Landmark Trees

ARBORICULTURAL IMPACT ASSESSMENT REPORT:

Land at 22 Frognal Way

London

NW3 5EX

REPORT PREPARED FOR:

KSR Architects LLP

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NW1 0ND

REPORT PREPARED BY

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MSc ARB MICFor FArbor A MRICS C Env

Ref: KSR/22FW/AIA/01

Date: 1st June 2015

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:	KSR Architects	**Case Ref:**	KSR/22FW/AIA/01
Local Authority:	LB Camden	**Date:**	1/06/15
Site Address: Land at 22 Frognal Way, London NW3 5EX			
Proposal: Demolition of existing dwelling and construction of a new family dwelling			

Report Checklist	**Y/N**		**Y/N**
Arboricultural constraints on site	Y	Trees removal proposed	Y
Tree Survey	Y	Topographical Survey	Y
BS5837 Report	Y	Conservation Area	Y
Tree Preservation Orders	Y	TPO Ref: 8H -T26 (lime tree T1)	
Tree Protection Plan:	N/a	(Include in future method statement)	
Tree Constraints Plan:	Y		
Arboricultural Impact Assessment:	Y		

Site Layout					
Site Visit	Y	Date: 12/05/14		Access Full/Partial/None	F
Trees on Site			Y	Off-site Trees	Y
Trees affected by development			Y	O/s trees affected by development	Y
Tree replacement proposed:			Y	On or off-site trees indirectly affected by development	N

Trees with the potential to be affected

Tree constraints have been considered from the outset; therefore impacts from the built proposals are negligible. Remodelling of garden has the potential for low impacts, including removal of the category C elm T6 (also to be removed on the grounds of sound husbandry), in addition to low potential impacts from excavation/ground raising within the RPA's of off-site category C trees T7, T8, T9 and T10. The proposed sunken garden will have very low impacts of around 4% of the modified RPA on category A trees T1 and T2; note: there are existing level changes and the proposals largely follow the existing contours for T1 & T2.

Comments

Tree works to TPO tree T1 (TPO Ref: 8H) undertaken in accordance with 2014/4899/T

(T3 felled in accordance with 2014/4872/T No Objection to Works to Tree(s) in CA 29-09-2014)

Recommendations

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

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

1. SUMMARY

1.1 This report comprises an arboricultural impact assessment of the proposals for Land at 22 Frognal Way, London NW3, reviewing any conflicts between the proposals and material tree constraints identified in our survey. The design process has included the identification of tree constraints from the outset, including trial pits. There was also a site visit with LB Camden's Tree Officer, Nick Bell on the 4/7/14, where the condition of the existing tree population was noted. Following this visit and subsequent climbing inspection, tree works to TPO tree T1 (TPO Ref: 8H) have been undertaken in accordance with 2014/4899/T, with T3 felled in accordance with 2014/4872/T.

1.2 There are 21 trees surveyed on or around the site, of which 3 are category A (High Quality), 1 is B category *(Moderate Quality), 1 is B/c category *(Moderate/Low Quality) ad 17 C category *(Low Quality). 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 Due to the consideration of tree constraints from the outset, the principal primary impacts in the current built proposals are very low, comprising negligible impacts from the basement (around 0.1%) to the modified RPAs of category A trees T1 and T2. The proposed landscape remodelling to form the sunken garden will have very low impacts of around 4% of the modified RPA on both trees, although it is important to note that there are existing level changes and the proposals largely follow the existing contours (so the actual impacts will be lower still). To mitigate any potential impacts, it is suggested that any required excavation is undertaken by hand within the modified RPA, with pre-emptive root pruning under arboricultural supervision in the unlikely event significant roots are found.

