Landmark Trees

ARBORICULTURAL IMPACT ASSESSMENT REPORT:

Spedan Tower Cottage
17 Branch Hill
Hampstead
NW3 7NA

REPORT PREPARED FOR:

SHH Architects Interior Designers
1 Vencourt Place
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REPORT PREPARED BY

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Ref: SHH/17BRH/AIA/01

Date: 15th July 2014

Appendices

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:	SHH Architects Interior Designers	Case Ref:	SHH/17BRH/AIA/01
Local Authority:	LB Camden	Date:	15/07/14
Site Address: Spedan Tower Cottage, 17 Branch Hill, Hampstead NW3 7NA			
Proposal: Demolition of existing property to create a larger new build contemporary home			

Report Checklist	Y/N		Y/N
Arboricultural constraints on site	Y	Trees removal proposed	N
Tree Survey	Y	Topographical Survey	Y
BS5837 Report	Y	Conservation Area	Y
Tree Preservation Orders	Y	(TPO's on site and in Savoy Court)	
Tree Protection Plan:	N/a	(Include in future method statement)	
Tree Constraints Plan:	Y		
Arboricultural Impact Assessment:	Y		

Site Layout					
Site Visit	Y	Date: 01/07/14		Access Full/Partial/None	F/P
Trees on Site			Y	Off-site Trees	Y
Trees affected by development			N	O/s trees affected by development	Y
Tree replacement proposed:			N/a	On or off-site trees indirectly affected by development	N

Trees with the potential to be affected

T1 - off-site Cat C: Demolition of existing building/hard landscaping (16.2%); New basement excavation 8.4m2 (11.6%) All existing hard standing with intervening boundary wall: low impact subject to proposed mitigation
T2 - off-site Cat B: Demolition of existing building/hard landscaping (2.4%); New basement excavation 5.6m2 (1.7%) All existing hard standing with intervening boundary wall: low impact subject to proposed mitigation
T3 - off-site Cat B: Demolition of existing hard landscaping (3.8%): low impact subject to proposed mitigation
T9 – off-site Cat B (TPO): Demolition of existing building/hard landscaping 49m2 (67.7%). NB existing basement within 1m of stem. New basement excavation 9.6m2 (13.3%) within 1.3m of stem. Total area: 35.3m2 (49%); all existing boundary wall & sig. level changes: theoretically significant impacts – further investigations recommended.
T11 – off-site Cat C (TPO): Demolition of existing garage//hard landscaping (17.7%): low (level change)
T12 – off-site Cat B (TPO): Demolition of existing garage, building/hard landscaping (20.3%): low (level change)
G8 – off-site Cat B (TPO): Removal of existing hard landscaping/construction beneath canopy: very low

Comments

Recommended works for two on-site trees (T16 and T18) and one off-site tree (T1 – third party tree) regardless of development.

Recommendations

1	Proposal will mean the loss of important trees (TPO/CA)	N
2	Proposal has sufficient amelioration for tree loss	N/a
3	Proposals provide adequate tree protection measures	TBC
4	Proposal will mean retained trees are too close to buildings	TBC
5	Specialist demolition / construction techniques required	Y
6	The Proposal will result in significant root damage to retained trees	TBC
7	Further investigation of tree condition recommended	Y

BS5837: 2012 'Trees in relation to design, demolition and construction – Recommendations'
RPA= Root Protection Area AIA = Arboricultural Implication Assessment
TPP= Tree Protection Plan AMS= Arboricultural Method Statement

1. SUMMARY

1.1 This report comprises an arboricultural impact assessment of the proposals for Spedan Tower Cottage, 17 Branch Hill, Hampstead NW3 7NA, reviewing any conflicts between the proposals and material tree constraints identified in our survey.

1.2 There are 19 trees surveyed on or around the site, of which 10 are B category *(Moderate Quality), 7 are C category *(Low Quality) and 2 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 would comprise a constraint in aggregate, in terms of any collective loss / removal, where replacement planting would be appropriate. In this instance, no such collective impact is proposed.

1.3 The principal primary impacts in the current proposals are summarised as follows:

T1 - off-site Category C Leyland cypress: Demolition of existing building/hard landscaping within theoretical RPA (16.2%); New basement excavation 8.4m2 (11.6%) and proposed elevations within overhanging canopy. The overall impact is low as the proposed basement is all existing hard standing with intervening boundary wall. The existing surfaces within the RPA should be removed by airspade/hand (subject to proposed mitigation

T9 – off-site Category B (TPO) sycamore: Demolition of existing building/hard landscaping within theoretical RPA totalling 49m2 (67.7%), but existing basement within 1m of T9's stem (see red dotted line on AIA plan in Appendix 5) and substantive level difference between properties: there is an area of new basement excavation totalling 9.6m2 (13.3%) of the theoretical RPA and within 1.3m of stem, but the ground in question stands c.3m below the base of the tree on the other side of a retaining wall, so no actual impact is anticipated. Thus the total area affected by elevations and basement at 35.3m2 (49%) of the RPA, is dismissed as a desktop impact only. It is also worth noting that the total area of proposed development within T9's RPA is lower than the removal of the existing (35m2 as opposed to 49m2). Thus, the theoretical impacts to T9 are rated low / non-existent in practice, although further investigations are recommended to prove this point.

