

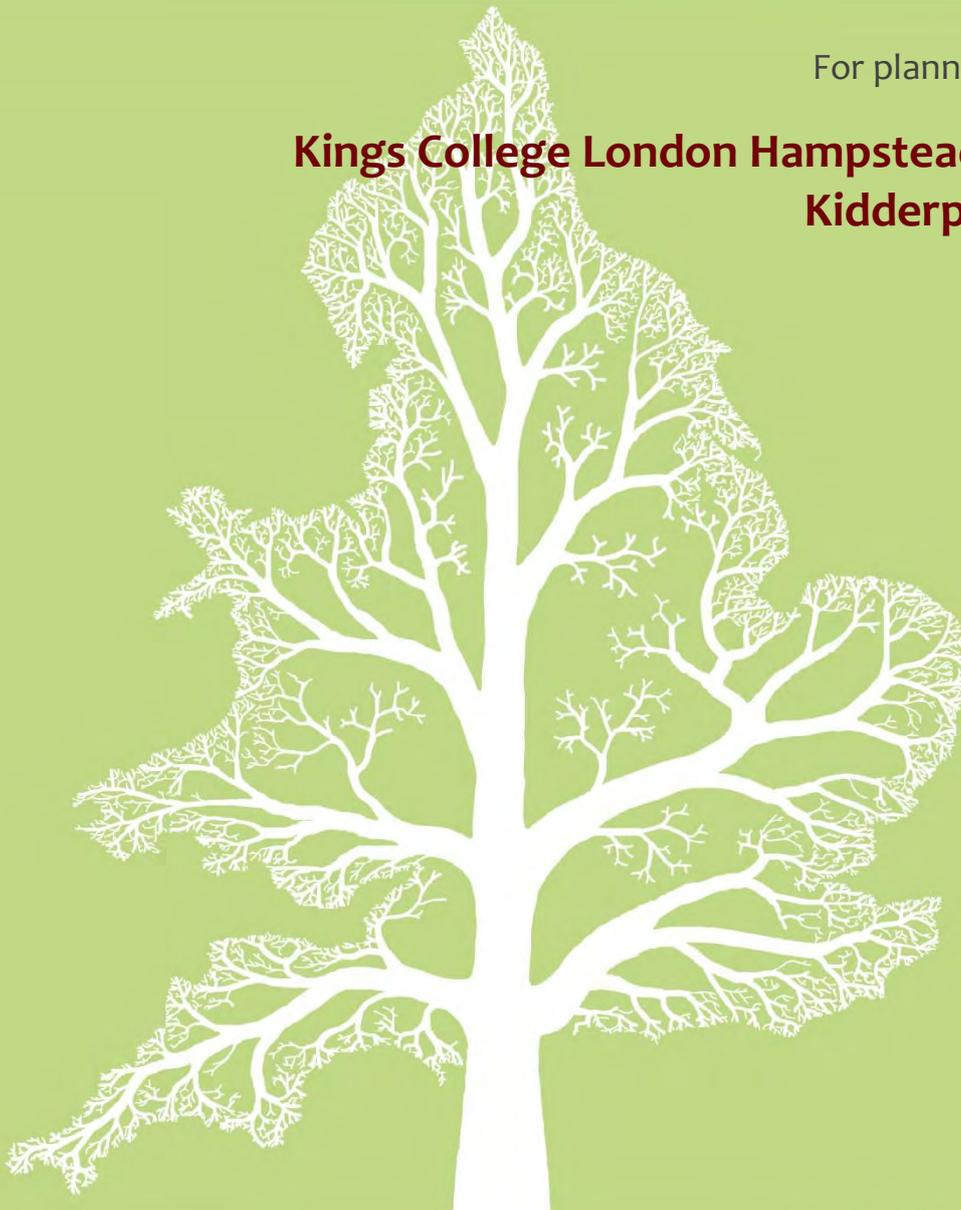
# Arboricultural Report

& Impact Assessment



For planning purposes at

**Kings College London Hampstead Residence**  
**Kidderpore Avenue**  
**Hampstead**  
**NW3 7ST**



Dated  
1<sup>st</sup> July 2015



**CROWN**  
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# Contents

<b>1.</b>	<b>Introduction</b>	<b>3</b>
1.1.	Instruction	3
1.2.	Scope and Purpose of the Report	3
1.3.	References	3
1.4.	Drawings	3
<b>2.</b>	<b>Site Overview</b>	<b>4</b>
2.1.	Brief Description (Existing Layout)	4
2.2.	Soils	4
<b>3.</b>	<b>Tree Survey and Data Schedule</b>	<b>5</b>
3.1.	Survey Details	5
3.2.	Data Schedule	5
3.3.	RPA calculation - Single Stems & Multiple Stems	5
<b>4.</b>	<b>Vegetation Overview (independent of proposals)</b>	<b>6</b>
4.1.	Preliminary Management Recommendations	6
4.2.	Work Priority and Future Inspections	6
4.3.	Tree Protection Status – Site Specific	7
4.4.	Tree Protection – General Notes	7
4.5.	Species Present – Additional Information	8
<b>5.</b>	<b>Arboricultural Impact Assessment</b>	<b>10</b>
5.1.	Overview	10
5.2.	Tree Removal	11
5.3.	Mitigation Planting	12
5.4.	Impact on Tree Canopies	12
5.5.	Impact on Tree Roots	12
5.6.	Demolition Activities	14
5.7.	Hazardous Materials	14
5.8.	Cabins and Site Facilities	14
5.9.	Boundary Treatments	14
5.10.	Impact of Retained Trees on the Development	14
5.11.	Summary	15
5.12.	Arboricultural Method Statement	15
<b>6.</b>	<b>Tree Works Schedule</b>	<b>16</b>
6.1.	Tree Works Specification	16
<b>7.</b>	<b>Photographs</b>	<b>17</b>
<b>8.</b>	<b>Photographs of Trench 1</b>	<b>22</b>
<b>9.</b>	<b>Photographs of Trench 2</b>	<b>26</b>
<b>10.</b>	<b>Photographs of Trench 3</b>	<b>29</b>
<b>11.</b>	<b>Signature</b>	<b>32</b>
	<b>Appendix 1: BS 5837: 2012 – Guidance Notes</b>	<b>33</b>
	<b>Appendix 2: Explanation of Tree Data &amp; Glossary</b>	<b>35</b>
	<b>Appendix 3: Survey Methodology</b>	<b>39</b>
	<b>Appendix 4: Author’s Qualifications</b>	<b>39</b>
	<b>Appendix 5: Further Information</b>	<b>40</b>
	<b>Appendix 6: Tree Data Schedule and Site Plan(s)</b>	<b>41</b>



## 1. Introduction

### 1.1. Instruction

1.1.1. We are instructed by Huw Bramhall of The Ecology Consultancy to undertake an Arboricultural Survey at Kings College London Hampstead Residence and produce our findings in a report. We are also instructed to assess the likely impact of development proposals.

### 1.2. Scope and Purpose of the Report

1.2.1. This report is designed to accompany a planning application for development proposals at the above site. Its purpose is to assist and inform the planning process. It is produced according to the guidance and recommendations within *BS 5837: 2012 - Trees in Relation to Design, Demolition and Construction*.

### 1.3. References

1.3.1. We have liaised closely with several members of the design team in order to agree a workable design that will minimise the impact of the proposal on adjacent trees. We have an adequate understanding of the project to enable us to carry out an accurate assessment of the proposals.

### 1.4. Drawings

1.4.1. We have been supplied with a measured plan of the site with tree positions already plotted. Where applicable, additional trees have been plotted according to measurements taken on site.

