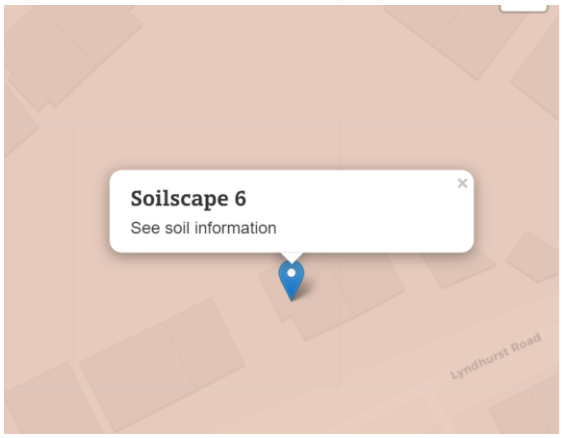


Geology

Bedrock geology

Claygate Member - Clay, silt and sand. Sedimentary bedrock formed between 56 and 47.8 million years ago during the Palaeogene period.

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



Soilscape 6:

Freely draining slightly acid loamy soils

Texture:
Loamy

Coverage:
England: 15.5%,**Wales:** 24.4%,**England & Wales:**16.7%

Drainage:
Freely draining

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

4.2. Site Investigations

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

4.3. Conclusion and Relevance

4.3.1. Based on the information reproduced in Section 3.1, local soils are assumed to have a loamy clay texture.

4.3.2. 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.

4.3.3. 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 that can tolerate heavy soils should be selected.

4.3.4. 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.

5. Arboricultural Impact Assessment

5.1. Overview

5.1.1. It is proposed to demolish the existing dwelling and construct a new dwelling with a larger footprint and an outbuilding in the rear garden, as indicated in the drawings in Appendix 6. The existing layout is indicated in black, and the footprint of the proposed layout is indicated in red.

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

Activity	Trees Potentially Affected
Tree Removal: Retention Category A	None
Tree Removal: Retention Category B	None
Tree Removal: Retention Category C	None
Tree Removal: Retention Category U	None
Tree Pruning	T2, T4 and T5
RPA: House Foundations	None
RPA: Outbuilding Foundations	T2
RPA: Acoustic Enclosure and Bin Store Foundations	T9 and T11
RPA: Garden Wall Foundations	T9 and T11
RPA: New Hard Surface	T1, T2, T9 and T11
RPA: Replace Existing Hard Surface	T9, T10 and T11
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)

5.1.1. 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.

5.2. Tree Removal

5.2.1. All trees are to be retained.

5.3. Tree Pruning

5.3.1. The table below specifies the proposed pruning works:

Tree No	Recommendation	Reason
T2, T4 and T5	Crown lift to a height of 4.5m, where they overhang the proposed outbuilding.	To enable adequate clearance between the proposal and the tree canopy.

5.3.2. The proposed pruning shall not have a significant impact on local levels of visual amenity.

5.3.3. All other tree canopies shall be unaffected by the proposals.

5.4. Impact of Foundations

5.4.1. **Rooting Habits**:

5.4.2. A 1.5m to 2m tall retaining wall separates T3, T4 and T5 from the site, and ground levels where the trees grow are circa 0.7m higher than ground levels within the site. The retaining wall foundation and difference in ground levels are likely to influence the pattern of root proliferation such that roots are likely to be less prolific within the site.

5.4.3. To determine the depth of the retaining wall foundations, a trial pit was excavated immediately adjacent to it. This excavation revealed the bottom of the foundation to be 1.1m below ground level where the trees grow and 0.4m below ground level within the site.

5.4.4. Below the upper soil horizons, the availability of oxygen and nutrients decreases with depth, resulting in an inhospitable environment for tree roots. Given the roots of T3, T4, and T5 would need to grow deeper than 1.1m to reach the bottom of the wall foundation before growing laterally into the site, they are unlikely to proliferate within the site. Instead, their roots are likely to proliferate in the adjacent garden in which they grow.

5.4.5. Consequently, the theoretical Root Protection Areas of T3, T4 and T5 have been amended on the accompanying Tree Constraints Plan to reflect actual site conditions.

