Landmark Trees

ARBORICULTURAL IMPACT ASSESSMENT REPORT:

9 Arkwright Rd

Camden,

London NW3 6AB

REPORT PREPARED FOR:

Jez San

Flat 401

The Glass Building

226 Arlington Road

London NW1

REPORT PREPARED BY

Adam Hollis

MSc ARB MICFor FArbor A MRICS C Env

Ref: SAN/AKR/AIA/01REV B

Date: 30th May 2012

Caveats

The report contents have been updated to BS5837: 2012, but the survey of, and constraints (RPA) for, multi-stem trees (H3 & T11 cypress, T16 plum & T22 Judas tree) remain as per BS5837: 2005. In general, the 2005 procedures generated larger RPA for multi-stems than the current revision. Therefore, the current anomaly potentially prejudices the client only. All trees affected are of low quality / significance and the implications are marginal: T22 is to be removed anyway, H3 & T11 cypresses are clear of the proposals. Only T16 is potentially impacted by the proposals and its size and RPA were estimated only, as an off-site tree. That estimate remains valid in 2012.

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 an inspection they will of course appear in the report.
Inherent in tree inspection 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:	Jez San	**Case Ref:**	SAN/AKR / AIA/01B
Local Authority:	LB Camden	**Date:**	30/5/12
Site Address: 9 Arkwright Rd, Camden, London NW3 6AB			
Proposal: redevelopment with basement extension			

Report Checklist	**Y/N**		**Y/N**
Arboricultural constraints on site	Y	Trees removed	Y
Tree Survey	Y	Topographical Survey	Y
BS5837 Report	Y	Conservation Area	Y
Tree Preservation Orders	N		
Tree Protection Plan:	N/a	(include In future method statement)	
Tree Constraints Plan:	Y		
Arboricultural Impact Assessment:	Y		

Site Layout					
Site Visit	Y	Date: 18/02/11	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 on plans:		Y	On or off-site trees indirectly affected by development		N

Trees with the potential to be affected

7 trees/shrubs or groups to be felled to main development: H1 (Chusan palm) and T9-13 & 15 (false cypress). H2 (false cypress) also part-felled. All felled trees young-semi-mature only. Basement impacts of <10% RPA to 2 mature trees, T5 & 7 (sycamore) and of <20% to 1 semi-mature birch in poor condition. Each impact modified by intervening boundary wall. Low rigs required below canopies of T5 & 7. Other minor impacts for hard landscape alterations, including access ramp and bed extensions. Further removal / replacement of 4 young trees (T20-23) and planting work within RPA's of T5, G6 & T7 in landscape proposals.

Comments

Outer limits of excavation within RPA to be airspade excavated to 600mm depth and hand pruned under arboricultural supervision as necessary.

Recommendations

1	Proposal will mean the loss of important trees	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: 2005 'Trees in relation to construction – recommendations'

1. SUMMARY

1.1 This report comprises an arboricultural impact assessment of the revised proposals for 9 Arkwright Rd, Camden, London NW3 6AB, reviewing any conflicts between the proposals and material tree constraints identified in our survey.

1.2 There are 23 trees surveyed on or around the site, of which 6 are 'B' category *(Moderate Quality) and 17 'C' category *(Low Quality). In theory, only the moderate quality trees are a material constraint on development. However, the site lies within the Fitzjohns Netherhall Conservation Area and therefore, the low quality trees will comprise a constraint in aggregate, in terms of at least, replacement planting. In general, the proposals have taken into account and preserve, the existing mature tree population.

1.3 The principal primary impacts in the main proposals are the removal of 7 trees/shrubs or groups: H1 (Chusan palm) and T9-13 & 15 (false cypress). H2 (false cypress) will also be part-felled. All felled trees are young-semi-mature only. Loss of low evergreen cover within the rear garden is rated low impact.

1.4 For the retained trees, there are basement impacts of <10% RPA to 2 mature trees, T5 & 7 (sycamore) and of <20% to 1 semi-mature birch which is in poor condition. Each impact is likely to be modified by the intervening boundary wall, which may restrict root penetration onto the site. These encroachments are rated low impact.

1.5 The further removal / replacement of 4 young trees (T20-23) and planting work within RPA's of T5, G6 & T7 arises in landscape proposals. The removals are effectively quid pro quo replacements of small trees and the planting works bring net enhancements, if undertaken carefully. The impacts rate very low.

1.5 Piling beneath mature canopies (of T5 & 7) could cause siginifcant impacts. These should be avoided through the use of mini-rigs in such locations. Pruning is an alternative consideration, but would require 3m linear reductions, which are better avoided. Other minor impacts for hard landscape alterations, include access ramp and bed extensions.

1.4 Secondary impacts from the proposals are not anticipated with basement only in the shadow of the southern boundary vegetation. Lightwells should not be placed along the southern boundary, beneath the sycamore canopies. A building has already co-existed with trees along the northern boundary for many years.