1.4 The proposed landscaping to the south of the site will also have a low arboricultural impact, with the category C T6 (elm) removed to facilitate the proposed remodelling (this tree could also be removed on the grounds of sound husbandry). The off-site category C trees T7, T8, T9 and T10 are also theoretically affected by the remodelling, therefore it is recommended that any excavation within these areas is undertaken manually, with any ground raising undertaken with coarse granular fill and suitable top-soil. All of the remodelling is undertaken at least 1.5m from the stems of these trees, thus reducing the potential impact of minor excavations or alterations of existing levels in these areas.

1.4 There will be some partial shade on this site from the existing off-site trees on the southern boundary (T5 in particular), with minor organic deposition. This is rated as a very low/negligible impact. Thus, the secondary impacts of development are minimal.

1.5 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 KSR Architects to provide a survey and an arboricultural impact assessment of proposals for the site: Land at 22 Frognal Way, London NW3. The report is to accompany a planning application.

2.1.2 The proposals are for the demolition of existing dwelling and construction of a new family dwelling. 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: 15529 A1 (LAND SURVEY)*

Proposals: P-090 - LIVING LEVEL PLAN

*In the absence of a full topographical survey, tree positions may be approximate only.

2.3 Scope of survey

2.3.1 As Landmark Trees' (LT) arboricultural consultant, I surveyed the trees on site on 12th May 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 3.

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 4. General observations and discussion follow, below.

3.0 OBSERVATIONS

3.1 Site description

Photograph 1: Aerial View of the site at 22 Frognal Way, London NW3 5EX (Source: Google Maps)

3.1.1	Frognal Way was once part of the fields that made up the Frognal estate, and was sold off in plots; 22 Frognal Way is a detached house built on one of these plots in the early 1970s. It is surrounded to the north, east and south by gardens, which have a significant level variance.
3.1.3	In terms of the British Geological Survey, the site overlies the London Clay Formation (see indicated location on Fig.1 plan extract below). The associated soils are generally, highly shrinkable clay; e.g. slowly permeable seasonally waterlogged fine loam over clay. Such highly plastic soils are prone to movement: subsidence and heave. The actual distribution of the soil series are not as clearly defined on the ground as on plan and there may be anomalies in the actual composition of clay, silt and sand content.
3.1.4	Clay soils are prone to compaction during development with damage to soil structure potentially having a serious impact on tree health. The design of foundations near problematic tree species will also need to take into consideration subsidence risk. Further advice from the relevant experts on the specific soil properties can be sought as necessary..