1.4 Other primary impacts include:

T2 - off-site Category B sycamore: Demolition of existing building/hard landscaping within the theoretical RPA (2.4%); New basement excavation within theoretical RPA 5.6m2 (1.7%). All of the proposed development area is existing basement or hard standing with intervening boundary wall; therefore the impact is rated as low subject to proposed mitigation.

T3 - off-site Category B sycamore: Demolition of existing hard landscaping (3.8%): rated as a low impact subject to proposed mitigation.

G8 – off-site Category B (TPO) sycamore: Removal of existing hard landscaping (2% of RPA) and construction of the basement and elevations beneath canopy with an 8m ground clearance, with c. 2m level change between properties: very low subject to mitigation.

1.5 To date, there are no details confirming whether the existing drive is to be altered. There would potentially be arboricultural impacts associated with any removal of the existing hard surfaces, but ones, which could be readily mitigated with the use of no-dig construction techniques; these include the use of existing sub-bases.

1.6 Subject to the proposed further investigations for T9, the primary impacts are likely to be low for all of the trees affected, following the proposed mitigation; this includes specialised demolition techniques ensuring that the removal of existing buildings and hard standings within the RPA are undertaken using pull-back methods for demolition and airspade/manual removal of hard surfaces. The excavation of the new basement lines outside the existing basement within the RPA of T1 and T9 should also be undertaken by hand to a depth of 750mm, with pre-emptive root pruning under supervision if required. The cutting back of T1's canopy is currently recommended as good arboricultural practice, but will also be required to facilitate the development proposals. It is important to note that the existing ground clearance for G8 is 8m, which will restrict the height of the piling equipment used, though some pruning would be reasonable.

1.7 Secondary impacts from the new elevation will require maintenance of the elevational clearance of T1, as required by the existing elevations. There will always be secondary impacts of honeydew / litter deposition and partial shade on this site, regardless of development. The status quo is unlikely to change with further development, which is the salient point for planning to consider. Thus, the secondary impacts of development are minimal.

1.8 Subject to the proposed further investigations to confirm the absence of significant root colonisation from the off-site T9, 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 recommended to planning.

* 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 SHH Architects to provide a survey and an arboricultural impact assessment of proposals for the site: Spedan Tower Cottage, 17 Branch Hill, Hampstead NW3 7NA. The report is to accompany a planning application.

2.1.2 The proposals are for the demolition of existing property to create a larger new build contemporary home. 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 The drawings supplied by the client and relied upon by Landmark Trees in the formulation of our survey plans are:

Existing site survey: 19988_01-03_PES

Proposals: 1.Lower Ground Floor

2.3 Scope of survey

2.3.1 As Landmark Trees' (LT) arboricultural consultant, I surveyed the trees on site on 1st July 2014, 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 4.

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 5. General observations and discussion follow, below.

3.0 OBSERVATIONS

3.1 Site description

Photograph 1: Entrance to Spedan Tower Cottage, 17 Branch Hill, Hampstead NW3 7NA (Source: Google Images)

3.1.1 The site is a family house located in Hampstead in close proximity to Hampstead Heath. It is set back from the main road with a private driveway leading to a detached three storey modern house, which is situated within private grounds with a landscaped garden to the rear. There is currently off street parking for 3 cars including a single storey carport. There is an indoor pool with associated plant located on the lower ground floor.

3.1.2 The site levels vary with the existing hard landscaping.

3.1.3 In terms of the British Geological Survey, the site overlies the Bagshot Formation (shown in yellow in fig.1 overleaf), typical of Hampstead Heath; the associated soils are generally, more sandy and less shrinkable than the surrounding Claygate member and are readily permeable. Such low plasticity soils are less prone to movement: subsidence and heave. The actual limits of soil series are not as clearly defined on the ground as on plan and there may be anomalies between them. Further advice from the relevant experts on the specific soil properties can be sought as necessary.