1.5 Thus, with suitable mitigation and supervision the scheme is viable.

* British Standards Institute. 2005. Trees in Relation to Construction BS 5837: 2005 HMSO, London

2. INTRODUCTION

2.1 Terms of reference

2.1.1 LANDMARK TREES were asked by Jez San, Flat 401, The Glass Building, 226 Arlington Road, London NW1, C/o PKS Architects, to update our September 2011 arboricultural impact assessment report on development proposals at 9 Arkwright Rd, Camden, London NW3 6AB. The report is to accompany a planning application.

2.1.2 The current proposals are for redevelopment with a basement extension and 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 20 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:

Topographical survey – 804-001-11_Survey

Proposed GF & LGF – 804-010-XX_ProposedPlansRevised

Landscape proposals - 1636.P.01 REV B REAR GARDEN

& 1636.P.02 REV A

2.3 Scope of survey

2.3.1 As Landmark Trees' arboricultural consultant, I surveyed the trees on site on 18th February 2011, recording relevant qualitative data in order to assess both their suitability for retention and their constraints upon the site, in accordance with British Standard 5837:2005 Trees in relation to construction – Recommendations [BS5837:2005].

2.3.2 Our survey of the trees, the soils and any other factors, is of a preliminary nature. The trees were inspected 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). I have not taken any samples for analysis and the trees were not climbed, but inspected from ground level.

2.3.3 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: 2005) 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

3.1.1 The property is on the south side of Arkwright Road between Frognal and Fitzjohns Avenue, approximately ½ mile south of Hampstead Village. The immediate area is mainly residential including a number of large houses on Arkwright Road. The house dates from the 1870s, substantially extended and altered in the 1890s. The building is currently in use as offices. There is a large garden laid mainly to lawn and with access to a part glazed conservatory. A tarmac surfaced access to the north of the property allows parking for up to 12 cars. The site slopes to the south west.

3.1.3 In terms of the Soil Survey of England and Wales, the soil lies within the unsurveyed area of Greater London where the soils are generally, highly shrinkable clay; e.g. slowly permeable seasonally waterlogged fine loam over clay. Such soils are prone to compaction during development. Damage to soil structure can have a serious impact on tree health. Design of foundations near problematic tree species will also need to take into consideration subsidence risk. A structural engineer may be able to advise further on the local geology and its implications for development.

3.2 Subject trees

3.2.1	There are 23 trees surveyed on or around the site, of which 6 are 'B' category *(Moderate Quality) and 17 'C' category *(Low Quality).
3.2.2	In terms of age demographics there is a preponderance of semi-mature evergreen trees on the site with few deciduous trees in the population. The latter are mostly provided off-site within the sycamore woodland belt to the rear. These still leave a dearth of ornamental or native tree species.

3.3 Planning Status

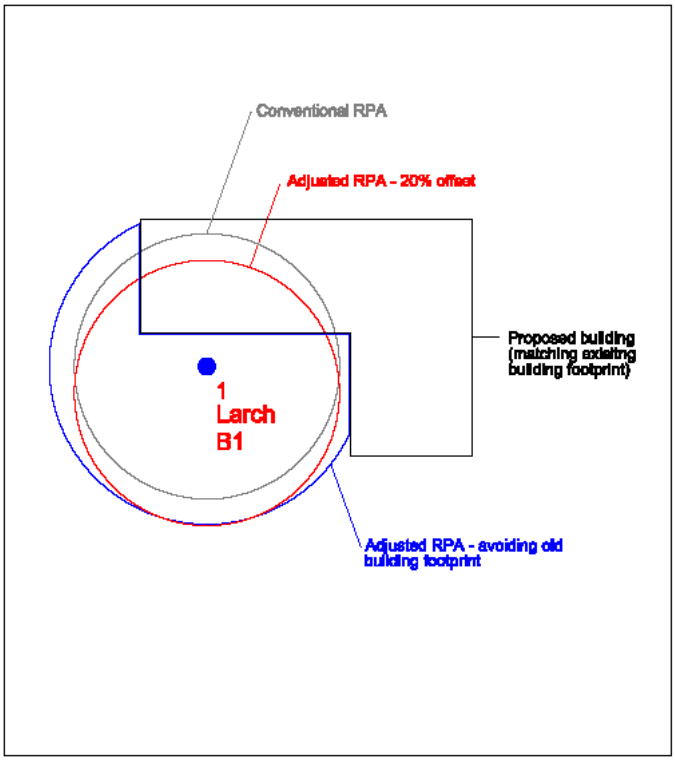
3.3.1	We are not aware of the existence of any Tree Preservation Orders, but note that the property stands within the Fitzjohns Netherhall Conservation Area, which will affect trees on the site. It is a criminal offence to disturb or damage such trees without permission from the local authority.

4.0 DEVELOPMENT CONSTRAINTS

4.1 Primary constraints

4.1.1 BS5837: 2005 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 generally 12-x stem diameter at 1.5m above ground level, except where basal diameters are used in the case of multi-stemmed trees, and the radius is set at 10x the diameter.