1.4.2. The *Tree Constraints Plan* shows the existing layout. For each tree the stem location is indicated and scaled according to its diameter, the canopy is indicated according to measurements taken along the four cardinal points of the compass. Root protection areas (RPAs) are indicated which are calculated according to the guidelines within BS 5837 (2012).

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

1.4.4. The *Tree Removal Plan* indicates the tree constraints with the proposals overlaid. This plan shows which trees are to be pruned or removed. This plan accompanies the Impact Assessment which is to be found in Section 5.

1.4.5. The *Impact Assessment Plan* indicates the tree constraints with the proposals overlaid but only shows the trees to be retained. Where applicable, this plan shows where works are proposed in Root Protection Areas. This plan also accompanies the Impact Assessment which is to be found in Section 5.



## 2. Site Overview

### 2.1. Brief Description (Existing Layout)

2.1.1. The site co-ordinates are 51° 33.448'N 0° 11.545'W and the altitude is approximately 99m above sea level. (Co-ordinates may be pasted or typed into the following site: <http://maps.google.co.uk/> where maps, satellite imagery and street views may be accessed).

2.1.2. Our survey covered the area indicated in Figure 1.



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

2.1.3. The survey area encompassed the entire curtilage of Kings College London Hampstead Residence. Within this site are several buildings and distinct landscaped areas. Trees growing beyond the boundary were also included in the survey.

2.1.4. The Tree Constraints Plan and Tree Data Schedule should be referred to for descriptions and locations of all trees.

2.1.5. Photographs of the site are included in Sections 7, 8, 9 and 10.

### 2.2. Soils

2.2.1. Geological maps ( <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> ) indicate that the underlying geology of the area is clay with no recorded superficial deposits. This means that soils throughout the site are likely to be susceptible to compaction and the root systems are likely to be relatively shallow. We have undertaken trial excavations in four places within the site and can confirm the present of clay soils.



## 3. Tree Survey and Data Schedule

This page is largely generic. Tree officers and other persons familiar with arboricultural reports may go straight to the following section and refer to the tree data in Appendix 6.

### 3.1. Survey Details

3.1.1. A ground level survey was undertaken on several dates between February and June 2015. The survey was conducted by Ivan Button. No climbed inspections or specialist decay detection were undertaken. Only trees with a stem diameter over 75mm were included, which lie within the site boundary or relatively close to it.

3.1.2. Where applicable, trees with significant defects have been highlighted and appropriate remedial works have been recommended. However, this report should not be seen as a substitute for a full *Safety Survey* or *Management Plan* which are specifically designed to minimise risk and liability associated with responsibility for trees.

3.1.3. Wherever possible, dimensions are 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.

### 3.2. Data Schedule

3.2.1. The findings of the survey are presented in The Tree Data Schedule which is provided as a separate document as well as being appended to the end of this document within Appendix 6.