5.4.6. **Proposed Foundations**:

5.4.7. The table below assesses the impact of proposed surfacing in Root Protection Areas:

Tree No	Nature of Foundation	Portion of RPA	Proposed Mitigation
T2	Deep	Circa 10%	<u>Hand-Dig Method</u> • In the direction of the tree, excavation not to exceed 250mm beyond the build-line. • Hand tools to be used to a depth of 600mm. • Plant machinery may be used at deeper depths. • Exposed roots over 25mm diameter shall be retained and protected with damp hessian if practicable, else neatly pruned.
T9 and T11	Shallow	<5%	<u>Shallow Raft, Beam or Slab Foundation Method</u> • Toward the trees, excavation is not to exceed 250mm beyond the build-line. • Excavation depth for raft or beam not to exceed 200mm. • Hand tools to be used to excavate. • Excavation to be supervised by the project arborist. • Exposed roots over 25mm diameter shall be retained and protected with damp hessian if practicable, else pruned by the arborist. • The foundation may be supported by narrow diameter piles (max 300mm diameter). • Trial pits excavated to determine pile locations. All roots over 25mm diameter to be retained intact and pile relocated.
T9 and T11	Wall	Circa 1%	<u>Shallow Beam Foundation Method</u> • Excavation should be undertaken using hand tools only. • Excavation to be supervised by the project arborist. • Where the project arborist deems necessary, a shallow beam shall be incorporated into the foundation design to ensure that all roots in excess of 50mm and most roots in excess of 25mm are retained intact.

5.4.8. These measures accord with industry best-practice[5] and shall ensure minimal impact on roots.

[5] BS 5837 (2012 section 7.5 and 7.6)

5.5. Impact of Surfacing

5.5.1. The table below assesses the impact of proposed surfacing in Root Protection Areas:

Tree No	Nature of Surfacing	Proposed Mitigation
T9, T10 and T11	Hard surface replaced with new hard surface	• Hand tools to be used. • No excavation to occur below the existing surface and sub-base. • Operation to be supervised by the project arborist.
T1, T2, T9 and T11	Soft surface replaced with hard surface	Minimum-Dig Technique • Excavation not to exceed 200mm. • Hand tools to be used. • New surface to be porous. • Sub-base to be porous (MOT type 3). • Ground to be protected against compaction. • Operation to be supervised by the project arborist.

5.5.2. These measures accord with industry best-practice[6] and shall ensure minimal impact on roots.

5.6. Underground Services:

5.6.1. The location of any underground services is yet to be determined. Wherever possible, these should be located outside of Root Protection Areas. Otherwise, the project arborist must be consulted, and approval obtained from the local authority.

5.7. Changes in Ground Levels:

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

Soil Compaction:

5.7.2. 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.

5.7.3. 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.

5.7.4. It is important therefore that ground compaction and soil disturbance over Root Protection Areas should be avoided during the construction phase. Where access is required over Root Protection Areas, suitable ground protection measures must be installed.

5.8. Demolition Activities

5.8.1. Care is required to avoid damaging trees when removing adjacent surfaces or structures. Surfaces must be lifted using hand tools or a carefully marshalled mechanical excavator. Walls must be demolished away from stems, and in a manner that doesn't damage branches. Removal of underground foundations requires extra special care to avoid root damage. During the implementation of this project, the following activities require special care:

- Demolition of the dwelling close to the canopy of T9.

[6] BS 5837(2012 section 7.4) and Arboricultural Association Guidance Note 12: The Use of Cellular Confinement Systems near Trees

5.9. Waste and Materials Storage

5.9.1. 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.

5.9.2. 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.

5.10. Cabins and Site Facilities

5.10.1. Any cabins and welfare facilities should be located outside of Root Protection Areas wherever possible. Otherwise, the project arborist should be consulted, and approval obtained from the local authority.

5.11. Boundary Treatments

5.11.1. No changes are proposed to the existing boundary features that might impact on trees.

5.12. Impact of Retained Trees on the Development

5.12.1. Adequate space has been allowed between retained trees and the proposal. Consequently, the proposal shall not result in increased pressure to remove or overly prune any of the retained trees.

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

5.12.3. 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.

5.13. Arboricultural Method Statement

5.13.1. 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.