4.1.2 Circular RPA's are appropriate for individual specimen trees grown freely such as these, but where there is ground disturbance, the morphology of the RPA can be modified to an alternative polygon, and where appropriate shifted 20% in the direction of undisturbed ground, as shown in the diagram below. In less fanciful terms, one needs to remember that RPA's are area-based and not linear. **No modifications have been made in this instance, but the boundary wall surrounding the site may restrict rooting from off-site trees. Modification can be substantiated by ground investigation.**



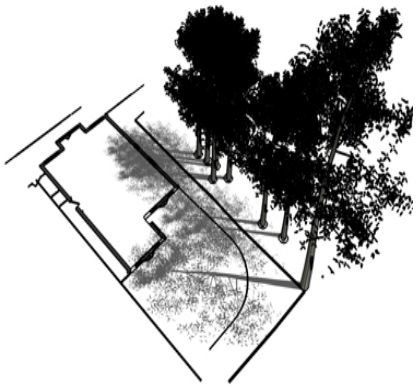
4.1.3 R Category trees are discounted from the process. Category-C trees would not normally constrain development individually, unless they provide some external screening function. As discrete, internal trees, their removal will not affect the wooded envelope that encloses much of the site.

4.1.4 "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 development work and subsequent demands for their removal. The end result is usually fewer and less suitable trees than would be the case if proper planning, selection and conservation had been applied from the outset." (BS5837: 2005)

4.1.5 In theory, only the moderate quality trees are a material constraint on development. However, the site lies within the Fitzjohns Netherhall Conservation Area and therefore, the low quality trees will comprise a constraint in aggregate, in terms of at least, replacement planting. In general, the proposals have taken into account and preserve, the existing tree population.

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, honeydew deposition or perceived risk of harm.



4.2.3 The shading constraints are crudely determined from BS5837:2005 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. This arc 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 principal secondary constraint would be shading on to the site from trees along the southern boundaries.

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 for Retained Trees

Hide irrelevant | Show All Trees

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

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	G1	Chusan palm	Felled to Facilitate Development	m^2 N/A %	Semi-mature	Normal	N/A	N/A	Very Low	New planting / landscaping
C	H2	Cypress, Lawson	Part-Felled to Facilitate Development	m^2 N/A %	Semi-mature	Normal	N/A	N/A	Low	New planting / landscaping
B	5	Sycamore	Basement Construction within RPA & Canopy (Existing boundary wall between tree & basement)	11 m^2 9.72 %	Mature	Normal	Moderate	Low	N/A	Airspade excavation of 1st 600mm of piling line Pre-emptive root pruning Mini-rigs only below crown
B	G6	Sycamore	New planting within RPA Also applicable to T5 & 7	m^2 N/A %	Early Mature	Normal	Moderate	Low	N/A	Airspade / manual excavation Also applicable to T5 & 7
B	7	Sycamore	Basement Construction within RPA & Canopy (Existing boundary wall between tree & basement)	3.5 m^2 6.31 %	Early Mature	Normal	Moderate	Low	N/A	Airspade excavation of 1st 600mm of piling line Pre-emptive root pruning Mini-rigs only below crown
C	9	Western Red Cedar	Felled to Facilitate Development	m^2 N/A %	Young	Normal	N/A	N/A	Very Low	New planting / landscaping

5.0 Table 1: Arboricultural Impact Assessment for Retained Trees

Hide irrelevant | Show All Trees

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

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	10	Cypress, Lawson variety	Felled to Facilitate Development	m^2 N/A %	Young	Normal	N/A	N/A	Very Low	New planting / landscaping
C	11	Cypress, Lawson variety	Felled to Facilitate Development	m^2 N/A %	Semi-mature	Normal	N/A	N/A	Very Low	New planting / landscaping
C	12	Cypress, Lawson variety	Felled to Facilitate Development	m^2 N/A %	Young	Normal	N/A	N/A	Very Low	New planting / landscaping
C	13	Cypress, Lawson variety	Felled to Facilitate Development	m^2 N/A %	Semi-mature	Normal	N/A	N/A	Very Low	New planting / landscaping
C	14	Birch, Silver	Basement Construction within RPA & Canopy (Existing boundary wall between tree & basement)	3 m^2 16.58 %	Semi-mature	Poor	N/A	Low	N/A	Airspade excavation of 1st 600mm of piling line Pre-emptive root pruning Mini-rigs only below crown
C	15	Cypress, Lawson variety	Felled to Facilitate Development	m^2 N/A %	Young	Normal	N/A	N/A	Very Low	New planting / landscaping