3.2.2. The Schedule includes scaled tree images based on measurements recorded for stem diameter, crown spread, crown height and overall height. Their purpose is to indicate, at a glance, the relative dimensions of each tree.

3.2.3. A definition of the Retention Categories can be found in Appendix 1. All other terms used within the Tree Data Schedule are defined and explained in Appendix 3.

### 3.3. RPA calculation - Single Stems & Multiple Stems

3.3.1. For single stemmed trees, the RPA is calculated according to the following formula:

$$\text{RPA radius} = 12 \times \text{stem diameter (measures at 1.5m above ground level)}$$

3.3.2. 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.

3.3.3. Occasionally this method is not appropriate (e.g. for coppiced specimens where there are numerous stems). In such cases the diameter at ground level may be recorded or a stem diameter which would provide a suitable Root Protection Area calculation. The form of the tree is recorded in the notes section.



## 4. Vegetation Overview (independent of proposals)

This section summarises all the recommendations within the Tree Data Schedule regardless of whether trees are to be retained, felled or pruned to facilitate the proposed development. It does not specify works that may be required to facilitate the development proposals. The protection status of the trees is also reported in this section.

### 4.1. Preliminary Management Recommendations

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

4.1.2. The ash tree, T6, was observed to be in poor condition. This is evidenced by the sparse canopy and significant deadwood throughout its canopy. Pockets of decay were also encountered in two places between the buttress roots. To our knowledge the extent of decay has not been determined. We therefore recommend that specialist decay detection is undertaken (especially since this tree is being considered for retention).

4.1.3. T26 and T60 could not be fully inspected due to the presence of dense ivy. It is recommended that the ivy is removed so that the trees may be re-inspected.

4.1.4. All other trees were deemed to be in an acceptable condition.

### 4.2. Work Priority and Future Inspections

4.2.1. 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
<b>Urgent</b>	As soon as possible	None
<b>Very High</b>	Within 1 Month	None
<b>High</b>	Within 3 Months	T6
<b>Moderate</b>	Within 1 year	T26, T60
<b>Low</b>	Within 3 years	None

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

Inspection Frequency (years)	Tree Number
<b>0.5</b>	T6
<b>1</b>	T60
<b>1.5</b>	T26
<b>3</b>	T1, T2, T3, T4, T5, G7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, G19, T20, T21, G22, T23, T24, T25, T27, T28, T29, T30, T31, G32, T33, T34, T35, T36, T37, T38, T39, T40, T41, T42, T43, T44, T45, T46, T47, T48, T49, T50, T51, T52, T53, T54, T55, T56, T57, T58, T59, T61, T62, T63

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



### 4.3. Tree Protection Status – Site Specific

4.3.1. On 26<sup>th</sup> June 2014, we were informed, by Leela Muthoora of London Borough of Camden that:

- The site is within a conservation area.
- There are tree preservation orders affecting trees within the site.
- There are no TPO's immediately adjacent to the site.

### 4.4. Tree Protection – General Notes

4.4.1. Heavy fines exist for carrying out unauthorised works to protected trees so we advise that further checks are made before any tree-works are undertaken.

4.4.2. Before undertaking works to trees protected by a tree preservation order, consent needs to be obtained from the local authority which will provide application forms and advice to potential applicants. The removal of dead wood is exempt.

4.4.3. Where the works are proposed for reasons of safety or ill health, a report from a suitably qualified arborist will usually be required. Trees that are dead, dangerous or dying are technically exempt from protection, though it would be prudent to give the local authority 5 days' notice of intention and take photographs before undertaking works without prior consent being granted. Unauthorised works to protected trees may result in a criminal prosecution and a large fine (unlimited).

4.4.4. Where trees are located in a conservation area, works are not permitted without first giving the local authority 6 weeks' notice of intention. During this time the local authority may elect to create a tree preservation order or to inform the applicant that they have no objection to the proposed works. If the local authority does not respond within 6 weeks, then the intended work may be undertaken. Note: the local authority cannot refuse consent for works to trees within a conservation area; they may only create a tree preservation order if they wish to have further control over what works are undertaken.

4.4.5. Where planning permission is granted and tree works have been approved as part of the planning consent, no further application is required in respect of protected trees and no further notice is required in respect of trees within a conservation area.