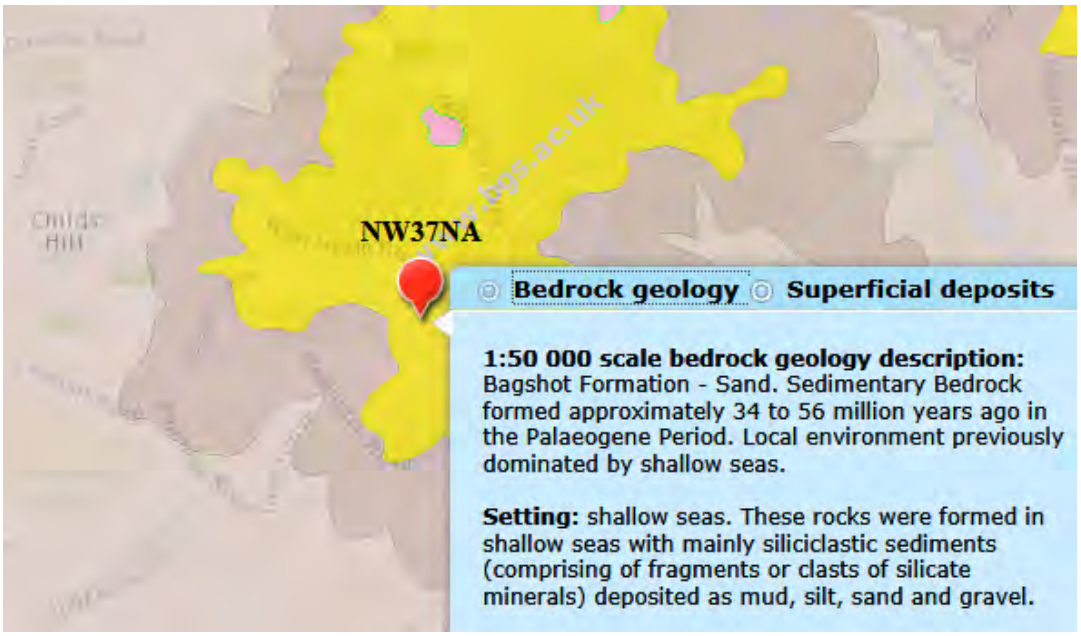

Figure 1: Extract from the BGS Geology of Britain Viewer

3.2 Subject trees

3.2.1	Of the 19 surveyed trees 10 are B category (Moderate Quality), 7 are C category (Low Quality) and 2 are U category (Unsuitable for Retention).
3.2.2	The tree species found on site comprise mainly sycamore, with some Austrian pine, common yew, elder, purple plum, Himalayan cedar, silver birch and Leyland cypress.
3.2.3	In terms of age demographics the trees range from early mature through to mature.

3.2.4	Full details of the surveyed trees can be found in Appendix 1 of this report.
3.2.5	There are recommended works for two on-site trees (T16 and T18) and one off-site tree (T1 – third party tree). These are listed in Appendix 2.

3.3 Planning Status

3.3.1	We are aware of the existence of Tree Preservation Orders protecting the trees, including TPO Ref: C100 that protects the trees at Savoy Court. The site also stands within the Hampstead conservation area, which will affect the subject trees: it is a criminal offence to prune, damage or fell such trees without permission from the local authority.

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), though further investigations are recommended to test the assumptions made below at 4.1.11.

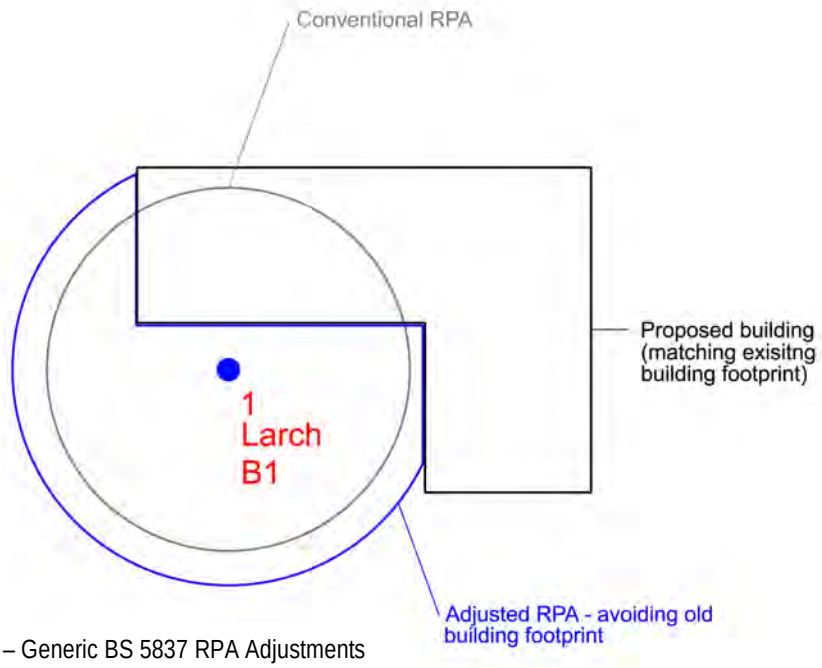

Figure 2 – Generic BS 5837 RPA Adjustments

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 would comprise a constraint in aggregate, in terms of any collective loss / removal, where replacement planting would be appropriate.