5.0 Table 1: Arboricultural Impact Assessment for Retained Trees

Hide irrelevant | Show All Trees

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

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	16	Plum, Purple	Accesss Ramp Construction within RPA (Existing boundary wall between tree & ramp)	4.5 m^2 5.73 %	Early Mature	Moderate	Moderate	Very Low	N/A	Airspade excavation of 1st 600mm of outer limits Pre-emptive root pruning
B	17	Maple, Norway	Accesss Ramp Construction within RPA: 0.5m2 (Extension of bed: 8.5m2)	9 m^2 6.82 %	Mature	Normal	Moderate-Good	Very Low	N/A	As per T16 Manual working
B	18	Lime, Common	(Extension of bed)	17 m^2 15.65 %	Early Mature	Normal	Moderate-Good	Very Low	N/A	Manual working
C	19	False Acacia	(Extension of bed)	0.5 m^2 17.27 %	Young	Normal	Good	Very Low	N/A	Manual working
C	20	Cherry, Flowering	Felled to Facilitate Landscaping Proposals	m^2 N/A %	Young	Normal	N/A	N/A	Very Low	New planting / landscaping
C	21	Cherry, Flowering	Felled to Facilitate Landscaping Proposals	m^2 N/A %	Young	Normal	N/A	N/A	Very Low	New planting / landscaping

5.0 Table 1: Arboricultural Impact Assessment for Retained Trees

Hide irrelevant | Show All Trees

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

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	22	Judas Tree	Felled to Facilitate Landscaping Proposals	m^2 N/A %	Young	Normal	N/A	N/A	Very Low	New planting / landscaping
C	23	Liquidambar	Felled to Facilitate Landscaping Proposals	m^2 N/A %	Young	Normal	Moderate	Very Low	N/A	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 removal of 7 trees/shrubs or groups: H1 (Chusan palm) and T9-13 & 15 (false cypress). H2 (false cypress) will also be part-felled. All felled trees are young-semi-mature only. Loss of this low evergreen cover within the rear garden is rated low impact.

6.1.2 For the retained trees, there are basement impacts of <10% RPA to 2 mature trees, T5 & 7 (sycamore) and of <20% to 1 semi-mature birch which is in poor condition. Each impact is likely to be modified by the intervening boundary wall, which may restrict root penetration onto the site.

6.1.3 The principal of RPA encroachment is established within BS5837:2005 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 sometimes misinterpreted as *Root Prohibition Areas* – a **category error** on the part of those making this assumption.

6.1.4 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 BS5837:2005 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

6.1.5 Piling beneath the canopies of T5 & 7 (& 14) could also cause aerial impacts. These should be avoided through the use of mini-rigs in such locations. Pruning is an alternative consideration, but would require 3m linear reductions, which are better avoided..

6.1.6	The further removal / replacement of 4 young trees (T20-23) and planting work within RPA's of T5, G6 & T7 arises in landscape proposals. The removals are effectively quid pro quo replacements of small trees and the planting works bring net enhancements, if undertaken carefully. Other minor impacts for hard landscape alterations, include the access ramp and bed extension. The latter works should be an improvement for the trees, if executed carefully The impacts are rated very low.

6.2 Rating of Secondary impacts

6.2.1	Secondary impacts from the proposals are not anticipated with basement only in the shadow of the southern boundary vegetation. Lightwells should not be placed along the southern boundary, beneath the sycamore canopies. A building has already co-existed with trees along the northern boundary for many years.

6.3 Mitigation of Impacts

6.3.1	The excavation encroachments within the RPA should be trial-excavated at their outer limits to 600mm depth using an airspade. Roots encountered therein may be hand pruned under arboricultural supervision. Mini-rigs with clearances of <5m should be used for piling below mature tree canopies.

6.3.2	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 3.

7.0 CONCLUSION

7.1	The potential impacts of development are all relatively low in terms of overall RPA percentage impacts to retained mature trees.
7.2	The full potential of such 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	The trees that are recommended for felling are of little individual significance, such that their loss will not affect the visual character of the area, provided landscape proposals are advanced in mitigation.
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 Tree works recommendations are found in Appendix 2 to this report, with a selection of columnar tree species cultivars for constricted sites provided in Appendix 3. 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 a mix of native and ornamental species pit-planted as advanced 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 demolishing 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 BS5837:2005). 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 excavation and 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 BS5837:2005 and 'The Principles of Arboricultural Practice: Note 1, Driveways Close to Trees, AAIS 1996 [APN1]'.

8.2.6 Where scaffolding installation is required within the RPA the provisions of Figure 3 of BS5837:2005 with regard to ground protection must be employed.

8.2.7 If the RPA of a tree is encroached by underground service routes then BS5837:2005 and NJUG VOLUME 4 provisions should be employed. If it is deemed necessary, further arboricultural advice must be sought.

8.2.8 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.

8.2.9 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: 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:

* 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.