6. Photographs

Refer also to the Tree Constraints Plan for photo locations

Photo 1.

Photo 2.

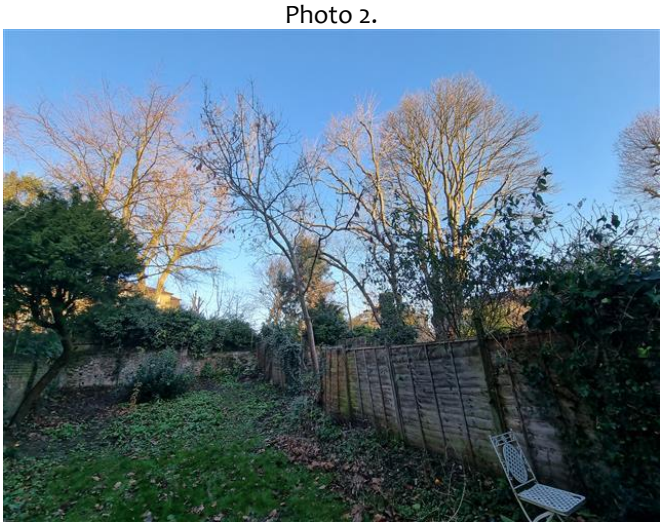


Photo 3.

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: 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 thatis unlikely to develop into a major defect.

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 tern of wood, cambium and bark that develop around the site of a wound on a woody plant
Pathogen	A microorganism that causes diseases within another organism.
Phloem	The principle conductive tissue that the products of Photosynthesis are transported around the plant
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, were 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 4: Author's Qualifications

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: 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

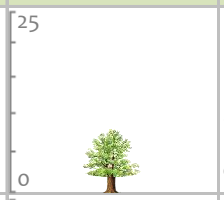
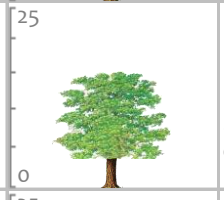
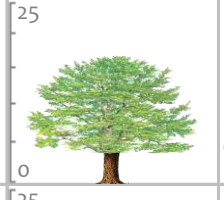
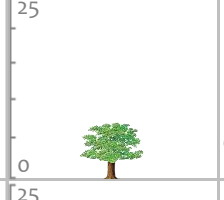
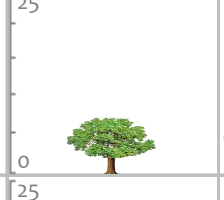
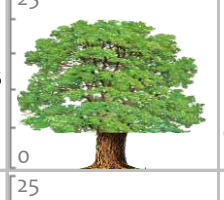
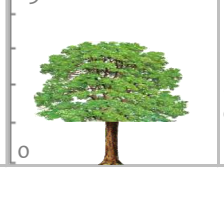
Communities and Local Government website with numerous downloadable documents, from:
http://www.communities.gov.uk/planningandbuilding/planning/treeshighhedges/

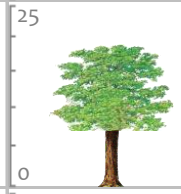
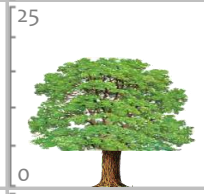
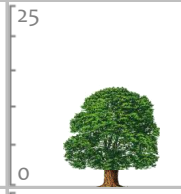
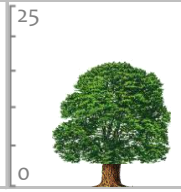
Tree Specific Websites