4.1.11 In this instance, the potentially significant constraints provided by the off-site category B trees T2, T3, G8, T9 and T12. It is likely that the existing level changes, boundary walls and the existing hard landscaping/build development has effectively minimised the significant roots from the off-site trees, in particular T9. Further investigations are recommended to test this assumption.

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.

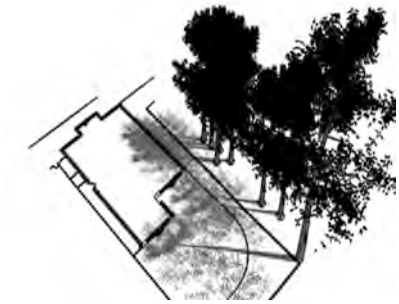

Figure 3 –
Generic Shading Constraints

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.

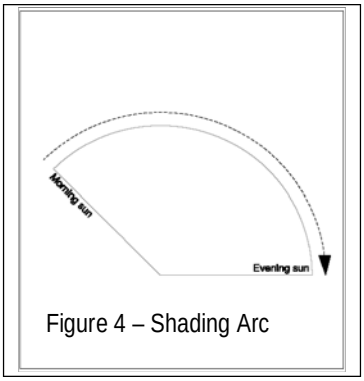

Figure 4 – Shading Arc

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 Assuming that they will be retained, the orientation of the on-site trees will ensure that shading constraints are minimal, with leaf deposition and honey-dew likely to be as it is today. However, the off-site trees have the potential to provide a variety of secondary constraints, including shading, organic deposition and the potential need to maintain crown clearance in the future. The significance of these constraints will vary depending on the location and proximity to the proposed re-development.

5.0

Table 1: Arboricultural Impact Assessment

(Impacts assessed prior to mitigation and rated with reference to Matheny & Clark (1998))

Hide irrelevant | Show All Trees

Ref: SHH/17BRH/AIA

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	1	Cypress, Leyland	Demolition of existing building/hard landscaping (16.2%) New basement excavation 8.4m2 (11.6%) All existing hard standing with intervening boundary wall	11.7 m^2 16.16 %	Early Mature	Normal	Good	Low	N/A	Top-down/pull back demolition & manual removal of hard standings Hand-dig top 750mm of basement line through RPA & tree works
B	2	Sycamore	Demolition of existing building/hard landscaping (2.4%) New basement excavation 5.6m2 (1.7%) All existing hard standing with intervening boundary wall	5.6 m^2 1.67 %	Mature	Normal	Moderate	Very Low	N/A	Top-down/pull back demolition & manual removal of hard standings Hand-dig top 750mm of basement line through RPA
B	3	Sycamore	Demolition of existing hard landscaping (3.8%)	6.2 m^2 3.81 %	Mature	Normal				Airspade / manual excavation
B	G8	Sycamore	Demolition of existing hard landscaping (2%) Basement/house construction under canopy	0.37 m^2 2.04 %	Semi-mature	Normal	Moderate	Very Low	N/A	Airspade / manual excavation Piling rig height restricted to 8m
B	9	Sycamore	Demolition of existing building/hard landscaping 49m2 (67.7%). NB existing basement New basement excavation 9.6m2 (13.3%) Total area: 35.3m2 (49%); boundary wall & sig. level changes	35.3 m^2 48.76 %	Early Mature	Moderate	Moderate	High	N/A	Top-down/pull back demolition & manual removal of hard standings Trial pits / further investigation
C	11	Plum, Purple	Demolition of existing garage//hard landscaping (17.7%) NB Level drop to site	7.2 m^2 17.68 %	Early Mature	Moderate	Moderate	Low	N/A	Top-down/pull back demolition & manual removal of hard standings

5.0

Table 1: Arboricultural Impact Assessment

(Impacts assessed prior to mitigation and rated with reference to Matheny & Clark (1998))

Hide irrelevant | Show All Trees

Ref: SHH/17BRH/AIA

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	12	Pine, Austrian	Demolition of existing garage, building/hard landscaping (20.3%) NB Level drop to site	18.6 m^2 20.3 %	Mature	Moderate	Good	Low	N/A	Top-down/pull back demolition & manual removal of hard standings

6.0 DISCUSSION

6.1 Rating of Primary Impacts

6.1.1 The principal primary impacts in the current proposals are summarised as follows:

T1 - off-site Category C Leyland cypress: Demolition of existing building/hard landscaping within theoretical RPA (16.2%); New basement excavation 8.4m2 (11.6%) and proposed elevations within overhanging canopy. The overall impact is low as the proposed basement is all existing hard standing with intervening boundary wall. The existing surfaces within the RPA should be removed by airspade/hand (subject to proposed mitigation.