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

8.2.11 The sequence of works should be as follows:

* initial tree works: felling, stump grinding and pruning for working clearances
* installation of TPB for demolition & construction
* installation of underground services
* installation of ground protection
* main construction
* removal of TPB
* soft landscaping

9.0 REFERENCES

- British Standards Institute. 2005. Trees in Relation to Construction BS 5837: 2005 HMSO, London.
- Barlow JF & Harrison G. 1999. Shade By Trees, Arboricultural Practice Note 5, AAIS, Farnham, Surrey.
- Lonsdale D 1999. Research for Amenity Trees No.7: Principles of Tree Hazard Assessment and Management, HMSO, London.
- Centre for Ecology & Hydrology. 2006. Tree Roots in the Built Environment, HMSO, London.
- Matheny, N; Clark, J. R.1998. Trees and Development: A Technical Guide to Preservation of Trees during Land Development. Champaign
- Mattheck C. & Breloer H. 1994. Research for Amenity Trees No.2: The Body Language of Trees, HMSO, London.
- Thomas P, 2000. Trees: Their Natural History, Cambridge University Press, Cambridge.

APPENDIX 1

TREE SCHEDULE - Notes for Guidance

Dm -	is the diameter of the trunk in millimetres at 1.5m above ground level.
Spread -	is in metres at the points of the compass relevant to the woodland boundary
Class/Colour -	refers to the retention classifications in Section 5.2 BS5837: 2005 and colouring on the site map - Highly High Quality (A) (Green), Moderate Quality (B) (Blue), Low Quality (C) (Grey), Poor Quality (R) (Red)

Landmark Trees Ltd
Tel: 020 7851 4544

Tree Survey Schedule

Site: 9 Arkwright Road, Camden NW3 6AB
Date: 18th February 2011

Surveyor: Adam Hollis
Ref:

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Age Class	Stem Diameter	Protection Multiplier	Protection Radius	Growth Vitality	Structural Condition	Landscape Contribution	B.S. Cat	Sub Cat	Useful Life	Observations
G1	Chusan palm	4	1	2	Semi-mature	150	12	1.8	Normal	Good	Low	C	2	10-20	
H2	Cypress, Lawson	7	2	0	Semi-mature	200	12	2.4	Normal	Good	Low	C	2	10-20	
H3	Cypress, Lawson	6	1	0	Semi-mature	150	10	1.5	Normal	Good	Low	C	2	10-20	
T4	Eucalyptus	12	5535	5	Early Mature	400 e	12	4.8	Normal	Good	Medium	B	1	20-40	
5	Sycamore	15	6653	4	Mature	500	12	6.0	Normal	Fair	Medium	B	1	>40	Ivy clad
G6	Sycamore	14	4433	4	Early Mature	250	12	3.0	Normal	Fair	Medium	B	2	>40	Ivy clad
7	Sycamore	15	6653	4	Early Mature	350	12	4.2	Normal	Fair	Medium	B	2	>40	Ivy clad

Notes:

1. Height describes the approximate height of the tree measured in meters 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 meters of crown clearance above adjacent ground level.
4. Stem Diameter is the diameter of the stem measured in millimeters at 1.5m from ground level for single stemmed trees or at ground level for multi-stemmed trees. Stem Diameter may be estimated where access is restricted.
5. Protection Multiplier is 12 for single stemmed and 10 for multi-stemmed trees 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 5837:2005 Table 1) and refers to tree/group quality and value; 'A' - High, 'B' - Moderate, 'C' - Low, 'R' - Remove.
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.

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Tree Survey Schedule

Site: 9 Arkwright Road, Camden NW3 6AB
Date: 18th February 2011

Surveyor: Adam Hollis
Ref:

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Age Class	Stem Diameter	Protection Multiplier	Protection Radius	Growth Vitality	Structural Condition	Landscape Contribution	B.S. Cat	Sub Cat	Useful Life	Observations
8	Yew, Common	4	3	1	Young	100	12	1.2	Normal	Fair	Low	C	2	>40	
9	Western Red Cedar	1	3	1	Young	100	12	1.2	Normal	Good	Low	C	2	>40	
10	Cypress, Lawson variety	7	1	1	Young	150	12	1.8	Normal	Good	Low	C	2	>40	
11	Cypress, Lawson variety	6	1	1	Semi-mature	200	10	2.0	Normal	Good	Low	C	2	>40	
12	Cypress, Lawson variety	7	1	1	Young	150	12	1.8	Normal	Good	Low	C	2	>40	
13	Cypress, Lawson variety	7	2	1	Semi-mature	200	12	2.4	Normal	Good	Low	C	2	>40	
14	Birch, Silver	8	2	3	Semi-mature	200	12	2.4	Poor	Fair	Low	C	2	<10	Dying back (uniform)

Notes:

1. Height describes the approximate height of the tree measured in meters 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 meters of crown clearance above adjacent ground level.
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9. Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees).
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Tree Survey Schedule

Site: 9 Arkwright Road, Camden NW3 6AB
Date: 18th February 2011

Surveyor: Adam Hollis
Ref:

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Age Class	Stem Diameter	Protection Multiplier	Protection Radius	Growth Vitality	Structural Condition	Landscape Contribution	B.S. Cat	Sub Cat	Useful Life	Observations
15	Cypress, Lawson variety	3	1.5	1	Young	150	12	1.8	Normal	Good	Low	C	2	>40	
16	Plum, Purple	8	3	2	Early Mature	500	10	5.0	Moderate	Poor	Low	C	1	10-20	Decay in trunk Multi stem weakness poor pruning
17	Maple, Norway	14	5	5	Mature	540	12	6.5	Normal	Fair	Medium	B	1	20-40	Pollarded Entry wounds on trunk aerial decay pockets in boles
18	Lime, Common	16	4	5	Early Mature	490	12	5.9	Normal	Fair	Medium	B	1	20-40	Pollarded Entry wounds on trunk aerial decay pockets in boles
19	False Acacia	6	2112	2	Young	80	12	1.0	Normal	Good	Low	C	1	20-40	
20	Cherry, Flowering	3	2	2	Young	90	12	1.1	Normal	Good	Low	C	1	20-40	
21	Cherry, Flowering	3	2	2	Young	120	12	1.4	Normal	Good	Low	C	1	20-40	

Notes:

1. Height describes the approximate height of the tree measured in meters 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 meters of crown clearance above adjacent ground level.
4. Stem Diameter is the diameter of the stem measured in millimeters at 1.5m from ground level for single stemmed trees or at ground level for multi-stemmed trees. Stem Diameter may be estimated where access is restricted.
5. Protection Multiplier is 12 for single stemmed and 10 for multi-stemmed trees and is the number used to calculate the tree's protection radius and area.
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9. Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees).
10. B.S. Cat refers to (British Standard 5837:2005 Table 1) and refers to tree/group quality and value; 'A' - High, 'B' - Moderate, 'C' - Low, 'R' - Remove.
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.

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Tel: 020 7851 4544

Tree Survey Schedule

Site: 9 Arkwright Road, Camden NW3 6AB
Date: 18th February 2011

Surveyor: Adam Hollis
Ref:

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Age Class	Stem Diameter	Protection Multiplier	Protection Radius	Growth Vitality	Structural Condition	Landscape Contribution	B.S. Cat	Sub Cat	Useful Life	Observations
22	Judas Tree	3	2122	2	Young	200	10	2.0	Normal	Fair	Low	C	1	20-40	
23	Liquidambar	5	2	2	Young	120	12	1.4	Normal	Good	Low	C	1	20-40	

Notes:

1. Height describes the approximate height of the tree measured in meters 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 meters of crown clearance above adjacent ground level.
4. Stem Diameter is the diameter of the stem measured in millimeters at 1.5m from ground level for single stemmed trees or at ground level for multi-stemmed trees. Stem Diameter may be estimated where access is restricted.
5. Protection Multiplier is 12 for single stemmed and 10 for multi-stemmed trees 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 5837:2005 Table 1) and refers to tree/group quality and value; 'A' - High, 'B' - Moderate, 'C' - Low, 'R' - Remove.
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.

APPENDIX 2

RECOMMENDED TREE WORKS

Landmark Trees Ltd
Tel: 0207 851 4544

Recommended Tree Works

Hide irrelevant | Show All Trees

Site: 9 Arkwright Road, Camden NW3 6AB

Surveyor: Adam Hollis

Date: 18th February 2011

Ref:

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works	Comments/ Reasons
G1	Chusan palm	4	150	1	Fell	Recommended to permit development
H2	Cypress, Lawson	7	200	2	SFell Partial felling of impacted N end	Recommended to permit development
9	Western Red Cedar	1	100	3	Fell	Recommended to permit development
10	Cypress, Lawson variety	7	150	1	Fell	Recommended to permit development
11	Cypress, Lawson variety	6	200	1	Fell	Recommended to permit development
12	Cypress, Lawson variety	7	150	1	Fell	Recommended to permit development
13	Cypress, Lawson variety	7	200	2	Fell	Recommended to permit development
15	Cypress, Lawson variety	3	150	1.5	Fell	Recommended to permit development
16	Plum, Purple	8	500	3	N/a Off-site tree	Decay in trunk Multi stem weakness poor pruning
17	Maple, Norway	14	540	5	Mon Inspect on next pruning within 2-3 years	Pollarded Entry wounds on trunk aerial decay pockets in boles Advisable for good arboricultural practice
18	Lime, Common	16	490	4	Mon Inspect on next pruning within 2-3 years	Pollarded Entry wounds on trunk aerial decay pockets in boles Advisable for good arboricultural practice

Notes:

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 %.
DDD - Decay Detection Device recommended.
Fell - Fell to ground level.
Fell2 - Fell and treat stump to prevent re-growth.
Pol - Pollard or re-pollard.
YM - Carry out normal maintenance of a young/newly planted tree.
RE - Remove Epicormic Growth (specific notes may be made).

