



ARBORICULTURAL IMPACT ASSESSMENT REPORT:

29 New End
Hampstead
London
NW3 1JD

REPORT PREPARED FOR:

Karawana Ltd
c/o Intrust Advisory Ltd
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REPORT PREPARED BY

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Ref: KWA/29NE/AIA/01

Date: 6th June 2013

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Caveats

This report is primarily an arboricultural report. Whilst comments relating to matters involving built structures or soil data may appear, any opinion thus expressed should be viewed as qualified, and confirmation from an appropriately qualified professional sought. Such points are usually clearly identified within the body of the report. It is not a full safety survey or subsidence risk assessment survey. These services can be provided but a further fee would be payable. Where matters of tree condition with a safety implication are noted during a survey they will of course appear in the report.

A tree survey is generally considered invalid in planning terms after 2 years, but changes in tree condition may occur at any time, particularly after acute (e.g. storm events) or prolonged (e.g. drought) environmental stresses or injuries (e.g. root severance). Routine surveys at different times of the year and within two - three years of each other (subject to the incidence of the above stresses) are recommended for the health and safety management of trees remote from highways or busy access routes. Annual surveys are recommended for the latter.

Tree works recommendations are found in the Appendices to this report. It is assumed, unless otherwise stated ("ASAP" or "Option to") that all husbandry recommendations will be carried out within 6 months of the report's first issue. Clearly, works required to facilitate development will not be required if the application is shelved or refused. However, necessary husbandry work should not be shelved with the application and should be brought to the attention of the person responsible, by the applicant, if different. Under the Occupiers Liability Act of 1957, the owner (or his agent) of a tree is charged with the due care of protecting persons and property from foreseeable damage and injury.' He is responsible for damage and/or nuisance arising from all parts of the tree, including roots and branches, regardless of the property on which they occur. He also has a duty under The Health and Safety at Work Act 1974 to provide a safe place of work, during construction. Tree works should only be carried out with local authority consent, where applicable.

Inherent in a tree survey is assessment of the risk associated with trees close to people and their property. Most human activities involve a degree of risk, such risks being commonly accepted if the associated benefits are perceived to be commensurate.

Risks associated with trees tend to increase with the age of the trees concerned, but so do many of the benefits. It will be appreciated, and deemed to be accepted by the client, that the formulation of recommendations for all management of trees will be guided by the cost-benefit analysis (in terms of amenity), of tree work that would remove all risk of tree related damage.

Prior to the commencement of any tree works, an ecological assessment of specific trees may be required to ascertain whether protected species (e.g. bats, badgers and invertebrates etc.) may be affected.

Tree Constraints & Protection Overview

Client:	Karawana Ltd c/o Intrust Advisory Ltd		Case Ref:	KWA/29NE/AIA/01
Local Authority:	LB Camden		Date:	6 th June 2013
Site Address: 29 New End, Hampstead, London NW3 1JD				
Proposal: Demolition of the existing building and replacement with residential flats with a basement (LGF) and associated landscaping.				
Report Checklist	Y/N			Y/N
Arboricultural constraints on site	Y	Trees removal proposed		Y
Tree Survey	Y	Topographical Survey		Y
BS5837 Report	Y	Conservation Area		Y
Tree Preservation Orders	Y	(T4 and T14)		
Tree Protection Plan:	N/a	(Include in future method statement)		
Tree Constraints Plan:	Y			
Arboricultural Impact Assessment:	Y			
Site Layout				
Site Visit	Y	Date: 22/05/13	Access Full/Partial/None	F
Trees on Site	Y	Off-site Trees		Y
Trees affected by development	Y	O/s trees affected by development		Y
Tree replacement proposed:	Y	On or off-site trees indirectly affected by development		N
Trees with the potential to be affected				
Felling of 5 category 'C' trees: T3, T5, T8, T9 and T14 (TPO'd tree, but felling previously agreed with Council) Low/very low RPA impacts to T1 & T4 (TPO'd) from LGF (confirmed by trial pits) Potential landscaping impacts to T4, T6 & T7 – low subject to mitigation				
Comments				
Recommended works to 8 trees, including felling the 4 'U' category trees (T2, T8, T9 and T12)				
Recommendations				
1	Proposal will mean the loss of important trees (TPO/CA)			N
2	Proposal has sufficient amelioration for tree loss			Y
3	Proposals provide adequate tree protection measures			Y
4	Proposal will mean retained trees are too close to buildings			N
5	Specialist demolition / construction techniques required			Y
6	The Proposal will result in significant root damage to retained trees			N
7	Further investigation of tree condition recommended			Y

RPA= Root Protection Area

TPP= Tree Protection Plan

AMS= Arboricultural Method Statement

AIA = Arboricultural Implication Assessment

BS5837: 2012 'Trees in relation to design, demolition and construction – Recommendations'

Arboricultural Impact Assessment Report 01: 29 New End, Hampstead, London NW3 1JD

Prepared for: Karawana Ltd c/o Intrust Advisory Ltd, Charles House, 108 Finchley Road, London NW3 5JJ

Prepared by: Adam Hollis of Landmark Trees, 20 Broadwick Street, London W1F 8HT

1. SUMMARY

- 1.1 This report comprises an arboricultural impact assessment of the proposals for 29 New End, Hampstead, London NW3 1JD, reviewing any conflicts between the proposals and material tree constraints identified in our survey. The report incorporates information identified in the previous Arboricultural Impact Assessment of the proposals by Tree Projects, in the report dated March 2012.
- 1.2 There are 13 trees surveyed on or around the site, of which 1 is category 'A' (High Quality), 3 are 'B' category *(Moderate Quality), 5 are 'C' category *(Low Quality) and 4 are 'U' category *(Unsuitable for Retention). In theory, only moderate quality trees and above are significant material constraints on development. However, the low quality trees will comprise a constraint in aggregate, in terms of at least, replacement planting.
- 1.3 The principal primary impacts in the current proposals are the felling of 5 category 'C' trees T3, T5, T8, T9 and T14 (with 4 further category 'U' trees T2, T8, T9 and T12 to be felled on husbandry grounds/ to facilitate landscaping). The felling of the TPO tree, T14 has been previously discussed and agreed with the Council's Tree Officer (Source: Tree Projects Report dated March 2012). The loss of these trees is rated as low impact, without significant effect on the visual character of the local conservation area.
- 1.4 Other primary impacts include the minor Lower Ground Floor (LGF) Level encroachment of T1 and T4's theoretical RPA. Both impacts to T1 and T4 (also subject to a TPO) have been investigated by trial pits and are (very) low. Of potentially greater significance, is the construction of the LGF beneath the canopies of both trees (subject to method of working). T1 already requires arboricultural work to be undertaken on husbandry grounds (see Appendix 2), which should provide the necessary clearance for construction. A crown-lift to T4 would also provide the necessary clearance, provided low-access equipment is used (e.g. mini-piling rigs).
- 1.5 The demolition of the existing property should be undertaken with due care, proceeding inwards in a "pull-back" fashion. Adequate supervision and protection of the retained trees will be required.
- 1.6 The removal of the existing tennis court and proposed landscaping to the rear of the property also has the potential to cause significant impacts. However, with the manual excavation of the tennis court and no-dig/porous paving replacement treatment, the impact to the retained trees would be minimal, if not beneficial.
- 1.7 Secondary impacts comprise minor shading and leaf deposition, particularly from T1. However, these impacts are similar to those which exist today, with mitigation rendering them negligible.
- 1.8 The site has potential for development without impacting significantly on the wider tree population or local landscape. Thus, with suitable mitigation and supervision the scheme is viable.