## 4.5. Species Present – Additional Information

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

Species	Typical Height at Maturity (m)	Typical Canopy Spread at Maturity (m)	General Notes
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 <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Fraxinus+excelsior">http://www.pfaf.org/user/Plant.aspx?LatinName=Fraxinus+excelsior</a> 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 <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Fagus+sylvatica">http://www.pfaf.org/user/Plant.aspx?LatinName=Fagus+sylvatica</a> for more info.
Cherry	8	10	Many cultivars available, bred for their abundance of spring flowers, edible cherries or ornamental bark (e.g. Tibetan Cherry). Usually white or pink flowering, often in very early spring. Usually with a single bole to around 2.5m and multi-stemmed thereafter. Most varieties have excellent autumn colour.
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 <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Sambucus+nigra">http://www.pfaf.org/user/Plant.aspx?LatinName=Sambucus+nigra</a> for more info.
Fig	30	12	Deciduous tree native to western Asia with large leaves. Many varieties available. Edible variety usually planted, though rarely fruits and ripens in the UK.
Goat Willow	10	8	Also called Pussy Willow or Great/Common Sallow. Native and abundant in Britain except on the lightest soils. One of the first pioneer species to colonise an abandoned site due to its light far-blown seeds. Traditionally coppiced and used for basket making. Rarely planted as an ornamental due to its untidy habit. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Salix+caprea">http://www.pfaf.org/user/Plant.aspx?LatinName=Salix+caprea</a> for more info.
Hawthorn	6	6	Arguably Britain's most common tree due to its abundance in field and roadside hedges. Deciduous, prickly and one of our most hardy trees, it will tolerate almost all conditions including drought, pollution and coastal winds. Also known as Mayflower because of its abundance of white flowers in May. Red 'haws' ripen from September to November and have only one pip (unlike Midland hawthorn which contains 2 pips). Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Crataegus+monogyna">http://www.pfaf.org/user/Plant.aspx?LatinName=Crataegus+monogyna</a> for more info.
Holly	16	12	Evergreen tree native across Western Europe. Many cultivars available, often with variegated leaves. Females produce bright red berries. Good wildlife value. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Ilex+aquifolium">http://www.pfaf.org/user/Plant.aspx?LatinName=Ilex+aquifolium</a> for more info.
Hornbeam	25	14	Deciduous tree native to Southeast England and across Europe. Bark is smooth and grey on a stem which is often twisted and sinewy. Leaves sharply toothed and deeply veined. Tolerant of heavy clay soils. Formerly coppiced and prized for its durable timber which was used in wheel hubs, piano hammers, mill wheels and chopping blocks. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Carpinus+betulus">http://www.pfaf.org/user/Plant.aspx?LatinName=Carpinus+betulus</a> for more info.
Indian Bean Tree	16	12	The 'Indian Bean Tree'. Native to S. Catalpa, Florida, Alabama and Mississippi. More frequent in the southern UK as it prefers a warmer climate. Leaves are very large and smell foul when crushed. Flowers in large candles at the branch ends in summer followed by slender hanging seed pods to 40cm long. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Catalpa+bignonioides">http://www.pfaf.org/user/Plant.aspx?LatinName=Catalpa+bignonioides</a> for more info.
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 <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Laburnum+anagyroides">http://www.pfaf.org/user/Plant.aspx?LatinName=Laburnum+anagyroides</a> for more info.
Lawson Cypress	40	10	Erect, narrowly conical evergreen tree native to Southwest Oregon and N. W. California. Introduced to Britain in the 1850's and now a common tree in gardens and parks. Makes an excellent dense hedge. Many varieties are available including golden and miniature varieties. Easily distinguished from Leyland cypress by the presence of small cones. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Chamaecyparis+lawsoniana">http://www.pfaf.org/user/Plant.aspx?LatinName=Chamaecyparis+lawsoniana</a> for more info.