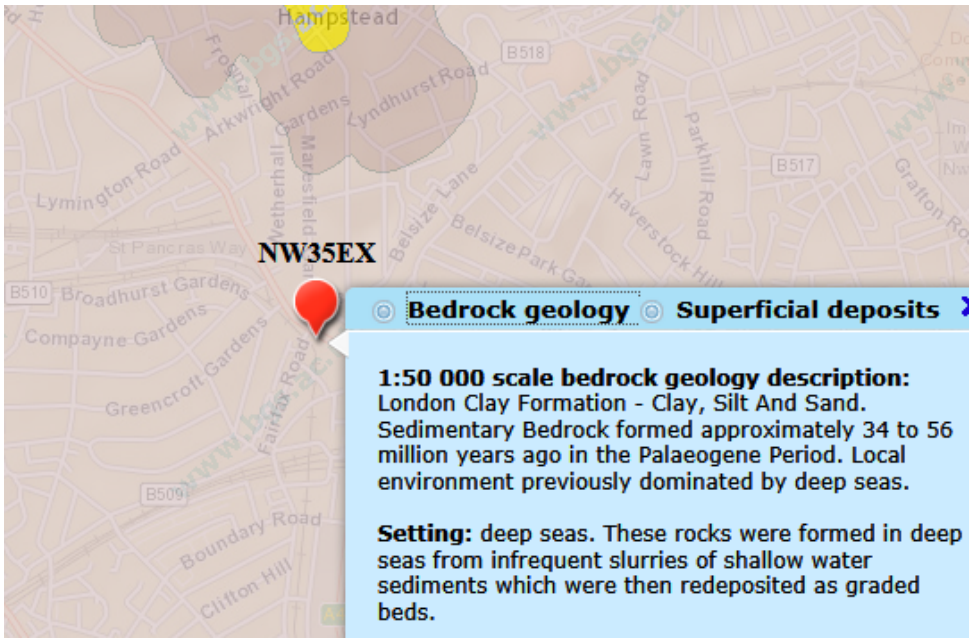

Figure 1: Extract from the BGS Geology of Britain Viewer

3.2 Subject trees

3.2.1	There are 21 trees surveyed on or around the site, of which 3 are category A (High Quality), 1 is B category *(Moderate Quality), 1 is B/c category *(Moderate/Low Quality) ad 17 C category *(Low Quality).
3.2.2	The tree species found on site comprise mainly common lime, plum, bay laurel and sycamore, with some crab apple, copper beech, false acacia, fig, horse chestnut, silver birch, medlar and rowan.
3.2.3	In terms of age demographics there is a wide range of ages from young through to mature trees in the population.

3.2.4	Full details of the surveyed trees can be found in Appendix 1 of this report.
3.2.5	Tree works to TPO tree T1 (TPO Ref: 8H) have been undertaken in accordance with 2014/4899/T (reduce the lower N limb only of T1 by 15% end weight and brace). The tree T3 has been felled in accordance with 2014/4872/T.

3.3 Planning Status

3.3.1	We are aware of the existence of the Tree Preservation Order TPO Ref: 8H -T26 (lime tree T1). The site 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).**

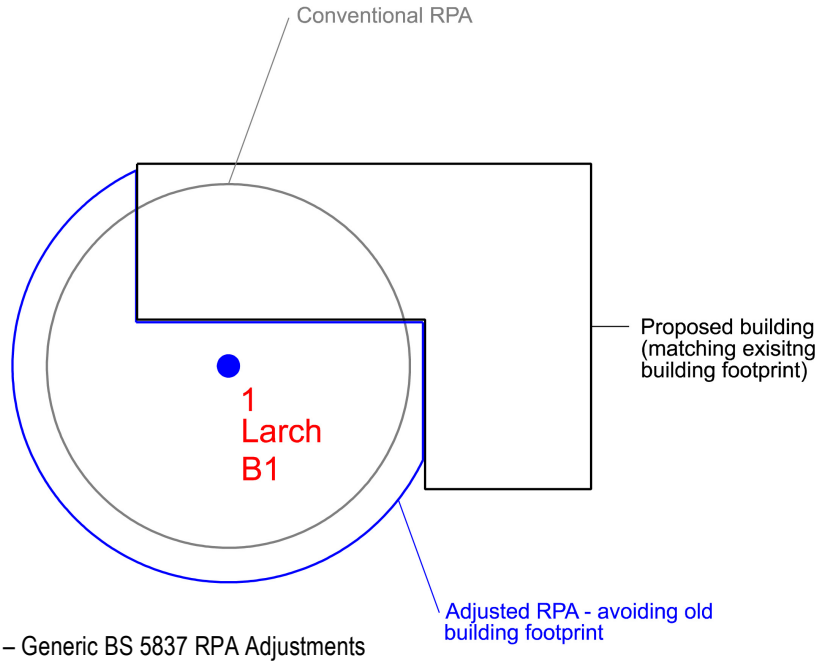

Figure 2 – Generic BS 5837 RPA Adjustments

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. Accordingly, the RPA's of T1 and T2 have been modified in accordance with existing site levels and previous trial pit evidence.

4.1.4 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.

4.1.5 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 most significant constraints to future development are the Category A trees T2 & T2.

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.

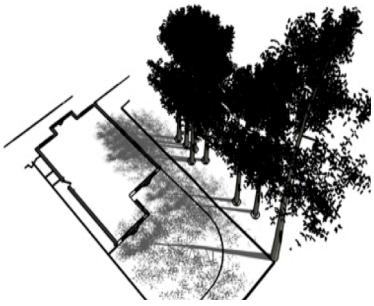

Figure 3 –
Generic Shading Constraints

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.