* British Standards Institute: Trees in relation to design, demolition and construction BS 5837: 2012 HMSO, London

2. INTRODUCTION

2.1 Terms of reference

- | | |
|-------|---|
| 2.1.1 | LANDMARK TREES were asked by Karawana Ltd c/o Intrust Advisory Ltd to provide a survey and an arboricultural impact assessment of proposals for the site: 29 New End, Hampstead, London NW3 1JD. The report is to accompany a planning application. |
| 2.1.2 | The proposals are for the demolition of the existing building and replacement with residential flats with a basement and associated landscaping. The proposal has undergone several revisions, with the latest comprising a minor realignment of the basement wall to the west of the proposed building. This report will assess the impact on the trees and their constraints, identified in our survey. Although the proposals were known at the time of the survey, Landmark Trees endeavour to survey each site blind, working from a topographical survey, wherever possible, with the constraints plan informing their evolution. |
| 2.1.3 | I am a Registered Consultant and Fellow of the Arboricultural Association and a Chartered Forester, with a Masters Degree in Arboriculture and 25 years experience of the landscape industry - including the Forestry Commission and Agricultural Development and Advisory Service. I am a UK Registered Expert Witness, trained in single joint expert witness duties. I am also Chairman of the UK & I Regional Plant Appraisal Committee, inaugurated to promote international standards of valuation in arboriculture. |

2.2 Drawings supplied

- | | |
|-------|--|
| 2.2.1 | <p>The drawings supplied by the client and relied upon by Landmark Trees in the formulation of our survey plans are:</p> <p>Existing site survey: JKK4657_1A-TOPO</p> <p>Proposals: NEN - PL - 120 rev L</p> |
|-------|--|

2.3 Scope of survey

- | | |
|-------|--|
| 2.3.1 | As Landmark Trees' (LT) arboricultural consultant, I surveyed the trees on site on 22 nd May 2013, recording relevant qualitative data in order to assess both their suitability for retention and their constraints upon the site, in accordance with British Standard 5837:2012 Trees in relation to design, demolition and construction – Recommendations [BS5837:2012]. |
| 2.3.2 | Our survey of the trees, the soils and any other factors, is of a preliminary nature. The trees were SURVEYED on the basis of the Visual Tree Assessment method expounded by Mattheck and Breloer (The Body Language of Trees, DoE booklet Research for Amenity Trees No. 4, 1994). LT have not taken any samples for analysis and the trees were not climbed, but inspected from ground level. |
| 2.3.3 | A tree survey is generally considered invalid in planning terms after 2 years, but changes in tree condition may occur at any time, particularly after acute (e.g. storm events) or prolonged (e.g. drought) environmental stresses or injuries (e.g. root severance). Routine surveys at different times of the year and within two - three years of each other (subject to the incidence of the above stresses) are recommended for the health and safety management of trees remote from highways or busy access routes. Annual surveys are recommended for the latter. |
| 2.3.4 | The survey does not cover the arrangements that may be required in connection with the laying or removal of underground services. |

2.4 Survey data & report layout

- | | |
|-------|---|
| 2.4.1 | Detailed records of individual trees are given in the survey schedule in Appendix 1 to this report. |
| 2.4.2 | A site plan identifying the surveyed trees, based on the client's drawings / topographical survey is provided in Appendix 5. |
| 2.4.3 | This plan also serves as the Tree Constraints Plan with the theoretical Recommended Protection Areas (RPA's), tree canopies and shade constraints, (from BS5837: 2012) overlain onto it. These constraints are then overlain in turn onto the client's proposals to create an Arboricultural Impact Assessment Plan in Appendix 6. General observations and discussion follow, below. |

3.0 OBSERVATIONS

3.1 Site description



Photograph 1: Site at 29 New End, Hampstead, London NW3 1JD (Source: Google Maps)

- | | |
|-------|---|
| 3.1.1 | New End runs broadly east to west within a largely residential area north of Hampstead Village. Christ Church stands adjacent to the northern boundary of the site. The existing property No. 29 New End comprises former nurses' accommodation standing within its plot on higher ground on the north side of New End. |
| 3.1.2 | The plot slopes gently from north to south, with retaining walls to the south containing landscape beds forward of the existing southern elevation. |
| 3.1.3 | In terms of the British Geological Survey, the site overlies the Bagshot Formation (see indicated location on Fig.1 plan extract below). The associated soils are generally fine, white, buff and sometimes crimson sands, grey when unweathered, with sporadic seams of pale pipe-clay and local beds of flint-pebble gravel. The actual distribution of the soil series are not as clearly defined on the ground as on plan and there may be anomalies in the actual composition of sand, clay and gravel content. Further advice from the relevant experts on the specific soil properties can be sought as necessary. |