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	Semi-Mature **Pencil Cedar** Juniperus virginiana.	7	2.5	23	N 2 W 2.5 E 2.5 S 2.5		Position: Situated within the rear garden. Form: Single stemmed and leaning with a compact crown. History: Previously topped at 3.5m. **Defects: Significant decay column from stem to crown break (circa 3m above ground level).** Other: Acceptable condition at present.	No action required. n/a / 1.5	Moderate Good Fair	Low 10-20 C -
T2	Semi-Mature **Ash** Fraxinus excelsior.	15	3.5	28	N 4.5 W 6 E 1 S 8		Position: Situated on third party land. Form: Single stemmed with a slight lean and an unbalanced crown. History: No evidence of significant pruning. **Defects: No significant defects.** Other: Limited inspection, dimensions estimated.	No action required. n/a / 3	Moderate Good Fair	Low 40+ C
T3	Early-Mature **Beech** Fagus sylvatica.	17	4.5	50	N 7 W 7 E 7 S 8		Position: Situated on third party land. Form: Twin stem specimen. History: No evidence of significant pruning. **Defects: No significant defects.** Other: Limited inspection, dimensions estimated.	No action required. n/a / 3	Moderate Good Good	Moderate 40+ B
T4	Semi-Mature **Ash** Fraxinus excelsior.	6	2.5	18	N 2.5 W 1.5 E 3 S 2.5		Position: Situated on third party land. Form: Single stemmed and vertical with a slightly unbalanced crown. History: No evidence of significant pruning. **Defects: Symptoms of ash dieback.** Other: Crack to boundary wall where stem is in contact.	Remove. Low / N/A	Low Poor Fair	Low <10 U
T5	Semi-Mature **Persian Ironwood** Parrotia persica.	6	2.5	18	N 2.5 W 4 E 2 S 6		Position: Situated on third party land. Form: Twin-stemmed at 2m with an unbalanced crown. History: Multiple pruning wounds due to crown lifting. **Defects: No significant defects observed.** Other: Limited inspection, dimensions estimated.	No action required. n/a / 3	Moderate Good Good	Low 40+ C
T6	Mature **London Plane** Platanus x hispanica.	20	5	110	N 8.5 W 8.5 E 8.5 S 8.5		Position: Situated on third party land. Form: Single stemmed and vertical with a well-formed crown. History: Multiple pruning wounds due to crown reduction. **Defects: No significant defects observed.** Other: Limited inspection, dimensions estimated.	No action required. n/a / 3	Moderate Good Good	High 40+ A
T7	Semi-Mature **Norway Maple** Acer platanoides.	16	6	40	N 6 W 9.5 E 3 S 7		Position: Situated on third party land. Form: Twin stemmed specimen. History: Multiple pruning wounds due to crown lifting. **Defects: No significant defects observed.** Other: Limited inspection, dimensions estimated. Recorded stem diameter is equivalent for two stems (35cm, 20cm).	No action required. n/a / 3	Moderate Good Good	Moderate 40+ B -

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 **Ash** Fraxinus excelsior.	19	8	40	N 5 / W 5 / E 5 / S 5		Position: Situated on third party land. Form: Single stemmed and vertical with a balanced crown. History: Managed by cyclical pruning. **Defects: No significant defects observed.** Other: Limited inspection, dimensions estimated.	No action required. n/a / 1	Moderate Good Good	High 40+ C +
T9	Early-Mature **Sycamore** Acer pseudoplatanus.	17	5	65	N 7 / W 7 / E 7.5 / S 6		Position: Situated on third party land. Form: Multi-stemmed at 2m with a balanced crown. History: Occasional pruning wounds due to crown reduction. **Defects: Significant included bark unions.** Other: Tree growing on top of, and causing significant damage to, boundary (retaining) wall. Limited inspection, dimensions estimated.	Remove tree and/or repair boundary wall. Monitor tree. Moderate / 1	Moderate Good Fair	High <10 C
T10	Early-Mature **Lime** Tilia sp.	13	2.5	48	N 3 / W 4 / E 4 / S 4		Position: Street tree. Form: Triple-stemmed at 3m with a balanced crown. History: Pollarded specimen. **Defects: No significant defects observed.**	Maintain by cyclical pollard every 3-5 years. Moderate / 1	Moderate Good Good	High 40+ B
T11	Early-Mature **Lime** Tilia sp.	17	3	64	N 4 / W 5 / E 5 / S 5		Position: Street tree. Form: Twin-stemmed at 3m with a balanced crown. History: Pollarded specimen. **Defects: No significant defects observed.**	Maintain by cyclical pollard every 3-5 years. Moderate / 1	Moderate Good Fair	High 40+ B