Species	Typical Height at Maturity (m)	Typical Canopy Spread at Maturity (m)	General Notes
Leyland Cypress	40	8	Vigorous evergreen tree, cultivated hybrid between Nootka Cypress and Monterey Cypress. Widely planted and widely hated. Excellent hedging species unless it is undermanaged in which case it forms a giant, dense wall of foliage. Very hardy. Tolerates most conditions. Size may be managed by regular trimming. Golden forms available. (The details of the specific cultivar surveyed are not listed here.) Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Cupressocyparis+leylandii">http://www.pfaf.org/user/Plant.aspx?LatinName=Cupressocyparis+leylandii</a> for 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 <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Tilia+x+europa">http://www.pfaf.org/user/Plant.aspx?LatinName=Tilia+x+europa</a> for info.
Lombardy Poplar	35	8	Distinctive, narrowly columnar deciduous tree with triangular leaves. Native to Italy. Gnarled bole supports numerous ascending branches that taper towards a narrow pointed crown. Often planted in rows. Tolerates a wide range of soils and climates. Upright habit can lead to weak branch junctions and a tendency for branch failure. Fast growing. Tolerant of heavy pruning.
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 multi-coloured flecked pattern. Very common as a street tree, especially throughout London where it dominates the streetscape. Often managed as a pollard in order to constrain its large size to more manageable proportions, especially where there are clay soils and adjacent buildings. Somewhat susceptible to the decay fungus <i>Inonotus hispidus</i> . Visit <a href="http://en.wikipedia.org/wiki/Platanus">http://en.wikipedia.org/wiki/Platanus</a> for more info.
Magnolia	7	8	Small tree or large shrub, favoured for its large, ornamental flowers. About 80 species and numerous cultivars are available, both deciduous and evergreen. Leaves always untoothed and sometimes very large. Large silky flower buds and berries dangling from unusual 'knobbly cucumber' fruits.
Maidenhair Tree	25	12	Deciduous tree native to Eastern China - a living fossil with no known relatives. Slow growing. Angular crown with long erratic branches. Occasionally planted as a street tree. Female trees are to be avoided due to their unpleasant smell. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Ginkgo+biloba">http://www.pfaf.org/user/Plant.aspx?LatinName=Ginkgo+biloba</a> for more info.
Monkey Puzzle	30	16	Evergreen tree native to Chile. Prized for its regular, geometric form. Intolerant of pollution. Very prickly foliage clothes all branches. A nightmare to climb.
Oak	22	18	Deciduous, long lived tree native and common throughout Europe with very durable timber. Excellent habitat tree - provides food and shelter for thousands of native species. Can be very attractive as a mature open grown specimen though not particularly ornamental, having no autumn colour or showy flowers. Responds well to pruning. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Quercus+robur">http://www.pfaf.org/user/Plant.aspx?LatinName=Quercus+robur</a> for more info.
Pissards Plum	6	7	Also called Purple Plum. Small deciduous tree usually with a dense, low canopy containing a multitude of upright epicormic shoots giving it a messy appearance. Adds colour interest and is suitable for a small garden. Pink flowers appear very early in the year and large fruits make good jam. Visit <a href="http://en.wikipedia.org/wiki/Cherry_plum">http://en.wikipedia.org/wiki/Cherry_plum</a> for more info.
Rowan	14	12	Deciduous tree native across Europe and N Africa. Also known as mountain ash due to its pinnate leaves and ability to grow at high altitudes. Attractive autumn colour and berries along with spring flowers. Good wildlife tree. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Sorbus+aucuparia">http://www.pfaf.org/user/Plant.aspx?LatinName=Sorbus+aucuparia</a> for more info.
Silver Birch	16	10	Deciduous native tree. A pioneer species requiring good lighting levels that will readily colonise open ground. Relatively short lived and surpassed in woodland by dominant species such as oak and beech. Attractive white bark and graceful, delicate form make this a popular garden tree. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Betula+pendula">http://www.pfaf.org/user/Plant.aspx?LatinName=Betula+pendula</a> 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 <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Acer+pseudoplatanus">http://www.pfaf.org/user/Plant.aspx?LatinName=Acer+pseudoplatanus</a> for more info
Turkey Oak	25	20	Deciduous and native across Southern Europe. Long whiskers clothing the buds distinguish this tree from Common Oak in winter. Acorn cups are also rougher and hairier. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Quercus+cerris">http://www.pfaf.org/user/Plant.aspx?LatinName=Quercus+cerris</a> for more info

4.5.2. The figures quoted regarding typical height and canopy spread should be treated as approximate. The figures quoted are not the maximum dimensions that the species may attain.



## 5. Arboricultural Impact Assessment

### 5.1. Overview

- 5.1.1. The proposed development involves the retention of the site’s five Grade II statutorily listed buildings. Kidderpore Hall, the Maynard Wing, the Chapel and the old Skeel Library will all be sensitively converted to residential use, and the Summerhouse will be restored in a new location on the site close to the Chapel.
- 5.1.2. Other non-listed buildings will also be retained and sensitively converted to residential use, namely Bay House, Dudin Brown, and Rosalind Franklin.
- 5.1.3. Three existing buildings will be demolished and replaced with new residential buildings: Lord Cameron Hall, Rosalind Franklin Hall and the Queen Mother’s Hall.
- 5.1.4. Integrated in the Kidderpore Avenue elevation of the replacement for the Queen Mother’s Hall will be an access to a basement area where car parking for residents and visitors will be provided. In total 97 spaces are proposed. The majority of cycle parking requirements will also be accommodated in the basement, amount to 312 spaces. Some cycle parking – in particular that intended to be used by visitors, amounting to 16 spaces – will be provided at ground floor level, carefully integrated into the hard and soft landscaping scheme.
- 5.1.5. New buildings are proposed in two locations on the site. The first is between the Chapel and Queen Mother’s Hall where ‘pavilion’ houses are proposed. A terrace of ‘townhouses’ is proposed between the Chapel and the Maynard Wing on the site of the previously-consented student accommodation development, planning permission for which remains extant by virtue of the development having been commenced. The proposed development also includes residents’ facilities and a concierge.
- 5.1.6. These proposals are indicated on the accompanying plans in Appendix 6. The existing layout is indicated in blue, the footprint of the proposed layout is indicated in pale green.
- 5.1.7. The table below summarises the potential impact on trees due to various activities.

Activity	
Tree Removal: Retention Category A	None
Tree Removal: Retention Category B	T14, T15, T17, T18, T56, T60
Tree Removal: Retention Category C	T1, T2, G7, T8, T10, T12, T13, T16, G19, T23, T24, T25, T26, T27, T28, T29, T30, T31, G32, T36, T37, T41, T42, T43, T44, T45, T49, T55
Tree Removal: Retention Category U	None
Tree Pruning	T38, T48, T50, T64
RPA: Foundations	T6, T20, T50, T64
RPA: New Road Surface	None
RPA: Underground Services	None Anticipated (To be confirmed)
RPA: Change of Ground Levels	None
RPA: Soil Compaction	All trees throughout the site (preventable by installing tree protection measures)