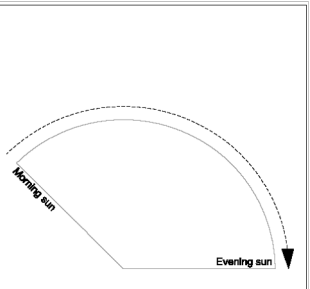

Figure 4 – Shading Arc

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 and organic deposition. The significance of these constraints will vary depending on the location and proximity to the proposed re-development.

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

5.0

Table 1: Arboricultural Impact Assessment

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

Hide irrelevant | Show All Trees

Ref: KSR/22FRG

Landmark Trees

B.S. Cat.	Tree No.	Species	Impact	Tree / RPA Affected	Age	Growth Vitality	Species Tolerance	Impact on Tree Rating	Impact on Site Rating	Mitigation
A	1	Lime, Common	Modified RPA only - 0.4m2 of basement (0.1%of RPA) Excavation of sunken garden Note: largely follows existing contours	18 m^2 3.98 %	Mature	Normal	Moderate	Very Low	N/A	Manual excavation Pre-emptive root pruning if required
A	2	Beech, Copper	Modified RPA only - 0.4m2 of basement (0.1%of RPA) Excavation of sunken garden Note: largely follows existing contours	18 m^2 4.14 %	Mature	Normal	Moderate	Very Low	N/A	Manual excavation Pre-emptive root pruning if required
C	6	Elm	Fell to facilitate landscape remodelling	m^2 N/A %	Semi-mature	Normal	N/A	N/A	Low	New planting / landscaping
C	7	Birch, Silver	Landscape remodelling within RPA Negligible area affected (less than 0,5m)	0.5 m^2 1.08 %	Semi-mature	Normal	Moderate	Very Low	N/A	None required
C	8	Laurel, Bay	Landscape remodelling within RPA	3.8 m^2 14 %	Early Mature	Normal				Airspade / manual excavation within RPA Pre-emptive root pruning
C	9	Sycamore	Landscape remodelling within RPA Note: existing level changes around 1m and excavations over 1.5m from stem.	83 m^2 32.61 %	Early Mature	Moderate	Moderate	Medium	N/A	Airspade / manual excavation within RPA Pre-emptive root pruning

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: KSR/22FRG

Landmark Trees

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	Laurel, Bay	Landscape remodelling within RPA Very minor area affected	1.5 m^2 2.37 %	Early Mature	Normal				Airspade / manual excavation within RPA Pre-emptive root pruning

6.1.5 "**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 There will be some partial shade on this site from the existing off-site trees on the southern boundary (T5 in particular), with minor organic deposition. This is rated as a very low/negligible impact. 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 can be lifted with caution by a skilled machine operator again working away from the tree.

6.3.2 The limits of excavation within RPAs will be undertaken manually; any roots encountered 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 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.

6.3.7 The landscape impact of the tree loss can be offset by the landscape proposals, ideally involving new planting of ornamental varieties of native species, and where appropriate with columnar or compact form. A selection of columnar tree species cultivars for constricted sites is provided in Appendix 4.