T9 – off-site Category B (TPO) sycamore: Demolition of existing building/hard landscaping within theoretical RPA totalling 49m2 (67.7%), but existing basement within 1m of T9's stem (see red dotted line on AIA plan in Appendix 5) and substantive level difference between properties: there is an area of new basement excavation totalling 9.6m2 (13.3%) of the theoretical RPA and within 1.3m of stem, but the ground in question stands c.3m below the base of the tree on the other side of a retaining wall, so no actual impact is anticipated. Thus the total area affected by elevations and basement at 35.3m2 (49%) of the RPA, is dismissed as a desktop impact only. It is also worth noting that the total area of proposed development within T9's RPA is lower than the removal of the existing (35m2 as opposed to 49m2). Thus, the theoretical impacts to T9 are rated low / non-existent in practice, although further investigations are recommended to prove this point.

6.1.2 Other primary impacts include:

T2 - off-site Category B sycamore: Demolition of existing building/hard landscaping within the theoretical RPA (2.4%); New basement excavation within theoretical RPA 5.6m2 (1.7%). All of the proposed development area is existing basement or hard standing with intervening boundary wall; therefore the impact is rated as low subject to proposed mitigation.

T3 - off-site Category B sycamore: Demolition of existing hard landscaping (3.8%): rated as a low impact subject to proposed mitigation.

G8 – off-site Category B (TPO) sycamore: Removal of existing hard landscaping (2% of RPA) and construction of the basement and elevations beneath canopy with an 8m ground clearance, with c. 2m level change between properties: very low subject to mitigation.

6.1.3 To date, there are no details confirming whether the existing drive is to be altered. There would potentially be arboricultural impacts associated with any removal of the existing hard surfaces, but ones, which could be readily mitigated with the use of no-dig construction techniques; these include the use of existing sub-bases.

6.1.4 Subject to the proposed further investigations for T9, the primary impacts are likely to be low for all of the trees affected, subject to the proposed mitigation.

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 from the new elevation will require maintenance of the elevational clearance of T1, as required by the existing elevations. There will always be secondary impacts of honeydew / litter deposition and partial shade on this site, regardless of development. The status quo is unlikely to change with further development, which is the salient point for planning to consider. Thus, the secondary impacts of development are minimal.

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 within the RPA's can be lifted with caution by an air spade/manually again working away from the trees.

6.3.2	The path of new basement foundations through RPAs will be manually excavated to 750mm depth under arboricultural supervision; any roots encountered within the trenches / pits will be cleanly pruned back to an appropriate junction 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	Any 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 the proposed recommended works on the grounds of sound husbandry..
6.3.5	Nuisance deposition can be mitigated with regular crown cleaning and filtration traps on the guttering (see Figure 5 below). Alternatively, elements of green roof construction might be considered, where applicable.
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.

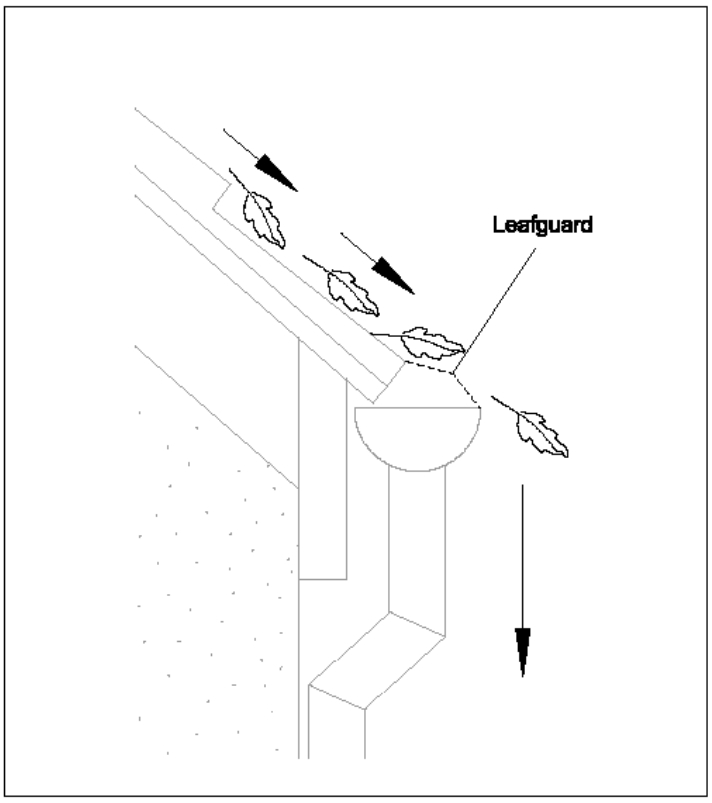

Figure 5: Filtration traps, as shown above, could be fitted on the gutters which can easily be maintained at 2-3m above ground.