Tree Data Schedule

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 - Time (yrs)	Vigour Physiological Condition / Structural Condition	Amenity Value Life Expectancy (yrs) / Retention Category
T1	Semi-Mature **Pencil Cedar** *Juniperus virginiana.*	7	2.5	23	2 / 2.5 / 2.5 / 2.5		Position: Situated within the rear garden. Form: Single stemmed and leaning with a compact crown. History: Previously topped at 3.5m. **Defects: Significant decay column from stem to crown break (circa 3m above ground level).** Other: Acceptable condition at present.	No action required. n/a	1.5	Moderate / Good / Fair	Low 10-20 C -
T2	Semi-Mature **Ash** *Fraxinus excelsior.*	15	3.5	38	4.5 / 6 / 1 / 8		Position: Situated on third party land. Form: Single stemmed with a slight lean and an unbalanced crown. History: No evidence of significant pruning. **Defects: No significant defects.** Other: Limited inspection, dimensions estimated.	No action required. n/a	3	Moderate / Good / Fair	Low 40+ C
T3	Early-Mature **Beech** *Fagus sylvatica.*	17	4.5	50	7 / 7 / 7 / 8		Position: Situated on third party land. Form: Twin stem specimen. History: No evidence of significant pruning. **Defects: No significant defects.** Other: Limited inspection, dimensions estimated.	No action required. n/a	3	Moderate / Good / Good	Moderate 40+ B
T4	Semi-Mature **Ash** *Fraxinus excelsior.*	6	2.5	18	1.5 / 2.5 / 3 / 2.5		Position: Situated on third party land. Form: Single stemmed and vertical with a slightly unbalanced crown. History: No evidence of significant pruning. **Defects: Symptoms of ash dieback.** Other: Crack to boundary wall where stem is in contact.	Remove. Low	N/A	Low / Poor / Fair	Low <10 U
T5	Semi-Mature **Persian Ironwood** *Parrotia persica.*	6	2.5	18	2.5 / 4 / 2 / 6		Position: Situated on third party land. Form: Twin-stemmed at 2m with an unbalanced crown. History: Multiple pruning wounds due to crown lifting. **Defects: No significant defects observed.** Other: Limited inspection, dimensions estimated.	No action required. n/a	3	Moderate / Good / Good	Low 40+ C
T6	Mature **London Plane** *Platanus x hispanica.*	20	5	110	8.5 / 8.5 / 8.5 / 8.5		Position: Situated on third party land. Form: Single stemmed and vertical with a well-formed crown. History: Multiple pruning wounds due to crown reduction. **Defects: No significant defects observed.** Other: Limited inspection, dimensions estimated.	No action required. n/a	3	Moderate / Good / Good	High 40+ A
T7	Semi-Mature **Norway Maple** *Acer platanoides.*	16	6	40	6 / 9.5 / 3 / 7		Position: Situated on third party land. Form: Twin stemmed specimen. History: Multiple pruning wounds due to crown lifting. **Defects: No significant defects observed.** Other: Limited inspection, dimensions estimated. Recorded stem diameter is equivalent for two stems (35cm, 20cm).	No action required. n/a	3	Moderate / Good / Good	Moderate 40+ B -
T8	Early-Mature **Ash** *Fraxinus excelsior.*	19	8	40	5 / 5 / 5 / 5		Position: Situated on third party land. Form: Single stemmed and vertical with a balanced crown. History: Managed by cyclical pruning. **Defects: No significant defects observed.** Other: Limited inspection, dimensions estimated.	No action required. n/a	1	Moderate / Good / Good	High 40+ C +
T9	Early-Mature **Sycamore** *Acer pseudoplatanus.*	17	5	65	7 / 7 / 7.5 / 6		Position: Situated on third party land. Form: Multi-stemmed at 1m with a balanced crown. History: Occasional pruning wounds due to crown reduction. **Defects: Significant included bark unions.** Other: Tree growing on top of, and causing significant damage to, boundary (retaining) wall. Limited inspection, dimensions estimated.	Remove tree and/or repair boundary wall. Monitor tree. Moderate	1	Moderate / Good / Fair	High <10 C
T10	Early-Mature **Lime** *Tilia sp.*	13	2.5	48	3 / 4 / 4 / 4		Position: Street tree. Form: Triple-stemmed at 3m with a balanced crown. History: Pollarded specimen. **Defects: No significant defects observed.**	Maintain by cyclical pollard every 3-5 years. Moderate	1	Moderate / Good / Good	High 40+ B
T11	Early-Mature **Lime** *Tilia sp.*	17	3	64	6 / 5 / 5 / 5		Position: Street tree. Form: Twin-stemmed at 3m with a balanced crown. History: Pollarded specimen. **Defects: No significant defects observed.**	Maintain by cyclical pollard every 3-5 years. Moderate	1	Moderate / Good / Fair	High 40+ B

Photographs

Photo 1.