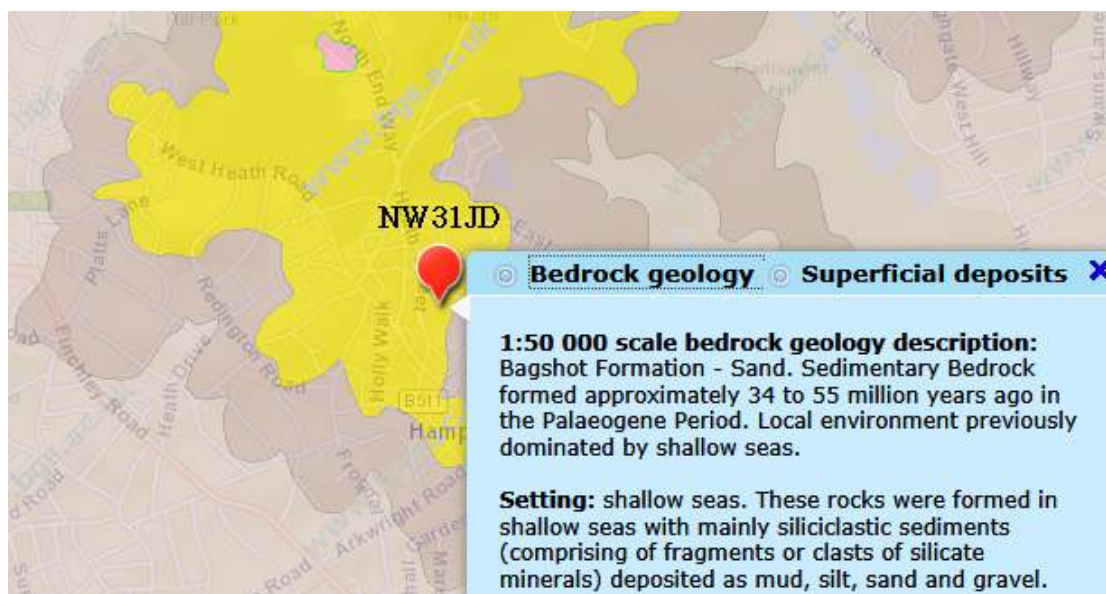


Figure 1: Extract from the BGS Geology of Britain Viewer

3.2 Subject trees

- 3.2.1 Of the 13 surveyed trees T4 is category 'A' (High Quality), T1, 6 & 7 are 'B' category (Moderate Quality), T3, 5, 10, 11 & 14 are 'C' category (Low Quality) trees and T2, 8, 9 and 12 are 'U' category trees (Unsuitable for Retention).
- 3.2.2 T1 is a category 'B' mature tree in fair condition given its age, pruning history, confined location and onset of Horse Chestnut Leaf minor and bleeding canker etc. The crown overhangs the street and adjacent New End Theatre and contains one 'Cobra' non-invasive support system. It is located in hard paved area with walls surrounding, which has limited root development and specifically, the root colonisation within the site (see trial pit evidence in Appendix 5).
- 3.2.3 T2 is a category 'U' elm sucker, which will soon succumb to Dutch Elm Disease. T3 is reasonable specimen of birch (category 'C'), that is fully mature and more than 50% through its service life, now showing minor dieback at the tips. It is located towards the rear of the plot, away from public view conferring limited visual amenity.
- 3.2.4 T4 is a category 'A,' fully mature tree, protected by TPO, located off site but with its crown substantially overhanging the site with a low crown ground clearance. The tree was remotely surveyed only, but it appears to be in good condition. There is a large retaining wall between the site and ground in which the tree is rooted, with the tree perched on higher ground, approximately 1200mm above the site. The interposing wall acts as significant impediment to radial rooting, with the trial trench revealing only minor rooting (see Appendix 5).

- 3.2.5 T5 is a category 'C', relatively small, self-seeded Sycamore to the north boundary of the site adjacent to Christ Church. This tree has limited amenity value, relative to T6 and T7, these being two well-established and mature category 'B' sycamores to the north of the site, adjacent to Christ Church, with T7 the more prominent from Christ Church Passage.
- 3.2.6 T8 & 9 are two category 'U' trees of somewhat limited stature, in fair condition (T9 low leaf/bud density at the time of survey) and of low amenity value and foreshortened life expectancy. T10 is a category 'C,' self-seeded tree in good condition, but inappropriately located and damaging one adjacent wall. T11 (category 'C') and T12 (category 'U') are located to the front of the property; although in a prominent location, they are of limited service life and amenity. T14 is off-site, located adjacent to them at the back of the footpath, close to the south west corner of the site. This category 'C' tree is protected by a TPO, but previous informal discussions with the Borough Arboriculturist, Alex Hutson confirmed that its replacement should be acceptable (Source: Tree Projects Report dated March 2012).
- 3.2.3 In terms of age demographics there is a preponderance of mature trees on the site with few younger, replacement trees in the population.

- 3.2.4 Full details of the surveyed trees can be found in Appendix 1 of this report.
- 3.2.5 There are some arboricultural works required within the existing tree population. These are listed in Appendix 2. It is important to note that 3 trees require arboricultural works within the next 6 months (T1, T7 & T12).

3.3 Planning Status

- 3.3.1 The trees on and adjacent to the site are all provided with statutory protection by designation of the Hampstead Conservation Area. Camden Council has noted the existence of Tree Preservation Orders (TPO) to a *Sorbus aucuparia* (assumed to be T14) and a Copper Beech rooted in 10/11 Hampstead Square (assumed to be T4).

4.0 DEVELOPMENT CONSTRAINTS

4.1 Primary constraints

- 4.1.1 BS5837: 2012 gives Recommended Protection Areas (RPA's) for any given tree size. The individual RPA's are calculated in the Tree Schedule in Appendix 1 to this report, or rather the notional radius of that RPA, based on a circular protection zone. The prescribed radius is 12-x stem diameter at 1.5m above ground level, except where composite formulae are used in the case of multi-stemmed trees.
- 4.1.2 Circular RPA's are appropriate for individual specimen trees grown freely, but where there is ground disturbance, the morphology of the RPA can be modified to an alternative polygon, as shown in the diagram below (Figure 2). Alternatively, one need principally remember that RPA's are area-based and not linear – notional rather than fixed entities. **No modifications have been made in this instance (please see overleaf) on plan, but the findings of the trial pits and other structural features have been considered within our assessment.**

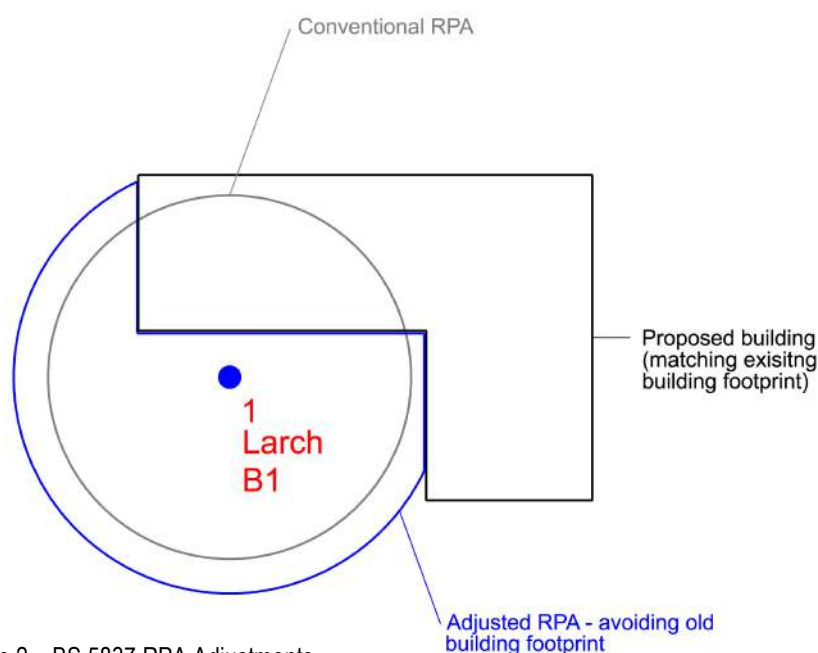


Figure 2 – BS 5837 RPA Adjustments

- 4.1.3 In BS5837, paragraph 4.6.2 states that RPA's should reflect the morphology and disposition of the roots; where pre-existing site conditions or other factors indicate that rooting has occurred asymmetrically, a polygon of equivalent area should be produced. Modifications to the shape of the RPA should reflect a soundly based arboricultural assessment of likely root distribution. Not infrequently, LT are requested by LPA Tree Officers to modify the RPA's to reflect their assumptions that e.g. a road will have drastically limited root growth.

- 4.1.4 Such assumptions cannot be proved without prior site investigations / trial pits. Where it is not always possible to conduct site investigations (e.g. below busy roads), we can always look to the published science. There seems little support for the popular myth that roads and services will curb root growth: research for the International Society of Arboriculture by Kopinga J (ISA 1994), found that “a constant high moisture content of the soil directly underneath the pavement surface can be considered as a major soil factor in attracting the trees’ roots to develop there.” By contrast, grass in lawns may actively antagonise tree roots with natural pathogens. Similarly, Professor F Miller (ISA 1994) found that service trenches at > 3m distances from trees had minimal impact on growth or crown shape.
- 4.1.5 A key misunderstanding, even among professionals, is that we conflate the RPA with the actual root system: RPA's are *prima facie* a notion / convention / treaty and almost entirely theoretical, but readily calculable. Conversely roots are a "known unknown," spatial entity that we predict at our folly. Yet, many are quick to do so.
- 4.1.6 LT favour the neutrality of a circular RPA, because in a difference of opinion, the tree officer will always have the prerogative to dictate the final modification of shape. With the best will in the world, the free allowance of modifications will tend to lead to inequitable outcomes, prejudicing the applicant and the practice is in our view, best avoided. The neutral circle dispenses with this inequity.
- 4.1.7 Ultimately, the point of the circular RPA is to illustrate areas of concern. The purpose of this report is to consider areas of concern (not to modify them to suit our argument or findings). Therefore, no modifications are made here to the RPA's, regardless of roads etc.
- 4.1.8 The quality of trees will also be a consideration: U Category trees are discounted from the planning process in view of their limited service life. Again, Category-C trees would not normally constrain development individually, unless they provide some external screening function.
- 4.1.9 At paragraph 5.1.1. BS5837: 2012 notes that “Care should be exercised over misplaced tree preservation; attempts to retain too many or unsuitable trees on a site are liable to result in excessive pressure on the trees during demolition or construction work, or post-completion demands on their removal.”