7.0 CONCLUSION

7.1 Subject to the proposed mitigation and further investigations, the potential impacts of development are likely to be relatively low.

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.

7.4 Therefore, it is likely that the proposals will not have any significant impact on either the retained trees or wider landscape. Thus, with trial pits to prove the restricted root colonisation from the existing structures, suitable mitigation and supervision the scheme is recommended to planning.

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.

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.

8.2 General Recommendations

8.2.1 Any trees which are in close proximity to the proposed development should be protected with a Tree Protection Barrier (TPB). Protective barrier fencing should be installed immediately following the completion of the tree works, remaining in situ for the entire duration of the development unless otherwise agreed in writing by the council. It should be appropriate for the intensity and proximity of the development, usually comprising 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 new 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.

8.2.8 To enable the successful integration of the proposal with the retained trees, the following points will need to be taken into account:

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: 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:
   - 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: 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 Conservational, Historic and Commemorative.
12. Useful Life is the tree's estimated remaining contribution in years.

Landmark Trees

Site: 17 Branch Hill, Hampstead NW3 7NA

Date: 1 July 2014

Appendix 1

BS5837 Tree Constraints Survey Schedule

Landmark Trees Ltd

020 7851 4544

Surveyor(s): Adam Hollis

Ref: SHH/17BRH/AIA

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Stem Diamete	Age Class	Protection Radius	Growth Vitality	Structural Condition	B.S. Cat	Sub Cat	Useful Life	Comments
1	Cypress, Leyland	15	3332	5.0	400	Early Mature	4.8	Normal	Good	C	2	20+	Unsuitable species for position Level drop of 600mm to client's Growing into eaves Remote survey only
2	Sycamore	18	5	8.0	860	Mature	10.3	Normal	Fair	B	2	20+	Remote survey only Ivy clad Co-dominant stems
3	Sycamore	19	7424	10.0	600	Mature	7.2	Normal	Fair	B	2	20+	Remote survey only A sparser than normal canopy
4	Elder	6	1321	1.0	250	Mature	3.0	Normal	Fair	C	2	20+	Remote survey only Kinked stem
5	Birch, Silver	13	3121	5.0	159	Semi-mature	1.9	Normal	Fair	C	2	20+	Remote survey only A sparser than normal canopy
6	Elder	6	1122	3.0	120	Early Mature	1.4	Poor	Fair	U		20+	Remote survey only Dying back (uniform)

Landmark Trees

Site: 17 Branch Hill, Hampstead NW3 7NA

Date: 1 July 2014

Appendix 1

BS5837 Tree Constraints Survey Schedule

Landmark Trees Ltd

020 7851 4544

Surveyor(s): Adam Hollis

Ref: SHH/17BRH/AIA

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Stem Diamete	Age Class	Protection Radius	Growth Vitality	Structural Condition	B.S. Cat	Sub Cat	Useful Life	Comments
7	Sycamore	6	3	3.0	250	Semi-mature	3.0	Normal	Fair	C	2	>40	Remote survey only A sparser than normal canopy
G8	Sycamore	17	4	8.0	200	Semi-mature	2.4	Normal	Fair	B	2	20+	Remote survey only Ivy clad Level drop of 1500mm to client's
9	Sycamore	17	3	12.0	400	Early Mature	4.8	Moderate	Fair	B	2	20+	Remote survey only Ivy clad / sparse Level drop to client's
10	Cedar, Himalayan	17	2	8.0	250	Early Mature	3.0	Poor	Poor	U		<10	Remote survey only A sparser than normal canopy Low taper stem Level drop to client's
11	Plum, Purple	8	3233	4.0	300	Early Mature	3.6	Moderate	Fair	C	2	20+	Remote survey only Young Thuja growing thru crown Level drop to client's
12	Pine, Austrian	17	5533	10.0	450	Mature	5.4	Moderate	Fair	B	2	20+	Remote survey only A sparser than normal canopy Level drop to client's