Photo 2.

Photo 3.

Photo 4.

Photo 5.

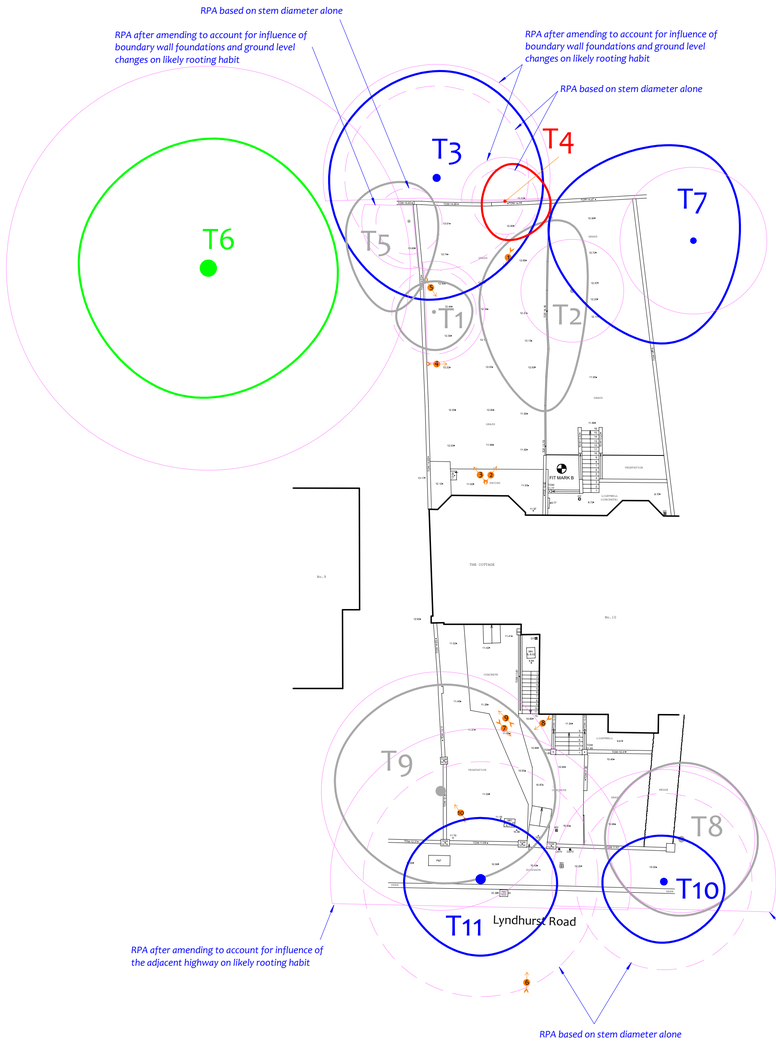
Photo 6.

Photo 7.

Photo 8.

Photo 9.

Photo 10.



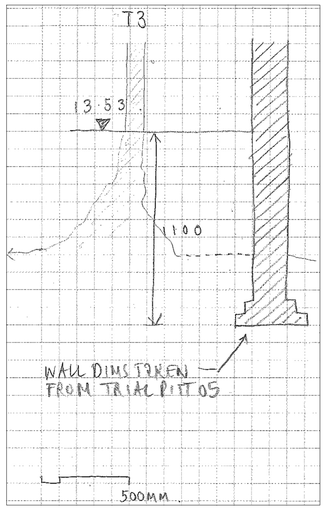
Rooting Habits

A 1.5m to 2m tall retaining wall separates T3, T4 and T5 from the site, and ground levels where the trees grow are circa 0.7m higher than ground levels within the site. The retaining wall foundation and difference in ground levels are likely to influence the pattern of root proliferation such that roots are likely to be less prolific within the site.