- 4.1.10 In theory, only moderate quality trees and above are significant material constraints on development. However, the low quality trees will comprise a constraint in aggregate, in terms of at least, replacement planting.

- 4.1.11 In this instance, there are high and moderate quality trees around the site which could potentially constrain development. However, the existing building, hard surfacing and levels have evidently constrained the root colonisation of trees such as T1 and T4. The site also has 2 TPO trees (T4 and T14), which could potentially constrain future development. Both these trees are off-site, with T14 owned and managed by the Borough Council. It is understood that previous discussions with the Borough's Tree Officer confirmed that the removal and replacement of this tree would be acceptable (Source: Tree Projects Report dated March 2012).

4.2 Secondary Constraints

- 4.2.1 The second type of constraint produced by trees that are to be retained is that the proximity of the proposed development to the trees should not threaten their future with ever increasing demands for tree surgery or felling to remove nuisance shading (Figure 3), honeydew deposition or perceived risk of harm.

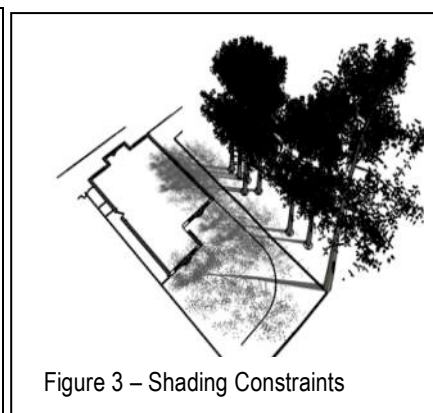


Figure 3 – Shading Constraints

- 4.2.2 The shading constraints are crudely determined from BS5837 by drawing an arc from northwest to east of the stem base at a distance equal to the height of the tree, as shown in the diagram opposite. Shade is less of a constraint on non-residential developments, particularly where rooms are only ever temporarily occupied.

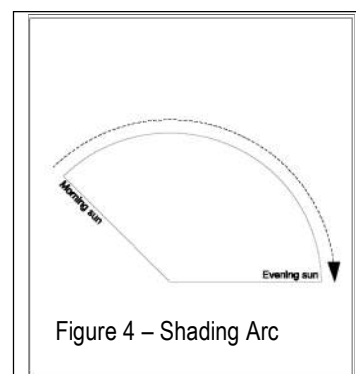


Figure 4 – Shading Arc

- 4.2.3 This arc (see Figure 4) represents the effects that a tree will have on layout through shade, based on shadow patterns of 1x tree height for a period May to Sept inclusive 10.00-18.00 hrs daily.

4.2.4 The orientation and proximity of T1 is likely to provide a variety of secondary constraints, including shading and organic deposition and the potential need to maintain crown clearance in the future. Minor leaf deposition is also likely to result from the retained trees on and off-site. The significance of these constraints will vary depending on the location and proximity to the proposed re-development.

Note: Sections 5 & 6 will now assess the impacts upon constraints identified in Section 4. Table 1 in Section 5 presents the impacts in tabular form (drawing upon survey data presented in Appendices 1 & 2). Impacts are presented in terms of whole tree removal and the effect on the landscape or partial encroachment (% of RPA) and its effect on individual tree health. Section 6 discusses the table data, elaborating upon the impacts' significance and mitigation.

5.0

Table 1: Arboricultural Impact Assessment

(Impacts assessed prior to mitigation and rated with reference to From Matheny & Cark (19

Hide irrelevant

Show All Trees

Ref: KWA/29NE/AIA/01

B.S. Cat.	Tree No.	Species	Impact	Tree / RPA Affected	Age	Growth Vitality	Species Tolerance	Impact on Tree Rating	Impact on Site Rating	Mitigation
B	1	Chestnut, Horse	Removal of existing hard landscaping Basement construction below Canopy (no RPA impact)	m ² N/A %	Mature	Moderate	Moderate	Low	N/A	Airspade / manual excavation Remedial tree surgery (see Rec. Works)
U	2	Elm, English	Felled to Facilitate Development (NB: To be felled for general husbandry)	m ² N/A %	Semi-mature	Normal	N/A	N/A	Very Low	New planting / landscaping
C	3	Birch, Silver	Felled to Facilitate Development	m ² N/A %	Mature	Moderate	N/A	N/A	Low	New planting / landscaping
A	4	Beech, Copper (TPO)	Landscaping within RPA Basement Construction within RPA/canopy	9 m ² 3.11 %	Mature	Normal	Moderate	Low	N/A	No-dig construction with porous surfaces. Remedial tree surgery Manual excavation/ pre-emptive pruning if nec.
C	5	Sycamore	Felled to Facilitate Development/landscaping	m ² N/A %	Semi-mature	Normal	N/A	N/A	Low	New planting / landscaping
B	6	Sycamore	Landscaping within RPA	m ² N/A %	Mature	Normal	Moderate	Low	N/A	No-dig construction with porous surfaces

5.0

Table 1: Arboricultural Impact Assessment

(Impacts assessed prior to mitigation and rated with reference to From Matheny & Cark (19

B.S. Cat.	Tree No.	Species	Impact	Tree / RPA Affected	Age	Growth Vitality	Species Tolerance	Impact on Tree Rating	Impact on Site Rating	Mitigation
B	7	Sycamore	Landscaping within RPA	m ² N/A %	Mature	Normal	Moderate	Low	N/A	No-dig construction with porous surfaces
U	8	Laburnum	Fell for general husbandry prior to development	m ² N/A %	Mature	Poor	Moderate	N/A	Very Low	New planting / landscaping
U	9	Laburnum	Fell for general husbandry prior to development	m ² N/A %	Early Mature	Poor	N/A	N/A	Very Low	New planting / landscaping
C	10	Sycamore	Felled to Facilitate Development	m ² N/A %	Semi-mature	Normal	N/A	N/A	Low	New planting / landscaping
C	11	Plum, Myrobalan	Fell to facilitate new landscaping	m ² N/A %	Mature	Moderate	N/A	N/A	Very Low	New planting / landscaping
U	12	Cherry, Kanzan	Fell to facilitate new landscaping	m ² N/A %	Mature	Moderate	N/A	N/A	Very Low	New planting / landscaping

5.0

Table 1: Arboricultural Impact Assessment

(Impacts assessed prior to mitigation and rated with reference to From Matheny & Cark (19