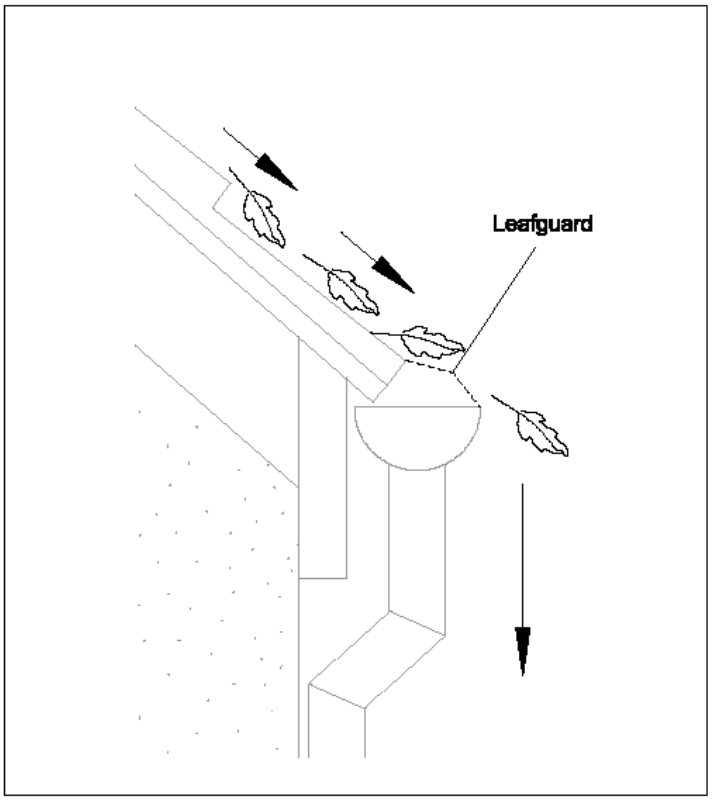

Figure 5: Filtration traps, as shown above, could be fitted on the gutters which can easily be maintained at 2-3m above ground.

7.0 CONCLUSION

7.1	Due to the acknowledgement of the tree constraints at the outset, the potential impacts of development are all low in terms of both quality of the tree removed and also RPA encroachments of trees retained.
7.2	The full potential of the impacts can be 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 tree that is recommended for felling is of little individual significance, such that its loss will not affect the visual character of the area. Furthermore, this is an elm which is susceptible to Dutch Elm Disease and of low quality, therefore could arguably be removed on the grounds of sound husbandry.
7.5	Therefore, the proposals will not have any significant impact on either the retained trees or wider landscape. Thus, with 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 and a selection of columnar tree species cultivars for constricted sites provided in Appendix 4. Any tree removals recommended within this report should only be carried out with local authority consent.

8.1.2 Excavation and construction impacts within the RPA's of trees identified in Table 1 above, will need to be controlled by method statements specifying mitigation methods suggested in para 6.3 above and by consultant supervision as necessary. These method statements can be provided as part of the discharge of conditions.

8.1.3 Replace felled tree T6 with native 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 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 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: felling 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: felling;
ii) installation of TPB for demolition & construction;
iii) installation of any additional 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.

Site: 22 Frognal Way

Date: 29 July 2014

Appendix 1

BS5837 Tree Constraints Survey Schedule

Landmark Trees Ltd
020 7851 4544

Surveyor(s): Adam Hollis

Ref: KSR/22FRG

Landmark Trees

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	Lime, Common	23	10, 7, 5, 6	5.0	1000	Mature	12.0	Normal	Good	A	2	>40	Die-back (minor) Included bark in main stem unions Acute forks from 5m; banana crack NE limb union: Lowest limb has partially failed and held
2	Beech, Copper	22	10, 9, 7,3	2.0	980	Mature	11.8	Normal	Good	A	2	>40	Asymmetry (minor) Rubbing & grafted branches
4	False Acacia (inermis)	8	5344	2.0	200	Semi-mature	2.4	Moderate	Fair	C	2	>40	A tree with insignificant defects
5	Sycamore	15	6	5.0	520	Mature	6.2	Moderate	Fair	B/c	2	>40	Ivy clad Remote survey only
6	Elm	11	1313	3.0	200	Semi-mature	2.4	Normal	Fair	C	2	10+	Remote survey only; susceptible to DED
7	Birch, Silver	13	3323	9.0	320	Semi-mature	3.8	Normal	Fair	C	2	20+	Die-back (minor)
8	Laurel, Bay	9	2244	1.5	245	Early Mature	2.9	Normal	Fair	C	2	20+	Unprofessionally topped/lopped Remote survey only