Landmark Trees Ltd
Tel: 0207 851 4544

Recommended Tree Works

Hide irrelevant | Show All Trees

Site: 9 Arkwright Road, Camden NW3 6AB

Surveyor: Adam Hollis

Date: 18th February 2011

Ref:

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works	Comments/ Reasons
20	Cherry, Flowering	3	90	2	Fell	Recommended to permit development
21	Cherry, Flowering	3	120	2	Fell	Recommended to permit development
22	Judas Tree	3	200	2122	Fell	Recommended to permit development
23	Liquidambar	5	120	2	Fell	Recommended to permit development

Notes:

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 %.
DDD - Decay Detection Device recommended.
Fell - Fell to ground level.
Fell2 - Fell and treat stump to prevent re-growth.
Pol - Pollard or re-pollard.
YM - Carry out normal maintenance of a young/newly planted tree.
RE - Remove Epicormic Growth (specific notes may be made).

APPENDIX 3: TREE SELECTION FOR CONSTRICTED SITES

Table 4: Rosaceous Tree Species for Constricted Planting Sites

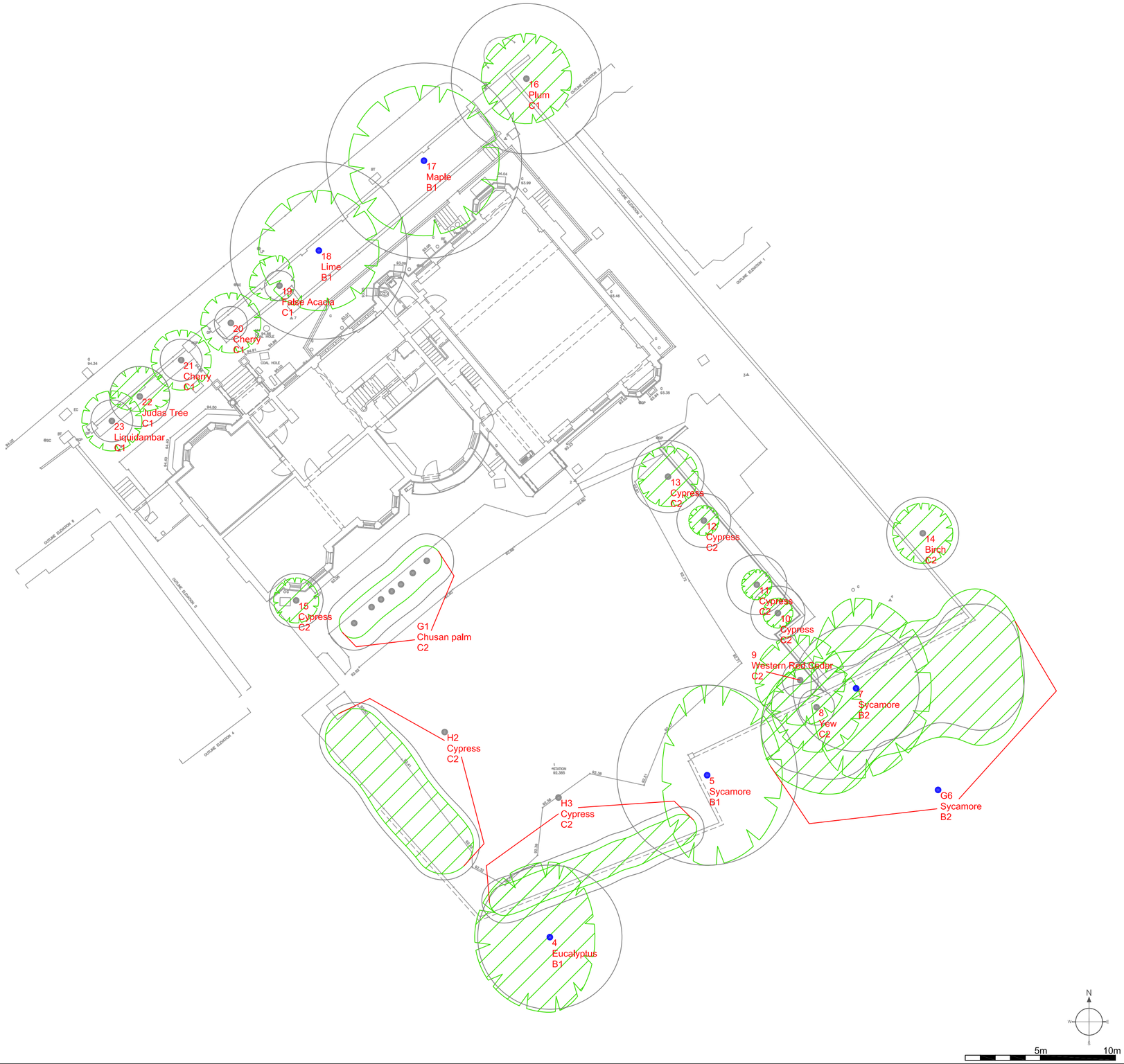
Common Name	Species	Selected Form
Hawthorn	Crataegus monogyna	Stricta
Cockspur	Crataegus prunifolia	Splendens
Cherry	Prunus x hillieri	Spire
Bird cherry	Prunus padus	Albertii
Rowan / Mountain ash	Sorbus aucuparia	Cardinal Royal
Rowan / Mountain ash	Sorbus aucuparia	Rossica Major
Rowan / Mountain ash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

Table 5: Specimen Tree Species for Constricted Planting Sites

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

APPENDIX 4

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) or immediately above the root flare for multi-stemmed trees.