Hide irrelevant

Show All Trees

Ref: KWA/29NE/AIA/01

B.S. Cat.	Tree No.	Species	Impact	Tree / RPA Affected	Age	Growth Vitality	Species Tolerance	Impact on Tree Rating	Impact on Site Rating	Mitigation
C	14	Rowan (TPO)	Fell to facilitate new landscaping	m ² N/A %	Young	Normal	N/A	N/A	Low	New planting / landscaping

6.0 DISCUSSION

6.1 Rating of Primary Impacts

- 6.1.1 The principal primary impacts in the current proposals are the felling of 5 category 'C' trees T3, T5, T8, T9 and T14 (with 4 further category 'U' trees T2, T8, T9 and T12 to be felled on husbandry grounds/ to facilitate landscaping). The felling of the TPO tree, T14 has been previously discussed and agreed with the Council's Tree Officer. The loss of these trees is rated as low impact, without significant effect on the visual character of the local conservation area.
- 6.1.2 Other primary impacts include the minor Lower Ground Floor (LGF) Level encroachment of T1 and T4's theoretical RPA. Both impacts to T1 and T4 (also subject to a TPO) have been investigated by trial pits and are (very) low. Of potentially greater significance, is the construction of the LGF beneath the canopies of both trees (subject to method of working). T1 already requires arboricultural work to be undertaken on husbandry grounds (see Appendix 2), which should provide the necessary clearance for construction. A crown-lift to T4 would also provide the necessary clearance, provided low-access equipment is used (e.g. mini-piling rigs).
- 6.1.3 The demolition of the existing property could also affect the retained tree population. Techniques are available to mitigate potential impacts. Adequate supervision and protection of the retained trees will be required.
- 6.1.4 The removal of the existing tennis court and proposed landscaping to the rear of the property also has the potential to cause significant impacts. However, with the manual excavation of the tennis court and no-dig/porous paving replacement treatment, the impact to the retained trees would be minimal, if not beneficial.

- 6.1.5 The principal of RPA encroachment is established within BS5837:2012 and supported by the source document, National Joint Utilities Guidelines 10 / Vol. 4 1995 / 2010. NJUG introduced the x12 diameter *Precautionary Zone* for supervised working and *Prohibited Zone* at a universal 1m from the base of the tree. RPA's are frequently confused with the NJUG Prohibited Zone, when they clearly correlate with the NJUG Precautionary Zone.

- 6.1.6 An RPA encroachment of <20% of RPA may be considered as low impact, given the permissive references to 20% RPA relocation and impermeable paving within BS5837:2012 and other published references to healthy trees tolerating up to 30-50% root severance (Coder, Helliwell and Watson in CEH 2006). The trees in question are healthy specimens of species with a good resistance to development impacts, and quite capable of tolerating these low impacts.
- 6.1.7 **"In practice 50% of roots can sometimes be removed with little problem**, provided there are vigorous roots elsewhere. Inevitably, this degree of root loss will temporarily slow canopy growth and even lead to some dieback" (Thomas 2000). LT do not recommend annexing such high proportions of the root system; rather that within the context of the published science, planning should not be unduly concerned by impacts that are well below the subcritical threshold – *tree health is not at stake*.

6.2 Rating of Secondary impacts

- 6.2.1 Secondary impacts comprise minor shading and leaf deposition, particularly from T1. However, these impacts are similar to those which exist today, i.e. development has no significant effect on the status quo, which has not lead to excessive pruning pressures.

6.3 Mitigation of Impacts

- 6.3.1 All plant and vehicles engaged in demolition works should either operate outside the RPA, or should run on a temporary surface designed to protect the underlying soil structure. The demolition of the building should proceed inwards in a "pull down" fashion. Hard surfacing can be lifted with caution by a skilled machine operator again working away from the tree.
- 6.3.2 RPA piling encroachments will be pre-emptively excavated by hand or with an Airspade under arboricultural supervision. Roots smaller than 25mm diameter may be cut cleanly with a sharp pruning saw or secateurs back to a junction. Roots larger than 25mm diameter may only be cut in consultation with an arboriculturalist
- 6.3.3 The replacement paving/hard landscaping will require a no-dig construction technique, either using a cellular confinement system with no fines aggregate for the sub-base or simply building upon the existing sub-base without disturbing the ground below. Choice of construction method will initially depend upon root penetration within the existing sub-grade. The key principle is not to excavate in the presence of roots and to provide a porous surface to promote healthy soil water relations for future root growth.

- 6.3.4 The immediate canopy encroachment can be avoided with a crown lift of lower limbs to T1 and T4, undertaken in accordance with British Standard 3998:2010 Tree work [BS3998].
- 6.3.5 Nuisance deposition can be mitigated with regular crown cleaning and filtration traps on the guttering (see Figure 5 below).
- 6.3.6 The shading impacts can be mitigated by building design, with the provision of dual aspect windows and choice of room layout. Some minor crown reduction may be necessary, but not such as to impose a burden of frequent, repetitive management.
- 6.3.7 The landscape impact of tree losses can be offset by the landscape proposals, ideally involving new planting of ornamental varieties of native species, and where appropriate with columnar or compact form. A selection of columnar tree species cultivars for constricted sites is provided in Appendix 4.

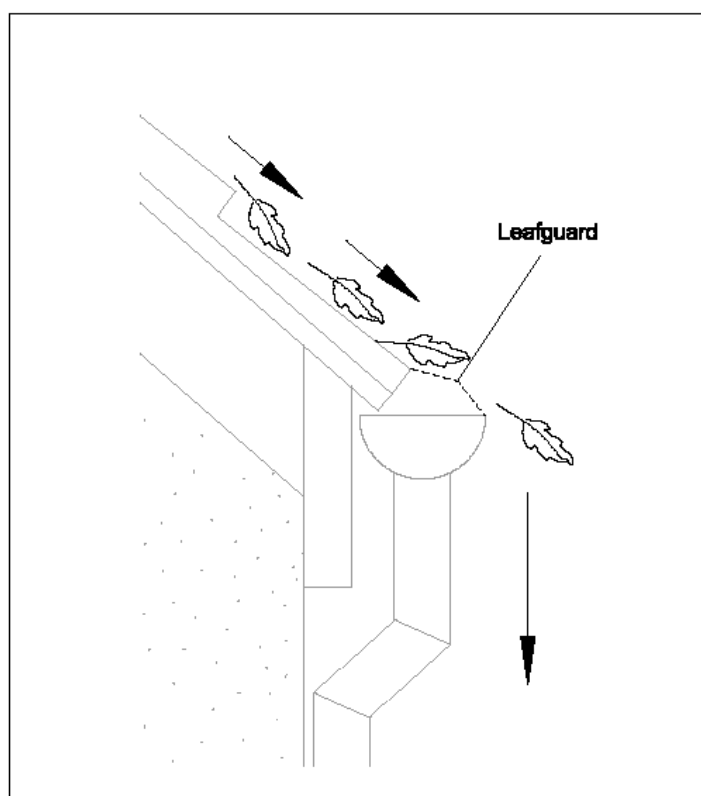


Figure 5: Filtration traps, as shown above, could be fitted on the gutters which can easily be maintained at 2-3m above ground.