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



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## 5.2. Tree Removal

- 5.2.1. All trees to be removed are indicated on the Tree Removal Plan and are listed below:
- 5.2.2. **Retention Category A:** It is proposed to retain all Retention Category A trees.
- 5.2.3. **Retention Category B:** It is proposed to remove the following Retention Category B trees: T14, T15, T17, T18, T56 and T60. T60 is located so close to a proposed residence that retention is not considered practicable. The other trees are all located over areas where deep excavation is required to enable the basement parking to be installed.
- 5.2.4. T14, T15, T17 and T18 are all birch trees and are either considered to be mature (T14) or early mature (T15, T17 and T18). These are a relatively fast growing and short lived species. They are located internally to the site so are not considered to have a particularly high amenity value. Their removal shall not have a major impact on the wider visual amenity of the locality.
- 5.2.5. T56 is a small monkey puzzle tree (height 6m) it is also located internally to the site and as such has a low amenity value.
- 5.2.6. T60 is a mature Lombardy poplar. This tree is in good physiological condition though it was not possible to accurately assess its structural condition as a dense covering of ivy prevented a close inspection of the tree stem and branch junctions.
- 5.2.7. Poplars are a fast growing species. This means that they sacrifice some structural strength in favour of rapid growth. They are generally regarded as a brittle species and are not very good at preventing the spread of decay (should any decay become established within the stem).
- 5.2.8. Lombardy poplars are fastigate in habit. This means that their branch junctions are at an acute angle. Bark often gets trapped between the branches and the stem, thus forming a weak junction. Branch failure is therefore relatively high in this species. They are often regarded as unsuitable for locations where safety is paramount. We have visited this site on several occasions and have observed that the rear gardens of the adjacent church grounds are used as a children's play area.
- 5.2.9. T60 is considered to be approaching end of its safe useful life expectancy for all of the reasons stated above.
- 5.2.10. T60 is barely visible from roads or public footways so it is not considered to have a particularly high amenity value. The removal of this tree is therefore considered to be justifiable to enable the site to be developed to a sensible extent. The Root Protection Area of this tree is so large that retaining it would effectively prevent any development of the north-west corner of the site.
- 5.2.11. **Retention Category C:** It is proposed to remove the following Retention Category C trees: T1, T2, G7, T8, T10, T12, T13, T16, G19, T23, T24, T25, T26, T27, T28, T29, T30, T31, G32, T36, T37, T41, T42, T43, T44, T45, T49, T55. These are all relatively small trees the tallest being the birch, T30 at 14m tall, the other trees are all 11m tall or less. Species include birch, holly, lime, Lawson cypress, laburnum, magnolia, rowan, cherry, hawthorn, goat willow, 2 x young ash, 4 x holly, magnolia, elder, young oak). These trees are all considered to have a low amenity value and are not considered to be a material planning consideration.
- 5.2.12. **Retention Category U:** Our survey did not identify any Retention Category U trees.
- 5.2.13. Details specific to each tree can also be found in the Tree Data Schedule.



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### 5.3. Mitigation Planting

- 5.3.1. There is ample scope for new planting to mitigate against tree loss. I understand that it is proposed to plant several new trees as part of a post development landscaping scheme.

### 5.4. Impact on Tree Canopies

- 5.4.1. It is proposed to remove the lower branches of T64 where they overhang the site boundary. This will create a clearance height of circa 6m which shall be sufficient to enable the build to the rear of the existing chapel. T64 is a sycamore so will tolerate such pruning with no detrimental impact.
- 5.4.2. The canopies of T38 and T50 may require very light trimming of the outer foliage in order to create enough clearance for scaffolding and demolition. No branches in excess of 30mm diameter shall require pruning.
- 5.4.3. It is also proposed to prune back the branches of T48 that are growing towards the proposal in order to create a clearance distance of circa 4.5m. This may be largely attained by the removal of one significant branch along with minor trimming of other branches. The exact pruning specification shall be agreed with the local authority and the owner of this tree (it is believed to be growing just beyond the site boundary). Some pruning of the canopy of T20 may also be required in order to provide adequate clearance for a piling rig to operate close to the periphery of its canopy. The exact pruning specification shall be agreed with the local authority after discussions with the piling rig operator. We understand that a clearance distance of circa 0.75m shall be required beyond the one where the piles are to be installed
- 5.4.4. So long as the above pruning works are undertaken sympathetically (working to BS 3998: 2010 guidelines) the trees shall not be significantly harmed or disfigured. These works are specified within the Tree Works Schedule in Section 6.
- 5.4.5. All other tree canopies shall be unaffected by the proposals.

### 5.5. Impact on Tree Roots

#### 5.5.1. Foundations / Basement Parking:

- 5.5.2. Trees potentially affected by excavation for foundations or for the basement parking are T6, T20, T50 and T64.
- 5.5.3. The extension to the rear of the chapel shall extend over the Root Protection Area of **T64**. However a pile and raft foundation is proposed here which shall avoid all excavation within the RPA. The reinforced raft shall be located entirely above the existing ground levels and shall be supported by narrow piles. So long as the piles are located in areas of low rooting activity (pre-determined by trial excavation), there shall be minimal impact on the root system of T64. Any minor loss of roots shall be off-set by the canopy proposed pruning.
- 5.5.4. Trial excavations have been undertaken to determine the extent of rooting activity where the basement parking is proposed close to T20 and T6. The impact assessment plan shows the location of the trial excavations. Photographs in Sections 8, 9 and 10 illustrate our findings.
- 5.5.5. The excavations beneath the periphery of the canopy of **T20** (Trench 3 on the Impact Assessment Plan) revealed very low rooting activity (maximum root diameter was 15mm. See Photos 3 to 15 in Section 10). This was to be expected since the excavations took place close to the edge of the Root Protection Area. In order to install the basement without impacting on soils within 6m of the stem of T20, it is proposed to utilise sheet piling (or contiguous piling). This will ensure such a small impact on the root system of



T20, that this tree will be able to tolerate it with no long term detrimental impact. Because excavation is proposed on three sides of this tree, it will be necessary to ensure additional rooting volume of soils are available to enable this tree to mature. In order to do this it is proposed to install 60mm of fertile soil on top of the basement car park.