To determine the depth of the retaining wall foundations, a trial pit was excavated immediately adjacent to it. This excavation revealed the bottom of the foundation to be 1.1m below ground level where the trees grow and 0.4m below ground level within the site. The adjacent sectional drawing illustrates the wall foundation and difference in garden levels relative to T3.

Below the upper soil horizons, the availability of oxygen and nutrients decreases with depth, resulting in an inhospitable environment for tree roots. Given the roots of T3, T4, and T5 would need to grow deeper than 1.1m to reach the bottom of the wall foundation before growing laterally into the site, they are unlikely to proliferate within the site. Instead, their roots are likely to proliferate in the adjacent garden in which they grow.

Consequently, the theoretical Root Protection Areas of T3, T4 and T5 have been amended.



Drawing No:	CCL 11757 / TCP Rev: 1
Title:	Tree Constraints Plan (Existing Layout)
Site:	10 Lyndhurst Road NW3 5PX
Scale:	1:200 (0 5 10m) Paper Size: A1

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Tree Retention Categories Stems & canopies shown

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

Tree Constraints Plan

Status: Final

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

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

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

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

1 Photo 1

MN = Measured North:

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

Tree Ref.	Species	Height (m)	Root Protection Area Radius (m)	m²	Square (m)
T1	Pencil Cedar	7	2.8	24	4.9
T2	Ash	15	3.4	35	6.0
T3	Beech	17	6.0	113	10.6
T4	Ash	6	2.2	15	3.8
T5	Persian Ironwood	6	2.2	15	3.8
T6	London Plane	20	13.2	547	23.4
T7	Norway Maple	16	4.8	72	8.5
T8	Ash	19	4.8	72	8.5
T9	Sycamore	17	7.8	191	13.8
T10	Lime	13	5.8	104	10.2
T11	Lime	17	7.7	185	13.6