Site: 22 Frognal Way

Date: 29 July 2014

Appendix 1

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Landmark Trees

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
9	Sycamore	9	6145	1.5	750	Early Mature	9.0	Moderate	Fair	C	2	20+	Unprofessionally topped/lopped A sparser than normal canopy minor deadwood Remote survey only
10	Laurel, Bay	9	5	2.0	374	Early Mature	4.5	Normal	Fair	C	2	20+	A tree with insignificant defects Remote survey only
11	Plum, Myrobalan	7	2	1.5	120	Semi-mature	1.4	Normal	Fair	C	2	20+	Suppressed by nearby tree
12	Lime, Small-leaved	10	3	2.0	200	Semi-mature	2.4	Normal	Fair	C	2	>40	Included bark in branch unions Suppressed by nearby tree Low branches over path?
13	Lime, Caucasian	11	4	2.0	310	Early Mature	3.7	Normal	Fair	B	2	>40	A tree with insignificant defects Low branches over path? Good specimen tree for futre
14	Plum, Domestic	8	2413	2.0	120	Semi-mature	1.4	Normal	Fair	C	2	10+	A sparser than normal canopy Low live crown ratio
15	Plum, Domestic	5	1322	1.5	120	Semi-mature	1.4	Normal	Fair	C	2	10+	A tree with insignificant defects

Site: 22 Frognal Way

Date: 29 July 2014

Appendix 1

BS5837 Tree Constraints Survey Schedule

Landmark Trees Ltd
020 7851 4544

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Ref: KSR/22FRG

Landmark Trees

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
16	Fig	5	3	2.5	122	Semi-mature	1.5	Normal	Fair	C	2	20+	Multi stem weakness Indifferent specimen
17	Rowan	9	2	2.0	140	Semi-mature	1.7	Normal	Fair	C	2	20+	Included bark in branch unions Columnar form
18	Laurel, Bay	12	4	3.0	468	Mature	5.6	Normal	Fair	C	2	20+	Included bark in main stem unions Co-dominant stems
19	Apple, Crab	4	2	1.5	100	Young	1.2	Normal	Fair	C	2	20+	A tree with insignificant defects
20	Apple, Crab	4	2	1.5	100	Young	1.2	Normal	Fair	C	2	20+	A tree with insignificant defects
21	Medlar	3	2	1.5	70	Young	0.8	Normal	Fair	C	2	20+	A tree with insignificant defects
22	Chestnut, Horse	18	8	3.0	900	Mature	10.8	Normal	Fair	A	2	>40	Unprofessionally topped/lopped on lower branch end over path

APPENDIX 2

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.