- 5.5.6. The trial trench to the southeast of T6 (Trench 1) also revealed low rooting activity (see Photograph 19 in Section 8). The largest roots unearthed in this trench measured 35mm and 11mm diameter. All other roots were less than 8mm diameter. This indicates that rooting activity is not prolific within the soils in excess of 10.5m from the stem of T6 (in a south-easterly direction). The installation of the pavilions here should therefore be tolerated by this tree if there were to be no other impact on its root system.
- 5.5.7. However, additional excavation is proposed at a distance of approximately 9m from the stem in a south-westerly direction. A trial trench here (Trench 2) revealed a high frequency of small feeder roots (though no particularly large roots (see Photographs 3 to 8 in Section 9). The largest root measured 35mm, the second largest measured 30mm and the third largest measured 20mm. This indicates that soils in this area are being exploited by the root system of T6. Healthy trees are able to tolerate some disturbance of their root system (up to approximately 20% loss of roots), however, T6 is not a healthy, vigorous tree. On the contrary, this tree is in very poor physiological condition. It has low vigour, a sparse canopy and significant deadwood throughout its canopy.
- 5.5.8. If this tree is to be retained, we recommend that the soils throughout most of its RPA are ameliorated by terraventing (our trial investigations revealed hard compact clay), along with the application of a nutritious mulch and earthworms. The removal of the existing grass coupled with mulching and aeration shall greatly improve the rooting environment for this tree with a likely improvement in its overall condition. This would mitigate against the negative impact of root loss due to excavation. The proposed landscaping scheme should take allow for significant soil amelioration throughout the Root Protection Area of this tree.
- 5.5.9. We also observed some decay present at the base of this tree stem. However, the extent of decay has not been determined. Specialist decay detection is recommended in order to determine the extent of decay. Depending on the findings of such an investigation, some additional works may be requires (canopy reduction or possibly even tree removal).
- 5.5.10. Excavation is proposed in order to install foundations within the Root Protection Area of T50. Only 2.3% of the Root Protection Area shall be affected. In order to ensure no disturbance of the rest of the root system, it is proposed to utilise sheet piling (or contiguous piling). We understand that a separate construction method statement is being compiled by engineers to demonstrate how this will be achieved. So long as there is no disturbance of the soils beyond the footprint of the adjacent proposed building, T50 will be able to tolerate the loss of approximately 2.3% of its root system with no observable impact.
- 5.5.11. **New Road Surfaces:**
- 5.5.12. No new road surfaces are proposed within the Root Protection Areas of any trees.
- 5.5.13. **Underground Services:**
- 5.5.14. Due to the potentially major impact of excavating trenches within Root Protection Areas, the locations of all underground services should be approved by the local authority after consultation with an appointed arborist to assess the potential impact on trees.



### 5.5.15. **Changes in Ground Levels:**

- 5.5.16. The finished ground levels shall approximate the existing ground levels throughout most of the site and there shall be very little impact on tree roots from land regrading. Proposed levels around the rear of the chapel should be clarified and agreed with the local authority. Sectional drawings of proposed levels in this area indicate that some raising of ground levels may be required to enable the elevated raft foundation. If possible, the raised levels should be limited to the footprint of the extension.

### 5.5.17. **Soil Compaction:**

- 5.5.18. 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.
- 5.5.19. Healthy soils contain about 25% air space between solid particles. Increased loading of the soils caused by construction activity causes air to be squeezed out as the soil becomes compacted preventing roots from breathing. Even an increase in pedestrian activity may cause some soil compaction.
- 5.5.20. It is important therefore that ground compaction and soil disturbance over Root Protection Areas should be avoided during the construction phase. This may be done by installing protective fencing and ground protection measures as recommended within BS 5837 (2012). The exact specification of protection measures should be specified in an Arboricultural Method Statement so that it may be agreed and approved by the local authority.



## 5.6. **Demolition Activities**

- 5.6.1. 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.

## 5.7. **Hazardous Materials**

- 5.7.1. 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 and cement run-off are contained outside of all Root Protection Areas.

## 5.8. **Cabins and Site Facilities**

- 5.8.1. 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.

## 5.9. **Boundary Treatments**

- 5.9.1. No changes are proposed to the existing boundary features.

## 5.10. **Impact of Retained Trees on the Development**

- 5.10.1. The proposed layout shall result in an improved juxtaposition between the large hornbeam, T50 and the adjacent building.