Landmark Trees

Site: 17 Branch Hill, Hampstead NW3 7NA

Date: 1 July 2014

Appendix 1

BS5837 Tree Constraints Survey Schedule

Landmark Trees Ltd

020 7851 4544

Surveyor(s): Adam Hollis

Ref: SHH/17BRH/AIA

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Stem Diamete	Age Class	Protection Radius	Growth Vitality	Structural Condition	B.S. Cat	Sub Cat	Useful Life	Comments
13	Pine, Austrian	17	4533	10.0	450	Mature	5.4	Moderate	Fair	B	2	>40	Remote survey only Level drop to client's
14	Pine, Austrian	17	5	10.0	600	Mature	7.2	Moderate	Fair	B	2	20+	Remote survey only A sparser than normal canopy Level drop to client's
15	Pine, Austrian	17	3	9.0	450	Mature	5.4	Moderate	Fair	B	2	20+	Remote survey only A sparser than normal canopy Level drop to client's
16	Sycamore	19	6443	8.0	560	Mature	6.7	Normal	Fair	B	2	20+	Restricted rooting in bed Decay in trunk Stem collar slightly buried High crown lift
17	Sycamore	19	7672	8.0	520	Mature	6.2	Normal	Fair	B	2	20+	Restricted rooting in bed Entry wounds on trunk High crown lift
18	Sycamore	14	3336	4.0	310	Early Mature	3.7	Normal	Fair	C	2	20+	Restricted rooting in bed Dying back (lower branches) CCTV installation Competing with T19

Landmark Trees

Site: 17 Branch Hill, Hampstead NW3 7NA

Date: 1 July 2014

Appendix 1

BS5837 Tree Constraints Survey Schedule

Landmark Trees Ltd

020 7851 4544

Surveyor(s): Adam Hollis

Ref: SHH/17BRH/AIA

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Stem Diamete	Age Class	Protection Radius	Growth Vitality	Structural Condition	B.S. Cat	Sub Cat	Useful Life	Comments
19	Yew, Common	10	2345	4.0	250	Semi-mature	3.0	Normal	Fair	C	2	>40	Suppressed by nearby tree

APPENDIX 2

RECOMMENDED TREE WORKS

Notes for Guidance:

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

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 - Check / monitor progress of defect(s) at next consultant inspection which should be <18 months in frequented areas and <3 years in areas of more occasional use. Where clients retain their own ground staff, we recommend an annual in- house inspection and where practical, in the aftermath of extreme weather events.
Svr Ivy / Clr Bs - Sever ivy / clear base and re-inspect base / stem for concealed defects.

Landmark Trees

Site: 17 Branch Hill, Hampstead NW3 7NA

Date: 1 July 2014

Surveyor(s): Adam Hollis

Ref: SHH/17BRH/AIA

Appendix 2

Recommended Tree Works

Hide irrelevant
Show All Trees

Tree No.	English Name	B.S. Cat	Height	Ground Clearance	Crown Spread	Recommended Works	Comments/ Reasons
1	Cypress, Leyland	C	15	5.0	3332	CB 2m	Unsuitable species for position Level drop of 600mm to client's Growing into eaves Remote survey only Recommended husbandry 2
16	Sycamore	B	19	8.0	6443	FInv Further Investigation of stem collar	Restricted rooting in bed Decay in trunk Stem collar slightly buried High crown lift Recommended husbandry 3
18	Sycamore	C	14	4.0	3336	DWD Option to fell to favour T19	Restricted rooting in bed Dying back (lower branches) CCTV installation Competing with T19 Recommended husbandry 3

APPENDIX 3

RECOMMENDED TREE WORKS TO FACILITATE DEVELOPMENT (See Table 1)

Notes for Guidance:

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 - Check / monitor progress of defect(s) at next consultant inspection which should be <18 months in frequented areas and <3 years in areas of more occasional use. Where clients retain their own ground staff, we recommend an annual in- house inspection and where practical, in the aftermath of extreme weather events.
Svr Ivy / Clr Bs - Sever ivy / clear base and re-inspect base / stem for concealed defects.

Landmark Trees

Site: 17 Branch Hill, Hampstead NW3 7NA

Date: 1 July 2014

Surveyor(s): Adam Hollis

Ref: SHH/17BRH/AIA

Appendix 2

Recommended Tree Works

Hide irrelevant
Show All Trees

Tree No.	English Name	B.S. Cat	Height	Ground Clearance	Crown Spread	Recommended Works	Comments/ Reasons
1	Cypress, Leyland	C	15	5.0	3332	CB 2m Recommended for existing husbandry and to facilitate development	Unsuitable species for position Level drop of 600mm to client's Growing into eaves Remote survey only Recommended husbandry 2/to facilitate development
G8	Sycamore	B	17	8.0	4	CB Possible pruning to facilitate construction of proposed elevations	Remote survey only Ivy clad Level drop of 1500mm to client's To facilitate development