Site: 22 Frognal Way

Date: 16 April 2015

Surveyor(s): Adam Hollis

Ref: KSR/22FRG/AIA

Landmark Trees

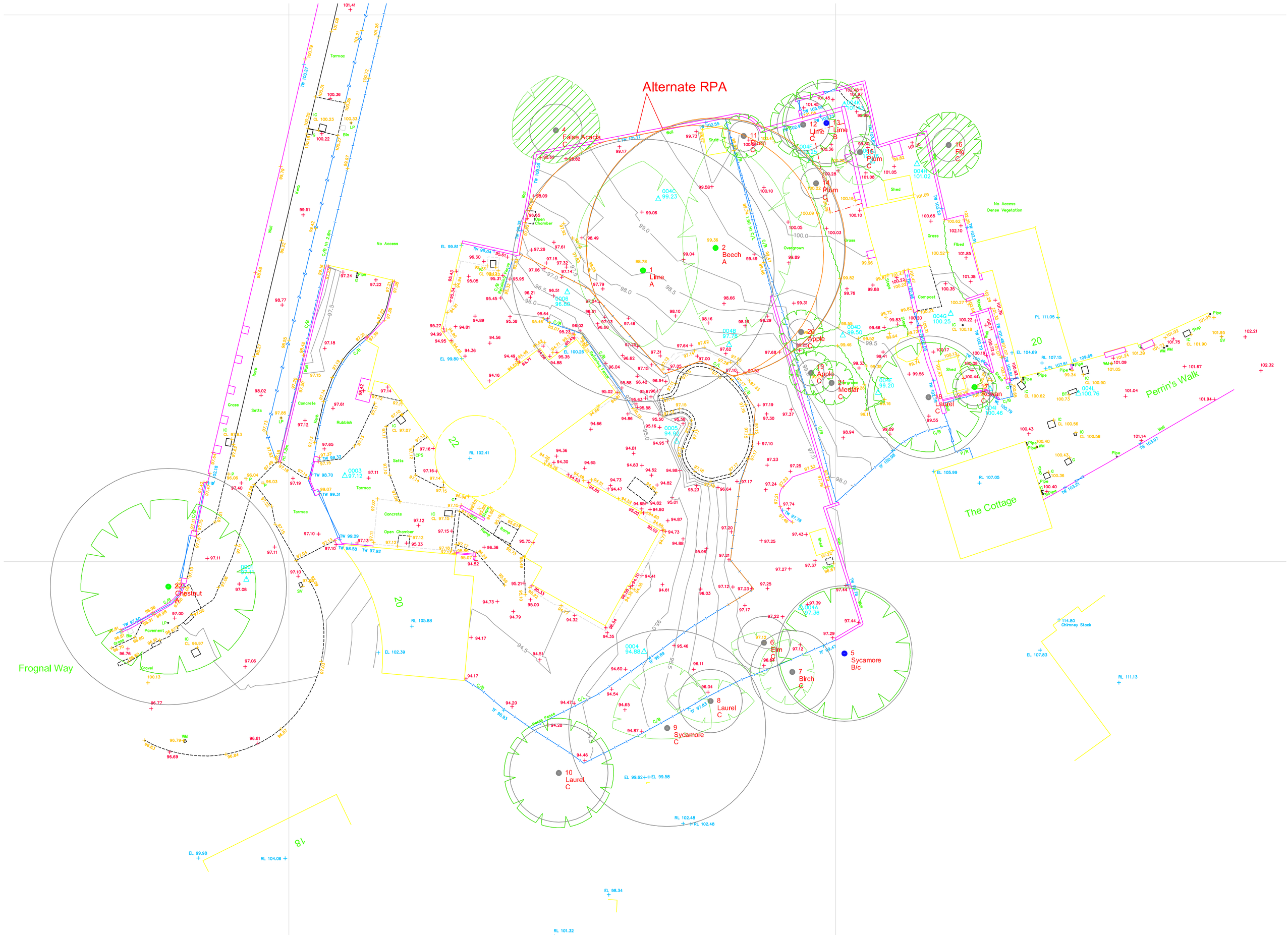
Appendix 3

Recommended Tree Works To Facilitate Development

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works	Comments/ Reasons
6	Elm	11	200	1313	Fell	Remote survey only; susceptible to DED Recommended to facilitate landscape proposals

APPENDIX 3

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).

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Site: 22 Frognal Way	1:200@ A1
Drawing Title: Tree Constraints Plan	May 2014

Key:

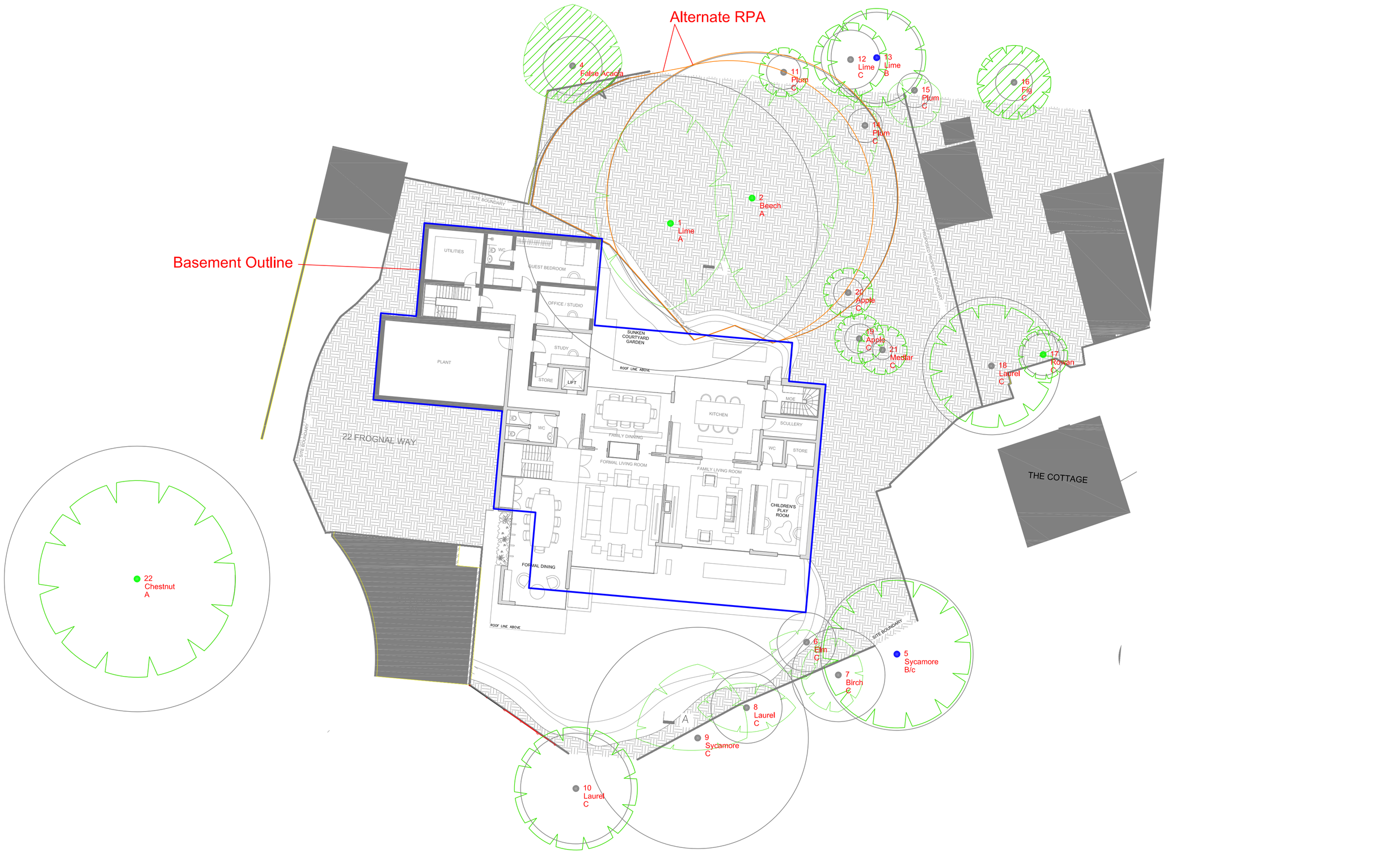
- Category A High Quality
- Category B Moderate Quality
- Category C Low Quality
- Category U Trees Unsuitable for Retention

Category
Root Protection Area
Crown Spread
Tree Number
Species
Category

Tree Position Approximate (not shown on original survey)

APPENDIX 4

ARBORICULTURAL IMPACT ASSESSMENT PLAN



Proposed Ground Floor 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: 22 Frognal Way	1:200@ A1
Drawing Title: Arboricultural Impacts Assessment	April 2015

Key:

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

Category
Crown Spread
Root Protection Area
Tree Number
Species
Category

Tree Position Approximate (not shown on original survey)

N W E S

5m 10m