7.0 CONCLUSION

- 7.1 The potential impacts of development are all relatively low in terms of both quality of trees removed and also RPA encroachments of trees retained.
- 7.2 The full potential of the impacts can be largely mitigated through design and precautionary measures. These measures can be elaborated in Method Statements in the discharge of planning conditions.
- 7.3 The species affected are generally tolerant of root disturbance / crown reduction and the retained trees are generally in good health and capable of sustaining these reduced impacts (subject to the further investigation of T1).
- 7.4 The trees that are recommended for felling are of little individual significance, such that their loss will not affect the visual character of the Conservation Area.
- 7.5 Therefore, the proposals will not have any significant impact on either the retained trees or wider landscape.

8.0 RECOMMENDATIONS

8.1 Specific Recommendations

- 8.1.1 Current tree works recommendations are found in Appendix 2 to this report, with works to facilitate development in Appendix 3 and a selection of columnar tree species cultivars for constricted sites provided in Appendix 4. Any tree removals recommended within this report should only be carried out with local authority consent.
- 8.1.2 Excavation and construction impacts within the RPA's of trees identified in Table 1 above, will need to be controlled by method statements specifying mitigation methods suggested in para 6.3 above and by consultant supervision as necessary. These method statements can be provided as part of the discharge of conditions.
- 8.1.3 Replace felled trees with native ornamental nursery stock under current best practice; i.e. conforming to and planted in accordance with the following:

- BS 3936:1980 Nursery Stock;
- BS 4043:1966 Transplanting Semi-Mature Trees; and
- BS 5236:1975 Cultivation and Planting of Trees in the Advanced Nursery Stock Category.
- All replacement stock should be planted and maintained as detailed in BS 4428:1989 (Section 7): Recommendations for General Landscape Operations.

8.2 General Recommendations

- 8.2.1 Any trees which are in close proximity to buildings proposed for demolition should be protected with a Tree Protection Barrier (TPB). This TPB should comprise steel, mesh panels 2.4m in height ('Heras') and should be mounted on a scaffolding frame (shown in Fig 2 of BS5837:2012). The position of the TPB can be shown on plan as part of the discharge of conditions, once the lay out is agreed with the planning authority. The TPB should be erected prior to commencement of works, remain in its original form on-site for the duration of works and removed only upon full completion of works.
- 8.2.2 A TPB may no longer be required during soft landscaping work but a full arboricultural assessment must be performed prior to the undertaking of any excavations within the RPA of a tree. This will inform a decision about the requirement of protection measures. It is important that all TPBs have permanent, weatherproof notices denying access to the RPA.

8.2.3	The use of heavy plant machinery for building demolition, removal of imported materials and grading of surfaces should take place in one operation. The necessary machinery should be located above the existing grade level and work away from any retained trees. This will ensure that any spoil is removed from the RPAs. It is vital that the original soil level is not lowered as this is likely to cause damage to the shallow root systems.
8.2.4	Any pruning works must be in accordance with British Standard 3998:2010 Tree work [BS3998].
8.2.5	Where sections of hard surfacing are proposed in close proximity to trees, it is recommended that “No-Dig” surfacing be employed in accordance with BS5837:2012 and ‘The Principles of Arboricultural Practice: Note 1, Driveways Close to Trees, AAIS 1996 [APN1]’.
8.2.6	If the RPA of a tree is encroached by underground service routes then BS5837:2012 and NJUG VOLUME 4 provisions should be employed. If it is deemed necessary, further arboricultural advice must be sought.
8.2.7	Numerous site activities are potentially damaging to trees e.g. parking, material storage, the use of plant machinery and all other sources of soil compaction. In operating plant, particular care is required to ensure that the operational arcs of excavation and lifting machinery, including their loads, do not physically damage trees when in use. Accordingly, low access machinery, such as mini-piling rigs, are recommended work construction work below T1 and T4.
8.2.8	<p>To enable the successful integration of the proposal with the retained trees, the following points will need to be taken into account:</p> <ol style="list-style-type: none"> 1) Plan of underground services. 2) Schedule of tree protection measures, including the management of harmful substances. 3) Method statements for constructional variations regarding tree proximity (e.g. foundations, surfacing and scaffolding). 4) Site logistics plan to include storage, plant parking/stationing and materials handling. 5) Tree works: felling, required pruning and new planting. All works must be carried out by a competent arborist in accordance with BS3998. 6) Site supervision: the Site Agent must be nominated to be responsible for all arboricultural matters on site. This person must: <ul style="list-style-type: none"> □ be present on site for the majority of the time; □ be aware of the arboricultural responsibilities;

- have the authority to stop work that is causing, or may cause harm to any tree;
- ensure all site operatives are aware of their responsibilities to the trees on site and the consequences of a failure to observe these responsibilities;
- make immediate contact with the local authority and/or a retained arboriculturalist in the event of any tree related problems occurring.

8.2.9 These points can be resolved and approved through consultation with the planning authority via their Arboricultural Officer.

8.2.10 The sequence of works should be as follows:

- i) initial tree works: felling, stump grinding and pruning for working clearances;
- ii) installation of TPB for demolition & construction;
- iii) installation of underground services;
- iv) installation of ground protection;
- v) main construction;
- vi) removal of TPB;
- vii) soft landscaping.

9.0 REFERENCES

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APPENDIX 1

TREE SCHEDULE

Notes for Guidance:

1. Height describes the approximate height of the tree measured in metres from ground level.
2. The Crown Spread refers to the crown radius in meters from the stem centre and is expressed as an average of NSEW aspect if symmetrical.
3. Ground Clearance is the height in metres of crown clearance above adjacent ground level.
4. Stem Diameter (Dm) is the diameter of the stem measured in millimetres at 1.5m from ground level for single stemmed trees. BS 5837:2012 formula (Section 4.6) used to calculate diameter of multi-stemmed trees. Stem Diameter may be estimated where access is restricted and denoted by '#'.
5. Protection Multiplier is 12 and is the number used to calculate the tree's protection radius and area
6. Protection Radius is a radial distance measured from the trunk centre.
7. Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree).
8. Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major defects present.
9. Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees).
10. B.S. Cat refers to (British Standard 5837:2012 section 4.5) and refers to tree/group quality and value; 'A' – High, 'B' - Moderate, 'C' - Low, 'U' - Unsuitable for retention. The following colouring has been used on the site plans:

█	High Quality (A) (Green),
█	Moderate Quality (B) (Blue),
█	Low Quality (C) (Grey),
█	Unsuitable for Retention (U) (Red)
11. Sub Cat refers to the retention criteria values where 1 is Arboricultural, 2 is Landscape and 3 is Cultural including Conservation, Historic and Commemorative.
12. Useful Life is the tree's estimated remaining contribution in years.