APPENDIX 4

TREE CONSTRAINTS PLAN

Savoy Court

1 to 9

Hotel

The Chestnuts

Leavesden Cottage

Leavesden

10 Cedar U

11 Plum C

12 Pine B

13 Pine B

14 Pine B

15 Pine B

16 Sycamore B

17 Sycamore B

18 Sycamore C

19 Yew C

G8 Sycamore B

9 Sycamore B

1 Cypress

2 Sycamore B

3 Sycamore B

4 Elder C

5 Birch C

6 Elder U

7 Sycamore C

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: 17 Branch Hill	1:100@ A1
Drawing Title: Tree Constraints Plan	July 2014

Key:

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

Category — Crown Spread — Tree Number — Species — Category — Root Protection Area

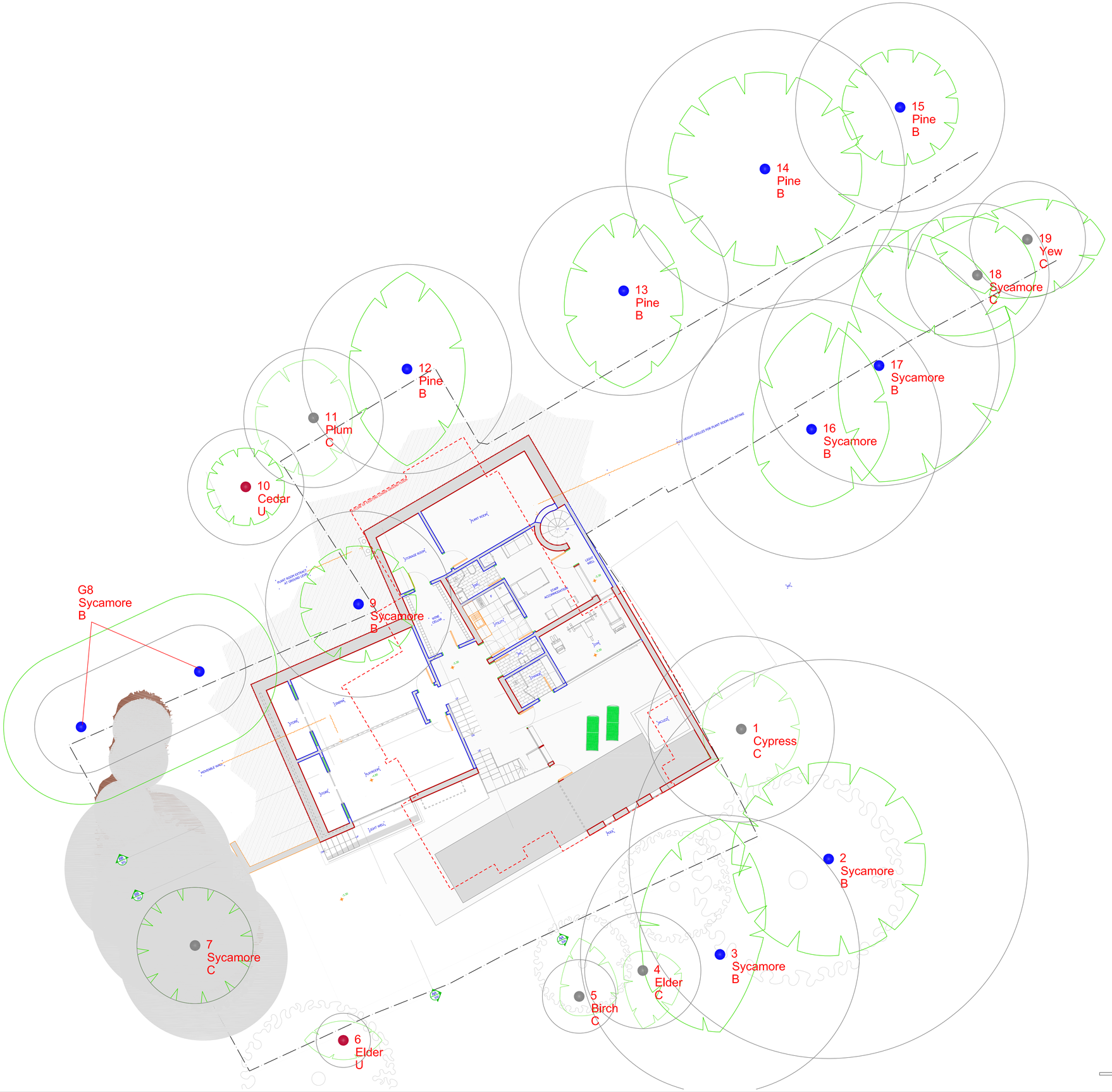
Note: All The Tree Positions Are Approximate

N

5m 10m

APPENDIX 5

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).

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Site: 17 Branch Hill	1:100@ A1
Drawing Title: Arboricultural Impacts Assessment	July 2014

Key:

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

Category
Root Protection Area
13 Birch C
Crown Spread
Tree Number
Species
Category

Note: All The Tree Positions Are Approximate