- 5.10.2. The new buildings shall extend closer to the canopies of T6 and T48 however so some future pruning may be required. Facilitative pruning has been specified for T48 as it is clear that this shall be required. Because the canopy of T6 is so high, it is anticipated that facilitative pruning may not be required. However, future maintenance pruning is likely to be required to enable adequate lighting levels in adjacent rooms. The canopy of this tree is so sparse (and the life expectancy so low), that excessive pruning is unlikely to be required.

## 5.11. Summary

- 5.11.1. In order to facilitate the development, it is proposed to remove thirty seven, Retention Category C trees and six Retention Category B trees. Most of these are located internally to the site and are largely hidden from public vantage points. Consequently the impact of tree removal on the wider local amenity shall be minor.
- 5.11.2. Three trees require light pruning to create an adequate clearance from the proposal.
- 5.11.3. No significant hard surfaces are proposed in RPAs.
- 5.11.4. Excavation is proposed in the Root Protection Areas of three trees. The potential impact and proposed mitigation measures are discussed in Section 5.5.

## 5.12. Arboricultural Method Statement

- 5.12.1. 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.



## 6. Tree Works Schedule

### 6.1. Tree Works Specification

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

Tree Reference	Action Required	Notes
T1, T2, G7, T8, T10, T12, T13, T14, T15, T16, T17, T18, G19, T23, T24, T25, T26, T27, T28, T29, T30, T31, G32, T36, T37, T41, T42, T43, T44, T45, T49, T55, T56, T60	Remove.	Stumps of trees within the RPAs of retained trees shall be removed with a stump grinder NOT a mechanical excavator.
T64	Prune lowest branches overhanging the boundary to create a clearance height of 6m.	Branches to be pruned back to a secondary branch junction or the branch collar wherever possible. Pruning to be kept to a minimum to achieve the desired clearance height of 6m.
T38, T59	Light trimming of the foliage to create a clearance distance of 1.8m from the existing buildings (to enable scaffolding and demolition)	Branches to be pruned back to a secondary branch junction or the branch collar wherever possible. Pruning to be kept to a minimum to achieve the desired clearance of 1.8m.
T48	Prune back to create a clearance distance of 4.5m from the proposed new building (clearance distance to be agreed with the local authority and the tree owner).	Only very minor pruning using secateurs (or a small manual pruning saw) is necessary.

6.1.2. **Pruning Standards:** Sympathetic pruning shall be carried out to BS 3998 (2010). Lopping of branches is to be avoided. Instead as system of ‘drop crotching’ or ‘reduction via thinning’ is to be used to achieve the desired clearance without spoiling the appearance, or form, of the trees. All pruning cuts shall be made close to the branch collar or a secondary growth point. Cuts to be made with sharp, clean tools. No wound sealants to be used.

6.1.3. **Additional works:** Any recommendations specified in the Tree Data Schedule (but not replicated in the above table) are intended to maintain the tree population in an acceptable condition. They are made for reasons of good arboricultural practice regardless of development proposals. However, they do not form part of this planning application. Where these trees are protected by a tree preservation order or are in a conservation area, consent must be sought from the local authority. Only the works listed in the table above form part of this planning application whereby no additional consent will be required if planning permission is granted.



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Crown Ref: 09166

Site: Kings College London Hampstead Residence

Author: Ivan Button

Date: 1<sup>st</sup> July 2015

## 7. Photographs

Refer to the Tree Constraints Plan for photo locations

Photo 1.



Photo 2.



Photo 3.



Photo 4.



Photo 5.



Photo 6.





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Photo 7.



Photo 8.



Photo 9.



Photo 10.



Photo 11.



Photo 12.





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Photo 13.



Photo 14.



Photo 15.



Photo 16.



Photo 17.



Photo 18.





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Photo 19.



Photo 20.



Photo 21.



Photo 22.



Photo 23.



Photo 24.





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Photo 25.



Photo 26.



Photo 27.





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## 8. Photographs of Trench 1

Photo 1. Commencing excavation of trench 1 in relation to the ash tree, T6



Photo 2. Trenches 1 and 2 in relation to the ash tree.



Photo 3. Trenches 1 and 2 in relation to the ash tree.



Photo 4. Trench 1 in relation to the ash tree.



Photo 5. Tape measure is set up from the rear wall of Queen Mother Hall



Photo 6. Tape measures runs alongside trench 1 to enable roots to be plotted.





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Photo 7. Between 6 and 7m from QMH very little rooting activity.



Photo 8. Between 9 and 10m from QMH the largest root is 8mm dia. one other roots are 8 and 7mm.



Photo 9. Between 7 and 8m from QMH only one root dia 8mm.



Photo 10. See photo 9



Photo 11. Between 8 and 9m from QMH no roots were found.



Photo 12. Between 9 and 10m from QMH three roots were found.





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Photo 13. Between 10 and 11m from QMH is one 35mm root, one 11m root and 3xN<sup>o</sup> 5mm to 8mm roots.



Photo 14. See photo 13



Photo 15. See photo 13



Photo 16. See photo 13, the 35mm root is 27cm deep



Photo 17. Maximum depth of trench is 67cm. Minimal rooting activity below 40cm deep



Photo 18. Shallowest part of trench is 42cm deep. this was distant from the ash where there was no rooting activity even in the upper soil bhorizons.