Landmark Trees

Site: 29 New End, Hampstead, London NW3 1JD

Date: 22nd May 2013

BS5837 Tree Constraints Survey Schedule

Landmark Trees Ltd

Tel: 020 7851 4544

Surveyor(s): Adam Hollis

Ref: KWA/29NE/AIA/01

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Clear Stem Height	Stem Diameter	Age Class	Protection Radius	Growth Vitality	Structural Condition	B.S. Cat	Sub Cat	Useful Life	Comments
1	Chestnut, Horse	17	8,7,11,7	2.0	3.0	920.0	Mature	11.0	Moderate	Fair	B	1	20-40	Bleeding canker (early) Constricted rooting N-S Cobra brace over theatre W Long spars E from decayed heads
2	Elm, English	12	5543	2.0	2.0	308.2	Semi-mature	3.7	Normal	Fair	U		<10	Susceptible to DED
3	Birch, Silver	18	6665	1.0	3.0	480.0	Mature	5.8	Moderate	Fair	C	2	20-40	A sparser than normal canopy Long low lateral branches Die-back branch tips / clusters Canopy on roof and walls
4	Beech, Copper (TPO)	19	8896	2.0	3.5	800.0	Mature	9.6	Normal	Good	A	1	>40	Remote survey only
5	Sycamore	13	3	5.0	7.0	230.0	Semi-mature	2.8	Normal	Good	C	2	>40	A tree with insignificant defects
6	Sycamore	19	5975	1.0	4.0	849.0	Mature	10.2	Normal	Good	B	1	20-40	Co-dominant stems Included bark in main stem unions Constricted rooting to N cracking boundary wall



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7	Sycamore	16	6759	0.5	4.0	500.0	Mature	6.0	Normal	Good	B	2	20-40	Asymmetry (minor) Deadwood throughout crown Constricted rooting to N & E
8	Laburnum	6	2.5	2.0	2.0	400.0	Mature	4.8	Poor	Fair	U		<10	Ivy smothered Dm estimated
9	Laburnum	7	2	2.0	3.0	290.0	Early Mature	3.5	Poor	Fair	U		<10	Ivy clad A sparser than normal canopy
10	Sycamore	16	2442	2.0	3.0	473.5	Semi- mature	5.7	Normal	Fair	C	2	20-40	Multi stem weakness Included bark in main stem unions Constricted rooting to S & E
11	Plum, Myrobalan	6	1411	1.0	1.0	240.0	Mature	2.9	Moderate	Fair	C	2	10-20	A sparser than normal canopy limited SULE@
12	Cherry, Kanzan	6	4534	1.0	1.0	360.0	Mature	4.3	Moderate	Fair	U		<10	A sparser than normal canopy V. limited SULE



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BS5837 Tree Constraints Survey Schedule

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Ref: KWA/29NE/AIA/01

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Clear Stem Height	Stem Diameter	Age Class	Protection Radius	Growth Vitality	Structural Condition	B.S. Cat	Sub Cat	Useful Life	Comments
14	Rowan (TPO)	5	2	2.0	2.0	80.0	Young	1.0	Normal	Fair	C	2	>40	Remote survey only

APPENDIX 2

RECOMMENDED TREE WORKS

Notes for Guidance:

1, 2, 3 - Urgent (ASAP), Standard (within 6 months), Non-urgent (2-3 years)

- RP - Pre-emptive root pruning of foundation encroachments under arboricultural supervision.
- CB - Cut Back to boundary/clear from structure.
- CL# - Crown Lift to given height in meters.
- CT#% - Crown Thinning by identified %.
- CCL - Crown Clean (remove deadwood/crossing and hazardous branches and stubs).
- CR#% - Crown Reduce by given maximum % (of outermost branch & twig length)
- DWD - Remove deadwood.
- Fell - Fell to ground level.
- FInv - Further Investigation (generally with decay detection equipment).
- Pol - Pollard or re-pollard.
- Mon - Monitor ongoing condition (annually by staff / owners & every 2-3 yrs by consultant).
- Svr Ivy / Clr Bs - Sever ivy / clear base and re-inspect base / stem for concealed defects.



Site: 29 New End, Hampstead, London NW3 1JD

Date: 22nd May 2013

Surveyor(s): Adam Hollis

Ref: KWA/29NE/AIA/01

Recommended Tree Works

Show All Trees

Hide irrelevant

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works			Comments/ Reasons
1	Chestnut, Horse	17	920.0	8,7,11 .7	FInv	CL3.5	CR15	Bleeding canker (early) Constricted rooting N-S Cobra brace over theatre W Long laterals E fr'm decay'd h'd's <u>Advisable for good arboricultural practice</u>
					FInv= climbing inspection of rot & brace 2			
2	Elm, English	12	308.2	5543	Fell			Susceptible to DED For general husbandry
					3			
3	Birch, Silver	18	480.0	6665	Mon			A sparser than normal canopy Long low lateral branches Die-back branch tips / clusters Canopy on roof and walls <u>Advisable for good arboricultural practice</u>
					3			
7	Sycamore	16	500.0	6759	CR	15% 2	DWD	Asymmetry (minor) Deadwood throughout crown Constricted rooting to N & E <u>Advisable for good arboricultural practice</u>
8	Laburnum	6	400.0	2.5	Fell			Ivy smothered Dm estimated For general husbandry
					3			
9	Laburnum	7	290.0	2	Fell			Ivy clad A sparser than normal canopy For general husbandry
					3			

APPENDIX 3

RECOMMENDED TREE WORKS TO FACILITATE DEVELOPMENT (See Table 1)

Notes for Guidance:

- CB - Cut Back to boundary/clear from structure.
- CL# - Crown Lift to given height in meters.
- CT#% - Crown Thinning by identified %.
- CCL - Crown Clean (remove deadwood/crossing and hazardous branches and stubs).
- CR#% - Crown Reduce by given maximum % (of outermost branch & twig length)
- DWD - Remove deadwood.
- Fell - Fell to ground level.
- FInv - Further Investigation (generally with decay detection equipment).
- Pol - Pollard or re-pollard.
- Mon - Monitor ongoing condition (annually by staff / owners & every 2-3 yrs by consultant).
- Svr Ivy / Clr Bs - Sever ivy / clear base and re-inspect base / stem for concealed defects.



Site: 29 New End, Hampstead, London NW3 1JD

Date: 22nd May 2013

Surveyor(s): Adam Hollis

Ref: KWA/29NE/AIA/01

Recommended Tree Works To Facilitate Development

Show All Trees

Hide irrelevant

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works	Comments/ Reasons
3	Birch, Silver	18	480.0	6665	Fell	A sparser than normal canopy Long low lateral branches Die-back branch tips / clusters Canopy on roof and walls <u>Recommended to permit development</u>
4	Beech, Copper (TPO)	19	800.0	8896	CL3 Crown lift to 2.5m with scaffolding protection previously recommended	Remote survey only To facilitate development
5	Sycamore	13	230.0	3	Fell	A tree with insignificant defects Recommended to permit development
6	Sycamore	19	849.0	5975	Fell	Co-dominant stems Included bark in main stem unions Constricted rooting to N cracking boundary wall <u>To facilitate development</u>
10	Sycamore	16	473.5	2442	Fell	Multi stem weakness Included bark in main stem unions Constricted rooting to S & E <u>Recommended to permit development</u>
11	Plum, Myrobalan	6	240.0	1411	Fell 3	A sparser than normal canopy limited SULE@ To facilitate new landscaping
12	Cherry, Kanzan	6	360.0	4534	Fell If not felling within 6months, CB S limb 25% 2	A sparser than normal canopy V. limited SULE To facilitate new landscaping



Landmark Trees

Site: 29 New End, Hampstead, London NW3 1JD

Date: 22nd May 2013

Surveyor(s): Adam Hollis

Ref: KWA/29NE/AIA/01

Recommended Tree Works To Facilitate Development

Show All Trees

Hide irrelevant

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works	Comments/ Reasons
14	Rowan (TPO)	5	80.0	2	Fell Felling and replacement previously agreed with Tree Officer	Remote survey only To facilitate development