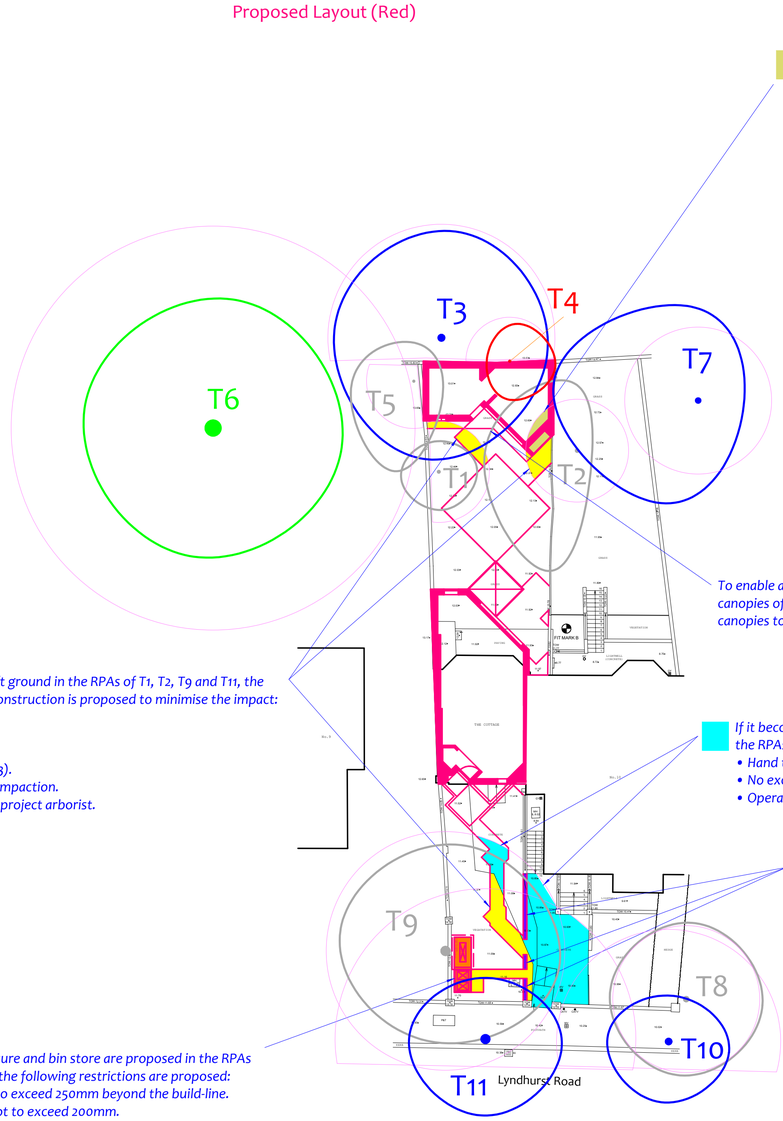
Overview

It is proposed to demolish the existing dwelling and construct a new dwelling with a larger footprint and an outbuilding in the rear garden, as indicated in the drawings in Appendix 6. The existing layout is indicated in black, and the footprint of the proposed layout is indicated in red.

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

Activity	Trees Potentially Affected
Tree Removal: Retention Category A	None
Tree Removal: Retention Category B	None
Tree Removal: Retention Category C	None
Tree Removal: Retention Category U	None
Tree Pruning	T2, T4 and T5
RPA: House Foundations	None
RPA: Outbuilding Foundations	T2
RPA: Acoustic Enclosure and Bin Store Foundations	T9 and T11
RPA: Garden Wall Foundations	T9 and T11
RPA: New Hard Surface	T1, T2, T9 and T11
RPA: Replace Existing Hard Surface	T9, T10 and T11
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)

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.



Building foundations are proposed in the RPA of T2. To minimise the impact, the following restrictions are proposed:
- *In the direction of the tree, excavation not to exceed 250mm beyond the build-line.*
- *Hand tools to be used to a depth of 600mm.*
- *Plant machinery may be used at deeper depths.*
- *Exposed roots over 25mm diameter shall be retained and protected with damp hessian if practicable, else neatly pruned.*

To enable adequate clearance between the proposed outbuilding and the tree canopies of T2, T4 and T5, it is proposed to crown lift the overhanging canopies to a height of 4.5m.

Where the path is proposed over soft ground in the RPAs of T1, T2, T9 and T11, the following Minimum-Dig method of construction is proposed to minimise the impact:
- *Excavation not to exceed 200mm.*
- *Hand tools to be used.*
- *New surface to be porous.*
- *Sub-base to be porous (MOT type 3).*
- *Ground to be protected against compaction.*
- *Operation to be supervised by the project arborist.*

If it becomes necessary to replace the hard surface with a new hard surface over the RPAs of T9, T10 and T11, the following is proposed to minimise the impact:
- *Hand tools to be used.*
- *No excavation to occur below the existing surface and sub-base.*
- *Operation to be supervised by the project arborist.*

Where the garden wall is proposed over the RPAs of T9 and T11, the following restrictions are proposed to minimise the impact on roots:
- *Excavation should be undertaken using hand tools only.*
- *Excavation to be supervised by the project arborist.*
- *Where the project arborist deems necessary, a shallow beam shall be incorporated into the foundation design to ensure that all roots in excess of 50mm and most roots in excess of 25mm are retained intact.*

Foudations for the new acoustic enclosure and bin store are proposed in the RPAs of T9 and T11. To minimise the impact, the following restrictions are proposed:
- *Toward the trees, excavation is not to exceed 250mm beyond the build-line.*
- *Excavation depth for raft or beam not to exceed 200mm.*
- *Hand tools to be used to excavate.*
- *Excavation to be supervised by the project arborist.*
- *Exposed roots over 25mm diameter shall be retained and protected with damp hessian if practicable, else pruned by the arborist.*
- *The foundation may be supported by narrow diameter piles (max 300mm diameter).*
- *Trial pits excavated to determine pile locations. All roots over 25mm diameter to be retained intact and pile relocated.*

Drawing No:	CCL 11757 / IAP Rev: 1
Title:	Impact Assessment Plan
Site:	10 Lyndhurst Road NW3 5PX
Scale:	1:200 (0, 5, 10m) Paper Size: A1

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Arboricultural Consultants
01423 316660

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Impact Assessment Plan

Status: Final - for submission

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