Landmark Trees

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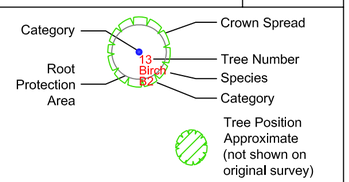
Site: 9 Awkright Road	1:200 @ A2
Drawing Title: Tree Constraints Plan	Feb 2011

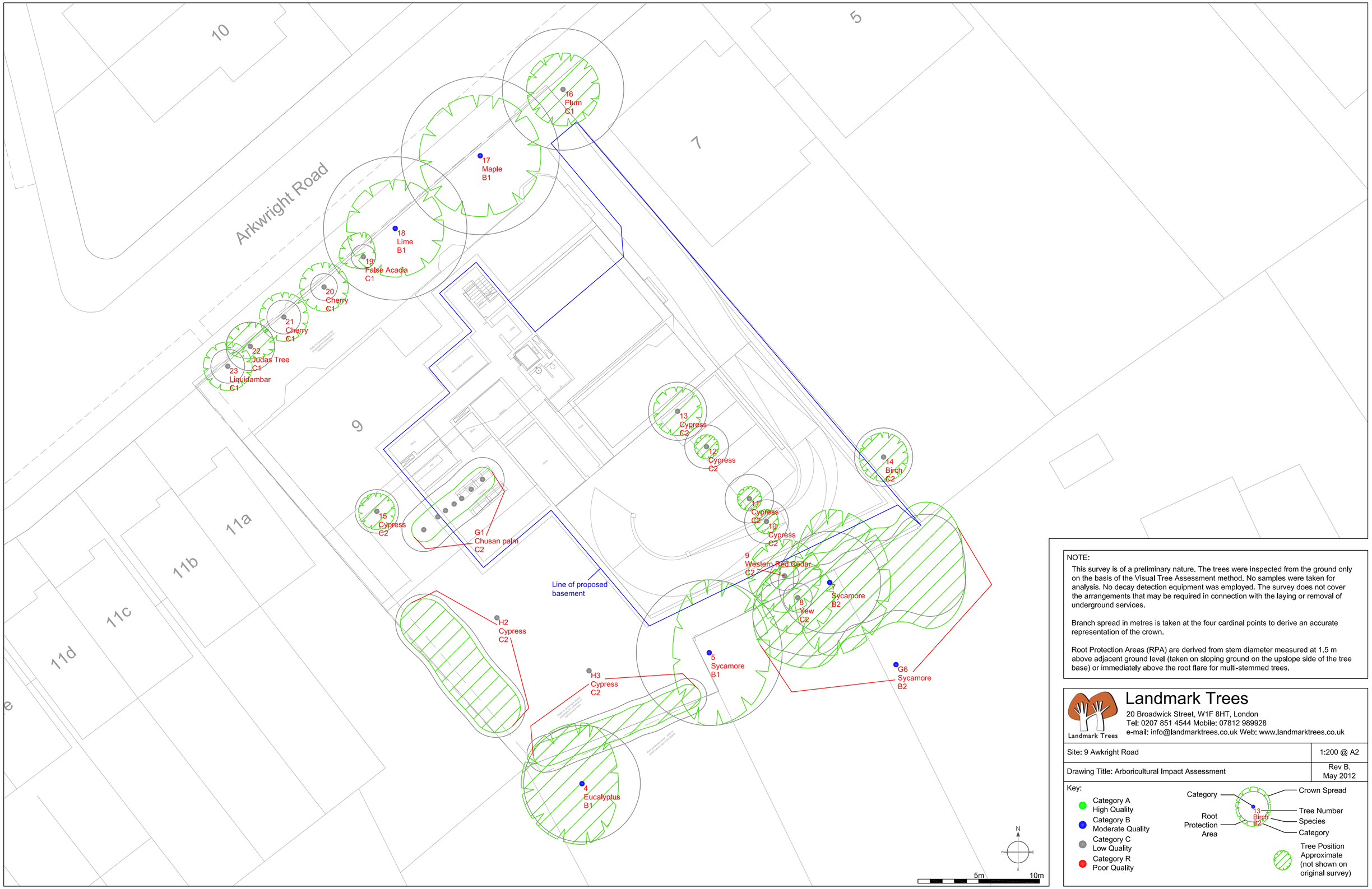
Key:

- Category A High Quality
- Category B Moderate Quality
- Category C Low Quality
- Category R Poor Quality



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) or immediately above the root flare for multi-stemmed trees.

Landmark Trees

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Site: 9 Awkright Road	1:200 @ A2
Drawing Title: Arboricultural Impact Assessment	Rev B, May 2012

Key:

- Category A High Quality
- Category B Moderate Quality
- Category C Low Quality
- Category R Poor Quality