APPENDIX 4

TREE SELECTION FOR CONSTRICTED SITES

Table 4: Rosaceous Tree Species for Constricted Planting Sites

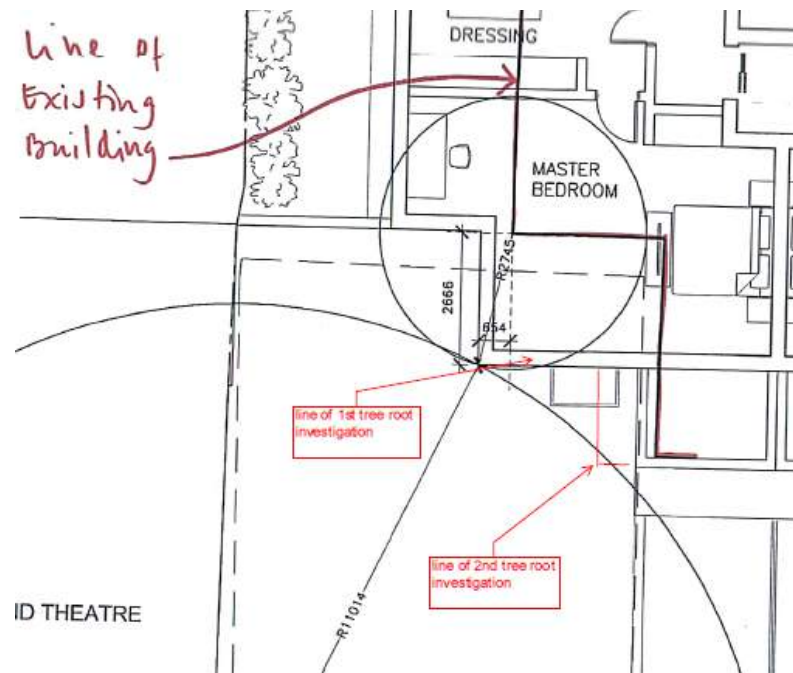
Common Name	Species	Selected Form
Hawthorn	<i>Crataegus monogyna</i>	Stricta
Cockspur	<i>Crataegus prunifolia</i>	Splendens
Cherry	<i>Prunus x hillieri</i>	Spire
Bird cherry	<i>Prunus padus</i>	Albertii
Rowan / Mountain ash	<i>Sorbus aucuparia</i>	Cardinal Royal
Rowan / Mountain ash	<i>Sorbus aucuparia</i>	Rossica Major
Rowan / Mountain ash	<i>Sorbus aucuparia</i>	Sheerwater Seedling
Swedish whitebeam	<i>Sorbus intermedia</i>	Brouwers
B. whitebeam	<i>Sorbus x thuringiaca</i>	Fastigiata

Table 5: Specimen Tree Species for Constricted Planting Sites

Common Name	Species	Selected Form
Chinese red bark birch	<i>Betula albosinensis</i>	Fascination
Swedish birch	<i>Betula pendula</i>	Dalecarlica
Hornbeam	<i>Carpinus betulus</i>	Fastigiata Frans Fountaine
Turkish Hazel	<i>Corylus columna</i>	
Maidenhair tree	<i>Ginkgo biloba</i>	
Pride of India	<i>Koelreuteria paniculata</i>	Fastigiata
European larch	<i>Larix decidua</i>	Sheerwater Seedling
Tulip tree	<i>Liriodendron tulipifera</i>	Fastigiata

APPENDIX 5**TREE ROOT INVESTIGATIONS FOR T1 HORSE CHESTNUT AND T4 COPPER BEECH**

Plan of Trial Pits for T1:



Photographs from T1 Trial Pits

Tree Root Investigation to T1 opened for 3/3/2009



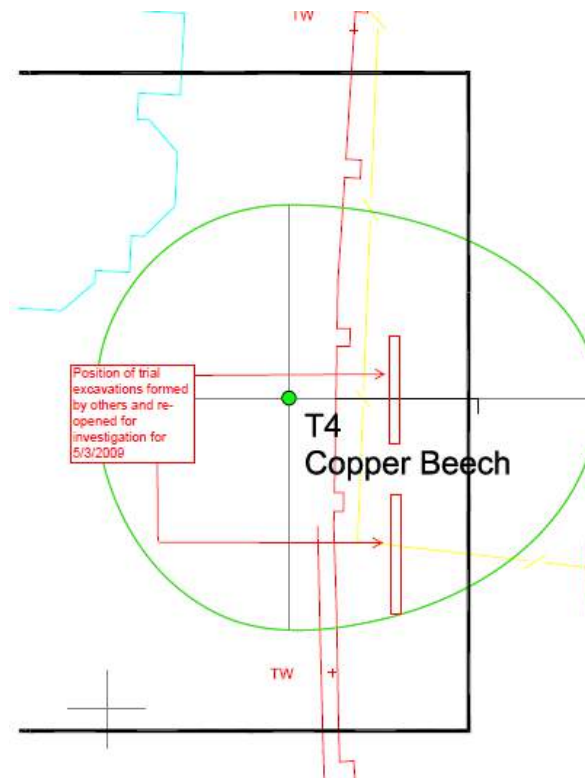
Tree root investigation based on early scheme design however the line of proposed construction subsequently been altered to the approximate lines shown red.

Tree Root Investigation to T1 opened 15/3/2011



Tree root investigation to 700mm based on revised scheme design. Excavation mainly through crushed brick and fill with few and fibrous roots.

Plan of Trial Pits for T4:



Photographs from T4 Trial Pits



APPENDIX 6**TREE CONSTRAINTS PLAN**



NOTE:
This survey is of a preliminary nature. The trees were inspected from the ground only on the basis of the Visual Tree Assessment method. No samples were taken for analysis. No decay detection equipment was employed. The survey does not cover the arrangements that may be required in connection with the laying or removal of underground services.

Branch spread in metres is taken at the four cardinal points to derive an accurate representation of the crown.

Root Protection Areas (RPA) are derived from stem diameter measured at 1.5 m above adjacent ground level (taken on sloping ground on the upslope side of the tree base).

Landmark Trees
20 Broadwick Street, London, W1F 8HT
Tel: 0207 851 4544 Mobile: 07812 989928
e-mail: info@landmarktrees.co.uk Web: www.landmarktrees.co.uk

Site: 29 New End, Hampstead, London 1-200@A1
Drawing Title: Tree Constraints Plan June 2013

Key:
Category A High Quality
Category B Moderate Quality
Category C Low Quality
Category U Trees Unsuitable for Retention

Crown Spread
Tree Number
Species
Category
Root Protection Area

APPENDIX 7**ARBORICULTURAL IMPACT ASSESSMENT PLAN**



NOTE:
This survey is of a preliminary nature. The trees were inspected from the ground only on the basis of the Visual Tree Assessment method. No samples were taken for analysis. No decay detection equipment was employed. The survey does not cover the arrangements that may be required in connection with the laying or removal of underground services.

Branch spread in metres is taken at the four cardinal points to derive an accurate representation of the crown.

Root Protection Areas (RPA) are derived from stem diameter measured at 1.5 m above adjacent ground level (taken on sloping ground on the upslope side of the tree base).



Landmark Trees
20 Broadwick Street, London, W1F 8HT
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Site: 29 New End, Hampstead, London	1-200@A1
Drawing Title: Arboricultural Impact Assessment	June 2013

Key:

- Category A High Quality
- Category B Moderate Quality
- Category C Low Quality
- Category U Trees Unsuitable for Retention

